Examiners' Report
Principal Examiner Feedback

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Non-Calculator) Paper 1F

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Grade Boundaries

Grade boundaries for all papers can be found on the website at:
https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

November 2019
Publications Code 1MA1_1F_1911_ER

GCSE (9 – 1) Mathematics – 1MA1
Principal Examiner Feedback – Foundation Paper 1

Introduction

This paper gave the opportunity for students of all abilities to demonstrate positive achievement. While most questions were accessible to a good number of students, there were few students able to work confidently on all the content matter tested. In particular, Q24 (angles and ratio problem), Q27 (scale drawing) and Q28 (angles problem) proved a challenge to most students.

Students appear to have had sufficient time to complete the paper and those entered for this paper seemed generally well suited to entry at the foundation tier.

Many students set out their working in a clear and logical manner. It is encouraging to report that students who did not give fully correct answers often obtained marks for showing a correct process or method.

Report on Individual Questions

Question 1

This question was quite well done with a big majority of students giving the correct answer “70”. Examiners accepted the answer “7 tens” but did not accept the word “tens” alone. Some students gave other incorrect responses such as “tenths” or “7 tenths”.

Question 2

This question was also answered well. Incorrect responses seen included 5, 4.5, 4.60 and 45.8.

Question 3

The majority of students answered this question correctly. 0.317, 317 and 31700 were the most commonly seen incorrect responses but some students introduced zeros between one or more of the digits in 31.7 and gave answers such as 3100.7.

Question 4

This question was not done very well. Answers given were often not equivalent to $\frac{28}{70}$.
A significant number of students who did some correct working did not give the fraction in its simplest form, most commonly leaving it as $\frac{14}{35}$.

Question 5

Nearly all students answered this question correctly though a few students gave incorrect answers such as 1.5 and $\frac{15}{100}$.

Question 6

This question was generally answered well. Nearly all students could use the representation to write down the number of pictures sold in January in part (a) of the question.

In part (b) a similarly high proportion of students could represent the number of pictures sold in April on the diagram.

Most students could also score the two marks available in part (c) though a significant proportion of responses contained mistakes in arithmetic, usually in one of the totals for a particular day. These responses normally got one mark for adding the four totals 24, 28, 20 and 12, three of which were correct.

Question 7

Most students scored both marks for their answer to this question though a surprisingly low proportion of students took the shorter route of writing 1¼ hours as 1 hour 15 minutes then comparing it with 1 hour 25 minutes. Students generally preferred to convert both times to minutes.
This approach was often successful but there was a significant number of students who wrote 1¼ hours as 1.25 hours then changed this to 85 minutes. Their resultant final answer was "0" and the sense that this must be wrong was usually missing. Another error seen was writing ¼ of an hour as 45 minutes. This led to a final incorrect answer of 20 minutes.

Question 8

Over a half of all students scored the full three marks for their responses to this question. The majority of students worked in grams, starting by converting 3 kilograms to 3000 grams. Only a small number of students worked in kilograms. Most of the errors seen in working were in the calculation of 4 × 650. Students making a mistake here usually scored two of the three marks available. The most common error seen in the method to solve this problem involved students dividing the 650 grams by 4 as part of their solution. Some other students subtracted the weight of one block from the total weight of all five blocks to give an answer of 2350 grams.

Question 9

Most students scored full marks for this question. The most common errors seen were either in the subtraction of 135 from 180 or in only subtracting 35 from 180. Students making an error with the subtraction could usually be awarded one mark. Perhaps it was surprising that students making errors rarely used a common-sense check to rule out the possibility of x being over 100°.

Question 10

There were many fully correct answers to this question but also many students who scored one mark for plotting the point correctly in part (a) of the question but in part (b) wrote down $(0, -1)$ instead of the correct $(-1, 0)$ for the coordinates of the midpoint of BC.

Question 11

This question was a good discriminator. More able students scored two marks for a complete list without any repeats. About a third of students scored one mark for listing at least 4 correct outcomes but were not able to provide a fully correct answer. A total of 6 combinations was commonly seen. Some students listed the possibilities of how many heads and how many tails could occur without making it clear the order of the heads and tails within these possibilities, so for example, stating 1 heads and 2 tails without differentiating between HTT, THT and TTH. Of the students who could not be awarded any marks, a good proportion of them gave outcomes for only 2 throws.

Question 12

Part (a) of this question was well answered and many students showed clear working together with a clear conclusion based on supportive figures. Most students stated that Rehan did not have enough money and gave their reason as either "he would need \$215" or that "he only has \$65 left".

Part (b) was less well answered but differentiated well between the most able students sitting the paper. Many students failed to "use a suitable approximation" so could not be awarded any marks for their response to this part of the question. Only a relatively small proportion of the students who did use an approximation guaranteed the statement that "Rehan is wrong" by using a value below £0.749, for example 0.74 or 0.7.

Question 13

Part (a) of this question was answered very well and it was unusual to see students not receiving any credit for their response to part (b). The most common incorrect response to part (a) was p^7.

In responses to part (b) there was a significant proportion of students who collected the terms in x correctly and who collected the terms in y correctly only to give a final answer of $8x - y$. These students were awarded one mark. $8xy$ was also seen as a final answer quite frequently. Where this answer was preceded by "$8x$" or "y" as a standalone term in the working space, examiners could award one mark.

Question 14

Students usually scored two marks for a fully correct response to this question. There were several different methods seen and no one method was used much more frequently than any of the other methods. Students who could demonstrate a correct method scored at least one mark. Errors in the evaluation of 10×20 were commonplace. Of those students who could not be awarded any marks, a common approach was to calculate $20 \times 10 + 3 \times 5$.

Question 15

Most students completed the frequency tree accurately and scored three marks for their response to part (a). The errors seen were usually caused by arithmetic mistakes. Students should be encouraged to write down their calculations in the working space as those students who did this were usually awarded the first and second marks even where their entries in the diagram were incorrect.

In part (b) $\frac{29}{45}$ was the most common incorrect answer seen. Students who wrote this had clearly not considered carefully the statement in the question that "one of the 120 people is chosen at random".

Question 16

About three quarters of students gave a correct answer to part (a) of this question.

A fully correct answer to part (b) was seen much more infrequently. However, a fair proportion of students could score at least one mark for either an attempt to find the gradient of the line representing Steve's journey home or for using the speed, distance, time formula correctly. Students often scored a mark for $\frac{25}{30}$ but could then not convert this to a speed in km/h. Those students who did give the correct answer, 50, had usually argued that 25 km in half an hour was equivalent to an average speed of 50 km/h. Other common errors included multiplying 25 by 30 and dividing 25 by 2 instead of by $\frac{1}{2}$.

Question 17

A high percentage of students correctly obtained the value of x from the equation given but only about a quarter of students were able to use the correct order of operations to find the correct value (18) of the expression $2x^2$ when $x = 3$. Instead most students worked out the value of $(2x)^2$, giving 36 as their final answer. The working $2 \times 3 = 6$, $6 \times 6 = 36$ was seen on many scripts.

Question 18

Marks gained for responses to this question were usually restricted to one or two marks for either finding the value of x in the pie chart for school A and/or for finding the number of students at school B who had tigers as their favourite animal. It was relatively rare to see a student complete the question successfully. Many students seem to get confused between the angles which represented the proportions of students and the numbers of students themselves.

Question 19

This question was not well done with only a small proportion of students gaining any marks and few students gaining two marks. The great majority of responses were in a form connecting the two numbers –3 and 1 with an inequality sign (often incorrect), for example $-3 \leq 1$. Such responses could not be given any marks. A number of students listed integer values only.

Question 20

Many students made a good start to this question by either starting with a prime factor decomposition of at least one of the numbers 108 and 120 or by writing down multiples of each of the numbers. Some allowance was made for arithmetic errors and students who used one of these two approaches generally scored at least one mark. Students who listed multiples were more likely to obtain full marks than those who used prime factor decomposition. It did seem that students who used the latter approach lacked confidence in how to use their products of prime factors to find the lowest common multiple. Final incorrect answers of 2 (lowest common factor) and 12 (highest common factor) were often seen.

Question 21

This question was quite well attempted by most students sitting this paper, with a high proportion of students being awarded at least two of the four marks available for finding that there were 10 men and 20 children in the choir. Some students stopped at this point, giving 20 as their final answer. However, many students did go on to write down a correct ratio and simplified it to .2 : 1. Examiners allowed 2 : 1 for full marks though the question did in fact ask for only the value of *n*.

Question 22

This question discriminated well at the top end of the ability range with many students getting each of the possible marks for their response. Some students realized the need to change the mixed numbers to improper fractions and demonstrated they could do this for at least one mixed number but could get no further. They scored 1 mark. Students who successfully multiplied the two mixed numbers but left their answers as improper fractions, for example $\frac{28}{12}$, scored 2 marks. Correct answers in the form of a mixed number scored full marks. They did not need to be fully simplified so, for example, $2\frac{4}{12}$ scored full marks. Many students benefitted from this. Disappointingly, there were a large number of students who tried to reach the answer by multiplying the whole numbers and the proper fractions separately to get an answer of $1\frac{1}{4}$ or equivalent. Some confusion between multiplying and dividing fractions was evident in a significant number of student's responses where inverting the second fraction before multiplying or cross-multiplying was seen quite often.

Question 23

There were few accurately constructed lines seen in answer to this question. More commonly, where students did gain some credit for their response, it was one mark for drawing a perpendicular line from the point *P* to the line *CD* within the tolerance allowed but without any evidence of it being constructed with a ruler and compasses. Some students gave an accurate construction of the perpendicular bisector of the line *CD*. They could not be awarded any marks.

Question 24

This multi-step question was not answered well. Many students mistakenly used the result that "angles on a straight line sum to 180°" with angles *ABC*, *BDC* and *BAC* to get an answer of 54° for the size of angle *BDC*. Of those students who did make a correct first step to find that angle *BCA* was 54°, few went on to split the angle correctly in the ratio 2 : 1 and then to complete the problem successfully.

Question 25

Relatively few students took into account that there was more than one red brick and more than one blue brick. Many students' responses consisted of the calculation (5 + 9 + 6) ÷ 10 or (5 + 9 + 6) ÷ 3. These could not be given any marks. Some students started to find the total weight of the red bricks or of the blue bricks and scored 1 mark for doing this.

Only about ten per cent of students gained two or more marks for getting as far as calculating a value which could be used to evaluate the statement that "The mean weight of the 10 bricks is less than 7 kg." A few students calculated the total weight of the bricks but did not calculate the mean. If they compared this with a stated value of 70 they could gain full marks.

Question 26

About a half of students taking this paper answered part (a) correctly to score 1 mark. Examiners saw the incorrect response "p^7" on many occasions.

About the same proportion of students scored at least one mark for their response to part (b) for giving a final answer which included at least two out of three correct components of the expression $2x^4y^2$.

Question 27

Fully correct answers to this question were hardly ever seen. Only about one third of students were able to get at least one mark for drawing a correct bearing and/or for calculating the distance travelled by the boat and using the scale of the diagram. Examiners were able to award three marks to students who plotted the position of Q accurately on the diagram. Those who did plot Q correctly were often able to use the scale to give an accurate distance from L to Q but were unable to measure the bearing, often giving the angle measured anticlockwise from the north line. Weaker students often started their working by multiplying 90 by 12 but seemingly with little purpose evident. There was a disappointing number of students who measured the length of one or more of the north lines on the diagram.

Question 28

This, the penultimate question on the paper, targeted the most able students sitting the examination. It was rare to see a fully correct solution and most responses could not be credited with any marks. A very common error made by students was to think that an obtuse angle was one greater than 180° or to mistakenly use one of the results that "angles in a triangle sum to 180°" or "angles on a straight line add to 180°". Students using 180° but carrying out subsequent processes accurately to get an answer of 34 were rewarded with some credit.

There were very few students who used algebra to formulate and solve an equation or inequality. Instead, most students who attempted the question used a numerical approach, sometimes by trial and improvement. Students who used such an approach and achieved an answer in the range $15 \leq x < 16$ could be given some credit.

Question 29

Answers to part (a) of this question revealed several approaches. A number of students showed a good understanding of similarity and gave a correct answer which scored full marks, but many students used differences leading to the incorrect working $15 - 10 = 5$, $9 - 5 = 4$. They could not be awarded any credit. Some students made little headway with the question. A minority of students obtained one mark for finding a relevant scale factor but were then unable to complete the question successfully.

A greater proportion of students gained some credit for their responses to part (b) than in part (a). There were a good number of fully correct answers. Where two marks were not scored, students often made some progress, for example by marking the lengths 4cm and 10 cm for HG and HK respectively and then working out that the length of GK was 6cm, but getting no further. It was not uncommon to see EG marked on the diagram as 10 cm and/or FG marked in as 6 cm, leading to an incorrect answer of 4 cm for the length of EF.

Summary

Based on their performance on this paper, students should:

- consider carefully the facts concerning angles, for example when “angles on a line add to 180” applies and when it does not

- practice solving problems using the mean, paying particular attention to how many pieces of data are to be added before dividing to find the mean

- carry out a common sense check on the answers to calculations, so for example you should expect the angle x in question 9 to be less than 90°

- check all calculations for arithmetic errors particularly when completing a paper where the use of a calculator is not allowed.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Examiners' Report
Principal Examiner Feedback

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Non-Calculator) Paper 1H

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Grade Boundaries

Grade boundaries for all papers can be found on the website at:
https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

November 2019
Publications Code 1MA1_1H_1911_ER

GCSE (9 – 1) Mathematics – 1MA1
Principal Examiner Feedback – Higher Paper 1

Introduction

The vast majority of students were able to attempt the first ten questions on the paper. After this, success was less evident – most likely due to the fact that this was a November examination.

It was pleasing to see many students clearly showing their working and able to communicate ideas when appropriate.

Report on Individual Questions

Question 1

Most students gained at least two marks on this question, usually for producing two factor trees with no more than one error. It was common however to see answers of 12 (finding the HCF) or 2 where many students thought that the lowest common factor was required.

The listing of multiples was often seen, but unfortunately this was often littered with arithmetic errors.

Question 2

Only a few students failed to determine that there were 10 men and 20 children in the choir. The correct value for n (2) or a correct ratio of 2:1 was often seen but many misread the question thinking that n was the number of children and an answer of 20 was a common error. An answer of 2:1 was awarded full marks. It was common to see students do 60/3 =20 and give 20 as the number of men and then 10 as the number of children meaning their answer of 2 but came from incorrect working and so could not be credited.

Question 3

Although a correct mixed fraction was found by many students, a large number still find great difficulty in working with fractions. The less able students, instead of working with “top heavy” fractions, split the fractions to multiply them and working of 1 (1×1) and $\frac{3}{12}\,(3 \times \frac{1}{4})$ was sometimes seen. Other students tried to add the fractions with $\frac{21}{12} + \frac{16}{12} = \frac{37}{12}$ regularly seen. Many answers were left as 28/12, when the question clearly stated that a mixed number was required.

Question 4

Many students did not understand the meaning of perpendicular and were therefore unable to score on this question. Of those who did, the perpendicular was often simply drawn with no sensible attempt at construction; stray arcs were often seen. It was pleasing, however, to see a significant number of students gaining full marks, usually with arcs centre D radius DP and centre C radius CP. Quite often the construction of a perpendicular bisector of CD was seen; this gained no marks. A significant number of students seemed not to understand the definition of perpendicular.

Question 5

180 – 75 – 51 = 54 was the common first step seen but many saw this as a method to find the required angle *BDC* incorrectly using ‘angles on a straight line’. Some correctly found angle *ACB* = 54° but could go no further and for those that did arithmetic errors were often seen preventing a complete and correct solution. Some students were unable to deal with the ratio and often 54 was simply halved. Others assumed that angle ADC or BDC was 90 degrees.

Question 6

This question was poorly answered with the majority of students simply attempting to find the mean of the weights 5, 9 and 6. Their resulting conclusion did relate to the question asked but no credit was given unless a correct process was applied. A number of students found the mean to be 7.1 kg but then failed to conclude that Donna was incorrect in her assertion, thus only gaining two marks. A number of students worked out the total weights correctly but then added them together with the 6 in the tens column leading to an answer of 125 instead of 71.

Question 7

In general, both parts of this question were answered well. In part (a), p^7 was the modal incorrect answer offered. In part (b), a significant number of students used correct rules of indices to derive expressions of x^4 and/or y^2 but often these were not seen in a product or a fraction. It was also common to see 12 – 6 = 6 instead of 12 ÷ 6 = 2.

Question 8

It was rare to see a fully correct solution to this question. Bearings remains a topic which many students find difficult to understand. Those students able to correctly draw a bearing of 070° usually went on to score well. The ability to use distance = speed × time did enable many students to gain at least one mark for a distance of 18 km and often an additional mark for correct use of scale. When a correct position for *Q* was found, the distance from *L* was usually correct but the bearing of *Q* from *L*, a reflex angle, was usually not correct.

Question 9

Distance = speed × time was usually applied in part (a) gaining the majority of students at least one mark. Misuse of units however was very common. 72 × 18 (= 1296) and 72 × 0.18 were the usual errors seen. Partitioning methods were usually incomplete and therefore gained no credit.

Part (b) was less well done again largely through the use of incorrect conversions. 1 km = 100 metres was a common mistake. Some students showed that the two speeds were the same but failed to answer the question posed.

Question 10

This question was poorly answered by this cohort of students. Any marks gained were usually in part (a) for correct plotting of the given values. However, it was common to see the points plotted in parts of the intervals other than at the ends.

Often seen were plots at time values of 30, 40, 50, 60 and 70 minutes; this gained no credit and prevented any success in part (c).

Many students drew histograms. A lack of understanding of quartiles and interquartile range was evident in part (b), 30 – 10 = 20 was a common error.

In part (c), correct readings from time = 50 and 90 were often found but then either just stated or added together gaining no credit. Many students struggled with the scale on the horizontal axis and often misread the required values.

Question 11

Those students who understood the concepts involved usually gave a correct solution. An incorrect answer of 60 (12 ×5) was common, as was 30 – 5 + 12 = 37.

Question 12

Although the question asked for identification of Spencer's mistake in line one, credit was given for answers which correctly explained how q could be made the subject of the formula, so answers of "he should have subtracted the 5 first before multiplying by 2" were awarded the mark. Any ambiguity in answers was penalised.

Question 13

Any marks gained in this question were usually in part (a), only a very small number of students gained the mark in part (b).

In part (a), many students correctly found the common denominator of $3x(x + 1)$ or equivalent. Unfortunately, numerators of 5 and 2 were often retained gaining no credit. A numerator $5 \times 3x + 2(x + 1)$ was often not or incorrectly simplified resulting expressions of $15x + 2x + 2$(or 1). It was also disappointing to see so many students having found the correct simplified expression then try to simply further. In algebraic questions, such subsequent incorrect working can never be ignored, and the final accuracy mark is lost.

In part (b), the modal approach was to expand the brackets rendering the resulting expression near impossible to factorise.

Question 14

Very few students were able to derive a correct quadratic equation from which a complete solution could be found. A common mistake was in finding the area of the triangle, $(x - 2)(x + 4)$ and $(x - 2) + (x + 4)$ were often seen, many times without brackets shown. One mark was available in a special case for a correct product expanded and equated to 27.5.

Many students after seeing a right-angled triangle, often started their solutions by attempting to use Pythagoras' theorem. When a trial and improvement method was employed, credit could only given if the final answer was correct.

Those students who realised that the area of the rectangle of sides $(x - 2)$ and $(x + 4)$ was 55 were often successful in getting the correct answer.

Question 15

Students are familiar with this type of question and at least one mark was usually gained for showing an understanding of the meaning of the recurring decimal notation, although 0.418418…was not uncommon. Many identified two decimals with a terminating decimal difference but were unable to accurately find the difference. Any subsequent incorrect cancelling of $\frac{414}{990}$ was ignored.

Question 16

It was pleasing to see many students, in part (a), attempting to multiply the given expression by $\frac{\sqrt{11}}{\sqrt{11}}$, some just wrote $\times\sqrt{11}$ but credit was given if the intention was clear. Student should be encouraged to write $\frac{\times\sqrt{11}}{\times\sqrt{11}}$. Many students correctly worked out the surd product but then failed to fully simplify, leaving $\frac{22\sqrt{11}}{11}$ as their answer. This was not awarded the final accuracy mark.

In part (b), students who knew to multiply numerator and denominator by $2\sqrt{3} + 1$, gained one mark but were often unable to complete the simplification to gain further credit.

Question 17

This question was very poorly answered, many simply using a scale factor of 2.25 (9 ÷ 4) in an attempt to make progress. Some looked as though they wanted to use the formulae for surface area and volume of a cylinder, but never really made any meaningful start. A few students correctly found the ratio of lengths but could go no further.

Question 18

In part (a), only a very few students correctly found an algebraic expression for the inverse of f(x). The most successful approach was in showing f(3) = 50 but a great number of students found f(50) instead which was clearly incorrect. Notation was often poor with the cube root symbol not encompassing the whole expression in some cases.

Only a minority of students correctly quoted $hg(x) = (x + 2)^2$, in part (b), and were able to make any progress. The most common mistake was in substituting $x + 2$ into hg(x). Those who managed to substitute correctly and form an equation often failed to simplify and solve the resulting quadratic equation.

Question 19

The correct answer to this question was seen only very occasionally. Some students were able to gain credit for $9^{-\frac{1}{2}} = \frac{1}{3}$ or equivalent. Only a very few were able to write $27^{\frac{1}{4}}$ in any useful format.

Question 20

Both parts of this question were poorly attempted. A translation of the given function was often seen in part (a), but rarely was this a correct one. A correct translation of either, -1 in *y* direction OR -3 in *x* direction obtained 1 mark.

In part (b), it was rare to see a correct reflection of f(*x*) drawn, many students either guessing the coordinates of *B* or using a diagram found in part (a).

Question 21

Again, only a very few students were able to make any headway in sketching a graph of the given quadratic. The *y*-intercept and the turning point were most often found by constructing tables of values. Some students did attempt to solve the quadratic, usually by completing the square, however this was often littered with mistakes. Many of the students who attempted this question drew a parabola which was symmetrical about the y-axis.

Question 22

Fully correct solutions were very rare indeed. Equal pairs of angles were sometimes identified but often with no reasons given. The most common award of one mark was for showing triangles *AED* and *EBC* to be equilateral with all angles of 60º shown. One mark for BC being common to both triangles was also awarded on a number of occasions.

Summary

Based on their performance on this paper, students should:

- read questions carefully.
- ensure that they know the difference between factors and multiples.
- re-visit the four rules of fractions.
- understand that constructions and scale drawings require accuracy of measurement.
- take care in interpreting the scale on the axes in graphical questions.
- ensure that specific questions posed in problems are answered, eg. “Is Donna correct” requires an answer of “yes” or “no” together with full explanation.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Examiners' Report
Principal Examiner Feedback

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Calculator) Paper 2F

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Grade Boundaries

Grade boundaries for all papers can be found on the website at:
https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

November 2019
Publications Code 1MA1_2F_1911_ER

GCSE (9 – 1) Mathematics – 1MA1
Principal Examiner Feedback – Foundation Paper 2

Introduction

Students generally did well on questions which asked them to perform standard calculations but found it more challenging when working in context. The majority of marks awarded for most students were for the earlier questions although some later questions were answered quite well. It was encouraging to see students 'having a go' rather than not trying at all.

Time calculations once again proved to be a challenge. Converting from minutes to hours (or from hours to hours and minutes) and adding on time (Q10) were weaknesses for a significant number of students. Working with scale and units of measurement (Q15) proved challenging as did writing an algebraic formula (Q18a). Another evident problem area for many students related to geometry. An isosceles triangle on its side (Q17) caused confusion for many, and volume alongside surface area (Q29) was beyond the skill set of the majority of students sitting this paper.

Examiners commented on an improvement in the quality of written responses in questions involving communication marks such as Q21 and Q24. Some students, though, need to be more explicit in their descriptions and use the correct mathematical language, e.g. 'angles on a straight line' or '*y*-axis'.

It was pleasing to see that many students showed their working although some showed little more than the answers they gave. In questions with no answer line on which to write a final answer the working was often unclear with no obvious logical process. Setting out work clearly in problem solving questions not only makes it easier for an examiner to follow a student's method but it also means that the student can check their own working to find any errors. Irrelevant or redundant working can be crossed out but when students attempt to simplify an answer, they should not cross out the un-simplified answer as it cannot then gain any marks if it cannot be read.

Many students made good use of a calculator but some students chose long winded methods and carried out written calculations instead of using their calculators effectively. Students should be reminded to use their calculators where appropriate and not rely on non-calculator methods. Those using a calculator often showed no working, e.g. when finding percentages of quantitites, so if the results were incorrect then no method marks could be awarded. Premature rounding and truncating of numbers displayed on a calculator prevented some students from being awarded full marks.

Report on individual questions

Question 1

Most students were able to write the numbers in order of size.

Question 2

This question was answered well with many students able to write 8375 correct to the nearest thousand. The most common mistake was to attempt to write it to the nearest hundred.

Question 3

Most students were able to write 0.23 as a percentage.

Question 4

This question was well answered with most students able to find the square root of 17.64

Question 5

The majority of students were able to find the value of 6^5.

Question 6

This question was well attempted and a pleasing number of students were able to show a complete process to work out the number of tickets that were not sold. A common approach was to subtract the number of tickets that had not been sold (1274 ÷ 6.50) from the total number of seats in the cinema (14 × 15). The other common approach was to start by working out the total cost of all the seats in the cinema (14 × 15 × 6.50) and then subtract the total cost of the tickets that were sold (1274) to get 91. Dividing 91 by 6.50 completed the process. A common mistake made by students using this approach was to miss out the final step and give 91 as the answer.

Question 7

After working out 20 – 7 = 13 to find the number of sweets that Harry had left most students gave the correct fraction 13/20. Some students gave the answer in decimal form and lost the accuracy mark. A few students gave the answer as 7/20, the fraction of the sweets that Nadia had, and were awarded one mark. Those that made an arithmetic error could be awarded the method mark if 20 – 7 was shown but an incorrect answer such as 14/20 with no working meant that no mark could be awarded.

Question 8

Part (a) was answered very well. A few students misread the question and worked out the input for an output of 6.

Part (b) was also answered well. Instead of giving the answer as –20 or ÷3 some students omitted the operation and wrote just 20 or 3 in the number machine. They gained no mark.

Question 9

In part (a) the majority of students knew that the median was the middle number even if they tried to find the median without ordering the list. Those who gave the answer as 8.5 (middle of the unordered list) gained one mark. Most students did order the numbers with many then able to give the correct answer. Some attempts at ordering the list omitted one of the numbers, often one of the two 4s. A common error was to identify the two middle numbers as 4 and 6 and give an answer of 4 or 6 or 4, 6 or carry out an incorrect calculation such as 6 – 4 with the two numbers. Some students confused the averages and worked out the mean or the mode. A few found the range.

Part (b) was answered very well. Those who did not give the correct probability often gained one mark for a fraction with either the correct numerator or the correct denominator. A few students used incorrect notation for probability such as 2 : 6 and were awarded the method mark only. A common incorrect answer was 1/2. There were relatively few students who gave a likelihood rather than a probability as the answer.

In part (c) many students were able to use the information about the mode to identify one of the hidden numbers as 3 and gain the first mark. They then often went on to give the correct answer.

Some students showed 3 + 3 + 8 + 5 + 6 = 25 and 25 ÷ 5 = 5 in the working space but then gave 3, 5 as the answer and gained one mark only. It was common to see 3 on the answer line with a number other than 6 and no working out shown. Some students gained the first mark for working with the mean but did not use the mode to complete the solution.

Question 10

Students who divided 8.40 by 0.024 had an efficient process to find the length of time spent in the car park in minutes and gained the first mark. This was the most common first step. Some students started by multiplying 0.024 by 60 to find that the cost per hour was 1.44 euros. Dividing 8.40 by 1.44 completed the process to find the length of time in hours and the first mark could be awarded. Some students used 1.44 in a build up method and attempted to reach 8.40 but few completed the method correctly. The next stage of the problem involved adding the length of time to 10 45. This was done by adding on 350 minutes in steps or by first converting it to 5 hours 50 minutes. However, this stage proved to be the downfall of many students. It was common to see 350 minutes converted to 3 hours 50 minutes or to see 5.83 (from 350 ÷ 60 or 8.40 ÷ 1.44) interpreted as 5 hours 83 minutes or 6 hours 23 minutes or 5 hours 8 minutes. Some of the students who added the length of time to 10 45 correctly gave the answer as 4 35 rather than as 4 35 pm or 16 35 and lost the accuracy mark. Students should be encouraged to use the time button on their calculator to deal with this type of question.

Question 11

In part (a) some students did not read the graph with sufficient care when changing 3 stones to kilograms. Answers such as 10.9 or 20 were quite common.

The most common approach seen to change 80 kilograms to stones in part (b) was reading from the graph at a factor of 80, which was often 40, and scaling up to 80. A few students used two values that sum to 80. The scale on the horizontal axis was often not read correctly and statements such as 40 kg = 6.1 stones or 10 kg = 1.3 stones were common. An answer outside the range 12.4 to 12.8 was awarded full marks if it came from a complete method that included a correct reading from the graph. Some students, for example, read from the graph to find 1 stone = 6 kg and then divided 80 by 6 to complete the method. Too many students gave an answer with little or no working out. When the answer was not in the range 12.4 to 12.8 marks could only be awarded if a complete method was shown. Students should be encouraged to show a clear method on the graph as, without this, incorrect conversions can be given no marks. Attempts at answering the question by extending the graph were usually unsuccessful.

Question 12

Many students gained the first mark for writing 1/10 and 3/5 as decimals or as percentages or for converting them to fractions with a common denominator. Those who used 0.1 and 0.6 tended to be more successful even though some students wrote out a list of decimals from 0.1 to 0.6 and were still unable to identify the halfway number as 0.35. Those who used fractions often struggled to complete the process and those using percentages sometimes failed to gain both marks because they gave 35 as the final answer. Some students gave the final answer as 3.5/10, not understanding that this is not an acceptable format for a fraction.

Question 13

Drawing a horizontal line and a vertical line both 6 squares in length should have been a straightforward start to the enlargement but a surprising number of students failed to gain at least one mark for drawing two of the sides correctly. Many of those who did make a correct start could not complete the enlargement correctly as the diagonal lines were often incorrectly drawn. It was noted that some students did not appear to have a ruler as their answer to this question was drawn freehand.

Question 14

Students that interpreted the two offers correctly were frequently able to find comparable values on which to base a decision. Many students found the cost of the same amount of compost for each offer, most often for 120 litres or for 40 litres. It was much less common to see students working out the cost per litre or the number of litres per £ for each offer. Having found comparable values students were usually able to make the correct decision. Those who worked with the number of litres per £ sometimes made the wrong decision. Some students interpreted the two offers correctly, for example 40 litres = £3.50 and 120 litres = £9, but gained only one mark because they did not find comparable values to support their decision. The offers were often not interpreted correctly. The first offer, for example, was often interpreted as 20 litres for £3.50 or 20 litres for £7. Some students simply worked out the cost of one bag for each offer and did not take the volume into account. Students should be encouraged to set out working clearly for questions like this one as it will be helpful to them if they can follow their own calculations and working when making their conclusion.

Question 15

This question was not answered particularly well. Many students were not able to use the scale correctly. The length of the plane was often multiplied by 24 instead of being divided by 24 and it was common for students to add 1 and 24 and then multiply or divide the length of the plane by 25. The conversion from metres to centimetres caused more problems than expected. Common mistakes were dividing by 100 instead of multiplying by 100 or using 1 metre = 10 centimetres or 1 metre = 1000 centimetres. Some students used the scale correctly and divided 19.2 by 24 to find the length of the scale model but forgot to convert their answer to centimetres. Many students gained just one mark for $19.2 \times 100 = 1920$.

Question 16

For those that understood simple interest a common first step was to work out 1.8% of 4500. It was surprising to see some students using an inefficient build up method to work out 1.8% of 4500 on this calculator paper. They were often not successful. Some students took the 3 years into account at the start and worked out 5.4% of 4500. Having used a complete method to get 243 some students were not awarded the accuracy mark because they gave the final answer as 4743 or 4257. A common incorrect first step was to divide 4500 by 3 and assume that Maria invested £1500 each year. Many students treated this as a compound interest question rather than as a simple interest question and they could score at most one mark for a calculation of the form 4500×1.018^n. This was usually 4500×1.018 or 4500×1.018^3. Incorrect multipliers such as 1.8 or 1.18 were quite common. A significant number of students gave answers which were large compared to the initial amount invested. Students should be encouraged to consider whether their answers are reasonable in the context of the question.

Question 17

This question was not answered as well as might have been expected. Many students could not make the correct first step and identify the size of angle *ADB* as 64º. A common mistake was to identify the two equal angles in triangle *ADB* as angles *DAB* and *ABD* or as angles *ABD* and *ADB*. Those who did find *ADB* = 64º often failed to make any further progress. Even some of those who got as far as finding that angle *ABD* = 52º and angle *DBC* = 128º could not complete the method to find the size of the angle marked *x*. Students that annotated the diagram tended to be more successful than those that tried a more formal labelling angles approach. It was disappointing that relatively few students achieved the C mark for giving two correct reasons appropriate to their method. When reasons were given they were often incomplete and did not include a reference to angles. Reasons such as 'triangles add up to 180º' or 'a straight line is 180º' are insufficient. Many gave no reasons at all or incorrect reasons based on parallel lines. A significant number of students misunderstood 'angles on a straight line add to 180°' and applied it to angles that were at separate points along the line *ABC*.

Question 18

In part (a) it was pleasing that many students did manage to write a formula for T in terms of n even if it wasn't a fully correct formula that gained full marks. Students that started by writing down Chloe's age as $2n$ or Dan's age as $n - 5$ were awarded the first mark and tended to be the most successful. Common errors were expressing Chloe's age as n^2 or Dan's age as $5 - n$ or $-5n$. Students who used both $2n$ and $n - 5$ often went on to give a fully correct formula although some gave the answer as $n + 2n + n - 5$ or as $4n - 5$ and scored only two marks. Students with an incorrect expression for either Chloe's age or Dan's age were still able to get two marks for an answer such as $T = n + n^2 + n - 5$ or $T = n + 2n - 5n$. Some students failed to include the original n for Ben's age. Answers of $T = 2n - 5$ with no working were common and these gained the first mark only for T = a linear expression in n. Some students thought they had to work out a numerical answer.

Many students were unable to select the identity in part (b). A popular incorrect answer was the inequality $x + 7 \leq 12$.

Question 19

Many students were able to make progress with this question and gain at least one mark. This was awarded for finding the maximum number of batches of 16 biscuits for one ingredient or the amount of one ingredient needed for one biscuit or for doubling the quantities in the recipe in the first stage of a build-up method, e.g. 350 g butter, 150 g sugar, 500 g flour. Many students went on to gain the second mark for showing a process to find the maximum number of biscuits for one ingredient or for an answer of 32. Students should be aware that it is possible to make a non-integer number of batches unless the question states otherwise. Some of the students that used a unitary method of solution and showed a complete process rounded or truncated intermediate values and lost the accuracy mark. A common incorrect start to the process was to add together quantities of the different ingredients. The presentation of work on this question was often poor with calculations spread all over the working space.

Question 20

Most of the students that substituted $f = 110$ into the formula obtained 452 and were awarded the first two marks. Many students, however, were not able to complete the solution by showing that the difference between 452 and the real height is less than 5% of the real height. Some made no attempt to do so. Others did make an attempt but could not show a complete method. Some found the difference of 10 but did not work with percentages whereas others found 5% of 442 but not the difference of 10. A common mistake was to find 5% of 452 instead of 5% of the real height. A significant number of students did not use the formula correctly and gained no marks. Attempts at solving an equation such as $442 = 4f + 12$ or $110 = 4f + 12$ were quite common. Some students thought that they needed to round values because of the word ‘estimate’.

Question 21

It was pleasing that many students were able to identify at least one of the things wrong with the frequency polygon. Often this was the missing frequency label on the vertical axis or the fact that the first point has been plotted incorrectly but some students identified the line joining the first and last points. Statements were often too general or incomplete. A statement such as ‘the points have been joined up wrong’ does not identify what is wrong in the way the points have been joined up. Similarly ‘the points have not all been plotted correctly’ is not sufficient as it does not specify that it is the first point that has been plotted incorrectly. A common incorrect answer was that the scale on the horizontal axis should start at 0, not at 10. Some students suggested that the points should not be joined at all or that the points should have been joined with a curve. A number of students incorrectly referred to lines of best fit.

Question 22

This question was answered surprisingly poorly with many students unable to complete the error interval correctly. Those who used 127.5 as the lower value sometimes used 128.4 as the upper value. Answers that used integers, such as $128 \leq \text{length} < 130$ or $127 \leq \text{length} < 129$, were very common. In many responses the number on the left of the error interval was larger than the number on the right.

Question 23

Many students successfully started by using the ratio 3 : 7 to find the number of stamps that Tom and Adam each had before Tom bought some stamps from Adam. There were some students who divided 240 by 3 and by 7 instead of by 10 but most used a correct process and found that Tom started with 72 stamps and Adam with 168 stamps. Those who then used the ratio 3 : 5 correctly to find that Tom finished with 90 stamps and Adam with 150 stamps usually went on to give the correct answer. There were many students, however, who did not use the ratio 3 : 5 correctly. Instead of working out $240 \div 8 = 30$ they used 24 (from $240 \div 10$). It was common to see $7 - 5 = 2$ followed by 2×24 and a final answer of 48.

Question 24

Part (i) was answered quite well with many students able to work out how many sports bags Stan should order. Those who showed a correct process usually gave the correct answer.

Students were far less successful in part (ii) where they were asked to write down an assumption they had made. Acceptable statements were based on the assumption that Stan’s sample is representative. Although some students explained how this could have affected their answer this was not required for the mark to be awarded. Many students gave a criticism of Stan’s sampling rather than an assumption they had made. Some simply described the calculation they had carried out in part (i).

Question 25

Both parts of this question were poorly answered.

Relatively few students were able to identify the graph with equation $y = x^3$ in part (a). It was perhaps to be expected that many students would choose graph B instead of graph F but it was surprising that both graph A and graph E were very popular incorrect choices.

In part (b) graph F was a popular incorrect choice for the graph with equation $y = 1/x$.

Question 26

This question was not answered well. It was disappointing that many students could not find at least two terms by substituting values of n. Many of those that did attempt to find terms of each sequence did not generate sufficient terms to satisfy the demand of the question. Some students found that the number 31 is in both sequences but did not show that that there is only one number that is in both sequences by generating the first five terms of the first sequence and the first six terms of the second sequence. Errors in generating terms using $2n^2 - 1$ were often the result of using an incorrect order of operations, most often finding $2n$ and then squaring.

Question 27

Many students were able to enter the calculation into a calculator to obtain 0.0456 and they were awarded the method mark. The question required the answer to be given in standard form but it was common to see 0.0456 given as the final answer. Those who did attempt to write 0.0456 in standard form were often unsuccessful. Some students did not show 0.0456 but scored one mark for an answer of the form 4.56×10^n with an incorrect value of n. Some students made hard work of this question and attempted to convert to ordinary numbers before doing the calculation. They usually got into difficulties.

Question 28

This question was generally answered quite well and it was pleasing that many students were able to gain the first mark for finding the number of workers used each day by Ali's company or by Hayley's company. Most went on to give a fully correct solution. Having found the two correct values (18 and 24) a few students did not complete the process by subtracting 18 from 24. Some students could not use the formula correctly and a common error was to work out 720 × 40 and 720 × 30.

Question 29

This question proved to be beyond most students on this Foundation tier paper and it was frequently not attempted. Many that did make an attempt were unable to do anything other than find the volume of the cuboid. On its own, this was insufficient to gain any marks. Many of the students who appreciated the need to work out the surface area of the cuboid could not show a complete process to do so. A common mistake was to include either four 6 by 18 faces or four 8 by 18 faces in the surface area calculation. Relatively few students were able to progress beyond a surface area calculation to find the side length of the cube but it was pleasing that some who did so were able to carry on and give a fully correct solution.

Question 30

This question was answered poorly with relatively few students showing an understanding of vector arithmetic. Some students scored the first method mark for 5 – 2 × 3 or 2 – 2 × – 1. When $\begin{pmatrix}5\\2\end{pmatrix}-\begin{pmatrix}6\\-2\end{pmatrix}$ was seen it was often not simplified correctly with errors usually occurring in the *y* component. Students that scored the second mark for simplifying to $\begin{pmatrix}-1\\4\end{pmatrix}$ were rarely able to achieve the final mark for drawing the vector. Some students attempted to find the vector **a** – 2**b** by drawing but most could not manage even the first step. At all stages of the question the drawing of vectors was extremely poor and very few students drew any kind of correct vector.

Summary

Based on their performance on this paper, students should:

- practise working with time, converting from minutes to hours and vice versa
- learn how to read and interpret scales on graphs, particularly those where 1 small square is not 1 or 0.1
- ensure that they know how to use their calculator
- practise finding missing angles with isosceles triangles in various orientations
- understand the difference between simple interest and compound interest
- practise working with algebra in formulating expressions or formulae and in substituting into formulae
- practise using and drawing column vectors

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Examiners' Report
Principal Examiner Feedback

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Calculator) Paper 2H

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Grade Boundaries

Grade boundaries for all papers can be found on the website at:
https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

November 2019
Publications Code 1MA1_2H_1911_ER

GCSE (9 – 1) Mathematics – 1MA1
Principal Examiner Feedback – Higher Paper 2

Introduction

Mathematical performance generally has improved on this paper since November last year, though was not always consistently good across the whole paper. Within a broad range of questions the paper was able to discriminate well. Weakest areas continue to be the application of ratios and bounds, but also algebraic manipulation and proof, iteration, working with histograms and problem solving. This was particularly the case where a question required skills from several areas of mathematics.

Approaches to questions that required some interpretation or explanation were inconsistent. Q1 and Q4 were answered well, but poor attempts were made in Q11 and Q21. On too many occasions students included contradictory or incorrect statements, which cannot be credited.

Questions which had a slightly unexpected approach, that is required more thought. caused immediate problems for many, even in the earlier part of the paper. This includes Q6, Q9 and Q16.
Q23 to Q25 were the more challenging questions for those striving to demonstrate ability at the highest grades available, and a significant proportion of students therefore failed to score on these questions.

There were far fewer attempts using trial and improvement approaches. These mainly occurred when students showed evidence of not understanding the process of getting to the answer. This was mostly evident in Q6, Q16 and Q23.

The inclusion of working out to support answers remains an issue for many; but not only does working out need to be shown, it needs to be shown legibly, demonstrating the processes of calculation that are used. This is most important in longer questions, and in “show that” questions. Examiners reported frequent difficulty in interpreting complex responses, poorly laid out, in Q9, Q16, and Q21.

Students need to read the questions carefully. There were too many cases where students misread the question but also where students mis-copied their own figures, copied down the wrong figures from the question, or rounded figures almost randomly. These many cases of premature rounding/truncating, either in their own figures or whilst in the process of taking them from the calculator, will usually result in lost accuracy marks and could also make questions more difficult than they were designed to be.

Report on individual questions

Question 1

This was generally well answered, with many gaining the two marks. Marks were usually lost for statements that were vague or ambiguous like “points incorrectly plotted” or “should not join all the dots up”. There were a few who thought that they should not have used midpoints for plotting.

Question 2

There remains a lot of misunderstanding about the values used to state an error interval. The most common error was 128.4 as the top of the interval. Many who were unprepared for this topic gave 127 and 129 as their answers or writing the largest number first.

Question 3

The majority of students gained full marks. Where this was not the case, many students gained two marks for finding 168 and 72 using the first ratio, but then carried on using 24 with the second ratio, using 48, rather than starting again with 240. On a rare occasion a student would gain the correct values to make a decision but subtracted the wrong numbers. Other common errors included dividing by the individual numbers in the ratio, not the sum, or multiplying 240 × 10 and 240 × 8.

Question 4

This question was well answered. Those who lost marks in part (i) usually made an error in the calculation, or just failed to perform the correct calculation. In part (ii) there were many good answers which made reference to “representative”, “proportional”, or the “same ratio”. The most common error was to explain the working in part (i), stating “others may not want that as a gift” or made reference to things that were of no relevance to the question.

Question 5

This was not well answered. B was a common incorrect answer for part (a).

Question 6

A significant minority of student left this question blank, seemingly unable to work out how to proceed with the question. Of those who started working out terms, many were able to gain two marks for generating at least 3 terms of each sequence, but often failing to go as low as the 4 on the second sequence. A common error was seen by many students who attempted to equate the two expressions and solve the equation, which led them nowhere.

Question 7

Many were awarded a single mark for 0.0456, since they were then unable to change this to a number in standard form. Common errors included 4.56×10^{-14} or 4.56×10^{2}.

Question 8

This was a well-answered question. Some incorrect answers showed all numbers multiplied together resulting in nonsensically large answers. The few students that did this thought nothing of giving an answer in thousands suggesting the context of the question had been missed. A common answer was to show 720 × 40 – 720 × 30 (leading to 7200).

Question 9

It was disappointing to find that so many students did not know how to find the surface area. Many only found volumes, which resulted in no marks being awarded. Of those who attempted to find the surface area, many found two of 6×8 and 4 of 6×18, but this still earned credit once they showed that they then wanted to add. Any remaining credit was only awarded for correctly processing their total surface area figure, usually by dividing their total surfaced area by 6 and then taking the square root to get their volume of the cube. Some students assumed that it was the volumes that were equal or that the cube was half the cuboid.

Question 10

There were some very confused attempts at doing this. Many tried to move items around without squaring first and got nowhere. Many made a good start getting to $y^2 = 2m\text{-}k$ then about half of these correctly rearranged to get full marks. Many were unprepared for manipulating the square root, often showing $2m^2$ as well as k.

Question 11

Students need to be made aware that just using the term “average” within the context of statistics is not enough; throughout correct statistical terms were needed such as “median” or “IQR”. Equally if figures were used, they had to be correct.

In part (a) those that recognised “half of” was associated with the median generally got the mark. Many responses quoted incorrect values or identified the incorrect parts of the box plot and a common misconception was that the box plot represented frequencies, so they would identify a "total" for the number of potatoes and then use it to try and find where the middle value was.

In part (b) a number of students did not understand what was being asked for or had not realised they needed to compare the median and (interquartile) range. Common was listing the values of each without a comparison or making an arithmetic error in calculation. Students often selected the wrong vocabulary, using mean instead of median and distribution or spread instead of the range. The IQR and range were often transposed. Students need to be reminded that they need to put their responses like this in context.

Question 12

This was not well done with many not attempting any trigonometry. Those that did often got the first mark for the process of making a correct start to trigonometry, but then spoilt their working. Others, having calculated 5.52… went on to use Pythagoras’s Theorem but then lost their way. It was not uncommon to see students using 5.52.. as the length of *ED*. Quite a few students over complicated the process of solution by using the sine rule or even cosine rule in an attempt to solve, with few of these showing any success due to error in manipulation. Some students, who showed a completely correct process, rounded or truncated their interim values to the extent that their final answer was outside the range required for the final mark.

Question 13

A common response was 3550×1.026^2 which gained both process marks. Some left it there, but a minority finished it off by writing 2.2 Premature rounding was all too prevalent in this question which frequently led to an answer outside the range allowed for the final mark. Weaker students used an incorrect multiplier which meant no marks could be awarded for example using 1.26 or 0.026 or even 10.26 Some trial and improvement methods were seen in this question, particularly when trying to find the final answer.

Question 14

Many students were unprepared for the requirements of this question. Some were able to get one mark for a correct first step. A very common incorrect response was $19 + 25 = 44$, then $3325 \div 44$.

Question 15

Many students could successfully find 3 out of 4 values of a correct expansion (more successfully if they used the positive brackets). A large number tried to do the multiplication in one step, which always led to an incorrect response as they could not keep track of all the multiplications necessary. Students who tackled the question in two steps often gained additional credit or the fully correct answer. Common misconceptions were errors in signs once the negative bracket was used, or when collecting the like terms such as $3x \times 2x = 6x$.

Question 16

Using a tree diagram was the most successful method seen which often led to at least one mark. A significant number of students chose to try to list all possibilities. This approach was largely unsuccessful, either because they failed to list various possibilities in the process, or because their work was not sufficiently organised to produce the necessary lists to enable them to see where they were going. A few used an incorrect replacement process.

Question 17

Students should be encouraged to mark the angles on the diagram. Many got one mark for identifying the 90˚ angle. It was disappointing to find errors were then made with basic geometry to find the angle *OAB*. Some students found the angle 58˚ at the top of the triangle, but failed to recognise the other triangle was isosceles, or incorrectly tried to apply the alternate segment theorem and made one of the angles in the triangle 32˚, which then led to an incorrect final answer.

Question 18

Only a few gained marks on this question. Some were able to find at least one frequency but then failed to proceed. In general, those who got to 32 were able to draw the bar at 3.2 Incorrect answers came from just adding the heights of the bars or misreading the scales when drawing the bar.

Question 19

Many students did not know the meaning of the word “hemisphere”, or failed to divide by 2 to find the volume of half the sphere. Too many substituted the figure for the diameter rather than the radius. Some cubed rather than squaring, even though the formula was given.

Question 20

Those who stated 10.85 and 10.95 often went on to get three marks. Of those that stated 160 very few gave a correct reason. The vast majority did not consider bounds, and used 10.9 A significant minority quoted 18.94 instead of 19.95 Of those who did arrive at two correct bounds the final mark was often lost due to no reason or a poor reason given for appropriate level of accuracy.

Question 21

There was a lot of misunderstanding of what was being asked for in this question, particularly confusion between speed and acceleration.

In part (a) some found the half way mark on the time axis and gave the answer as 50 or used distance/speed/time. Of those that realised they needed to work with the area under the graph a large number made an error with the vertical scale using 12.5 or 14 for the speed. Some made errors using the formula for the area of a triangle. However, many still gained the first make for starting to find an area.

In part (b) few students realised the first part was acceleration and the last part deceleration, though they did notice that the last part was greater than the first part because the gradient was steeper. Some responses gave no comparison.

Question 22

Part (a) was poorly attempted, but there were some who gained full marks. Those who understood that 200 should be substituted generally gained at least the first mark leading to 190. It was unfortunate that some calculated 163.6 but failed to associate this with whole rabbits.

Part (b) was poorly answered, with many students either assuming that the number of rabbits got bigger, irrespective of their answer to part (a).

Question 23

In part (a) very few responses gained any credit. Nearly all students failed to recognise the sine rule for area was needed and instead just multiplied the two sides of the parallelogram. Just expanding the two brackets was the most common strategy adopted or students did the work for part (b) and just tried to solve the quadratic.

Part (b) was more successfully attempted as students could either factorise, or more often use the quadratic formula to solve the equation. Once the two answers were found, all too often they were expressed as x = or with an incorrect inequality, especially with 2.5. Students who gave the correct inequality often did so by sketching a curve and using it to assist them in interpreting their answer. Some students just used the brackets from the parallelogram, evaluating them to zero.

Question 24

A very challenging question for the vast majority. Many were able to gain one mark for stating a correct co-ordinate, the most popular of which were (-1,0) or (-1,2). There were many who left out the direction in their description and some confused their description by using enlargement, translation and vectors instead of co-ordinates.

Question 25

It was clear that many students knew what to do but lacked the skills to do what they wanted. As a result this question was rarely attempted at all. Where the question was attempted and credit was achieved it was usually for finding the gradient of line L, although several forgot to divide the whole expression by 2. Once a gradient had been established, it was common for students to then use $-1/m$ to find the gradient of the perpendicular, although -2/3 was seen. It was common to see the correct equation here, but then students did not know how to progress further, although some then sketched the equation identifying the y coordinate of B. Even in the rare cases when the coordinate of C was established forming the correct triangle and then successfully calculating the area was infrequent.

Summary

Based on their performance on this paper, students should:

- ensure that figures taken from the question, and from their own work, are transcribed accurately.
- avoid rounding or truncating answers part way through a solution and use the most accurate values where possible.
- ensure that calculators are used correctly.
- remember to include working out to support their answers.
- spend time on topics such as algebraic manipulation and proof, and application of ratios, bounds, iteration and histograms when preparing for future examinations.
- spend time on practicing response type questions where a written explanation is required.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Examiners' Report
Principal Examiner Feedback

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Calculator) Paper 3F

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Grade Boundaries

Grade boundaries for all papers can be found on the website at:
https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

November 2019
Publications Code 1MA1_3F_1911_ER

GCSE (9 – 1) Mathematics – 1MA1
Principal Examiner Feedback – Foundation Paper 3

Introduction

This paper provided most students with a good opportunity to show their understanding. The vast majority of students made a good attempt at most, if not all, questions showing they had been well prepared for the examination.

On the whole students seemed to be reasonably well prepared and had access to suitable equipment, with calculators evident in almost all cases. Some students seemed to lack rulers but were not penalised for this.

Students continue to show improvements in demonstrating an ability to attempt problem solving questions and in this series response questions seemed to have improved.

Report on Individual Questions.

Question 1

The one mark was awarded for students being able to find two different factors of 12. Most students were successful either listing factors or writing a pair as a product. Those who didn't gain the mark had usually mixed up the word factor with multiple.

Question 2

A very well answered question showing students have a good understanding of basic fractions of amounts. Almost all students knew that to find $\frac{1}{3}$ they had to divide by 3, and it was only those making an arithmetic error that typically failed to score the mark. This was a real shame when a calculator was available.

Question 3

This question required students to be able to convert between basic decimals and fractions. Again, it was well answered by students with most scoring the available mark.

Question 4

Another well answered question; most students scored the mark.

Question 5

In this question students were required to convert metric units, in this case kilometres to metres. Generally speaking, the students performed well, but there was evidence of students not fully understanding their conversion and either dividing by 1000 rather than multiplying or multiplying by 10 or 100.

Question 6

Students were required to extract a ratio from a diagram of the shaded to unshaded squares.
The question was answered well with most of those who actually worked with ratio able to do so successfully. However, some students got confused and tried to work with fractions: $\frac{3}{5}$, $\frac{3}{8}$, $\frac{5}{3}$ and $\frac{5}{8}$ being commonly seen or worked with 'the whole' eg 3:8.

Question 7

A good number of students gained both marks, but where that wasn't the case, many gained one mark for the first step. These students then typically completed the calculation in the wrong order, often arriving at 44. Of those who scored zero this was often a result of not including the "×" when substituting and simply writing 48 rather than 4 × 8, typically leading to an answer of 51.

Question 8

It is clear that many of the students were familiar with this sequence (triangle numbers) and were simply able to write down the next two terms. Many others were able to decipher the correct pattern and generated the next two terms by addition of 6 then 7. Some of these students only gained one of the two marks, for, despite knowing what to add, they made arithmetic errors along the way.

Question 9

Part (a) required students to tally data and complete a frequency column. This was generally answered very well. However, there were a number of students who completed frequencies in the tally column and then wrote probabilities (out of 18) in the frequency column and thus lost a mark. A small number of students wrote cumulative frequencies in the frequency column but often showed correct frequencies in the tally column.

Part (b) required students to draw a bar chart to represent this data, and again this was completed well, although the most common mark was two out of three marks. This was because most students made a mistake in some way. The most common of these mistakes was to miss the frequency label from the vertical axis or to have a non-linear vertical scale.

Part (c) was for recognising the most popular pet. The only students who dropped this mark were ones who left the response blank.

Question 10

Part (a) required students to draw a diameter on a circle, which the vast majority were able to do. The most common incorrect response was to draw a radius rather than a diameter, or to extend the diameter beyond the circumference of the circle.

In part (b) the question demanded the student draw a segment. A significant proportion of students made the mistake of drawing a sector instead.

Question 11

Part (a) saw the first problem solving question on the paper, and it was one that was answered very well. Students are really starting to get a solid understanding of money based problems and have good success.

It was pleasing to note that only a small minority showed arithmetic errors or incomplete processing. Students who failed to score any marks simply subtracted the cost of one set of lights from 20 and chose to ignore the multiple lights and multiple £20 notes given in the question.

Part (b) was testing students ability to find a fractional change of an amount. Those who failed to get any marks usually tried to subtract $\frac{1}{5}$ or 0.2 from 120, rather than finding $\frac{1}{5}$ of 120 and subtracting that. Very few students followed the more efficient method of finding $\frac{4}{5}$.

Question 12

Another problem solving question answered well by many students. The full range of marks was awarded. The initial mark was for a first step in the process, finding the weight of the small boxes, which almost all students were able to score. The next process was to find the number of large boxes. The most efficient method was to subtract the weight of the small boxes and divide by 750. However, with this being a foundation paper, more inefficient build up methods were regularly seen (and catered for in the mark scheme) and the second mark was regularly awarded. In most cases, once the second mark was awarded, so was the third. This tended to not be the case only when arithmetic errors occurred. Again, with proper calculator use this error could have been eradicated.

Question 13

A very well answered question. A large number of students were able to extract the correct two values from the stem and leaf diagram and find the difference for two marks. It was not uncommon for students to write the answer as a range of values, such as 31 – 74, rather than subtract, and in this case one mark was awarded. Of those who were not awarded the marks, it was often due to finding the median and on occasion, some found the mean.

Question 14

Both these response questions were well attempted by students and, in general, answered well. Part (a) was looking for students to realise that the area had been found rather than the perimeter, and many did. There were some cases where the response included mathematically incorrect statements, such as P = 7 + 3 = 10, and where this occurred the mark was not awarded.

In part (b) students were expected to realise that a triangle cannot have a negative length. This part was answered less well than the previous one, with many students either being unclear in their response, or making incorrect statements. It was not uncommon to see arguments relating to 180 (degrees) or students trying to find the value of x themselves, without sufficient information to do so.

Question 15

This item posed many problems for students, with many unable to get beyond two marks. The best responses were the more structured ones, and it was good to see students using two-way tables or frequency trees, to structure their response. Typically, students scored one or both of the first two process marks (which could be awarded in either order) by finding either the number of boy or girls, along with the number of school dinners or packed lunches. It was from this point that many were unable to progress and often we saw incomplete processes. It was also unfortunate to see students mis-assigning values, eg girls = 0.55 × 800 = 440, which made the processes incorrect. Students should be encouraged to take real care in how they present their responses; those who approached the question in a logical and structured way, ticking off information in the question at each stage were more successful.

Question 16

The fundamental part of this question was the first step, where students had to equate the sum of the probabilities to 1. Without using this, students were unable to gain credit for later processes. Once students had found that the sum of the probabilities for blue and green is 0.35, they had to divide this value in the ratio 3 : 4. This was done with varying degrees of success, many dividing by 3 and 4 separately rather than dividing by (3 + 4). Students were able to work in any suitable form (fractions, decimals and percentages) and those who worked in percentages were able to gain process marks with a missing % symbol. However, it did need to be present to gain the final accuracy mark.

Question 17

A really well answered question. There were relatively few cases of incorrect tables, and where there were incorrect values they tended to be when x was negative. It was rare to award no marks in part (a).

Part (b) was answered very well, and in many cases better than part (a). It was not uncommon for students to have incorrect values in their table and to then draw a fully correct graph. The method mark in part (b) was able to be awarded as a follow through mark from their table in (a) provided one mark had been scored in part (a). The most common cause for a lost mark in this part was to not complete the graph by joining the points plotted with a line.

Question 18

It was disappointing to see so many students unable to fully complete this question. Many students were able to complete a reflection, but many were either unable to draw the mirror line, or just assumed it was something else. Common mirror lines seen were $x = 3$, $x = 2.5$, $x = 0$ and also $y = 2.5$. There were also a significant number of students carrying out rotations and perhaps even more commonly, translations.

Question 19

The majority of students attempted the expansion as their first step, and in many cases, were successful. Of those who were not successful this was for a variety of reasons. Common errors were to exchange the minus sign for a plus; to fail to multiply the second term when expanding, or to expand but not as part of an equation. The second mark was for the correct answer. As under general guidance, markers were able to award the first mark for an embedded "17" in working provided it wasn't contradicted by the answer line.

Question 20

The Venn diagram question was answered really well by many students and the award of three or four marks was common. Generally speaking a good proportion of students were able to score at least three marks, normally for a correctly labelled diagram with at least 2 regions correct. When mistakes were made, it was often from values in more than one region, or quite commonly, for the region $(A \cup B)'$ to be either incomplete, or containing all the values.

Question 21

This was a question that students generally struggled with. Most were able to make a start and gain the first mark for finding the profit. At that point many students did not know how to progress further to find the percentage profit. Students generally knew division was necessary part of this calculation, but often this was seen as profit ÷ new rather than profit ÷ original and as a result no further marks were awarded. It is evident that percentage change and percentage profit is an area that foundation students need to work on further. Trial and improvement methods were seen and were usually unsuccessful in finding a correct solution; this method should be discouraged.

Question 22

Most students were able to gain at least one mark in part (a), normally for 3 of their 4 terms correct. It was very common to see $2x$ in place of x^2 or to have the constant term incorrect. Many students who did gain one mark were unable to gain the full marks as they often over simplified their expression by combining non-like terms.

Part (b) was testing students ability to factorise into a single bracket. One mark could be awarded for a correct partial factorisation, removing either the factor of 3 or x correctly from the expression. The first mark could also be awarded if one of the correct factors, $3x$ or $(3x + 2)$, was found. Another frequently seen incorrect response was an attempt to factorise into two brackets due to the $9x^2$.

A small proportion of students correctly factorised the expression and checked that the expansion would lead them to the original expression but then wrote the original expression on the answer line rather than the factorisation.

Question 23

A good number of students were able to gain both marks. Of those who didn't a large proportion gained no marks, often because no intermediate work was shown. Students really should be encouraged to show intermediate steps of working as good exam technique and ensure the method mark can be awarded.

In part (b) students were asked to round their answer to part (a) to 4 significant figures. This mark could be awarded whatever was seen in (a) provided the value had at least 5 significant figures. It is clear many students have no real understanding of what significant figures means, with many giving 4 decimal places, or including trailing zeros.

Question 24

Another familiar style of question and again answered well. Most students gained two marks for a correct answer in range. Of those who didn't it was surprising to see many failing to draw in a line of best fit, which students should be encouraged to do. Some students were able to gain a mark for taking a reading from $x = 34$

Question 25

Finding an estimated mean is another question that students should be well prepared for. It was common for students to fail to gain the second method mark as they divided by 4 rather than 18. The final mark was then only gained by those students who had correctly used the midpoint values and had a complete correct method.

Question 26

Conversion of metric units of volume is clearly something that students at this level find difficult. Various powers of 10 were used, most commonly 10 and 100 rather than 1000.

Question 27

Questions involving time and conversion of time are always a challenge and this problem solving question was no exception. A good number of students were able to gain the first mark for finding the time difference of 1 hour 18 minutes, or 78 minutes. The next two processes were interchangeable. A calculation of speed was required, but unfortunately in many cases could not be awarded as the division was often completed the wrong way round. The other mark was for a conversion of either time (if done before the speed calculation) or speed. It was this step that students found most challenging with many either not completing it at all, or often multiplying by 100.

Question 28

Part (a) and (b), which involved conversion to and from standard form, were generally answered well and worth a single mark each.

Part (c) was another interpretation question, and like the questions earlier in the paper, it was answered quite well. Students were expected to realise that the major contributor was the power of 10 and hence B is bigger, and many were able to articulate this well enough. However, there were a number of misconceptions that became evident through responses. Some students made the same mistake as the person in the question and felt the number of decimal places was key. A good number also felt it was to do with the number of zeros, rather than the magnitude of the number and also scored no marks. Unfortunately, some students left the decimal point in when converting to ordinary numbers and therefore often lost the mark in their explanation.

Question 29

This geometry problem was broken into three steps. A process to use angles in a parallelogram (or parallel lines) to find an angle of 63. The second was to use interior or exterior angles of a pentagon, and then finally to combine these as a process to find x. With the first two steps, if there was any contradiction by mis-assigning the correct value to an incorrect angle either in working or on the diagram, the mark was not awarded. Many students were able to gain some credit, more typically for the 63, but often no more. Those who knew how to calculate interior or exterior angles, often got confused and stated them incorrectly, and as a result gained no credit. It is clear though that many students have no understanding of how to find angles within polygons. Students should also be reminded that diagrams are not drawn to scale and also be discouraged from making assumptions based on the diagram such as x being equal to the angle in the parallelogram or that x was an angle inside an isosceles triangle if a line was extended from the parallelogram.

Question 30

The final problem on the paper was one that many students were able to attempt, and in many cases gain some credit. The problem could be approached in various ways. Students could either start at one shape, find its area, use the scaling factor of 9 and then calculate the radius of the other shape. This could be done starting at either **A** or **B**. However, most students started with one shape, found its area and then the other area using the scaling factor of 9. Rather than then find the radius, students re-started with the second shape and found the area and showed these were the same. Both ways were equally acceptable and a decent proportion of correct responses were seen. Of those who didn't gain full marks the common error was to fail to divide by 4 when finding the area of **A**. It was pleasing to note that very few confused formulae for area and circumference and used the correct formula in their work.

Summary

Based on their performance on this paper, students should:

- be encouraged to use their calculators to check basic calculations.

- remember to keep working their working inside the boxes provided or use an extra sheet to ensure working worthy of credit is seen.

- remember to use their calculator in percentage questions.

- ensure that they are able to identify between the different types of transformations.

- show calculations for each stage of working carried out.

- read questions carefully to ensure that they have used all of the information provided

- have further practise at questions involving a passage of time and resulting compound unit calculations

- ensure that they have set out their work clearly so that stages of their calculations can be easily found and used.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Examiners' Report
Principal Examiner Feedback

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Calculator) Paper 3H

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Grade Boundaries

Grade boundaries for all papers can be found on the website at:
https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

November 2019
Publications Code 1MA1_3H_1911_ER

GCSE (9 – 1) Mathematics – 1MA1
Principal Examiner Feedback – Higher Paper 3

Introduction

The paper was accessible to students who had been prepared for a higher GCSE Mathematics paper. There were some questions which were not well answered especially towards the end of the paper but this can be expected from the cohort sitting the November paper.

It was pleasing to see that many students showed their working out but it is worth noting that some students do not do this and where questions request working marks will be withheld if answers only are shown.

Report on Individual Questions.

Question 1

Part (a) of this question was answered well by the majority of students with a large proportion receiving full marks.

If full marks were not award then at least one mark was usually awarded. Of these students most were able to expand the brackets correctly but made errors when simplifying; for example, $x^2 -9x + 4x - 45$ became $x^2 +14x - 45$ or $x^2 - 4 - 45$ when simplified. The other main error was to add the –9 and 5 together for the constant term and obtain –4 rather than multiply to obtain –45.

Part (b) was also well answered with the majority of students gaining both marks for $3x(3x+2)$. Those who did not gain full marks often gained one mark for a correct partial factorisation. The most common incorrect answer seen was $3x(3+2)$.

Question 2

The modal score for this question was full marks.

In part (a) a few students made errors with the root sign by only rooting the number 35 rather than the whole denominator. However, when full marks were not achieved students often gained one mark for showing partial correct working.

Part (b) was really well answered. Irrespective of their answer to part (a) the students were able to give ‘their’ answer correct to the required degree of accuracy.

Question 3

This question was well answered and almost all students gained both marks. A few students drew a line at $x = 34$ but did not give a final answer or gave an answer outside of the range.

Question 4

This question was the first on the paper that some students found challenging. Many did not score at all as they were unable to start the question.

However, another large proportion of students were able to complete this question fully, obtain the correct solution and receive all the marks.

A few students did not use the mid-values for time but were still able to gain two marks for using values from within the inequalities and dividing the sum by 18.

Where working was shown and marks were often lost as a result of dividing the total by 4 or simply adding together the mid values (not considering the frequencies) and dividing this by 4.

Question 5

Unfortunately, metric conversions are challenging for students. This question was not answered well, with 370 and 3700 seen commonly as incorrect answers.

Question 6

Two marks was the modal mark for this question however full marks was also scored by a significant proportion of the cohort.

The vast majority of students were able to calculate the time difference as 1 hour 18 minutes or 78 minutes. However, they then thought that this was the time to use when using 'speed = distance/time'. They were awarded a mark for 65/78 or 65/1.18 as this was an indication that they knew the relationship between the speed, distance and time. However, students found it challenging to convert the time from minutes to hours. It was acceptable to convert before or after the use of the speed, distance, time formula but many students failed to attempt this part of the question.

Time continues to be a challenge for many students and centres are encouraged to show students different time formats and practice converting between units.

Question 7

Part (a) and part (b) of this question was well answered. The vast majority of students gained both marks. Only occasional errors were seen with no common theme.

Part (c) was also very well answered and the modal score was full marks.

Many students appreciated that Asma was wrong and most were able to say why in an acceptable way, the most common of which was to write the numbers as ordinary numbers and then compare. A few others correctly referred to the number of digits in each number or compared the powers of 10.

However, the most common errors were to refer only to the number of zeros or include the poor use of terminology, e.g. '6.212 is to the power of 8'.

Question 8

The modal score for this question was full marks. When full marks was not obtained most students were able to obtain the first mark, but fewer could correctly identify the value of the interior or exterior angle of a pentagon without contradiction or error. Many either didn't know how to find the interior or exterior angle or divided 360 by the number of sides but thought that gave them the size of an interior angle, this was often shown by incorrect placement on the diagram.

A common incorrect response was $72 – 63 = 9^{\circ}$ Some students gave reasons for their calculations, even though not asked for. Students are reminded to carefully read the question being asked.

Question 9

This question was almost always attempted but the marks were reasonably evenly spread over the three options.

The most common incorrect responses seen were the incorrect placing of an image of correct size and orientation. A few students drew an enlargement using a different scale factor. The most common incorrect scale factor used was 3.5.

Question 10

Over a third of the students gained full marks for this question. Those that were successful usually carried out the same series of steps, multiplying by 7 for their first step rather than the use of fractions and then isolating x.

For those that were not fully successful the most common incorrect response was to only multiply one of 11 or $-x$ by 7. Another common error was to also multiply $9 + x$ by 7 as well as $11 - x$.

Part (b) was correctly answered by approximately half of the cohort. Incorrect answers were usually seen when students tried to multiply out the brackets or cancel terms within the brackets without considering the powers of 3 and 2.

Question 11

Most students attempted this question and it was common to see at least one correct product to gain the initial mark. It was pleasing to see that almost a third of the cohort went on to complete the question fully giving the correct answer

The most common incorrect responses involved adding the probabilities, e.g. $0.07 + 0.02 + 0.11 = 0.2$ or adding in the product 0.07×0.02. Although very few arithmetic errors were seen the most common one was $0.07 \times 0.98 = 0.686$ not 0.0686, using this often led to the student gaining two out of the three marks.

Question 12

The majority of students were able to interpret the stem and leaf diagram well, most were able to find the median but the quartiles were less well identified.

For the box plot, most plotted the end points accurately, but fewer plotted the box correctly. Frequently students obtained two marks by showing 3 correctly plotted values usually the minimum, maximum and median. The most common incorrect response involved misplacing the lower quartile.

It was rare to see a student state the median or quartiles and not successfully mark them on the scale.

Question 13

Many students gained the first process mark by showing a full substitution of the figures to calculate the volume of the cylinder C or showing the correct figure for the volume of the cylinder *C*. The most common approach was then to work with density and ratio together, rather than with ratio to find the volumes of A and B, however many were not able to show enough understanding for the second mark. Some students did score the second mark for getting as far as 15.68 but then failed to process fully for the final two marks.

The most successful way seen to gain full marks was to find the individual volumes of *A* and *B* and add.

Question 14

This question was found by many to be challenging and some did not know how to start. A number of students simply added the numbers in all three ratios together to obtain 8/19, showing no understanding of what was expected.

One of the approaches which gained marks was by choosing a starting number and dividing it in the correct ratios. An alternative approach seen was a tree diagram, often with the first process mark being awarded for use of fractions for either soup (2/5) or Prawns (3/5), however, many students did not know what to do next after this point. The most common incorrect answer for this question, when working with fractions was seen, was to work only using the curry part of each ratio (3/8 × 5/6) and ignoring the relationship to the choice of starter.

Question 15

Some fully correct responses were seen although many students gained one or two method marks. However, there are still too many students who used numerical values but algebra is required for proof questions.

When students tried to use algebra, a number gave incorrect expressions for even numbers, typically n and n +2 or n and $n + 1$, note n is assumed to be an integer unless otherwise defined by the student.

Of those students who were able to state two consecutive even numbers algebraically many lost the second method mark as minor errors were made when expanding the expressions.

Question 16

Many mixed responses were seen here, it would be wise to remind students to read the question carefully as many stated the relationship incorrectly (e.g. using direct proportion, omitting the square, or using a square root instead).

Students who were able to state the correct relationship usually went on to find k successfully but then they found it much harder to substitute the fractional value of y into their formula. Some who managed to correctly find the value of x^2 did not give just the negative value of x as their final answer.

Students are reminded to always read questions carefully.

Question 17

This was a not well answered question. Many students left this question blank. Of those that made an attempt many ignored the statement ‘Use the graph to find estimates …’ and tried alternative methods, either using the quadratic formula, attempting to factorise, or drawing a graph using a table of values – neither of these scored any marks as they did not use the given graph as instructed to do so.

Some students completed the square and if done correctly this gained the first method mark. This was then followed up with a translation of the original graph being shown. Only a very few students rearranged the formula and plotted the correct straight line to look for the points of intersection.

Centres should note this is a specific assessment objective and so the graph must be used when the question states this.

Question 18

Many students found this question challenging and the modal score is zero. There were many blank responses.

Those who could use the cosine rule generally obtained the first two marks however, there was often confusion over the identity of angle BCA. Of those that correctly found angle BCA very few were able to apply the sine rule accurately and gain full marks for this question. A small number of students lost the final accuracy mark due to rounding earlier in their solution.

The most common errors seen involved using the trigonometry ratios for right-angled triangles.

Question 19

Some students drew a tangent to answer this question but the most common incorrect answer was from 10/6 = 1.666… this was when students read off values at $x = 6$ and just divided the raw figures.

Those students that did draw a tangent often went on to calculate the gradient and obtained an answer within the acceptable range. However, there were a number of students who drew a tangent, thus gaining the first method mark, but then incorrectly read the scales, or ignored the scales altogether. At this level it is expected that students should be able to accurately a read and apply scales on axes to gain an appropriate estimation.

Question 20

Many students were able to score one mark with quite a few providing the full correct answer of $n^2 - 2n$. A number of students were able to identify a common second difference as 2 but were then unable to deduce that this meant the sequence was quadratic. Those that did either wrote final expression as $n^2 + 2n$, which was a very common incorrect answer or used the ‘difference method’ to try to find the nth term, as opposed to just finding it by inspection, which might have been easier with this sequence.

Question 21

This question with not well answered. The most common response by far was 65/81. Very few students were able to secure a mark indicating that they did not really understand what the question was asking. Subtraction or dividing by 4 was often seen rather than finding 4th root.

Question 22

Most students attempted this question and often gained one mark from multiplying by the reciprocal. Students could often factorise the numerator or the denominator of the first fraction, but they could not fully factorise the second fraction, often factorising $x^3 - 36x$ incorrectly or failing to notice the difference of two squares. Only a small minority managed to simplify to 7x, some went on to give their final answer as $a = 7$, this was not penalised.

Many students did not realise that they needed to factorise and cancel terms, a significant number of students spent a lot of time expanding the brackets for no gain and could not then simplify the complex expression generated.

Question 23

This question was not attempted by all students. Those who did attempt the question often gained the first two marks for substituting into the volume formula and rearranging to find the radius. Many of these students then failed to realise that the slant height of the cone had to be found, using Pythagoras. For those that did find the slant height, a good proportion did not use this slant height as the radius of the sector OACB.

A small number of students did gain full marks for this question.

Question 20

When answers were attempted students often gained three marks by finding correct vectors for *ZP* and *ZR*. Very few of these students were then able to show the full process to show *ZP* and *ZR* in an appropriate ratio.

Others only gained two marks for correct vectors using the given ratios and finding a vector for *OZ* or *XY*.

A noticeable error was when students had *YX* correct as $a - b$ they did not reverse the whole vector to get *XY*, they simply used $-a-b$.

Summary

Based on their performance on this paper, students should:

- read questions carefully
- practice questions involving time, in different notations and also converting between hours and minutes
- recognise right angled triangles and non right angled triangles and know which trigonometry relationships are appropriate for the different style of triangles.
- always attempt questions as part marks are available for suitable starting points.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Mark Scheme (Results)

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Non-Calculator) Paper 1F

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

November 2019
Publications Code 1MA1_1F_1911_MS

General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

1 All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first.
Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

2 All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no answer) indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

Questions where working is not required: In general, the correct answer should be given full marks.
Questions that specifically require working: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

3 **Crossed out work**
This should be marked **unless** the candidate has replaced it with an alternative response.

4 **Choice of method**
If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.
If no answer appears on the answer line, mark both methods **then award the lower number of marks.**

5 **Incorrect method**
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review for your Team Leader to check.

6 **Follow through marks**
Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

7 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question or its context. (eg. an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg. incorrect algebraic simplification).

8 Probability

Probability answers must be given as a fraction, percentage or decimal. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

9 Linear equations

Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

10 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and all numbers within the range.

11 Number in brackets after a calculation

Where there is a number in brackets after a calculation E.g. 2 × 6 (=12) then the mark can be awarded **either** for the correct method, implied by the calculation **or** for the correct answer to the calculation.

12 Use of inverted commas

Some numbers in the mark scheme will appear inside inverted commas E.g. “12” × 50 ; the number in inverted commas cannot be any number – it must come from a correct method or process but the candidate may make an arithmetic error in their working.

13 Word in square brackets

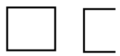
Where a word is used in square brackets E.g. [area] × 1.5 : the value used for [area] does **not** have to come from a correct method or process but is the value that the candidate believes is the area. If there are any constraints on the value that can be used, details will be given in the mark scheme.

14 Misread

If a candidate misreads a number from the question. Eg. uses 252 instead of 255; method or process marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

Guidance on the use of abbreviations within this mark scheme

M	method mark awarded for a correct method or partial method
P	process mark awarded for a correct process as part of a problem solving question
A	accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
C	communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity
B	unconditional accuracy mark (no method needed)
oe	or equivalent
cao	correct answer only
ft	follow through (when appropriate as per mark scheme)
sc	special case
dep	dependent (on a previous mark)
indep	independent
awrt	answer which rounds to
isw	ignore subsequent working

Paper: 1MA1/1F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
1	70 or 7 tens	B1	for 70 (or seventy) or 7 tens (or seven tens)	Condone any incorrect spelling provided the intention is clear
2	4.6	B1	cao	
3	3170	B1	cao	
4	$\frac{2}{5}$	B1	cao	
5	0.15	B1	cao	
6 (a)	24	B1	cao	
(b)		C1	for showing diagrams that represent 12 pictorially	Shapes can come from a combination of shapes, but must sum to 12. Any orientation.
(c)	84	M1	for a complete method to find the total number eg 3 × 8 + 3.5 × 8 + 2.5 × 8 + 12 or $(3 + 3\frac{1}{2} + 2\frac{1}{2} + 1\frac{1}{2}) \times 8$ or 24 + 28 + 20 + 12 or 9 × 8 + 3 × 4 NB ft from (b)	Accept one error in the totals for each month, eg 24 + 28 + 18 + 12 for the award of this mark. Do not award for omission of figure for April. If work in (a) or (b) consistently shows a misinterpretation of the scale the M mark can still be awarded if also consistent
		A1	cao	
7	10	M1	for converting $1\frac{1}{4}$ hours or $\frac{1}{4}$ hour to minutes eg. $1\frac{1}{4}$ hours = 60 + 15 (= 75) or $\frac{1}{4}$ hour = 15 minutes or for converting 1 hour 25 minutes to minutes eg 60 + 25 (= 85)	Condone absence of units in the working
		A1	cao	

Paper: 1MA1/1F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
8	400	P1	for finding the total weight of 4 blocks, eg 650 × 4 (= 2600) or 0.65 × 4 (= 2.6) **or** for using 1 kg = 1000g eg 650 ÷ 1000 (= 0.65) or 3 × 1000 (= 3000)	Writing 1 kg as 1000g is insufficient without it being used in a calculation
		P1	for subtraction, eg. 3 × 1000 – “2600” or 3 – “2.6” (= 0.4)	
		A1	cao SC B1 for 2350	
9	45	M1	for 180 – (100 + 35) oe	
		A1	cao	Answer may be written on the diagram.
10 (a)	*A* plotted at (3, 2)	B1	cao	Accept a cross or dot or A written at (3, 2) with or without labelling provided not ambiguous
(b)	(–1, 0)	B1	cao	Could be shown on the diagram
11	HHH HHT HTH HTT THH THT TTH TTT	M1	for at least 4 correct different combinations	Accept words or unambiguous abbreviations For M1 ignore extras or repeats;
		A1	for fully correct list with no extras or repeats	

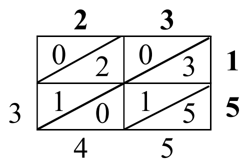
Paper: 1MA1/1F					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
12	(a)	No from correct figures	P1	for first step in process to solve the problem, eg find cost of 3 T-shirts, 25 × 3 (= 75) **or** eg find remaining money after just one purchase, eg 200 – 60 (= 140) or 200 – 25 (= 175)	Award this mark for addition of 2 or more items or for subtraction of one item or more from 200 eg 200 – 50 (= 150) etc.
			P1	for process to find total cost of trainers and T-shirts, eg 60 + "75" (= 135) **or** find total cost including cost of jacket, eg. 60 + "75" + 80 (= 215) **or** find the change after buying all 4 items, eg. 200 – 60 – 3 × 25 (= 65) oe	
			C1	for No from correct figures **Acceptable examples** No, needs 215 No, only has 65 left No, needs 15 more **Not acceptable examples** Yes ….	Figures can be given without units ($)
	(b)	Explanation	P1	for a start to a method, eg. approximating 0.749 to 0.7, 0.74, 0.75 or 0.8	
			C1	for explanation **Acceptable examples** 0.7 × 60 = 42 [is an underestimate] 0.74 × 60 = 44.4(0) [is an underestimate] . **Not acceptable examples** 0.75 × 60 = 45 [is an overestimate] 0.8 × 60 = 48 [is an overestimate]	For full marks, any calculations must be correct. No statement in words is needed.

<table>
<tr><th colspan="5">Paper: 1MA1/1F</th></tr>
<tr><th>Question</th><th>Answer</th><th>Mark</th><th>Mark scheme</th><th>Additional guidance</th></tr>
<tr><td>13 (a)</td><td>10ab</td><td>B1</td><td>cao</td><td></td></tr>
<tr><td>(b)</td><td>8x + y</td><td>M1

A1</td><td>for 8x or y

for 8x + y</td><td>Accept 1y for 1 or 2 marks</td></tr>
<tr><td>14</td><td>345</td><td>M1</td><td>for complete method with relative place value correct including addition of all the appropriate elements of the calculation.

2 3 0
1 1 5
3 4 5



<table>
<tr><td></td><td>20</td><td>3</td></tr>
<tr><td>10</td><td>200</td><td>30</td></tr>
<tr><td>5</td><td>100</td><td>15</td></tr>
</table>
200 + 30 + 100 + 15 = 345

23 + 23 + 23 + 23 + 23 = 115; 115 + 115 + 115 = 345</td><td>Accept all equivalent methods if complete.

Partitioning methods may show a complete method which has been broken down into multiple stages.

Multiple addition of 23 (or 15) acceptable if the correct number added is shown, and an attempt at addition is clear.</td></tr>
<tr><td></td><td></td><td>A1</td><td>cao</td><td></td></tr>
</table>

Paper: 1MA1/1F					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
15	(a)	16 45 29 75 14 61	C1	starts to interpret information eg 75 or 29 in the correct place	May be seen as numerators of fractions for the first 2 marks.
			C1	for 120 – 75 (= 45) and "45" – 29 (= 16)	Could be seen in working or on the diagram
			C1	Complete and correct frequency tree	
	(b)	$\frac{29}{120}$	B1	for $\frac{29}{120}$ or ft "29" from part (a)	Accept any equivalent fraction, decimal form 0.24(166…) or percentage form 24(.166..) Ignore subsequent incorrect attempts to write the correct answer in a different form.
16	(a)	45	B1	cao	
	(b)	50	M1	for an attempt to find the gradient eg "25" ÷ "0.5" ft their readings from the travel graph; use of speed-time formula eg 25 ÷ 30 (ignore units if shown)	could be shown in working or on the graph using any acceptable triangle; could be shown by multiples of 25, 0.5 or multiples of ft figures
			A1	cao	
17		18	P1	for process to solve x – 1 = 2, eg. x = 2 + 1 (= 3) or for 2x = 6	Can award mark for 3 – 1 = 2
			P1	for 2 × 9	
			A1	cao	

Paper: 1MA1/1F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
18	No with fully correct figures	M1	for (360 – 60) ÷ 2 (= 150) or $\frac{60}{360} \times 480$ (= 80) oe	Angle of 150° may be seen on diagram
		M1	(dep) for method to find required number of students in School **A** eg $\frac{\text{"150"}}{360} \times 480$ (= 200) or (480 – "80") ÷ 2 (= 200)	
		M1	for method to find required number of students in School **B**, eg $\frac{\text{"90"}}{360} \times 760$ (= 190) or 760 ÷ 4 (= 190)	ft the angle of 90 eg from 360 – 160 – 110 calculated incorrectly, or measured incorrectly from the diagram within the range 88 to 92
		C1	for No with correct figures **Acceptable examples** No, 200 and 190 He is wrong, School A has 10 more **Not acceptable examples** Yes …. No, School A had 20 more [incorrect figures]	
19	$-3 \le p < 1$	C2	for $-3 \le p < 1$ or $p \ge -3$, $p < 1$ oe	Accept use of a letter other than *p*.
		(C1	for $-3 \le p$ or for $p < 1$ or for $-3 < p \le 1$ oe)	

Paper: 1MA1/1F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
20	1080	M1	for method to write one number as a product of prime factors (condone one division error in method chosen), eg. one complete factor tree or 2, 2, 3, 3, 3 or 2, 2 , 2, 3, 5 or for listing at least 5 multiples of either number (condone one error) or for any common multiple (≠ 1080), eg. 12960 (= 108 × 120)	Accept first 5 multiples if all correct or one error in first 6 multiples
		M1	for method to write both numbers as a product of prime factors (condone a total of one division error) eg. two complete factor trees or 2, 2, 3, 3, 3 **and** 2, 2, 2, 3, 5 or lists of multiples of the two numbers, at least 5 of each, one of which includes 1080	For the list not containing 1080, accept first 5 multiples if all correct or one error in first 6 multiples
		A1	cao SC B2 for any product that would lead to 1080, eg $2^3 \times 3^3 \times 5$ or 12 × 9 × 10	

Paper: 1MA1/1F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
21	2	P1	for a process to find the number of men, eg. (60 ÷ 2) ÷ 3 (= 10)	
	(supported)	P1	for a process to find the number of children, eg. 60 – "30" – "10" (= 20)	60 ÷ 3 = 20 scores no marks.
		P1	for a start of a process to find the value of n, eg. ("20" : "10") ÷ 5 or 20 : 10 = 10 : 5 or "20" ÷ "10"	Any ratio must come from correct processes to find the number of children and the number of men
		A1	for 2 with supportive working	Award 0 marks for 2 with no correct supportive working Award full marks for 2 : 1 given as final answer from correct supportive working
22	$2\frac{1}{3}$	M1	for either $\frac{7}{4}$ oe or $\frac{4}{3}$ oe	
		M1	for method to find the product, eg $\frac{7\times4}{4\times3}$ or $\frac{21\times16}{12\times12}$ oe or for $\frac{28}{12}$ or $\frac{7}{3}$ oe	
		A1	for $2\frac{1}{3}$ or an equivalent mixed number	
23	perpendicular line constructed	C2	for a fully correct construction with all relevant arcs drawn	Perpendicular line segment between *P* and *CD* must be within guidelines Accept dotted lines.
		(C1	for a perpendicular line drawn from *P* to the line *CD* or all relevant arcs drawn)	

Paper: 1MA1/1F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
24	93	M1 M1 M1 A1	for method to find angle *ACB*, eg 180 – 75 – 51 (= 54) (dep M1) for method to use the ratio, eg "54" ÷ (2 + 1) (= 18) for complete method, eg 180 – 51 – "18" × 2 or 75 + "18" oe cao	Angles may be shown on diagram but must not be ambiguous eg. M0 for angle of 54º shown in the wrong place
25	No (supported)	P1 P1 C1	for process to find total weight of the 4 red bricks, eg. 5 × 4 (= 20) **or** for process to find total weight of the 5 blue bricks, eg. 9 × 5 (= 45) for process to find total weight of all 10 bricks, eg. "20" + "45" + 6 (= 71) No with correct supporting evidence **Acceptable examples** No, it is 7.1 She is wrong, it is 0.1 more No, (the total weight is) 71 not 70 **Not acceptable examples** Yes …. No, it is 71	May be seen next to statements 20 must be clearly referenced to the red bricks. 5 + 9 + 6 = 20 scores no marks Candidates working in grams will need to give 7100 and 7000 for example as comparable figures.

Paper: 1MA1/1F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
26 (a)	p^{10}	B1	cao	
(b)	$2x^4y^2$	M1	for any two of 12 ÷ 6 (= 2), x^{7-3} (= x^4), y^{3-1} (= y^2) in a product or written as a fraction with complete and correct cancelling of at least two terms	
		A1	cao	
27 (i)	Distance in the range 20 to 23	P1	for a process to draw a bearing of 070º, eg. a line drawn 70º from the North line at P	Accept a line of any length as long as the intention is clear.
(ii)	Bearing in the range 317 to 330	P1	for a process to work out the distance PQ, eg. 12 × 1.5 (= 18)	
		P1	(dep previous P1) for the process to use the given scale eg. "18" ÷ 4 (= 4.5 cm)	Award P3 for Q shown in the correct place on the diagram. 4.5 scores 2 marks provided there is a link to 12 × 1.5 (= 18)
		A1	(dep P3) for distance in the range 20 to 23	Award no marks if no supportive processes
		A1	(dep P3) for bearing in the range 317 to 330	Award no marks if no supportive processes Award A0A0 if Q is not in the correct place

Paper: 1MA1/1F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
28	16	P1	for process to formulate an equation or inequality, eg $2x + 3x + 10 * 90$ **or** for 90 – 10	*denotes an equality or inequality symbol Accept equivalent forms
		P1	for a process to solve the equation or inequality by isolating terms in x, eg $5x * 90 - 10$ **or** for $(90 - 10) \div 5$	Award P2 for an embedded answer of 16, which could be shown on the diagram as 32, 48, (10) or written as x embedded in working in an equation.
		A1	cao SC B1 for $x = 34$ or for a value in the range $15 \le x < 16$	
29 (a)	6	M1	for stating a similar triangle relationship eg $\frac{AB}{PQ} = \frac{AC}{PR} = \frac{CB}{RQ}$ or equivalent set of similar triangle expressions or for substitution giving a fraction form for a scale factor eg $\frac{10}{15}\left(=\frac{2}{3}\right)$ or $\frac{15}{10}\left(=\frac{3}{2}\right)$ or $\frac{9}{15}\left(=\frac{3}{5}\right)$ or $\frac{15}{9}\left(=\frac{5}{3}\right)$	Accept any equivalent fractions or decimal equivalents given to at least 2 dp truncated or rounded
		A1	cao	
(b)	2	P1	for showing understanding of the properties of congruent triangles by finding an unknown length using matching of two sides, eg *EG*, *KG* and 6, or *HG*, *FG* and 4 **or** matching corresponding angles eg *HEG* with *FKG* **and** *EHG* with *KFG*	Can be shown by any complete statements that are unambiguous Can be shown in working using algebraic statements, or given by unambiguous marking on the diagram to confirm the relationship.
		A1	cao	

Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 1F

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 1MA1/1F			
Question		**Modification**	**Mark scheme notes**
6		Diagram enlarged. Key moved above and to the left of the diagram. Squares divided into four sections. Wording 'incomplete' added.	Standard mark scheme
9		Diagram enlarged. Wording added 'There are three angles marked 100°, 35° and x' Wording added 'marked'. Angles moved outside of the angle arcs and angle arcs made smaller.	Standard mark scheme
10		Diagram enlarged. Crosses changed to solid circles. Zero moved above the x axis. Wording added 'It shows the line BC on a coordinate grid.'	Standard mark scheme
13		In part (a) Braille only - change *a* and *b* to *m* and *n*. In part (b) MLP only - change *x* and *y* to *e* and *f*.	Standard mark scheme except for the letter changes indicated.
15		Diagram enlarged. Wording added 'It shows an incomplete frequency tree.' Braille only- label spaces (i) to (vi). In part (a) wording added 'There are six spaces to fill.'	Standard mark scheme

PAPER: 1MA1/1F			
Question		**Modification**	**Mark scheme notes**
16		Diagram enlarged. Right axis labelled. Axes labels moved to the left of the horizontal axis and above the vertical axis	Standard mark scheme
17		Question wording changed to 'When x−1 = 2 work out the value of 2x2.'	Standard mark scheme
18		Diagram enlarged. Angles moved outside of the angle arcs and angle arcs made smaller. Description of diagram added below the diagram. 'There are 480 students at school A. In the school A pie chart, 60° represents monkeys, x° represents tigers an x° represents lions.' 'There are 760 students at school B. In the school B pie chart, 90° represents tigers, 110° represents lions and 160° represents monkeys.'	Standard mark scheme
19		Diagram enlarged.	Standard mark scheme
21		Wording changed to 'Using the information work out the value of n.'	Standard mark scheme
23		P moved 1 cm to the left.	Standard mark scheme
24		Diagram enlarged. Wording added 'Angle BAC = 75° Angle ABC =51°.' Angles moved outside of the angle arcs and angle arcs made smaller.	Standard mark scheme

PAPER: 1MA1/1F			
Question		**Modification**	**Mark scheme notes**
27		North lines made 9 cm. Scale moved above the diagram. Changed the scale from ‘1 cm represents 4 km’ to ‘1 cm represents 2 km.’	Standard mark scheme but note the scale change P1 for a process to work out the distance *PQ*, eg. 12 × 1.5 (= 18) P1 for the process to use the given scale eg. “18” ÷ 2 (= 9 cm) Award P3 for Q shown in the correct place on the diagram. A1 for distance in the range 20 to 23 A1 for bearing in the range 317 to 330
28		Diagram enlarged. Angles moved outside of the angle arcs and angle arcs made smaller. Wording added ‘Three angles are marked $(2x)°$, $(3x)°$, 10°’	Standard mark scheme
29	(a)	Diagram enlarged. Wording added ‘AC = 9 cm RQ = 10 cm.’ Braille only - wording added ‘Angle ACB is a right angle’ and ‘Angle PRQ is a right angle.’	Standard mark scheme
29	(b)	Diagram enlarged. Labels added to diagram: HG labelled as ‘4 cm’ and HK labelled as ‘10 cm’. Wording added, ‘HGE is a right angle, FGK is a right angle.’	Standard mark scheme

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Mark Scheme (Results)

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Non-Calculator) Paper 1H

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

November 2019
Publications Code 1MA1_1H_1911_MS

General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

1 All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first.

Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

2 All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no answer) indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

Questions where working is not required: In general, the correct answer should be given full marks.
Questions that specifically require working: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

3 **Crossed out work**
This should be marked **unless** the candidate has replaced it with
an alternative response.

4 **Choice of method**
If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.
If no answer appears on the answer line, mark both methods **then award the lower number of marks.**

5 **Incorrect method**
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review for your Team Leader to check.

6 **Follow through marks**
Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

7 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question or its context. (eg. an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg. incorrect algebraic simplification).

8 Probability

Probability answers must be given as a fraction, percentage or decimal. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

9 Linear equations

Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

10 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and all numbers within the range.

11 Number in brackets after a calculation

Where there is a number in brackets after a calculation E.g. 2 × 6 (=12) then the mark can be awarded **either** for the correct method, implied by the calculation **or** for the correct answer to the calculation.

12 Use of inverted commas

Some numbers in the mark scheme will appear inside inverted commas E.g. "12" × 50 ; the number in inverted commas cannot be any number – it must come from a correct method or process but the candidate may make an arithmetic error in their working.

13 Word in square brackets

Where a word is used in square brackets E.g. [area] × 1.5 : the value used for [area] does **not** have to come from a correct method or process but is the value that the candidate believes is the area. If there are any constraints on the value that can be used, details will be given in the mark scheme.

14 Misread

If a candidate misreads a number from the question. Eg. uses 252 instead of 255; method or process marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

Guidance on the use of abbreviations within this mark scheme	
M	method mark awarded for a correct method or partial method
P	process mark awarded for a correct process as part of a problem solving question
A	accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
C	communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity
B	unconditional accuracy mark (no method needed)
oe	or equivalent
cao	correct answer only
ft	follow through (when appropriate as per mark scheme)
sc	special case
dep	dependent (on a previous mark)
indep	independent
awrt	answer which rounds to
isw	ignore subsequent working

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
1	1080	M1	for method to write one number as a product of prime factors (condone one division error in method chosen), eg. one complete factor tree or 2, 2, 3, 3, 3 or 2, 2 , 2, 3, 5 or for listing at least 5 multiples of either number (condone one error) or for any common multiple (≠ 1080), eg. 12960 (= 108 × 120)	Accept first 5 multiples if all correct or one error in the first 6 multiples
		M1	for method to write both numbers as a product of prime factors (condone a total of one division error) eg. two complete factor trees or 2, 2, 3, 3, 3 **and** 2, 2, 2, 3, 5 or lists of multiples of the two numbers, at least 5 of each, one of which includes 1080	For the list not containing 1080, accept first 5 correct multiples or one error in the first 6 multiples
		A1	cao SC: B2 for any product that would lead to 1080, eg. $2^3 \times 3^3 \times 5$ or 12 × 9 × 10	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
2	2	P1	for a process to find the number of men, eg. (60 ÷ 2) ÷ 3 (= 10)	
	(supported)	P1	for a process to find the number of children, eg. 60 – "30" – "10" (= 20)	60 ÷ 3 = 20 scores no marks
		P1	for a start of a process to find the value of *n*, eg. ("20" : "10") ÷ 5 or 20 : 10 = 10 : 5 or "20" ÷ "10"	Any ratio must come from correct processes to find the number of children and the number of men
		A1	for 2 with supportive working	Award 0 marks for 2 with no correct supportive working Award full marks for 2 : 1 given as a final answer from correct supportive working
3	$2\frac{1}{3}$	M1	for either $\frac{7}{4}$ oe or $\frac{4}{3}$ oe	
		M1	for method to find the product, eg. $\frac{7\times4}{4\times3}$ or $\frac{21\times16}{12\times12}$ oe or for $\frac{28}{12}$ or $\frac{7}{3}$ oe	
		A1	for $2\frac{1}{3}$ or an equivalent mixed number	
4	perpendicular line constructed	C2	for a fully correct construction with all relevant arcs drawn	Perpendicular line segment between *P* and *CD* must be within guidelines Accept dotted lines
		(C1	for a perpendicular line drawn from *P* to the line *CD* or all relevant arcs drawn)	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
5	93	M1	for method to find angle *ACB*, eg. 180 – 75 – 51 (= 54)	Angles may be shown on diagram but must not be ambiguous eg. M0 for angle of 54° shown in the wrong place
		M1	(dep M1) for method to use the ratio, eg. "54" ÷ (2 + 1) (= 18)	
		M1	for complete method, eg. 180 – 51 – "18" × 2 or 75 + "18" oe	
		A1	cao	
6	No (supported)	P1	for process to find total weight of the 4 red bricks, eg. 5 × 4 (= 20) **or** for process to find total weight of the 5 blue bricks eg. 9 × 5 (= 45)	May be seen next to statements 20 must be clearly referenced to the red bricks. 5 + 9 + 6 = 20 gets no marks
		P1	for process to find total weight of all 10 bricks, eg. "20" + "45" + 6 (= 71)	
		C1	No with correct supporting evidence **Acceptable examples** No, it is 7.1 She is wrong, it is 0.1 more No, (the total weight is) 71 not 70 **Not acceptable examples** Yes …. No, it is 71	Candidates working in grams will need to give 7100 and 7000 for example as comparable figures

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
7 (a)	p^{10}	B1	cao	
(b)	$2x^4y^2$	M1	for any two of 12 ÷ 6 (= 2), x^{7-3} (= x^4), y^{3-1} (= y^2) in a single product or written as a fraction with complete and correct cancelling of at least two terms	
		A1	cao	
8 (i)	Distance in the range 20 to 23	P1	for a process to draw a bearing of 070º, eg. a line drawn 70º from the North line at *P*	Accept a line of any length as long as the intention is clear.
(ii)	Bearing in the range 317 to 330	P1	for a process to work out the distance *PQ*, eg. 12 × 1.5 (= 18)	
		P1	(dep previous P1) for the process to use the given scale, eg. "18" ÷ 4 (= 4.5 cm)	Award P3 for Q shown in the correct place on the diagram. 4.5 scores 2 marks provided there is a link to 12 × 1.5 (= 18)
		A1	(dep P3) for distance in the range 20 to 23	Award no marks if no supportive processes
		A1	(dep P3) for bearing in the range 317 to 330	Award no marks if no supportive processes Award A0A0 if *Q* is not in the correct place

Paper: 1MA1/1H					
Question		Answer	Mark	Mark scheme	Additional guidance
9	(a)	21.6	M1	for a method using distance = speed × time, eg. $72 \times \frac{18}{60}$ or 7.2 km in 6 minutes, so 7.2 × 3 oe partitioning method	Accept 72 × 18
			A1	for 21.6 oe	
	(b)	No (supported)	M1	for a method to convert 20 m/s to km/h or 72 km/h to m/s, eg. $20 \times \frac{3600}{1000}$ (= 72) or $72 \times \frac{1000}{3600}$ (= 20)	Accept methods to convert **both** speeds to km/s or m/h
			C1	for No since 72 km/h = 20 m/s oe	
10	(a)	cf graph through (40, 5), (60, 25), (80, 35), (100, 38) and (120, 40)	C2	for a complete and accurate cf graph	May be a cumulative frequency curve or a cumulative frequency polygon Ignore any graph drawn to the left of the first point If histograms drawn, plots must be identified
			(C1	for at least 4 or 5 cf values plotted correctly)	
				SC: B1 for 4 or 5 points plotted not at end but consistently within each interval and joined provided no gradient is negative	
	(b)	answer in range 21 to 28	M1	for UQ in the range 66 to 70 or LQ in the range 42 to 46 or ft their cf graph	
			A1	for answer in range 21 to 28 or ft their cf graph	
	(c)	answer in the range $\frac{19}{40}$ to $\frac{24}{40}$	M1	for finding the difference between readings taken from the cf axis at points from a mark of 50 and a mark of 90 or ft their graph (if possible)	Their graph must be a cf graph
			A1	for an answer in the range $\frac{19}{40}$ to $\frac{24}{40}$ or ft their cf graph	Accept any equivalent fraction, decimal from 0.475 to 0.6 or percentage from 47.5% – 60%

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
11	72	M1	for $\frac{5}{30}=\frac{12}{p}$ oe, eg $\frac{12}{p}\times 30=5$ or $12\div\frac{5}{30}$ **or** 5 : 30 = 12 : p **or** 1 in 6 (30 ÷ 5) counters are yellow, so 12 × "6" **or** using equivalent ratios to 5 : 30, eg. 2 : 12 and 10 : 60 and adding to give 2 + 10 : 12 + 60	
		A1	cao	
12	Mistake identified	C1	for a correct mistake identified **Acceptable examples** all three terms should be multiplied by 2 and not just two of them the 5 should be multiplied by 2 it should be $2\times T=q+2\times 5$ should subtract 5 first (before multiplying by 2) **Not acceptable examples** Should remove the 5 first $2\times T$ should be $2T$ should have got rid of the denominator	Accept answers showing a correct first step
13 (a)	$\frac{17x+2}{3x(x+1)}$	M1	for a correct common denominator with at least one correct numerator eg. $\frac{5\times 3x}{3x(x+1)}+\frac{2(x+1)}{3x(x+1)}$	
		A1	for a single simplified fraction, eg. $\frac{17x+2}{3x(x+1)}$ or equivalent eg. $\frac{17x+2}{3x^2+3x}$	$\frac{15x+2(x+1)}{3x(x+1)}$ gets M1 only
(b)	$(x+y)(x+y+3)$	B1	cao	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
14	5	P1	for process to find the area of the triangle, eg. $0.5 \times (x+4)(x-2)$ oe OR for process to find the area of rectangle and 27.5×2, eg. $(x+4)(x-2)$ and 55	Trial and improvement methods must be fully correct identifying the value of x as 7 (3 marks) or the shortest side as 5 (4 marks)
		P1	(dep P1) for process to expand the brackets and derive a quadratic equation, eg. $x^2 + 4x - 2x - 8 = 55$ or $0.5(x^2 + 4x - 2x - 8) = 27.5$ oe	
		P1	(dep P2) for complete process to solve the quadratic equation $x^2 + 2x - 63 = 0$ eg $(x-7)(x+9)$ $(= 0)$ or $\frac{-2\pm\sqrt{2^2-4\times1\times-63}}{2\times1}$ or $(x+1)^2 - 1 - 63$ $(= 0)$	
		A1	cao SC: B1 for $x^2 + 4x - 2x - 8 = 27.5$	An answer of 5 with no supportive working gets no marks

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
15	$\frac{414}{990}$	M1	for ($x =$) 0.41818… or ($10x =$) $4.\dot{1}\dot{8}$ or 4.1818… or ($100x =$) $41.\dot{8}\dot{1}$ or 41.818… or ($1000x =$) $418.\dot{1}\dot{8}$ or 418.18…	
		M1	for using two recurring decimals with a terminating decimal difference, eg. ($1000x - 10x =$) $418.\dot{1}\dot{8} - 4.\dot{1}\dot{8}$ or 418.18… − 4.1818… (= 414)	Accept ($100x - x =$) $41.\dot{8}\dot{1} - 0.4\dot{1}\dot{8}$ or 41.818... – 0.41818... (= 41.4)
		A1	for $\frac{414}{990}$ oe, eg $\frac{23}{55}$	$\frac{41.4}{99}$ must be simplified to gain the accuracy mark
16 (a)	$2\sqrt{11}$	M1	for method to multiply numerator and denominator by $\sqrt{11}$ or a multiple of $\sqrt{11}$, eg $\frac{22}{\sqrt{11}} \times \frac{\sqrt{11}}{\sqrt{11}}$	
		A1	for $2\sqrt{11}$	
(b)	$\frac{6+\sqrt{3}}{11}$	M1	for method to multiply numerator and denominator by $2\sqrt{3}+1$ or a multiple of $2\sqrt{3}+1$, eg $\frac{\sqrt{3}}{2\sqrt{3}-1} \times \frac{2\sqrt{3}+1}{2\sqrt{3}+1}$	
		M1	(dep) for $\sqrt{3} \times 2\sqrt{3} = 6$ or $2\sqrt{3} \times 2\sqrt{3} = 12$	
		A1	for $\frac{6+\sqrt{3}}{11}$ (accept $a = 6$ and $b = 11$)	

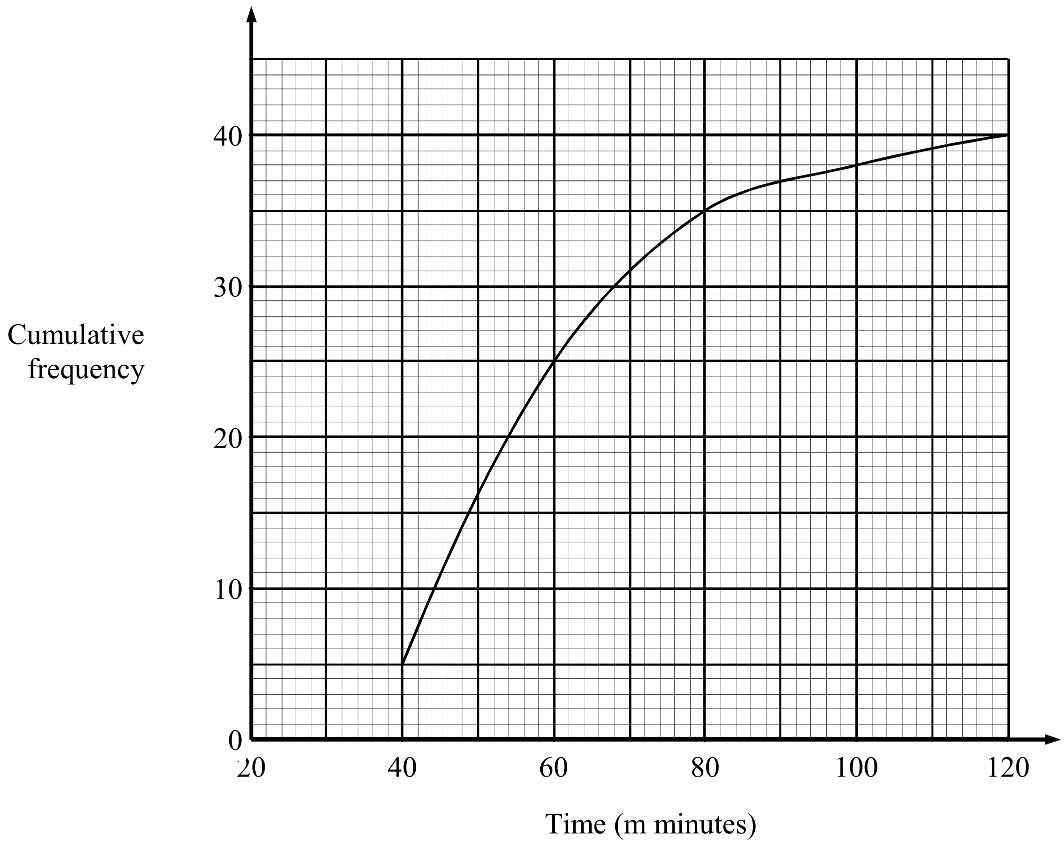
Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
17	4	P1	for process to find ratio of corresponding lengths, eg. $\sqrt{4}$: $\sqrt{9}$ (= 2 : 3)	
		P1	for process to find ratio of volumes, eg "2"^{3} : "3"^{3} (= 8 : 27)	
		P1	for "27" ÷ "8" (= 3.375)	This may be seen by checking their volume, eg. "8" × 4 (= 32) and "8" × 3 (= 24)
		A1	for rounding to give an answer of 4 from correct working	An answer of 4 with no supportive working gets no marks

Paper: 1MA1/1H					
Question		Answer	Mark	Mark scheme	Additional guidance
18	(a)	Shown	C1	for $f^{-1}(x) = \sqrt[3]{\frac{x+4}{2}}$ OR for $2x^3 - 4 = 50$ OR for substituting $x = 3$ to find f(3)	
			C1	for substituting $x = 50$ to show the result giving $f^{-1}(50) = 3$ OR solving for x to give $x = 3$ OR for showing that f(3) = 50	
	(b)	$x = -1$ and $x = 2.5$	P1	for $hg(x) = (x + 2)^2$	
			P1	(dep) for start to a process to derive a quadratic equation eg. $x^2 + 4x + 4 = 3x^2 + x - 1$	$(x + 2)^2$ must be correctly expanded
			P1	for a process to solve the quadratic equation $2x^2 - 3x - 5 = 0$ eg $(2x - 5)(x + 1)$ (= 0) or $\frac{--3\pm\sqrt{(-3)^2-4\times2\times-5}}{2\times2}$ or $2\left[(x-\frac{3}{4})^2 - \frac{9}{16} - \frac{5}{2}\right]$ (= 0)	
			A1	for $x = -1$ and $x = 2.5$	2.5 or $2\frac{1}{2}$ or $\frac{5}{2}$ acceptable
19		$\frac{3}{4}$ oe	P1	for a first step to converting to a common base with one correct conversion, eg. $9^{-\frac{1}{2}} = 3^{-1}$ or $\frac{1}{3}$ or $27^{\frac{1}{4}} = 3^{\frac{3}{4}}$ oe	$9^{-\frac{1}{2}} = 3^{-1}$ (or $\frac{1}{3}$) oe or $27^{\frac{1}{4}} = 3^{\frac{3}{4}}$ oe seen alone gets the P1
			P1	(dep) for $3^{-1} = 3^{\frac{3}{4}} \div 3^{x+1}$ oe	
			A1	cao	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
20 (a)	graph	C2	for a translation of the graph by the vector $\begin{pmatrix}-1\\-3\end{pmatrix}$	Condone graph of y = f($-x$) also being drawn on the grid
		(C1	for a translation of the graph by the vector $\begin{pmatrix}-1\\b\end{pmatrix}$ where $b \neq -3$ or $\begin{pmatrix}a\\-3\end{pmatrix}$ where $a \neq -1$ **or** for a translation by the vector $\begin{pmatrix}-1\\-3\end{pmatrix}$ of 3 or 4 critical points)	Correct vector gets 1 mark
(b)	2, 1	B1	cao	
21	Sketch graph with TP at (2, -13) and intercepts at (0, -5), $(2+\sqrt{\frac{13}{2}}, 0)$ and $(2-\sqrt{\frac{13}{2}}, 0)$	B1	for a parabola drawn with intercept at the point (0, – 5)	
		M1	for the start of a method to find the roots of $y = 0$, eg. $2(x-2)^2 - 13$ (= 0) oe or (x =) $\frac{--8 \pm\sqrt{(-8)^2-4\times2\times-5}}{2\times2}$	
		M1	(dep) for method to find the roots, eg. $2 \pm \sqrt{\frac{13}{2}}$ oe	
		B1	for turning point at $(2, -13)$	Turning point may be just seen and labelled on the sketch
		C1	for a fully correct parabola drawn with turning point at $(2, -13)$ and intercepts at $(0, -5)$, $(2+\sqrt{\frac{13}{2}}, 0)$ oe and $(2-\sqrt{\frac{13}{2}}, 0)$ oe clearly shown	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
22	Proof	C1	for **one** correct pair of equal angles with correct reason from: angle *ACB* = angle *ADB*, (angles in the same segment are equal) angle *DBC* = angle *DAC*, (angles in the same segment are equal) angle *ABD* = angle *ACD*, (angles in the same segment are equal) **or** for recognising all angles of 60 in triangle *AED* **and** in triangle *CEB*)	Underlined words need to be shown; reasons need to be linked to their statement(s) Pairs of equal angles may be just shown on the diagram
		C1	for **one** identity, with reason(s), from the following list of alternatives: **Alternatives:** a complete method to show that angle *ACB* = angle *DBC* (= 60), **or** *BC* being common to both triangles **or** *DB* = *DE*+*EB* = *AE*+*EC* = *AC* (sides of an equilateral triangle are equal) **or** angle *ABC* = 60 + angle *ABD* = 60 + angle *ACD* = angle *DCB* (angles in the same segment are equal) **or** angle *BDC* = angle *CAB* (angles in the same segment are equal)	
		C1	for a **second** identity, with reason(s), from the alternatives above	
		C1	for concluding the proof with a **third** identity, with reason(s), from the alternatives above, together with the condition for congruency, ASA or SAS or AAS	

Q10(a)



Cumulative frequency
40
30
20
10
0
20
40
60
80
100
120
Time (m minutes)

Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 1H

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5º
Measurements of length: ±5 mm

PAPER: 1MA1_1H			
Question		**Modification**	**Mark scheme notes**
2		Wording changed to ‘Using the information work out the value of n.’	Standard mark scheme
4		P moved 1 cm to the left.	Standard mark scheme
5		Diagram enlarged. Wording added ‘Angle BAC = 75° Angle ABC =51°.’ Angles moved outside of the angle arcs and angle arcs made smaller.	Standard mark scheme
8		North lines made 9 cm. Scale moved above the diagram. Changed the scale from ‘1 cm represents 4km’ to ‘1 cm represents 2 km.’	Standard mark scheme but note the scale change P1 for a process to work out the distance *PQ*, eg. 12×1.5 (= 18) P1 for the process to use the given scale eg. “18” ÷ 2 (= 9 cm) Award P3 for *Q* shown in the correct place on the diagram. A1 for distance in the range 20 to 23 A1 for bearing in the range 317 to 330

10		Table left aligned. Diagram enlarged. Right axis labelled. Axes labels moved to the left of the horizontal axis and above the vertical axis. Frequency table: 20 < m ≤ 40 5 20 < m ≤ 60 10 20 < m ≤ 80 25 20 < m ≤ 100 35 20 < m ≤ 120 40	Part (a) Standard mark scheme but plots at values shown. Part (b): M1 for UQ = 90 (±2) or LQ = 60 (±2) or ft their cf graph A1 answer in the range 36 to 44 Part (c): M1 for finding the difference between readings taken from the cf axis at points from a mark of 50 and a mark of 90 eg 30 – 7.5 A1 answer in the range 19/40 to 26/40

PAPER: 1MA1_1H			
Question		**Modification**	**Mark scheme notes**
12		MLP only- q changed to m.	Standard mark scheme
13	(a)	MLP only – x changed to y.	Standard mark scheme with letters changed as indicated.
13	(b)	MLP only – x and y changed to e and f.	Standard mark scheme with change of letters as indicated.
14		Diagram enlarged. Triangle vertices labelled *ABC*. Wording ‘*ABC*’ added. Wording ‘*BC* = (y+4) cm’ and ‘BA = (y-2) cm’ added. MLP only – x changed to y	Standard mark scheme with change of letters as indicated.
17		Diagram enlarged; model may be provided. Labels removed from inside the shapes and above the containers labelled ‘container A’ and ‘container B’. Wording changed to ‘They show two similar cylindrical containers, container A and container B’ ; Container A is smaller than container B.’	Standard mark scheme
20		Diagram enlarged. In part (a) the wording changed from ‘y =f(x+1) -3’ to ‘y =f(x+1) -5’.Braille only – only point A on the diagram and wording ‘Point A (-2,1)’ added above the diagram.	Standard mark scheme, but note the graph required to be drawn in part (a) is now 2 squares below that normally expected, so in the standard mark scheme replace -3 by -5
21		A pair of axes provided.	Standard mark scheme
22		Diagram enlarged.	Standard mark scheme

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Mark Scheme (Results)

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Calculator) Paper 2F

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

November 2019
Publications Code 1MA1_2F_1911_MS

General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

1 All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first.

Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

2 All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no answer) indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

Questions where working is not required: In general, the correct answer should be given full marks.
Questions that specifically require working: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

3 **Crossed out work**
This should be marked **unless** the candidate has replaced it with an alternative response.

4 **Choice of method**
If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.
If no answer appears on the answer line, mark both methods **then award the lower number of marks.**

5 **Incorrect method**
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review for your Team Leader to check.

6 **Follow through marks**
Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

7 **Ignoring subsequent work**
It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question or its context. (eg. an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg. incorrect algebraic simplification).

8 **Probability**
Probability answers must be given as a fraction, percentage or decimal. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

9 **Linear equations**
Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

10 **Range of answers**
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and all numbers within the range.

11 **Number in brackets after a calculation**
Where there is a number in brackets after a calculation E.g. 2 × 6 (=12) then the mark can be awarded **either** for the correct method, implied by the calculation **or** for the correct answer to the calculation.

12 **Use of inverted commas**
Some numbers in the mark scheme will appear inside inverted commas E.g. “12” × 50 ; the number in inverted commas cannot be any number – it must come from a correct method or process but the candidate may make an arithmetic error in their working.

13 **Word in square brackets**
Where a word is used in square brackets E.g. [area] × 1.5 : the value used for [area] does **not** have to come from a correct method or process but is the value that the candidate believes is the area. If there are any constraints on the value that can be used, details will be given in the mark scheme.

14 **Misread**
If a candidate misreads a number from the question. Eg. uses 252 instead of 255; method or process marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

Guidance on the use of abbreviations within this mark scheme	
M	method mark awarded for a correct method or partial method
P	process mark awarded for a correct process as part of a problem solving question
A	accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
C	communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity
B	unconditional accuracy mark (no method needed)
oe	or equivalent
cao	correct answer only
ft	follow through (when appropriate as per mark scheme)
sc	special case
dep	dependent (on a previous mark)
indep	independent
awrt	answer which rounds to
isw	ignore subsequent working

Paper: 1MA1/2F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
1	–7, –4, –2, 1, 8	B1	for –7, –4, –2, 1, 8	Accept reverse order 8, 1 –2, –4, –7
2	8000	B1	cao	
3	23	B1	cao	
4	4.2	B1	for 4.2 **or** $\frac{21}{5}$ oe	
5	7776	B1	cao	
6	14	P1 P1 A1	for making a start to the process eg 14 × 15 (= 210) **or** 14 × 15 × 6.50 (= 1365) **or** 1274 ÷ 6.50 (= 196) **or** 14 × 15 × 6.50 – 1274 (= 91) for a complete process eg (14 × 15 × 6.50 – 1274) ÷ 6.50 **or** 14 × 15 – (1274 ÷ 6.50) cao	
7	$\frac{13}{20}$	M1 A1	for 20 – 7 (= 13) **or** $\frac{7}{20}$ oe **or** 0.65 **or** 65% for $\frac{13}{20}$ or equivalent fraction	
8 (a) (b)	43 – 20 or ÷ 3	B1 B1	cao for ÷ 3 **or** – 20 **or** $\times\frac{1}{3}$ **or +** –20	

Paper: 1MA1/2F					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
9	(a)	5	M1	for listing numbers in order, eg 3 4 4 6 8 9 **or** answer of 4, 6 **or** answer of 8.5	Condone one error or additional number
			A1	cao	
	(b)	$\frac{2}{6}$	M1	for $\frac{2}{x}$ with $x > 2$ **or** for $\frac{y}{6}$ with $y < 6$	Incorrect notation can imply a correct method. Award M1 for eg 2 out of 6 **or** 2 in 6 **or** 2 : 6
			A1	for $\frac{2}{6}$ oe	Accept any equivalent fraction, decimal form 0.33(33..) or percentage form 33(.33..)%
	(c)	3, 6	P1	for at least one 3 **or** 5×5 (= 25)	Numbers may be seen on the cards (but the answer line takes precedence)
			A1	for 3, 6 or 6, 3	
10		16 35	P1	for process to find length of time in car park eg 8.40 ÷ 0.024 (= 350) **or** 0.024 × 60 (= 1.44) **and** 8.40 ÷ "1.44" (= 5.833...)	
			P1	for process to add "350" minutes to 10 45 eg 10 45 + 60 + 60 + 60 + 60 + 60 + 50 **or** 10 45 + "5 hours 50 minutes" **OR** for 4 35	Do not accept incorrect interpretation of time, eg 5.83 = 5 hours 83 minutes
			A1	for 16 35 **or** 435 pm	Accept 16 35 pm

Paper: 1MA1/2F					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
11	(a)	19	B1	cao	
	(b)	12.4 to 12.8	M1	for a complete method, eg attempts to read from the graph at a factor of 80 **and** scales up to 80 **or** attempts to read from the graph at two numbers that sum to 80 **and** finds the sum of their readings **or** 1 stone = "6"kg **and** 80 ÷ "6"	
			A1	for an answer in the range 12.4 to 12.8 **or** ft correct reading from graph	
12		0.35	P1	for $\left(\frac{1}{10}+\frac{3}{5}\right)\div 2$ **or** 0.1 **and** 0.6 **or** 10(%) **and** 60(%) **or** 35(%) **or** for converting to equivalent fractions with a common denominator eg $\frac{1}{10}$ **and** $\frac{6}{10}$	
			A1	for $\frac{7}{20}$ oe **or** 0.35	

<table>
<tr><th colspan="5">Paper: 1MA1/2F</th></tr>
<tr><th>Question</th><th>Answer</th><th>Mark</th><th>Mark scheme</th><th>Additional guidance</th></tr>
<tr><td>13</td><td>enlargement</td><td>B2

(B1</td><td>for correct enlargement

for any two sides correct or a correct enlargement with scale factor other than 3 or 1)</td><td>Any orientation</td></tr>
<tr><td>14</td><td>40 litres
(supported)</td><td>P1

P1

C1</td><td>for finding a cost linked to the correct volume for one offer
eg 120 litres = 3 × 3.50 (= (£)10.5(0)) or 120 litres = (£)9

OR for finding cost per litre or litres per £ for one offer
eg 3.50 ÷ 40 (= 0.0875) or 9 ÷ 120 (= 0.075)
or 40 ÷ 3.50 (= 11.4…) or 120 ÷ 9 (= 13.3…)

OR for working with bags in the ratio 2 : 1

for finding costs linked to the same volume for both offers
eg 120 litres = 3 × 3.50 (= (£)10.5(0)) and 120 litres = (£)9

OR for finding cost per litre or litres per £ for both offers
eg 3.50 ÷ 40 (= 0.0875) and 9 ÷ 120 (= 0.075)
or 40 ÷ 3.50 (= 11.4…) and 120 ÷ 9 (= 13.3…)

OR for a complete process to inform decision

‘40 litre bags’ supported by correct comparable values</td><td><table><tr><td>120 l</td><td>£10.50</td><td>£9</td></tr><tr><td>80 l</td><td>£7</td><td>£6</td></tr><tr><td>40 l</td><td>£3.50</td><td>£3</td></tr><tr><td>20 l</td><td>£1.75</td><td>£1.50</td></tr></table>

Clear indication that the 40 litre bags are better value for money supported by correct values for comparison</td></tr>
<tr><td>15</td><td>80</td><td>M1

M1

A1</td><td>for converting to cm

for use of scale eg 19.2 ÷ 24 (= 0.8) or 1920 ÷ 24 or [length] ÷ 24

cao</td><td>Can be done at any stage of the problem
eg 19.2 × 100 (=1920) or 0.8 × 100

[length] must come from an attempt to change 19.2 metres into cm</td></tr>
</table>

Paper: 1MA1/2F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
16	243	M1 A1	for $1.8 \div 100 \times 4500$ oe (= 81) **or** for a complete method eg $4500 \times 1.8 \times 3 \div 100$ oe **or** for 4743 **or** 4257 cao	Award M1 for 4500×1.018^n
17	26	M1 M1 A1 C1	for $ADB = 64$ **or** $ABD = 52$ for complete method, eg $(180 – 64 – 64) \div 2$ oe for 26 (dep on first M1) for two correct reasons appropriate to their method from base <u>angles</u> of <u>isosceles triangle</u> are equal sum of <u>angles</u> in a <u>triangle</u> = 180 sum of <u>angles</u> on a straight <u>line</u> = 180 the <u>exterior angle</u> of a triangle is <u>equal</u> to the sum of the <u>interior opposite angles</u>	May be shown on the diagram Correct method can be implied from angles on the diagram if no ambiguity or contradiction. Underlined words need to be shown; reasons need to be linked to their method; any reasons not linked, do not credit. There should be no incorrect reasons given.
18 (a)	$T = 4n – 5$	M1 M1 A1	for $2n$ **or** $n – 5$ **or** T = a linear expression in n for $n + 2n + n – 5$ oe **OR** for T = an expression in n with 2 of 3 ages correct eg $T = n + n^2 + n – 5$ for $T = 4n – 5$ oe eg $T = n + 2n + n – 5$	Allow variables other than n Each age must be an expression in n
(b)	$5m – 3m = 2m$	B1	for $5m – 3m = 2m$ indicated	

Paper: 1MA1/2F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
19	40	P1	for a process to find the maximum number of batches for one ingredient, eg 500 ÷ 175 (= 2.85...) **or** 300 ÷ 75 (= 4) **or** 625 ÷ 250 (= 2.5) **OR** for a process to find the amount of one ingredient for 1 biscuit, eg 175 ÷ 16 (= 10.9375) **or** 75 ÷ 16 (= 4.6875) **or** 250 ÷ 16 (= 15.625) **OR** for multiples of 175 : 75 : 250, eg 175 × 2 (= 350) **and** 75 × 2 (= 150) **and** 250 × 2 (= 500)	Figures may be truncated or rounded
		P1	(dep P1) identifies flour as the limiting factor **OR** for a process to find the maximum number of biscuits for one ingredient, eg butter: “2.85” × 16 **or** 500 ÷ “10.9..” oe (= 45.7...) sugar: “4” × 16 **or** 300 ÷ “4.6..” oe (= 64) flour: “2.5” × 16 **or** 625 ÷ “15.625” oe (= 40)	
		A1	cao SCB2 for answer of 32	

Paper: 1MA1/2F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
20	Shown (supported)	M1 A1 M1 C1	for substitution eg $4 \times 110 + 12$ for 452 (dep M1) for method to find value(s) needed for comparison eg $\frac{\text{"452"} - 442}{442} \times 100$ **OR** $\frac{5}{100} \times 442$ oe (= 22.1) **and** "452" – 442 (= 10) **OR** $\frac{5}{100} \times 442 + 442$ oe (= 464.1) **and** "452" shown with correct comparable values eg 2.2(6...)(%) **OR** 22.1 **and** 10 **OR** 452 **and** 464.1	

Paper: 1MA1/2F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
21	Two statements	C2 (C1	Two different statements **Acceptable** There is no 'frequency' label / *y*-axis is not labelled / no title for the *y*-axis The polygon should not be closed / have a line at the bottom / have first and last points connected (15, 6) has been plotted incorrectly / at (15, 8) / (The first point is at) 8 rather than 6 / First point is on an incorrect frequency **Not acceptable** There is no title / Points should be joined with a curve *x*-axis doesn't start at 0 There is no label The axes have not been labelled (*x* and *y*) The points haven't (all) been plotted correctly $10 < w \leq 20$ and $30 < w \leq 40$ have been plotted wrong The first point is plotted incorrectly, its at (15, 7) not (15, 6) The points have been joined up wrong / Points should not be joined in the shape of a triangle / They've connected all the points Done the midpoints rather than the numbers on the right side / The points are in the middle for one statement eg from those above)	Ignore additional statements provided no contradiction
22	127.5 and 128.5	B1 B1	for 127.5 in the correct position for 128.5 in the correct position	 Accept $128.4\dot{9}$ or 128.499...

Paper: 1MA1/2F					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
23		18	P1 P1 P1 A1	for 240 ÷ 10 (= 24) **or** 240 ÷ 8 (= 30) for 3 × "24" (= 72) **or** 7 × "24" (= 168) **or** 3 × "30" (= 90) **or** 5 × "30" (= 150) for 3 × "24" (= 72) **and** 3 × "30" (= 90) **or** 7 × "24" (= 168) **and** 5 × "30" (= 150) cao	Accept 3 + 7 for 10, 3 + 5 for 8
24	(i) (ii)	238 statement	P1 A1 C1	for working with proportion eg $\frac{17}{50} \times 700$ oe cao for statement **Acceptable** Sample is representative (otherwise answer wrong) Random sample (otherwise answer will be different) The 50 people are from the 700 (otherwise not accurate) 17 out of **every** 50 want a sports bag (otherwise answer will be different / wrong) There is no bias That the other 650 will want the same gifts as the 50 **Not acceptable** There would be more than 17 people who want the sports bag I rounded my answer 17 out of 50 want a sports bag A repeat of the calculation done in (i) Most of the people would want a sports bag References as what might change in the future (eg a change in membership) That all 700 people wanted a type of gift rather than no gift (otherwise would have changed my answer)	

Paper: 1MA1/2F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
25 (a)	F	B1	cao	
(b)	D	B1	cao	
26	Shown (supported)	M1	for method to find at least two terms, eg $2 \times 4^2 - 1$ (= 31) **and** $40 - 3^2$ (= 31)	1 7 17 31 49 71 97 127 161 199 39 36 31 24 15 4 –9
		M1	for generating at least three correct terms of each sequence	
		A1	for generating at least the terms 1, 7, 17, 31, 49 of the first sequence **and** at least the terms 39, 36, 31, 24, 15, 4 of the second sequence	
27	4.56×10^{-2}	M1	for 0.000000342 ÷ 0.0000075 **OR** for 0.0456 oe eg 0.456×10^{-1} **or** 45.6×10^{-3} **or** $\frac{57}{1250}$ **OR** for an answer of 4.56×10^{n}	
		A1	cao	
28	6	M1	for 720 ÷ 40 (= 18) **or** 720 ÷ 30 (= 24)	
		M1	for a complete process eg (720 ÷ 30) – (720 ÷ 40) **or** “18” × 4/3 – “18” **or** “24” – “24” × 3/4	
		A1	cao	

Paper: 1MA1/2F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
29	No (supported)	P1	for finding the area of 3 or more faces of the cuboid **and** adding eg (6 × 8) + (8 × 18) + (6 × 18) … or "48" + "144" + "108" … (= 300)	Could be an addition of *any* three faces eg 48 + 48 + 144 etc.
		P1	complete process to find surface area of cuboid, eg 6 × 8 × 2 + 6 × 18 × 2 + 8 × 18 × 2 (= 600)	
		P1	for process to find side length of cube, eg [surface area] ÷ 6 **and** square rooting (= 10) for a process to find the volume of the cuboid 6 × 8 × 18 (= 864) **and** cube rooting (= 9.52…) to find a side length	[surface area] must come from the addition of at least three attempts at area, but not from volume.
		P1	(dep on previous P1) for processes to find volume of cube **and** volume of cuboid, eg [side length]^3 (= 1000) **and** 6 × 8 × 18 (= 864) (dep on previous P1) for process to find surface area of cube, eg. ("9.52…")^2 × 6 (= 544.28…)	
		A1	No with 1000 **and** 864 **OR** No with 600 **and** 544(.28…)	

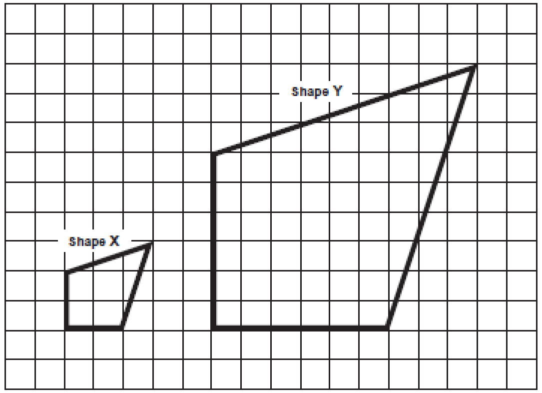
Paper: 1MA1/2F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
30	Vector drawn	M1	for 5 – 2 × 3 (= –1) **or** 2 – 2 × – 1 (= 4) seen as a calculation **OR** for $\begin{pmatrix}5\\2\end{pmatrix} - \begin{pmatrix}2\times 3\\2\times -1\end{pmatrix}$ **OR** for $\begin{pmatrix}-1\\b\end{pmatrix}$ **or** $\begin{pmatrix}a\\4\end{pmatrix}$ **OR** for $\begin{pmatrix}5\\2\end{pmatrix}$ **or** $\begin{pmatrix}-3\\1\end{pmatrix}$ **or** $\begin{pmatrix}-6\\2\end{pmatrix}$ drawn	May be in a column vector Condone missing arrows
		M1	for $\begin{pmatrix}-1\\4\end{pmatrix}$ **OR** for $\begin{pmatrix}-1\\4\end{pmatrix}$ drawn with no arrow or incorrect arrow **OR** for $\begin{pmatrix}-1\\b\end{pmatrix}$ **or** $\begin{pmatrix}a\\4\end{pmatrix}$ drawn with arrow, where $b \neq 4$ and $a \neq -1$	
		A1	cao	For this mark the drawn vector must include an arrow showing direction.

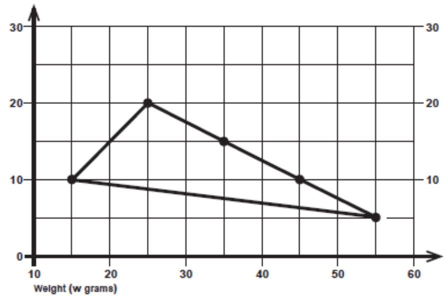
Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 2F

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 1MA1/2F			
Question		Modification	Mark scheme notes
1		Wording added ‘five’.	Standard mark scheme
8		Braille only – answer space labelled (i).	Standard mark scheme
9		Wording added ‘six’.	Standard mark scheme
10		Wording changed to ‘The charge for a car park in Spain is 0.024 euros per minute.’ Information box removed.	Standard mark scheme
11		Diagram enlarged. Right axis labelled. Graph line made thicker. Axes labels moved to the left of the horizontal axis and above the vertical axis. Wording added ‘It shows a graph used to change between stones and kilos.’ Part (a) wording changed to ‘Change 4 stones to kilograms.’	Standard mark scheme but apply the greater tolerance described above for taking readings.

PAPER: 1MA1/2F			
Question		Modification	Mark scheme notes
13		Diagram enlarged and changed:  Wording added ‘It shows shape X and shape Y on a grid of squares. ’Question changed to ‘Describe fully the single transformation that maps shape X to shape Y.’ Three answer lines provided.	Mark scheme: B1 for “enlargement” B1 for “scale factor 3” Do not award any marks for a description that mentions other transformations (other than enlargement)
14		Diagram removed. Wording changed to ‘Special offer 1 20 litres: 2 bags for £3.50 Special offer 2 40 litres: 3 bags for £9.	Standard mark scheme
17		Diagram enlarged. Wording added ‘It shows triangle *ADC*.’ ; Angle *DCA* is marked *x*.’ Angles moved outside of the angle arc and angle arc made smaller.	Standard mark scheme
18	(b)	MLP only: *x* changed to *y*. MLP and Braille: *a*, *b*, *c* changed to *r*, *s*, *t*. Braille only – expressions labelled (i) to (v) and tick boxes removed.	Standard mark scheme
19		Information box moved to Diagram Book.	Standard mark scheme

PAPER: 1MA1/2F			
Question		**Modification**	**Mark scheme notes**
21		Diagram enlarged and changed:  Crosses changed to solid circles. Axes label moved to the left of the horizontal axis. Frequency changed as follows: $10 < w \leq 20$ 5 $20 < w \leq 30$ 20 $30 < w \leq 40$ 15 $40 < w \leq 50$ 10 $50 < w \leq 60$ 5 Question wording changed from '50 potatoes' to '55 potatoes'.	Standard mark scheme, but reference to the first point is now "(15,5) has been incorrectly plotted at (15,10)"
23		Wording added 'Tom and Adam have some stamps.' Information moved to Diagram Book.	Standard mark scheme
25		Diagram enlarged. Graphs labelled as 'Graph A, graph B etc'.	Standard mark scheme
29		Diagrams enlarged; models should be provided for all candidates. Wording added 'The cuboid has length 18 cm, width 8 cm and height 6 cm.'	Standard mark scheme.
30		Diagram enlarged. Wording added 'It shows a grid.' Braille only - sticky label provided a-2b Question wording changed to 'On the grid, draw the vector a-2b. Label the vector.'	Standard mark scheme

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Mark Scheme (Results)

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Calculator) Paper 2H

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

November 2019
Publications Code 1MA1_2H_1911_MS

General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

1 All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first.

Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

2 All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no answer) indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

Questions where working is not required: In general, the correct answer should be given full marks.
Questions that specifically require working: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

3 **Crossed out work**
This should be marked **unless** the candidate has replaced it with
an alternative response.

4 **Choice of method**
If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.

If no answer appears on the answer line, mark both methods **then award the lower number of marks.**

5 **Incorrect method**
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review for your Team Leader to check.

6 **Follow through marks**
Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

7 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question or its context. (eg. an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg. incorrect algebraic simplification).

8 Probability

Probability answers must be given as a fraction, percentage or decimal. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

9 Linear equations

Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

10 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and all numbers within the range.

11 Number in brackets after a calculation

Where there is a number in brackets after a calculation E.g. 2 × 6 (=12) then the mark can be awarded **either** for the correct method, implied by the calculation **or** for the correct answer to the calculation.

12 Use of inverted commas

Some numbers in the mark scheme will appear inside inverted commas E.g. "12" × 50 ; the number in inverted commas cannot be any number – it must come from a correct method or process but the candidate may make an arithmetic error in their working.

13 Word in square brackets

Where a word is used in square brackets E.g. [area] × 1.5 : the value used for [area] does **not** have to come from a correct method or process but is the value that the candidate believes is the area. If there are any constraints on the value that can be used, details will be given in the mark scheme.

14 Misread

If a candidate misreads a number from the question. Eg. uses 252 instead of 255; method or process marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

Guidance on the use of abbreviations within this mark scheme	
M	method mark awarded for a correct method or partial method
P	process mark awarded for a correct process as part of a problem solving question
A	accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
C	communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity
B	unconditional accuracy mark (no method needed)
oe	or equivalent
cao	correct answer only
ft	follow through (when appropriate as per mark scheme)
sc	special case
dep	dependent (on a previous mark)
indep	independent
awrt	answer which rounds to
isw	ignore subsequent working

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
1	Two statements	C2 (C1	Two different statements **Acceptable** There is no ‘frequency’ label / y-axis is not labelled / no title for the y-axis The polygon should not be closed / have a line at the bottom / have first and last points connected (15, 6) has been plotted incorrectly / at (15, 8) / (The first point is at) 8 rather than 6 / First point is on an incorrect frequency **Not acceptable** There is no title / Points should be joined with a curve / x-axis doesn't start at 0 There is no label / The axes have not been labelled (x and y) The points haven't (all) been plotted correctly $10 < w \leq 20$ and $30 < w \leq 40$ have been plotted wrong The first point is plotted incorrectly, its at (15, 7) not (15, 6) The points have been joined up wrong / Points should not be joined in the shape of a triangle / They've connected all the points Done the midpoints rather than the numbers on the right side / The points are in the middle for one statement eg from those above)	Ignore additional statements provided no contradiction
2	127.5 and 128.5	B1 B1	for 127.5 in the correct position for 128.5 in the correct position	 Accept $128.4\dot{9}$ or 128.499...
3	18	P1 P1 P1 A1	for 240 ÷ 10 (= 24) **or** 240 ÷ 8 (= 30) for 3 × “24” (= 72) **or** 7 × “24” (= 168) **or** 3 × “30” (= 90) **or** 5 × “30” (= 150) for 3 × “24” (= 72) **and** 3 × “30” (= 90) **or** 7 × “24” (= 168) **and** 5 × “30” (= 150) Cao	Accept 3 + 7 for 10, 3 + 5 for 8

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
4 (i)	238	P1 A1	for working with proportion eg $\frac{17}{50}\times 700$ oe cao	
(ii)	statement	C1	for statement **Acceptable** Sample is representative (otherwise answer wrong) Random sample (otherwise answer will be different) The 50 people are from the 700 (otherwise not accurate) 17 out of **every** 50 want a sports bag (otherwise answer will be different / wrong) There is no bias That the other 650 will want the same gifts as the 50 **Not acceptable** There would be more than 17 people who want the sports bag I rounded my answer 17 out of 50 want a sports bag A repeat of the calculation done in (i) Most of the people would want a sports bag References as what might change in the future (eg a change in membership) That all 700 people wanted a type of gift rather than no gift (otherwise would have changed my answer)	
5 (a)	F	B1	cao	
(b)	D	B1	cao	
6	Shown (supported)	M1 M1 A1	for method to find at least two terms, eg $2 \times 4^2 - 1$ (= 31) **and** $40 - 3^2$ (= 31) for generating at least three correct terms of each sequence for generating at least the terms 1, 7, 17, 31, 49 of the first sequence **and** at least the terms 39, 36, 31, 24, 15, 4 of the second sequence	1 7 17 31 49 71 97 127 161 199 39 36 31 24 15 4 –9

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
7	4.56×10^{-2}	M1	for 0.000000342 ÷ 0.0000075 **OR** for 0.0456 oe eg 0.456×10^{-1} **or** 45.6×10^{-3} **or** $\frac{57}{1250}$ **OR** for an answer of 4.56×10^{n}	
		A1	cao	
8	6	M1	for 720 ÷ 40 (= 18) **or** 720 ÷ 30 (= 24)	
		M1	for a complete process eg (720 ÷ 30) – (720 ÷ 40) **or** “18” × 4/3 – “18” **or** “24” – “24” × 3/4	
		A1	cao	
9	No (supported)	P1	for finding the area of 3 or more faces of the cuboid **and** adding eg (6 × 8) + (8 × 18) + (6 × 18) … or “48” + “144” + “108” … (= 300)	Could be an addition of *any* three faces eg 48 + 48 + 144 etc.
		P1	complete process to find surface area of cuboid, eg 6 × 8 × 2 + 6 × 18 × 2 + 8 × 18 × 2 (= 600)	
		P1	for process to find side length of cube, eg [surface area] ÷ 6 **and** square rooting (= 10) **OR** for a process to find the volume of the cuboid 6 × 8 × 18 (= 864) **and** cube rooting (= 9.52…) to find a side length	[surface area] must come from the addition of at least three attempts at area, but not from volume.
		P1	(dep on previous P1) for processes to find volume of cube **and** volume of cuboid, eg $[\text{side length}]^3$ (= 1000) **and** 6 × 8 × 18 (= 864) **OR** (dep on previous P1) for process to find surface area of cube, eg. $(\text{“}9.52…\text{”})^2 \times 6$ (= 544.28…)	
		A1	No with 1000 **and** 864 **OR** No with 600 **and** 544(.28…)	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
10	$k = 2m - y^2$	M1	correct first step of showing an intention to square both sides with no algebraic ambiguity in any resulting statements, eg $y^2 = 2m - k$	
		A1	for $k = 2m - y^2$	
11 (a)	Explanation	C1	eg 'No' the median is 57	
(b)	Comparison	C1	(ft) a correct comparison of medians eg the median weight for Megan was greater than the median weight for Amy	Simply quoting values for median, range and IQR is insufficient, they must be compared Median Range IQR Megan 57 49 26 Amy 42 47 16 Figures given must be correct. Comparisons can relate to the range or the IQR
		C1	a correct comparison of a measure of spread eg the interquartile range of weights for Megan was greater than the interquartile range of weights for Amy For the award of both marks at least one of the comparisons must be in the context of the question	
12	32.1	P1	starts process, eg $\sin 40 = \frac{DB}{8.6}$ oe or for 8.6 × sin 40 (=5.52797…)	Accept values rounded or truncated to 2 dp.
		P1	complete process to find *ED*, eg (8.6 × sin40) ÷ 2 (=2.76...)	
		P1	process to find angle *EAD*, eg $\tan^{-1}\left(\frac{"2.76...."}{4.4}\right)$ or $\tan^{-1}$("0.628…")	
		A1	answer in range 32.09 to 32.2	If an answer in the range is seen in working and then incorrectly rounded award full marks

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
13	2.2	P1 P1 A1	works out interest for one year, eg 3550 × 0.026 (= 92.3(0)) **or** 3550 × 1.026 (=3642.3(0)) for compound interest calculation, eg 3550×1.026^2 (= 3736.9…) **or** for an answer given as 0.0219… or 1.0219… answer in range 2.19 to 2.2	If an answer in the range is seen in working and then incorrectly rounded award full marks
14	7	M1 A1	method to find number of combinations, eg 19 × 25 oe (= 475) **or** for 3325 ÷ 19 (= 175) **or** 3325 ÷ 25 (= 133) cao	
15	$6x^3 - 23x^2 - 33x - 10$	M1 M1 A1	for method to find the product of any two linear expressions (3 out of no more than 4 terms correct with correct signs or 4 correct terms ignoring signs) for method of multiplying out remaining products, half of which are correct (ft their first product) cao	Note that, for example, $6x^2 + 7x$ or $7x + 2$ are regarded as three terms in the expansion of $(3x + 2)(2x + 1)$ First product must be quadratic but need not be simplified or may be simplified incorrectly

<table>
<tr><th colspan="5">Paper: 1MA1/2H</th></tr>
<tr><th>Question</th><th>Answer</th><th>Mark</th><th>Mark scheme</th><th>Additional guidance</th></tr>
<tr><td>16</td><td>$\frac{52}{72}$</td><td>P1

P1

A1</td><td>for $\frac{4}{9}\times\frac{3}{8}$ $\left(\frac{12}{72}\right)$ or $\frac{4}{9}\times\frac{5}{8}$ or $\frac{5}{9}\times\frac{4}{8}$ $\left(\frac{20}{72}\right)$

for 1 – $\left(\frac{5}{9}\times\frac{4}{8}\right)$ or $\frac{4}{9}\times\frac{3}{8}+\frac{4}{9}\times\frac{5}{8}+\frac{5}{9}\times\frac{4}{8}$ oe

for $\frac{52}{72}$, $\frac{13}{18}$ oe
SC B1 for answer of $\frac{56}{81}$ (replacement)</td><td>

Accept equivalent fractions, decimals (0.72…) or percentages (72.22…..%)</td></tr>
<tr><td>17</td><td>61</td><td>B1

M1

A1</td><td>angle OAD = 90, may be marked on diagram

method to work out angle OAB (=29)

cao</td><td>Angle could be shown by a right-angle symbol

Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
Reasons need not be given.
Award 0 marks for an answer of 61 with no other working.</td></tr>
<tr><td>18</td><td>Bar of height 3.2</td><td>M1

M1

C1</td><td>method to find any frequency
eg 1.2 × 2.5 (= 3) or 2 × 2.5 (= 5) or 2.8 × 5 (= 14)
or 0.8 × 12.5 (= 10)

or method to use areas
eg 12 × 5 (=60) or 20 × 5 (=100) or 28 × 10 (=280) or 8 × 25 (=200)

complete method to find total frequency for the four intervals
eg “3” + “5” + “14” + “10” (=32)
or “60” + “100” + “280” + “200” (=640)

cao</td><td>Accept equivalent methods proportional to those shown</td></tr>
</table>

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
19	155	M1	for a complete method to find the volume of the hemisphere, eg $\frac{1}{2}\times\frac{4}{3}\times\pi\times4.2^3$ oe	
		A1	answer in range 155 to 155.2	If an answer in the range is seen in working and then incorrectly rounded award full marks
20	160 (supported)	B1	stating bound of 10.85 or 10.95	Accept $10.94\dot{9}$ or 10.9499... for 10.95
		M1	using both UB **and** LB to work out value of *d* eg [UB of *c*]^3 ÷ 8 **and** [LB of *c*]^3 ÷ 8 **or** gives a bound of 159.66... from correct working **or** gives a bound of 164.11... from correct working	$10.9 < \text{UB} \le 10.98$ $10.85 \le \text{LB} < 10.9$
		A1	for 159.66... **and** 164.11... from correct working	Accept bounds rounded or truncated to at least 4 sig fig
		C1	for 160 from 159.66... and 164.11... with a supporting reason eg “since both UB and LB round to 160”	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
21 (a)	52.5	P1	starts to find area under graph, eg $\frac{30\times12}{2}$ (=180) **or** 50 × 12 (=600) **or** $\frac{20\times12}{2}$ (=120)	
		P1	complete process to find area under graph, eg $\frac{30\times12}{2}+50\times12+\frac{20\times12}{2}$ (= 900)	
		P1	starts process to find half way time, eg ((“900” ÷ 2) – 180) ÷ 12 (=22.5)	
		A1	52.5 oe	
(b)	Comparison	C1	acceptable comparison **Acceptable** (acceleration) during first part is positive but (acceleration) during last part is negative / deceleration (acceleration is) greater during the last part than during the first part gradient is steeper in the last part / longer to speed up than slow down speed / (acceleration) is increasing at start and decreasing at end (acceleration) is slower in the first part (acceleration) is ascending in the first part and descending in the last part 0.4 is the first part and –0.6 in the last part **Not acceptable** goes down in the last part speed is greater in last part than first part	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
22 (a)	163 or 164	P1	uses formula eg 1.2 × 200 – 50 (= 190)	
		P1	for complete process, eg May: 1.2 × "190" – 50 (= 178) **and** June: 1.2 × "178" – 50 (= 163.6)	
		A1	for 163 or 164	
(b)	Statement	C1	(dep P1) ft statement, eg there won't be any rabbits, fewer rabbits, decrease	
23 (a)	Shown	C1	for a method to find the area of half of the parallelogram or of the whole parallelogram, eg ½(2x – 1)(10 – x) sin150 or ½(2x – 1)(10 – x)× ½ oe or (2x – 1)(10–x) sin150 or (2x – 1)(10–x) × ½ oe	
		C1	for a correct expansion of the whole area eg ½ (20x – 10 – 2x^2 + x) or ½ (–2x^2 + 21x – 10) or –x^2 + 10.5x – 5	
		C1	complete chain of reasoning with fully correct algebra dealing with the inequality eg x^2 – 10.5x + 5 < –15 or x^2 – 10.5x + 20 < 0 or 2x^2 – 21x + 10 < –30 which lead to 2x^2 – 21x + 40 < 0	
(b)	2.5 < x < 8	M1	for factorising, (2x – 5)(x – 8)	Could use the formula
		A1	for critical values, 2.5, 8	
		A1	for any statement that x is greater than 2.5 and x is less than 8	Need not be given as an inequality statement

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**

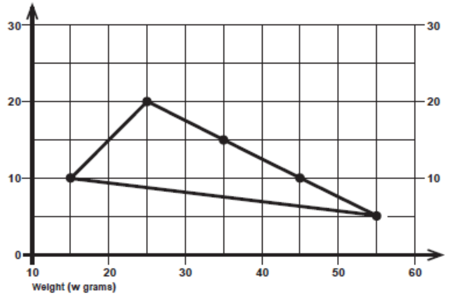
24	Description	C2
		
		(C1
			for (rotation) 90º clockwise about (–1, 0)
			or (rotation) 90º anticlockwise about (–1, 6)
			or (rotation) 180º about (–1, 2)
			or (rotation) 180º about (–1, 4)
			
			for (–1, 0) or (–1, 6) or (–1, 2) or (–1, 4))
				Award 0 marks if there is reference to other transformations eg coordinates given as vectors (which is a translation)

25	9.75	P1 P1 B1 P1 A1	process to find the gradient of **L** $\left(=-\frac{3}{2}\right)$ process to find the gradient of the perpendicular line **M** eg use of $-\frac{1}{m}$ or states gradient as $\frac{2}{3}$ **or** $y=\frac{2}{3}x+c$ (indep) gives y coordinate of B = 8.5 oe (dep P2) process to find x coordinate of C (= 3) or y coordinate of C (= 4) eg the first stage of solving equations or using elimination by substitution, to find a coordinate of C. 9.75 oe	 Could be indicated other ways, eg 8.5 on the y axis of a diagram ft their linear equation for M with L; allow some error in manipulation of these linear equations as long as the overall process is correct. Award 0 marks for a correct answer with no supportive working.

Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 2H

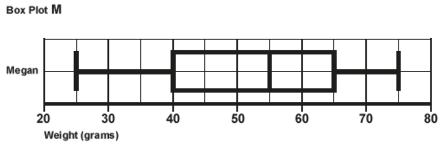
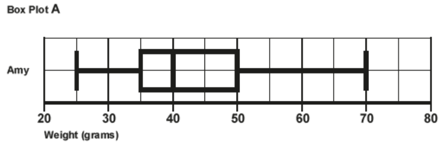
Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

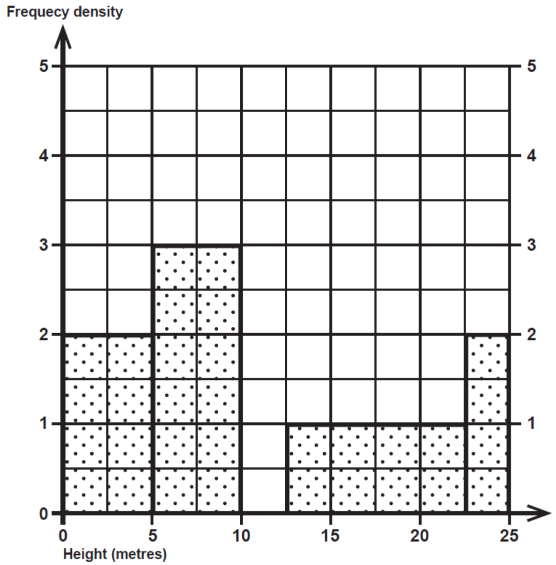
The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5º
Measurements of length: ±5 mm

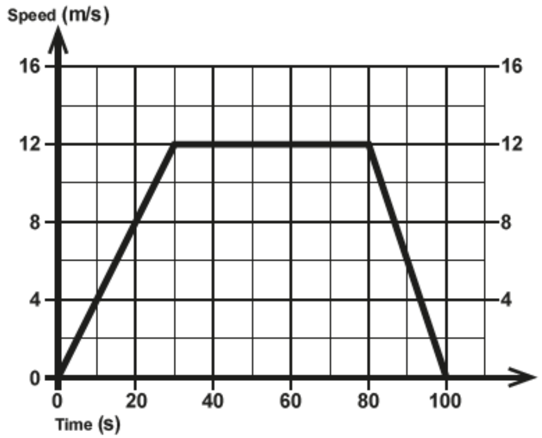
<table>
<tr><th colspan="4">PAPER: 1MA1_2H</th></tr>
<tr><th colspan="2">Question</th><th>Modification</th><th>Mark scheme notes</th></tr>
<tr><td>1</td><td></td><td>Diagram enlarged and changed:


Crosses changed to solid circles. Axes label moved to the left of the horizontal axis.
Frequency changed as follows: 10 < w ≤ 20 5 20 < w ≤ 30 20 30 < w ≤ 40 15
40 < w ≤ 50 10 50 < w ≤ 60 5
Question wording changed from ‘50 potatoes’ to ‘55 potatoes’.</td><td>Standard mark scheme, but reference to the first point is now “(15,5) has been incorrectly plotted at (15,10)”</td></tr>
<tr><td>3</td><td></td><td>Wording added ‘Tom and Adam have some stamps.’ Information moved to Diagram Book.</td><td>Standard mark scheme</td></tr>
<tr><td>5</td><td></td><td>Diagram enlarged. Graphs labelled as ‘Graph A, graph B etc’.</td><td>Standard mark scheme</td></tr>
<tr><td>9</td><td></td><td>Diagrams enlarged; models should be provided for all candidates.
Wording added ‘The cuboid has length 18 cm, width 8 cm and height 6 cm.’</td><td>Standard mark scheme.</td></tr>
</table>

PAPER: 1MA1_2H

Question		Modification	Mark scheme notes
11		Box plots changed as shown.   Wording added ‘They show box plot M and box plot A.’ Megan’s box plot labelled ‘Box plot M’ and Amy’s box plot labelled ‘Box plot A.’ Horizontal axes labels moved to the left. Megan’s box plot: Lowest 25, Highest 75, Median 55, IQR 40-65 (=25), range = 50 Amy’s box plot: Lowest 25, Highest 70, Median 40, IQR 35-60 (=25), range = 45	Part (a): C1 explanation eg ‘No’ the median is 55 Part (b): C1: a correct comparison of medians eg the median weight for Megan was greater than the median weight for Amy C1: a correct comparison of a measure of spread eg the IQR of weights for Megan was the same as the IQR of weights for Amy For the award of both marks at least one of the comparisons must be in the context of the question Additional guidance: Simply quoting values for median, range and IQR is insufficient, they must be compared Figures given must be correct. Comparisons can relate to the range or the IQR
12		Diagram enlarged. Angle *EAD* marked with an angle arc. Angle moved outside of the angle arc and the angle arc made smaller.	Standard mark scheme
15		MLP only: x changed to y.	Standard mark scheme with letters changed as indicated.
16		Wording added ‘Each card is numbered from 1-9.’	Standard mark scheme
17		Diagram enlarged. Angle moved outside of the angle arc and the angle arc made smaller.	Standard mark scheme

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
18		Histogram changed as shown below.  Diagram enlarged. Right axis labelled. Shading changed to dotty shading. Axes labels moved to the left of the horizontal axis and above the vertical axis. Wording added ‘It shows an incomplete histogram.’ Grid extended to 5 on the vertical axis.	Mark scheme adjusted as follows: M1: method to find any frequency, eg 2 × 5 (= 10) **or** 3 × 5 (= 15) **or** 1 × 10 (= 10) **or** 2 × 2.5 (= 5) oe **or** method to use areas eg 2 × 4 (=8) or 2 × 6 (=12) or 4 × 2 (=8) or 1 × 4 (=4) oe complete method to find total frequency for the four intervals eg “10 + “15” + “10” + “5” (=40) **or** “8” + “12” + “8” + “4” (=32) C1: Bar of height 4 (8 squares high)
19		Diagram enlarged. Wording added for MLP only ‘A hemisphere is half a sphere.’ Formula placed above hemisphere. Wording for Braille only: ‘The model represents a hemisphere with diameter 8.4cm.’	Standard mark scheme
20		Braille only- *c* changed to *r* and *d* changed to *s*	Standard mark scheme with the letters changed as indicated.

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
21		Diagram enlarged. Right axis labelled. Vertical axis marked in units of 4. Axes labels moved to the left of the horizontal axis and above the vertical axis. 	Standard mark scheme
23		Diagram enlarged. Angle moved outside of the angle arc and the angle arc made smaller. Wording added ‘with sides ($2x$ -1) cm and ($10 – x$) cm. An angle of 150° is marked’	Standard mark scheme
24		Diagram enlarged. Shading changed to dotty shading. Wording added ‘It shows square *ABCD* on a coordinate grid.’ Shape provided for all candidates labelled *ABCD* on both sides. Wording added ‘A cut out shape may be available if you wish to use it.’	Standard mark scheme

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Mark Scheme (Results)

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Calculator) Paper 3F

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

November 2019
Publications Code 1MA1_3F_1911_MS

General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

1 All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first. Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

2 All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no answer) indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

Questions where working is not required: In general, the correct answer should be given full marks.

Questions that specifically require working: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

3 **Crossed out work**

This should be marked **unless** the candidate has replaced it with an alternative response.

4 **Choice of method**

If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.

If no answer appears on the answer line, mark both methods **then award the lower number of marks.**

5 **Incorrect method**

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review for your Team Leader to check.

6 **Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

7 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question or its context. (eg. an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg. incorrect algebraic simplification).

8 Probability

Probability answers must be given as a fraction, percentage or decimal. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

9 Linear equations

Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

10 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and all numbers within the range.

11 Number in brackets after a calculation

Where there is a number in brackets after a calculation E.g. 2 × 6 (=12) then the mark can be awarded **either** for the correct method, implied by the calculation **or** for the correct answer to the calculation.

12 Use of inverted commas

Some numbers in the mark scheme will appear inside inverted commas E.g. "12" × 50 ; the number in inverted commas cannot be any number – it must come from a correct method or process but the candidate may make an arithmetic error in their working.

13 Word in square brackets

Where a word is used in square brackets E.g. [area] × 1.5 : the value used for [area] does **not** have to come from a correct method or process but is the value that the candidate believes is the area. If there are any constraints on the value that can be used, details will be given in the mark scheme.

14 Misread

If a candidate misreads a number from the question. Eg. uses 252 instead of 255; method or process marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

Guidance on the use of abbreviations within this mark scheme

M	method mark awarded for a correct method or partial method
P	process mark awarded for a correct process as part of a problem solving question
A	accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
C	communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity
B	unconditional accuracy mark (no method needed)
oe	or equivalent
cao	correct answer only
ft	follow through (when appropriate as per mark scheme)
sc	special case
dep	dependent (on a previous mark)
indep	independent
awrt	answer which rounds to
isw	ignore subsequent working

Paper: 1MA1/3F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
1	Two correct factors	B1	for 2 correct factors from 1, 2, 3, 4, 6, 12 and no incorrect factors	Accept one correct product
2	10	B1	cao	
3	$\frac{7}{10}$	B1	for $\frac{7}{10}$ or for any other equivalent fraction	Eg $\frac{70}{100}$
4	18	B1	cao	
5	4000	B1	cao	
6	3 : 5	B1	for 3 : 5 or for any other equivalent ratio	
7	35	M1 A1	for 4×8 (=32) cao	Award this mark if used ambiguously eg $4 \times 8 + 3 = 4 \times 11$ as long as 4×8 is stated
8	21, 28	B2 (B1	both correct one correct in the correct position **or** for 15 + 6 (= a) or a + 7 (= b) where $a \neq 21$ and $b \neq 28$)	May be written alongside the given sequence but if contradiction accept the answer line. If both correct, accept in either order. May be seen as "+6" next to the sequence

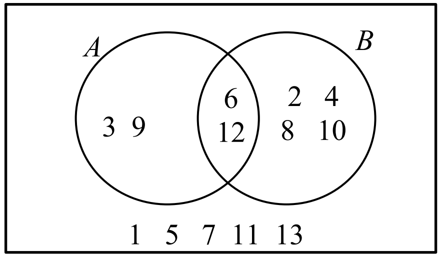
Paper: 1MA1/3F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
9 (a)	Correct frequencies 8, 3, 5, 2	B2	all frequencies correct	Correct tallies alone scores B1 Correct frequencies with no tallies scores B2
		(B1	Starts to work with tallies, eg 2 tallies fully correct, or 2 frequencies fully correct)	Tallies need not be crossed
(b)	Bar chart	M1	for labelling pet names on the horizontal axis or bars **OR** a linear scale on the vertical axis.	Accept unambiguous abbreviations for labels, eg D, R, C, H Horizontal axis does not need "pet" label
		M1	for at least two correct bars ft their table in (a)	Condone bars of unequal width Condone no gaps or inconsistent gaps Bars must be unambiguously correct for their scale
		A1	for a fully correct bar graph ft from their frequencies or tallies in (a).	All four bars must be correct with labels, ft, to award this mark. Vertical axis must have a suitable label, accept unambiguous abbreviations, eg freq or number Condone no gaps, or inconsistent gaps. Condone bars of unequal width Horizontal axis does not need "pet" label
(c)	dog	B1	cao or ft from frequencies in (a) **or** chart in (b)	Mark to the benefit of the candidate if table and graph are different.

Paper: 1MA1/3F					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
10	(a)	Diameter drawn	B1	diameter drawn	Accept hand drawn, intention through centre and from edge to edge. Ruler not required but intention clear.
	(b)	Segment shaded	B1	segment drawn unambiguously	Line must go edge to edge (condone extending outside the circle). Freehand acceptable. Can also draw a diameter here (as semi-circle).
11	(a)	2.5(0)	P1	for 13 × 7.5(0) (=97.5(0)) **or** 5 × 20 (=100)	
			P1	for "100" – "97.5(0)"	
			A1	cao	
	(b)	96	M1	for $\frac{1}{5}$ × 120 (= 24) oe **or** $\frac{4}{5}$ × 120 oe	
			A1	cao	
12		6	P1	process to find the weight of small boxes eg 3 × 450 (=1350)	
			P1	complete process to find the number of large boxes, eg (5850 – "1350") ÷ 750 **or** 5850 – "1350" (=4500) **and** 6 × 750 (=4500)	
			A1	cao	Cannot award this mark if 6 comes from a rounded value due to error in calculating
13		43	M1	for identifying 74 and 31 as the key numbers	It is insufficient to identify these on the diagram (eg as 1, 4) –43 as an answer implies M1
			A1	cao	

Paper: 1MA1/3F					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
14	(a)	Explanation	C1	for a correct explanation, eg that he has found the area not perimeter **Acceptable examples** He has found the area (not perimeter) He should have added The perimeter is 7+3+7+3 (=20) oe He did base×height He has timesed (not added) **Not acceptable examples** He has worked it out wrong He should have squared it He should have done 14×6 **or** 7×3×7×3 **or** 7×3 twice then add them He didn't include the top or the other side He should have doubled it It should be P=7×3 **or** he has done the sum not found the answer	Any incorrect statement as part of a correct response can be ignored unless it contradicts the statement, eg, he found area but perimeter equals 10
	(b)	Explanation	C1	for correct explanation, eg that you cannot have a length of −2 **Acceptable examples** x cannot be negative Cannot have a negative length Has to be positive It is impossible Can't have −2(cm) (as a measurement) It has to be more than 0 **Not acceptable examples** You can have −2 Won't add to 180 He has a minus sign and the other sides have add signs It has to be a whole number or decimal there are no negative numbers to get a negative answer there is no cm after his answer It should be +2	Any incorrect statement as part of a correct response can be ignored unless it contradicts the statement.

Paper: 1MA1/3F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
15	72	P1	for a correct process to find the number of boys or girls, eg boys = 0.55 × 800 (=440) **or** girls = 0.45 × 800 (=360) **or** process to find proportion that are boys having packed lunch, eg 0.55 × 0.4 (=0.22)	<table><tr><td></td><td>PL</td><td>SD</td><td>Total</td></tr><tr><td>Boys</td><td>176</td><td>264</td><td>440</td></tr><tr><td>Girls</td><td>72</td><td>288</td><td>360</td></tr><tr><td>Total</td><td>248</td><td>552</td><td>800</td></tr></table>
		P1	for a correct process to find the total number of school dinners or packed lunches, eg SD = 800 × 0.69 (=552) **or** PL = 800 × 0.31 (=248) **or** process to find proportion that are girls having packed lunch, eg 0.31 – "0.22" (=0.09) **or** process to find the number of boys having school dinner, eg "440" × 0.6 (= 264) **or** number of boys having packed lunch, eg "440" × 0.4 (=176)	
		P1	for a correct process to find the number of girls having packed lunches, eg "800" × "0.31" – (440 × 0.4) **or** "0.45" × "800" – ("800" × "0.69" – "440" × 0.6) **or** "0.09" × 800	
		A1	cao	

Paper: 1MA1/3F					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
16		blue 0.15 green 0.2	P1	for 1 – 0.4 – 0.25 (=0.35) oe	May work in percentages, condone missing % sign If the two numbers in the table sum to 0.35 that implies P1
			P1	for using the ratio, eg "0.35" ÷ (3 + 4) (=0.05) **or** "0.35" × $\frac{3}{7}$ (=0.15) **or** "0.35" × $\frac{4}{7}$ (=0.2)	One correct value in the table implies P2 7 can come from 3+4
			P1	for a complete process 3 × "0.05" (=0.15) **and** 4 × "0.05" (=0.2) **or** "0.35" – "0.15" (=0.2) **or** "0.35" – "0.2" (=0.15) **or** green 0.15, blue 0.2	
			A1	oe	Accept answers given in decimals, fractions or percentages.
17	(a)	−10, −6, 2, 6	B2	for 4 values correct −10, −6, (−2), 2, 6, (10)	
			(B1	for 2 or 3 values correct)	
	(b)	Graph drawn	M1	(ft from (a) if B1 awarded) for at least 5 points correctly plotted.	
			A1	correct graph drawn from $x = -1$ to 4	
18		Correct reflection	B2	correct triangle drawn with vertices (1, 2) (2, 2) (1, −1)	
			(B1	for a correct reflection in the line $y = a$ **or** a correct reflection in the line $x = 3$, **or** triangle in correct orientation with 2 of 3 vertices correct)	

Paper: 1MA1/3F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
19	17	M1 A1	for correctly expanding the bracket, as part of an equation to get $4x - 24 = 44$ **or** for dividing both sides of the equation by 4 as a first step, eg $\frac{4(x-6)}{4} = \frac{44}{4}$ oe cao	Award M1 for an embedded value of 17 if not identified as the answer
20	Venn Diagram	B1 M1 M1 A1	for labelling diagram, accept "multiples of 3" and "even numbers" for labels for correct numbers in at least one region for correct numbers in at least two regions for all regions correct	Ignore all entries except the region you are marking for each method mark 
21	8	M1 M1 A1	for 158220 – 146500 (=11720) **or** 158220 ÷ 146500 (=1.08) for complete method, eg (158220 – 146500) ÷ 146500×100 oe **or** 1.08×100 – 100 cao	0.08 as an answer implies M1

Paper: 1MA1/3F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
22 (a)	$x^2 - 4x - 45$	M1 A1	for 3 of 4 terms correct **or** 4 terms correct ignoring signs cao	3 terms correct can be implied, eg $x^2 - 4x + c$
(b)	$3x(3x + 2)$	B2 (B1	for $3x(3x + 2)$ for $3(3x^2 + 2x)$ **or** $x(9x + 6)$ **or** $3x(ax + b)$ where a and b are integers **or** $(3x + 2)$ as a factor)	
23 (a)	157.668(255)	M1 A1	for 836.4 **or** 5.304(809139) **or** 28.141 **or** a truncated or rounded version of 157.668255 to no less than 3 sf for 157.668(255)	Answer must be given to at least 3 decimal places rounded or truncated Accept a clear indication of the decimal point. Check first 3 decimal places only
(b)	157.7	B1	ft from part (a) provided answer to (a) has at least 5 sf	
24	35 to 42	M1 A1	for drawing a suitable line of best fit **or** for a line from $x = 34$ **or** for a point marked on the grid at $(34, y)$, y in the range 33 to 44 answer in the range 35 to 42	Line at $x = 34$ does not have to be full length of grid but should be in or reach the data set. Acceptable values for the data set are $y = 33$ to $y = 44$

<table>
<tr><th colspan="5">Paper: 1MA1/3F</th></tr>
<tr><th>Question</th><th>Answer</th><th>Mark</th><th>Mark scheme</th><th>Additional guidance</th></tr>
<tr><td>25</td><td>18.6</td><td>M1</td><td>for finding 4 products within intervals (including end points)</td><td><table><tr><th>Min fx</th><th>Max fx</th></tr><tr><td>5</td><td>10</td></tr><tr><td>20</td><td>30</td></tr><tr><td>105</td><td>140</td></tr><tr><td>160</td><td>200</td></tr></table></td></tr>
<tr><td></td><td></td><td>M1</td><td>for Σ“fx” ÷ (1+ 2 + 7 + 8)
or (7.5×1 +12.5×2 + 17.5×7 +22.5×8) ÷ (1+ 2 + 7 + 8)
or (“7.5” + “25” + “122.5” + “180”) ÷ “18”
or “335” ÷ “18”</td><td>Σ“fx” must come from 4 products fx within intervals (including end points)</td></tr>
<tr><td></td><td></td><td>A1</td><td>for 18.6(111…)</td><td></td></tr>
<tr><td>26</td><td>37 000</td><td>B1</td><td>cao</td><td></td></tr>
<tr><td>27</td><td>50</td><td>B1</td><td>for finding the time difference, eg, 1hr 18 mins or 78 mins oe</td><td>Allow 1.18 for this mark
118 scores B0</td></tr>
<tr><td></td><td></td><td>P1</td><td>for correct process to convert minutes to hours,
eg 18 ÷ 60 (=0.3) or 78 ÷ 60 (=1.3)
or for a correct process to convert speed in miles per minute to mph
eg “0.833...” × 60</td><td>For a conversion of time or speed</td></tr>
<tr><td></td><td></td><td>P1</td><td>for using speed = distance ÷ time eg, 65 ÷ [time]
or 65 ÷ 78 (=0.833...)</td><td>[time] is what the candidate clearly indicates as time difference</td></tr>
<tr><td></td><td></td><td>A1</td><td>cao

SCB2 for 83(.333…) seen as the answer</td><td></td></tr>
</table>

Paper: 1MA1/3F					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
28	(a)	3.246×10^7	B1	cao	
	(b)	0.00496	B1	cao	
	(c)	No with explanation	C1	No and explanation that B is bigger as the power of 10 is bigger. **Acceptable examples** She is incorrect as 10^8 is smaller than 10^9 No, because B has more digits than A No, A is millions but B is billions No, if you subtract A from B the answer is positive (but if you subtract B from A the answer is negative) A= 621200000, B=4730000000, B is bigger No because she did not take into account standard form No as when you find the ordinary number B is greater than A **Not acceptable examples** Yes… A = 5 zeros after the number where as B = 7 zeros after the number No as 4.73×10^9 is one more than 6.212×10^8 6.212 is to the power of 8 and 4.73 is to the power of 9 so there is an extra digit Asma is wrong because she has more numbers behind the decimal point which means that it will be bigger than A No B has more zeros	Decision eg “No” may be seen by the question. “She is incorrect” is equivalent to “no”

<table>
<tr><th colspan="5">Paper: 1MA1/3F</th></tr>
<tr><th>Question</th><th>Answer</th><th>Mark</th><th>Mark scheme</th><th>Additional guidance</th></tr>
<tr><td>29</td><td>45</td><td>P1

P1

P1

A1</td><td>for 180 – 117 (=63)
or states, or uses, exterior angle + x =117

for process to find the exterior or the interior angle of the pentagon,
eg 360 ÷ 5(=72) or 180 – (360 ÷ 5) (=108) or ((5–2) × 180) ÷ 5 (=108)

for a complete process to find x,
eg 180 – “72” – “63” or “108” – “63” or 117 – “72”

cao</td><td>Angles may be shown on the diagram.

Any angle labelled correctly as 63 and not contradicted scores this mark

Exterior = 108 or interior =72 does not score the mark

An answer of 45 with no supporting working scores 0</td></tr>
<tr><td>30</td><td>Result shown</td><td>M1

M1

C1</td><td>for finding the area of A or the area of B,
eg $(\pi \times 15^2) \div 4$ (=56.25π = 176.(7…) or 177)
or $\pi \times 2.5^2$ (= 6.25π = 19.6(3…))

for finding the area of A and the area of B,
eg $(\pi \times 15^2) \div 4$ or “6.25π” × 9 (=56.25π = 176.(7…) or 177)
AND $\pi \times 2.5^2$ or “56.25π” ÷ 9 (= 6.25π = 19.6(3…))

for conclusion
eg, $\sqrt{56.25\pi \div 9 \div \pi}$ =2.5 oe
or $\sqrt{\frac{6.25\pi \times 9 \times 4}{\pi}}$ = 15 oe
or 56.25π ÷ 9 = 19.6(3…) and $\pi \times 2.5^2$ = 19.6(3…) oe
or 6.25π × 9 = 176.(7…)or 177 and $(\pi \times 15^2) \div 4$ = 176(.7..) or 177 oe
or for $((\pi \times 15^2) \div 4) \div (\pi \times 2.5^2)$ =9 oe</td><td>May work without π or with an approximation of π
Values may be rounded or truncated</td></tr>
</table>

Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 3F

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5º
Measurements of length: ±5 mm

PAPER: 1MA1/3F			
Question		**Modification**	**Mark scheme notes**
2		Question changed to "Find ¼ of 30"	Mark scheme is B1 for 7.5 oe Accept $\frac{15}{2}$
4		Wording added 'six'.	Standard mark scheme
6		Diagram enlarged. Shading changed to dotty shading.	Standard mark scheme
7		Wording changed as follows: 'Find the value of w when u = 8 given that w = 4u + 3'	Standard mark scheme
9		Wording added 'Her results are shown in the Diagram Book.' Information stacked in 6 rows. Tally column enlarged. Braille only: key added: 'd = dog r = rabbit c = cat h = hamster' Part (a): Diagram enlarged. Wording 'below' removed. Braille only: labels provided as follows: dog rabbit cat hamster and numbers 1 – 10	Standard mark scheme, but see notes for Braille
10	(a)	Diagrams enlarged. Wording 'above' removed	Standard mark scheme

PAPER: 1MA1/3F			
Question		**Modification**	**Mark scheme notes**
10	(b)	Diagrams enlarged. Wording 'below' removed.	Standard mark scheme
13		Diagram enlarged. Key moved above the diagram.	Standard mark scheme
14	(a)	Wording changed 'It shows a rectangle with length 7 cm and width 3 cm.' Diagram enlarged. Dimensions moved to the top and the left of the diagram.	Standard mark scheme
14	(b)	Wording changed 'It shows a triangle. The sides of the triangle are $(y + 7)$ cm, $(y + 8)$ cm, y cm	Standard mark scheme, but see the letter change
16		Table turned to vertical format and left aligned. Braille only- spaces labelled (i) and (ii). Wording added 'There are two spaces to fill.'	Standard mark scheme
17		Table turned to vertical format and left aligned. Braille only – spaces labelled (i) to (iv). Wording added 'There are four spaces to fill.' Part (b) Diagram enlarged. Grid cut at 12 on the y axis.	Standard mark scheme
18		Diagram enlarged. Shape P moved to (1,5) (1,8) (2,5). Grid extended to 9 on the y axis. Shape labelled as shape P. Shading changed to dotty shading. Wording added 'It shows shape P on a coordinate grid. Unlabelled cut out shape may be provided. 'A cut out shape may be available if you wish to use it.'	For B2 the correct triangle drawn with vertices (1, 1) (1, −2) (2, 1) For B1 apply standard mark scheme
20		Diagram enlarged. 'Set A' and 'Set B' labelled. Braille only – spaces labelled (i) to (iv). Wording added 'It shows an incomplete Venn diagram.'	Standard mark scheme

PAPER: 1MA1/3F			
Question		**Modification**	**Mark scheme notes**
22		MLP only: *x* changed to *y*.	Standard mark scheme but note the letter change.
24		Diagram enlarged. Crosses changed to solid circles. Right axis labelled. Axes labels moved to the left of the horizontal axis and above the vertical axis. Question wording changed to 'Jamie got a mark of 35 in the Science test.'	M1 for for drawing a suitable line of best fit **or** for a line from $x = 35$ to a point at $(35, y)$, y in the range 30 – 45 **or** for a point marked on the grid at $(35, y)$, y in the range 30 – 45 A1 for an answer in the range 30 to 45
25		Frequency column widened.	Standard mark scheme
27		Wording changed to 'The table shows the information on his Sat Nav at 13 30.'	Standard mark scheme
29		Diagram enlarged. Angles moved outside angle arcs and angle arcs made smaller. Wording added 'Two angles are marked 117° and x°	Standard mark scheme
30		Diagram enlarged. Shapes labelled as 'shape A' and 'shape B'. Wording added 'It shows two shapes.', 'shape' added before 'A' and 'B'.	Standard mark scheme

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Pearson Edexcel

Mark Scheme (Results)

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Calculator) Paper 3H

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

November 2019
Publications Code 1MA1_3H_1911_MS

General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

1 All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first.

Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

2 All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no answer) indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

Questions where working is not required: In general, the correct answer should be given full marks.
Questions that specifically require working: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

3 **Crossed out work**
This should be marked **unless** the candidate has replaced it with
an alternative response.

4 **Choice of method**
If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.

If no answer appears on the answer line, mark both methods **then award the lower number of marks.**

5 **Incorrect method**
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review for your Team Leader to check.

6 **Follow through marks**
Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

7 **Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question or its context. (eg. an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg. incorrect algebraic simplification).

8 **Probability**

Probability answers must be given as a fraction, percentage or decimal. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

9 **Linear equations**

Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

10 **Range of answers**

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and all numbers within the range.

11 **Number in brackets after a calculation**

Where there is a number in brackets after a calculation E.g. 2 × 6 (=12) then the mark can be awarded **either** for the correct method, implied by the calculation **or** for the correct answer to the calculation.

12 **Use of inverted commas**

Some numbers in the mark scheme will appear inside inverted commas E.g. "12" × 50 ; the number in inverted commas cannot be any number – it must come from a correct method or process but the candidate may make an arithmetic error in their working.

13 **Word in square brackets**

Where a word is used in square brackets E.g. [area] × 1.5 : the value used for [area] does **not** have to come from a correct method or process but is the value that the candidate believes is the area. If there are any constraints on the value that can be used, details will be given in the mark scheme.

14 **Misread**

If a candidate misreads a number from the question. Eg. uses 252 instead of 255; method or process marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

Guidance on the use of abbreviations within this mark scheme	
M	method mark awarded for a correct method or partial method
P	process mark awarded for a correct process as part of a problem solving question
A	accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
C	communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity
B	unconditional accuracy mark (no method needed)
oe	or equivalent
cao	correct answer only
ft	follow through (when appropriate as per mark scheme)
sc	special case
dep	dependent (on a previous mark)
indep	independent
awrt	answer which rounds to
isw	ignore subsequent working

Paper: 1MA1/3H					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
1	(a)	$x^2 - 4x - 45$	M1 A1	for 3 of 4 terms correct **or** 4 terms correct ignoring signs cao	3 terms correct can be implied, eg $x^2 - 4x + c$
	(b)	$3x(3x + 2)$	B2 (B1	for $3x(3x + 2)$ for $3(3x^2 + 2x)$ **or** $x(9x + 6)$ **or** $3x(ax + b)$ where a and b are integers **or** $(3x + 2)$ as a factor)	
2	(a)	157.668(255)	M1 A1	for 836.4 **or** 5.304(809139) **or** 28.141 **or** a truncated or rounded version of 157.668255 to no less than 3 sf for 157.668(255)	Answer must be given to at least 3 decimal places rounded or truncated Accept a clear indication of the decimal point. Check first 3 decimal places only
	(b)	157.7	B1	ft from part (a) provided answer to (a) has at least 5 sf	
3		35 to 42	M1 A1	for drawing a suitable line of best fit **or** for a line from $x = 34$ **or** for a point marked on the grid at $(34, y)$, y in the range 33 to 44 answer in the range 35 to 42	Line at $x = 34$ does not have to be full length of grid but should be in or reach the data set. Acceptable values for the data set are $y = 33$ to $y = 44$

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
4	18.6	M1	for finding 4 products within intervals (including end points)	<table><tr><td>Min *fx*</td><td>Max *fx*</td></tr><tr><td>5</td><td>10</td></tr><tr><td>20</td><td>30</td></tr><tr><td>105</td><td>140</td></tr><tr><td>160</td><td>200</td></tr></table>
		M1	for Σ"*fx*" ÷ (1+ 2 + 7 + 8) **or** (7.5×1 +12.5×2 + 17.5×7 +22.5×8) ÷ (1+ 2 + 7 + 8) **or** ("7.5" + "25" + "122.5" + "180") ÷ "18" **or** "335" ÷ "18"	Σ"*fx*" **must** come from 4 products *fx* within intervals (including end points)
		A1	for 18.6(111…)	
5	37 000	B1	cao	
6	50	B1	for finding the time difference, eg, 1hr 18 mins or 78 mins oe	Allow 1.18 for this mark 118 scores B0
		P1	for correct process to convert minutes to hours, eg 18 ÷ 60 (=0.3) **or** 78 ÷ 60 (=1.3) **or** for a correct process to convert speed in miles per minute to mph eg "0.833.." × 60	For a conversion of time or speed
		P1	for using speed = distance ÷ time eg, 65 ÷ [time] **or** 65 ÷ 78 (=0.833..)	[time] is what the candidate clearly indicates as time difference
		A1	cao SCB2 for 83(.333…) seen as the answer	

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
7 (a)	3.246×10^7	B1	cao	
(b)	0.00496	B1	cao	
(c)	No with explanation	C1	No and explanation that B is bigger as the power of 10 is bigger. **Acceptable examples** She is incorrect as 10^8 is smaller than 10^9 No, because B has more digits than A No, A is millions but B is billions No, if you subtract A from B the answer is positive (but if you subtract B from A the answer is negative) A= 621200000, B=4730000000, B is bigger No because she did not take into account standard form No as when you find the ordinary number B is greater than A **Not acceptable examples** Yes… A = 5 zeros after the number where as B = 7 zeros after the number No as 4.73×10^9 is one more than 6.212×10^8 6.212 is to the power of 8 and 4.73 is to the power of 9 so there is an extra digit Asma is wrong because she has more numbers behind the decimal point which means that it will be bigger than A No B has more zeros	Decision eg “No” may be seen by the question. “She is incorrect” is equivalent to “no”

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
8	45	P1	for 180 – 117 (=63) **or** states, or uses, exterior angle + x =117	Angles may be shown on the diagram. Any angle labelled correctly as 63 and not contradicted scores this mark
		P1	for process to find the exterior or the interior angle of the pentagon, eg 360 ÷ 5(=72) **or** 180 – (360 ÷ 5) (=108) **or** ((5–2) × 180) ÷ 5 (=108)	Exterior = 108 or interior =72 does not score the mark
		P1	for a complete process to find x, eg 180 – "72" – "63" **or** "108" – "63" **or** 117 – "72"	
		A1	cao	An answer of 45 with no supporting working scores 0
9	Enlargement	B2	vertices at (2.5, 1) (2.5, 6) (5, 6)	
		(B1	for triangle of the correct size and orientation in the wrong position **or** a correct enlargement of a different scale factor centre (0, 1) **or** correct orientation with 2 of 3 vertices correct)	
10 (a)	8.5	M1	for multiplying both sides by 7 as a first step eg $9 + x = 7(11 - x)$ **or** dividing each term on the left hand side by 7 eg $\frac{9}{7} + \frac{x}{7} = 11 - x$	× 7 written near the equation is not enough for this mark
		M1	(dep M1) for method to isolate the x terms on one side	
		A1	oe	
(b)	$4(y + 3)$	B1	$4(y + 3)$ **or** $4y + 12$	

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
11	0.1709	M1	for one product, 0.07×0.98 (=0.0686) **or** 0.93×0.11 (=0.1023) **or** 0.07×0.02 (=0.0014) **or** 0.93×0.89 (= 0.8277)	If all products shown, award this mark
		M1	for a fully correct method, eg $0.07 \times 0.98 + 0.93 \times 0.11$ **or** $1 - (0.07 \times 0.02) - (0.93 \times 0.89)$	
		A1	oe	
12	Box plot	M1	for correctly identifying one of the LQ (188), median (197) or UQ (209) from the stem leaf	May be implied by one of these values being correctly plotted.
		M1	for showing a box and at least 3 correctly plotted values from 173, 188, 197, 209, 219	
		A1	for a fully correct box plot	
13	739	P1	process to find the volume of C, eg $\pi \times 3^2 \times 25$ (= 706.8583471 or 225π)	For use of 3.14 Volume of C is 706.5
		P1	process to find the volume of A **or** the volume of B, eg "706.8..." $\times \frac{2}{2+13}$ (= 94.24777961 or 30π) or "706.8…" $\times \frac{13}{2+13}$ (= 612.6105675 or 195π) **or** process to work with density and ratio, eg $(2 \times 1.21 + 13 \times 1.02)$ (= 15.68)	Volume of A is 94.2 Volume of B is 612.3
		P1	process to find the mass of C, eg "30π" $\times$ 1.21 (= 114.0398133) + "195π" $\times$ 1.02 (= 624.8627788) **or** "225π" $\times$ "15.68" $\div$ (2+13)	Mass of A is 113.982 Mass of B is 624.546
		A1	for an answer in the range 738.5 to 739	Do not award accuracy mark if the figure is from obvious incorrect working

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
14	$\frac{13}{20}$	P1	for finding the fraction who chose either soup ($\frac{2}{5}$ oe) or chose prawns ($\frac{3}{5}$ oe) **or** for process to share any number in the ratio 2 : 3 eg 100 ÷ (2 + 3) × 2 (=40)	Starting number 100 Soup : Prawn 40:60
		P1	for a process that could lead to the proportion who chose lasagne or curry for either starter, eg sharing 40% (soup) in the ratio 5 : 3 **or** sharing 60% (prawns) in the ratio 1 : 5 **or** $\frac{2}{5} \times \frac{5}{8}$ **or** $\frac{2}{5} \times \frac{3}{8}$ **or** $\frac{3}{5} \times \frac{1}{6}$ **or** $\frac{3}{5} \times \frac{5}{6}$ **or** for continuing the process with their starting number to find the number who chose lasagne or curry for either starter	L:C L:C 25:15 10:50
		P1	for a complete process to find the proportion who chose curry for **both** starters, eg$(\frac{2}{5} \times \frac{3}{8}) + (\frac{3}{5} \times \frac{5}{6})$ **or** to find the number who chose curry for **both** starter for their starting number	15 + 50 =65 and $\frac{15+50}{100}$
		A1	$\frac{13}{20}$ or equivalent fraction	

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
15	Proof	M1	for correct expressions for two consecutive even numbers eg $2n$ and $2n+2$	$(2n)^2 + (2n + 2)^2$ $= 4n^2 + 4n^2 + 8n + 4$ $= 8n^2 + 8n + 4 = 4(2n^2 + 2n + 1)$
		M1	(dep M1) for expanding both expressions with at least one expansion fully correct eg $4n^2$ and $4n^2 + 4n + 4n + 4$ **or** for factorising both terms and intention to square correctly eg $(2n)^2$ and $2^2(n+1)^2$	**Or** $(2n)^2 + (2n - 2)^2$ $= 4n^2 + 4n^2 - 8n + 4$ $= 8n^2 - 8n + 4 = 4(2n^2 - 2n + 1)$
		A1	complete proof	**Or** $(2n)^2 + (2n + 2)^2$ $= 4(n)^2 + 4(n + 1)^2$ $= 4(n^2 + (n + 1)^2)$
16	−7.5	M1	for stating a correct relationship, eg $y = \frac{k}{x^2}$ **or** $8 = \frac{k}{2.5^2}$	Accept $y \propto \frac{k}{x^2}$ where k may be 1
		A1	for $k = 50$, could be seen in an equation	
		A1	−7.5 oe	

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
17	2.7 and −0.7	M1	for $x^2-3 = 2x-1$ oe **or** $x^2-3-2x+1$ (=0) **or** completing the square eg (y=)$(x-1)^2-1-2$	
		M1	(dep M1) draws graph of $y = 2x-1$ **or** drawing the translated graph **or** describing the translation in words **or** −1.7 + 1 (= −0.7) **or** 1.7 + 1 (=2.7)	Line segments required For 1.7 allow from 1.6 to 1.8 For −1.7 allow from −1.8 to −1.6
		M1	shows the points of intersection clearly for the given quadratic graph and linear graph **or** for one correct solution from appropriate supportive working	Points indicated or attempt to read off x-axis at the appropriate points – maybe indicated by dashes
		A1	for x in the range 2.6 to 2.8 **and** −0.6 to −0.8 SCB2 for plotting $y = 2x + 1$ **and** values for x in the range −1.1 to −1.3 **and** 3.1 to 3.3	No marks will be awarded for correct answers only
18	1.95	P1	for correct substitution into the cosine rule, eg $3.4^2 = 6.1^2 + 6.2^2 - 2 \times 6.1 \times 6.2 \times \cos BCA$	Can be any angle within triangle ABC
		P1	for a full process to find BCA eg (cos BCA =) $\frac{6.1^2+6.2^2-3.4^2}{2\times 6.1\times 6.2}$ **or** (BCA =) 32(.08046913…)	P2 can be awarded for BCA = 32(.08046913…)
		P1	correct substitution into the sine rule, eg $\frac{DC}{\sin(\text{"32.08..."}\times\frac{2}{5})} = \frac{6.2}{\sin(180-\text{"32.08..."}-(\text{"32.08..."}\times\frac{2}{5}))}$	
		P1	for complete process to find DC eg (DC =) $\frac{6.2\times\sin\text{"12.832"}}{\sin\text{"135.088"}}$	
		A1	Answer in the range 1.94 to 1.951	Must not come from incorrect processing

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
19	3.4	M1	for drawing a suitable tangent at $t = 6$	
		M1	for a full method to find the gradient of the tangent at t=6, eg 20 ÷ 5.8	Use of change in y over change in x
		A1	answer in the range 3.05 to 3.7	Answers of $\frac{10}{6}$ oe scores no marks
20	$n^2 - 2n$	M1	for correct deduction from differences, eg 2nd difference of 2 implies $1n^2$ **or** gives a quadratic expression which includes the term $1n^2$ **or** states 1,4,9,16,25 and deduces 2,4,6,8,10	
		A1	oe	
21	$\frac{1}{81}$	M1	for finding the probability of heads eg $\sqrt[4]{\frac{16}{81}}$ $(=\frac{2}{3})$ **or** for finding the probability of tails $1 - \sqrt[4]{\frac{16}{81}}$ $(=\frac{1}{3})$	Seeing a probability of $\frac{2}{3}$ or $\frac{1}{3}$ is enough for this mark
		A1	oe	

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
22	$7x$	M1	multiplication by reciprocal, eg $\frac{7(x-2)}{(x-2)(x+6)} \times \frac{x(x+6)(x-6)}{x-6}$	Independent mark, may be awarded at any point
		M1	for factorising the numerator or denominator of the 1st fraction, eg $\frac{7(x-2)}{(x-2)(x+6)}$ **or** $\frac{7(x-2)}{x^2+4x-12}$ **or** $\frac{7x-14}{(x-2)(x+6)}$	
		M1	for factorising the denominator of the second fraction, eg $\frac{x-6}{x(x+6)(x-6)}$ $(=\frac{1}{x(x+6)})$	
		A1	completing the algebra to reach $7x$	
23	264	P1	correct substitution into the volume formula, eg $56.8 = \frac{1}{3} \times \pi \times r^2 \times 3.6$	
		P1	completes process to find base radius **or** the value of r^2, eg $r = \sqrt{\frac{56.8 \times 3}{\pi \times 3.6}}$ (=3.88158…) or $r^2 = \frac{56.8}{1.2\pi}$ (=15.066)	
		P1	Uses Pythagoras to find the sloping length, eg $\sqrt{\text{"3.88 ..."}^2 + 3.6^2}$ (=5.29.….)	
		P1	process to find an equation in AOB, eg $\pi \times$ "3.88" $\times$ "5.29" $= \frac{AOB}{360} \times \pi \times$ "5.29"^{2} **or** $\frac{AOB}{360} \times \pi \times 2 \times$ "5.29" $= 2 \times \pi \times$ "3.88" **or** $\frac{AOB}{360} \times$ "5.29" = "3.88"	AOB does not need to be the subject of the equation
		A1	answer in the range 263.9 to 264.1	

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
24	4 : 3	P1	Process to find a missing vector using the given ratios as fractions, eg. $\frac{1}{3}$ of $\overrightarrow{OX}$ (=$\frac{1}{3}$ **a**) or. $\frac{1}{4}$ of $\overrightarrow{OY}$ (=$\frac{1}{4}$ **b**)	
		P1	for a process to use $\overrightarrow{ZO} = \overrightarrow{YX} = \mathbf{a} - \mathbf{b}$ oe	Might be embedded in their answer for ZP
		P1	for a process to find either $\overrightarrow{ZP}$ or $\overrightarrow{ZR}$ in terms of **a** and **b**, eg. either $\overrightarrow{ZP} = \mathbf{a} - \mathbf{b} + \frac{1}{3}\mathbf{a}$ or $\overrightarrow{ZR} = \mathbf{a} - \mathbf{b} + \frac{1}{4}\mathbf{b}$	The award of this mark implies the first two process marks.
		P1	for a process to write $\overrightarrow{ZP}$ and $\overrightarrow{ZR}$ as multiples of the same vector, eg. multiplying both by 12 to get the ratio, $\frac{4}{3}$(**a** – 0.75**b**) and **a** – 0.75**b** respectively	
		A1	oe	

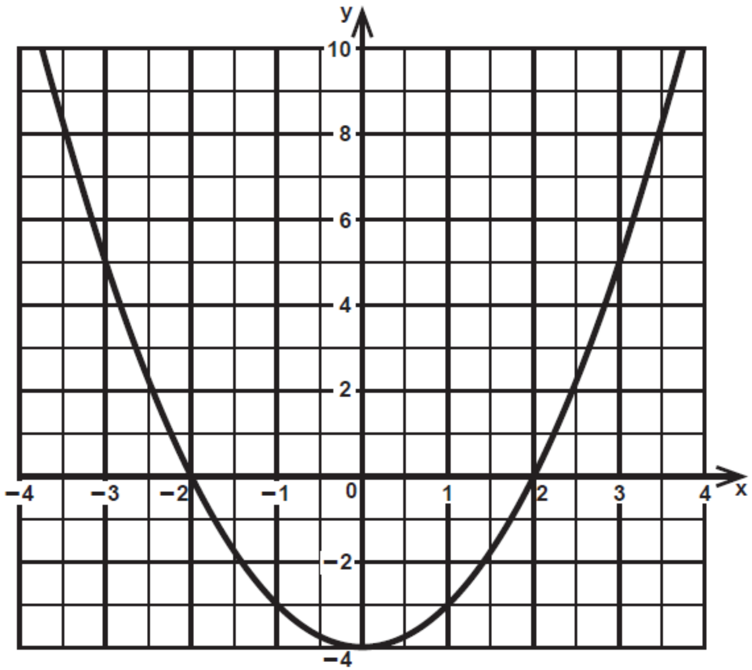
Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 3H

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
1		MLP only: x changed to y.	Standard mark scheme but note the letter change.
3		Diagram enlarged. Crosses changed to solid circles. Right axis labelled. Axes labels moved to the left of the horizontal axis and above the vertical axis. Question wording changed to 'Jamie got a mark of 35 in the Science test.'	M1 for for drawing a suitable line of best fit **or** for a line from $x = 35$ to a point at $(35, y)$, y in the range 30 – 45 **or** for a point marked on the grid at $(35, y)$, y in the range 30 – 45 A1 for an answer in the range 30 to 45
4		Frequency column widened.	Standard mark scheme
6		Wording changed to 'The table shows the information on his Sat Nav at 13 30.'	Standard mark scheme
8		Diagram enlarged. Angles moved outside angle arcs and angle arcs made smaller. Wording added 'Two angles are marked 117° and x°'	Standard mark scheme

PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
9		Wording added ‘It shows triangle A and triangle B on a coordinate grid.’ Diagram enlarged. Label removed from inside triangle. Shading removed. Enlargement drawn at (2.5,1), (2.5,6) (5,6) Triangles labelled as ‘triangle A’ and ‘triangle B’. Cross removed from (0,1) on the diagram. Grid cut at 7 on the x axis and 6 on the y axis. Grid cut before the *x* and *y* axes labels. Question wording now ‘Describe fully the transformation that maps triangle A onto triangle B.’ Three answer lines provided. Braille only: Two labelled shapes, triangle A and triangle B.	Amended mark scheme as follows: B1 for “enlargement scale factor 2.5” B1 for “centre (0,1) Award B0 for any mention of a different transformation.
10	(a)	MLP only: *x* changed to *y*.	Standard mark scheme but note letter change.
11		Diagram enlarged.	Standard mark scheme
12		Diagrams enlarged. Key moved above and to the left of the stem and leaf diagram. Horizontal line added to the base of the stem and leaf diagram. Wording changed to ‘Look at Diagram 1 and Diagram 2 for Question 12… Diagram 1 shows a stem and leaf diagram. Diagram 2 shows a grid.’ Wording added ‘below Diagram 1’. Numbers in the stem and leaf changed (see table below) 17 5 7 9 18 4 5 5 19 0 0 1 3 4 5 8 20 1 3 4 4 5 7 21 2 3 3 5	Amended mark scheme: P1 for correctly identifying one of the LQ (185), median (195) or UQ (205) from the stem leaf M1 for showing a box and at least 3 correctly plotted values from 175, 185, 195, 205, 215 A1 for a fully correct box plot

PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
14		Wording added ‘shown in the table.’	
17		Question wording 1st line changed to ‘It shows the graph of $y = x^2 - 4$’ Question demand changed to ‘Use the graph to find estimates to the equation $x^2 - 2x - 3 = 0$.’ Diagram enlarged and changed (see below). The graph line will go through (-3, 5) and (3,5). 	Mark scheme first P1 now process to rearrange the equation to $x^2 - 4 = 2x - 1$ Otherwise standard mark scheme.
18		Diagram enlarged.	Standard mark scheme
19		Diagram enlarged. Right axis labelled. Axes labels moved to the left of the horizontal axis and above the vertical axis.	Standard mark scheme

PAPER: 1MA1/3H			
Question		Modification	Mark scheme notes
23		Diagrams enlarged and model and shape may be provided. Sector *OACB* labelled as Diagram 1 and the cone labelled as Diagram 2. Add wording 'Diagram 1 shows a sector *OACB*... Diagram 2 shows a hollow cone…' There may be a model of the hollow cone and a cut out shape of the sector *OACB*. Wording added 'The formulae are shown above Diagram 1 and Diagram 2 in the Diagram Book.' Dashed lines made longer and thicker.	Standard mark scheme
24		Diagram enlarged.	Standard mark scheme

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Centre Number	Candidate Number

Tuesday 5 November 2019

Morning (Time: 1 hour 30 minutes)	Paper Reference **1MA1/1F**

Mathematics

Paper 1 (Non-Calculator)
Foundation Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.	Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may not be used.**

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Write down the value of the 7 in the number 1074

....

(Total for Question 1 is 1 mark)

---

2 Write 4.58 correct to 1 decimal place.

....

(Total for Question 2 is 1 mark)

---

3 Work out 31.7×100

....

(Total for Question 3 is 1 mark)

---

4 Write the fraction $\frac{28}{70}$ in its simplest form.

....

(Total for Question 4 is 1 mark)

---

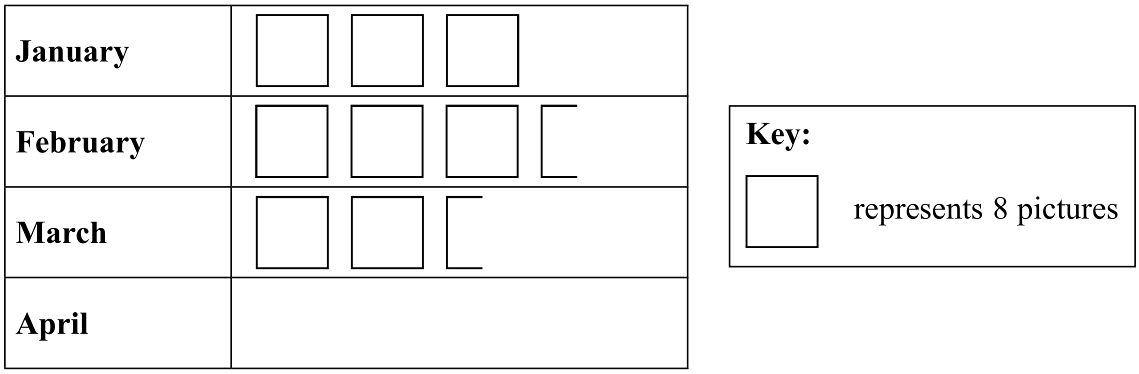
5 Write 15% as a decimal.

....

(Total for Question 5 is 1 mark)

---

6 The pictogram shows information about the number of pictures sold in an art shop in each of January, February and March.



(a) Write down the number of pictures sold in January.

....

(1)

12 pictures were sold in April.

(b) Show this information on the pictogram.

(1)

(c) What was the total number of pictures sold in these four months?

....

(2)

(Total for Question 6 is 4 marks)

---

7 Work out the difference, in minutes, between 1 hour 25 minutes and $1\frac{1}{4}$ hours.

.... minutes

(Total for Question 7 is 2 marks)

8 Prasha has five blocks of wood.

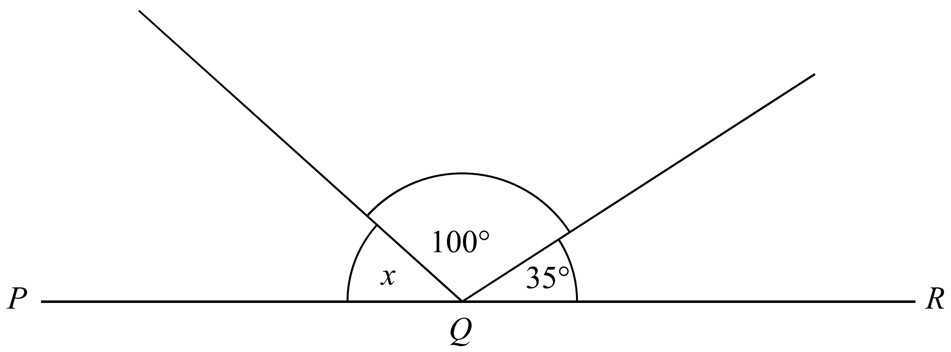
The total weight of all five blocks of wood is 3 kilograms.
4 of the blocks of wood each have a weight of 650 grams.

Work out the weight, in grams, of the other block of wood.

.... grams

(Total for Question 8 is 3 marks)

9 *PQR* is a straight line.



Work out the size of angle x.

.... °

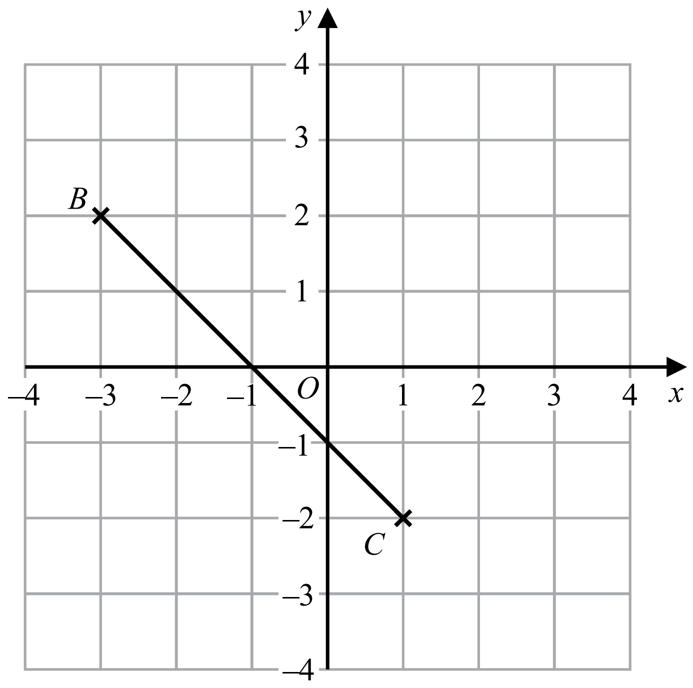
(Total for Question 9 is 2 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

10



(a) Plot the point with coordinates (3, 2)
Label this point *A*.

(1)

(b) Write down the coordinates of the midpoint of *BC*.

(.............................. , ...)

(1)

(Total for Question 10 is 2 marks)

---

11 Mason throws a coin 3 times.
The outcome of each throw is either Heads or Tails.

List all the possible outcomes of the 3 throws.

....

....

....

(Total for Question 11 is 2 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

12 Rehan is on holiday in the USA.

He has \$200 to spend on clothes.

Rehan buys

1 pair of trainers costing \$60
3 T-shirts costing \$25 each.

He also wants to buy a jacket costing \$80

(a) Has Rehan got enough money to buy the jacket?
You must show how you get your answer.

(3)

The trainers cost \$60
The exchange rate is \$1 = £0.749

Rehan says,

"The trainers cost less than £40"

Rehan is wrong.

(b) Using a suitable approximation, show working to explain why.

(2)

(Total for Question 12 is 5 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

13 (a) Simplify $2a \times 5b$

....

(1)

(b) Simplify $3x + 2y + 5x - y$

....

(2)

(Total for Question 13 is 3 marks)

---

14 Work out 23×15

....

(Total for Question 14 is 2 marks)

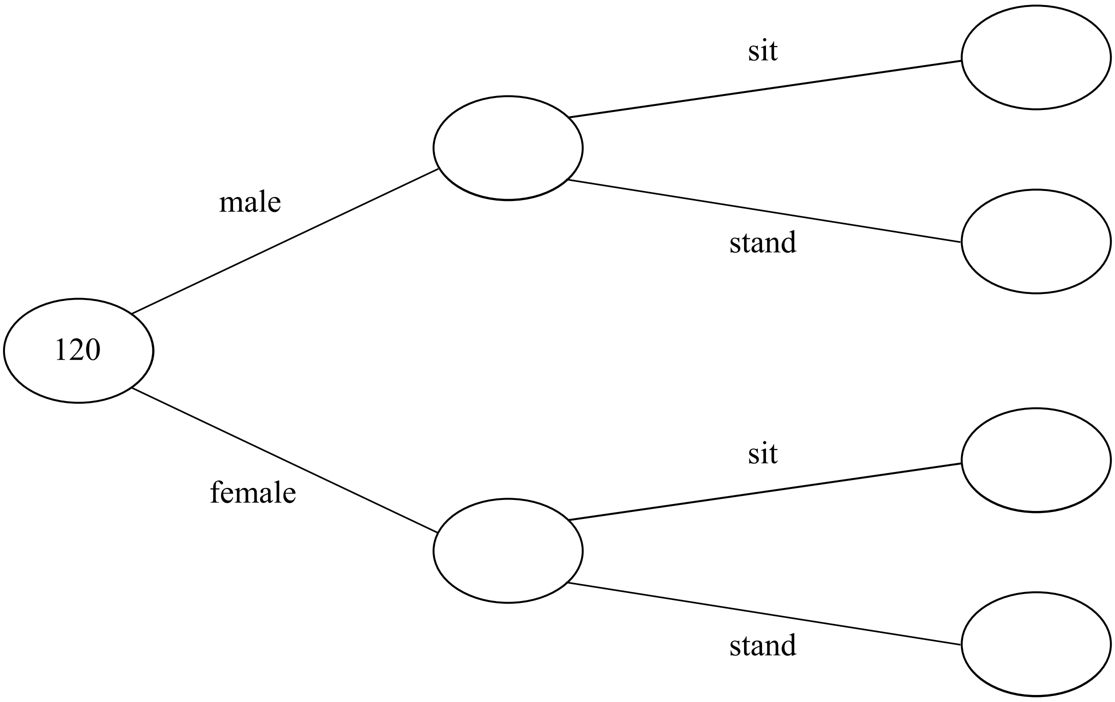
---

15 120 people were at a hockey match.

Each person was asked if they wanted to stand or to sit to watch the match.

75 of the people were female
29 of the males wanted to stand
30 of the people wanted to sit

(a) Use this information to complete the frequency tree.



(3)

One of the 120 people is chosen at random.

(b) Write down the probability that this person is a male who wanted to stand.

....

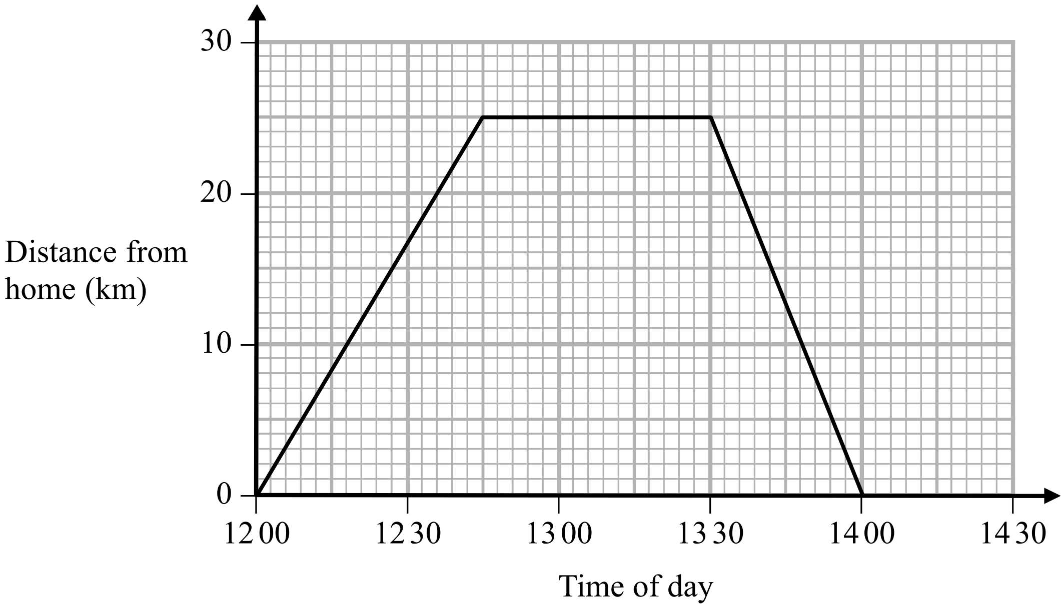
(1)

(Total for Question 15 is 4 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

16 Steve drove from his home to his friend's house.
He stayed at his friend's house and then drove home.

Here is Steve's travel graph.



(a) For how many minutes did Steve stay at his friend's house?

.... minutes
(1)

(b) What was Steve's average speed on his journey home?

.... km/h
(2)

(Total for Question 16 is 3 marks)

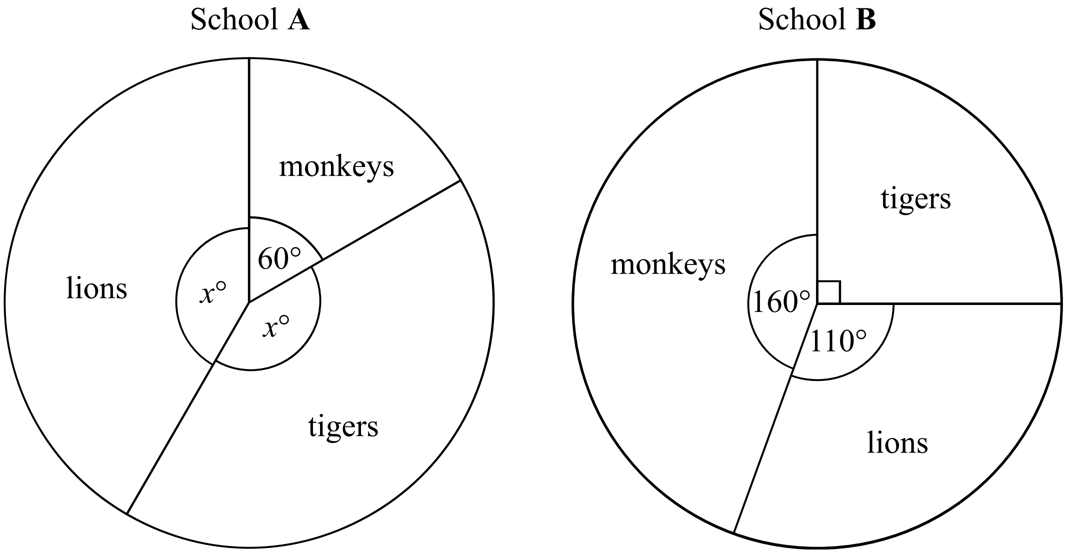
17 $x - 1 = 2$

Work out the value of $2x^2$

....

(Total for Question 17 is 3 marks)

18 The pie charts show information about the favourite animal of each student at school **A** and of each student at school **B**.



There are 480 students at school **A**.

There are 760 students at school **B**.

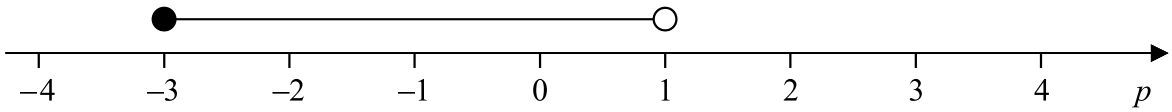
Henry says,

"The same number of students at each school have tigers as their favourite animal."

Is Henry correct?
You must show how you get your answer.

(Total for Question 18 is 4 marks)

19 Here is a number line.



Write down the inequality shown on the number line.

....

(Total for Question 19 is 2 marks)

---

20 Find the Lowest Common Multiple (LCM) of 108 and 120

....

(Total for Question 20 is 3 marks)

P 5 8 8 6 5 A 0 1 2 2 0

21 There are 60 people in a choir.
Half of the people in the choir are women.

The number of women in the choir is 3 times the number of men in the choir.
The rest of the people in the choir are children.

the number of children in the choir : the number of men in the choir = $n : 1$

Work out the value of n.
You must show how you get your answer.

n = ...

(Total for Question 21 is 4 marks)

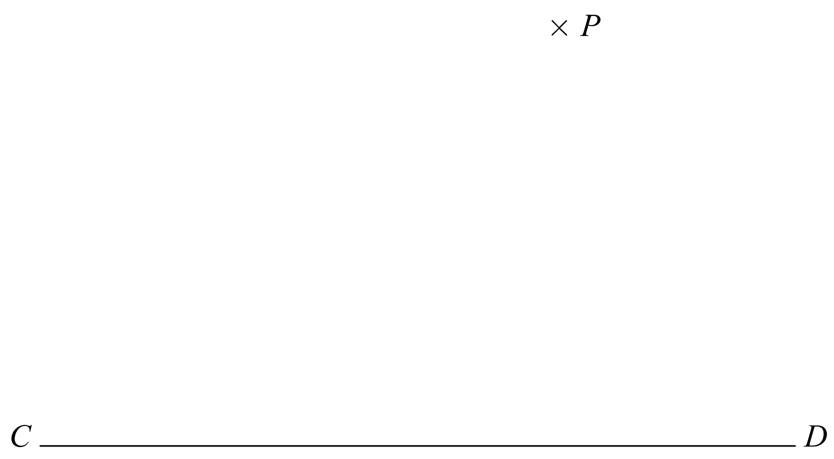
22 Work out $1\frac{3}{4} \times 1\frac{1}{3}$

Give your answer as a mixed number.

....

(Total for Question 22 is 3 marks)

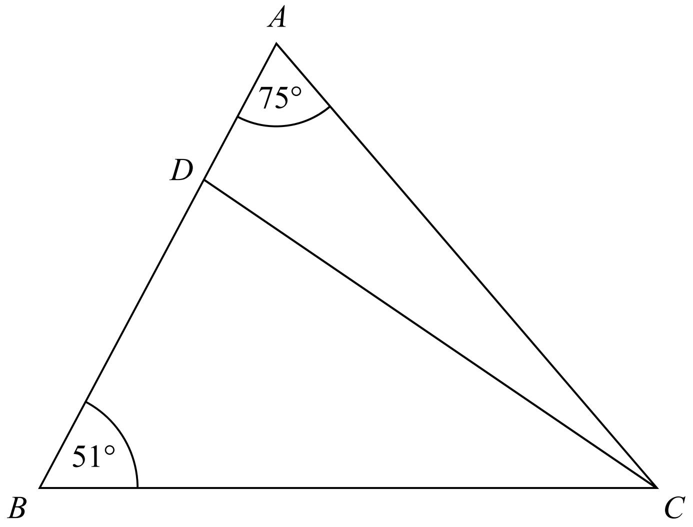
23 Use a ruler and compasses to construct the line from the point P perpendicular to the line CD.
You must show **all** construction lines.



(Total for Question 23 is 2 marks)

P 5 8 8 6 5 A 0 1 4 2 0

24 The diagram shows triangle *ABC*.



ADB is a straight line.

the size of angle *DCB* : the size of angle *ACD* = 2 : 1

Work out the size of angle *BDC*.

....°

(Total for Question 24 is 4 marks)

Turn over

25 4 red bricks have a mean weight of 5 kg.
5 blue bricks have a mean weight of 9 kg.
1 green brick has a weight of 6 kg.

Donna says,

"The mean weight of the 10 bricks is less than 7 kg."

Is Donna correct?
You must show how you get your answer.

(Total for Question 25 is 3 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

26 (a) Simplify $(p^2)^5$

....

(1)

(b) Simplify $12x^7y^3 \div 6x^3y$

....

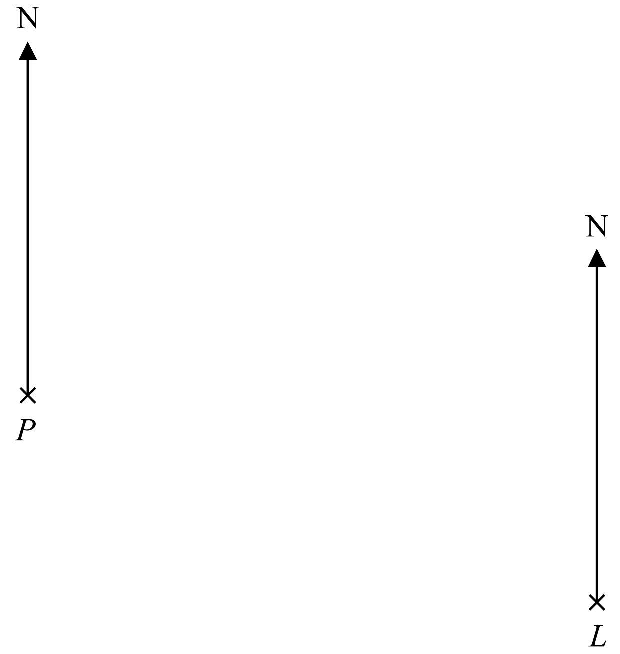
(2)

(Total for Question 26 is 3 marks)

P 5 8 8 6 5 A 0 1 7 2 0

Turn over

27 The accurate scale drawing shows the positions of port P and a lighthouse L.



Scale: 1 cm represents 4 km.

Aleena sails her boat from port P on a bearing of 070°

She sails for $1\frac{1}{2}$ hours at an average speed of 12 km/h to a port Q.

Find

(i) the distance, in km, of port Q from lighthouse L,

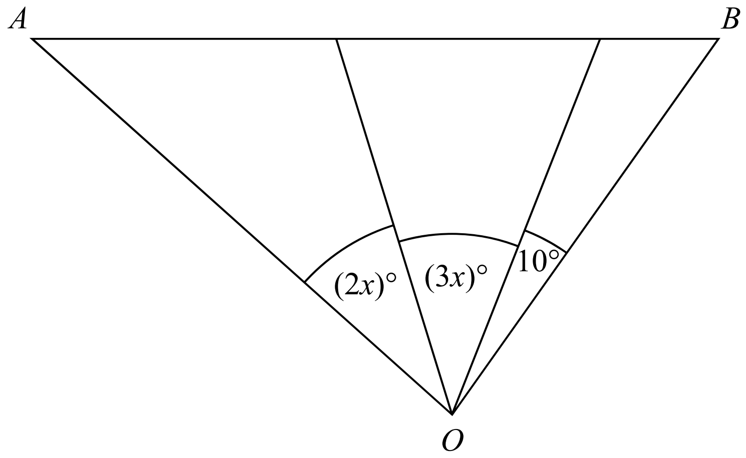
(ii) the bearing of port Q from lighthouse L.

distance QL = ... km

bearing of Q from L = ... °

(Total for Question 27 is 5 marks)

28 The diagram shows triangle *AOB*.



Angle *AOB* is **not** an obtuse angle.

Find the greatest value of x.
You must show all your working.

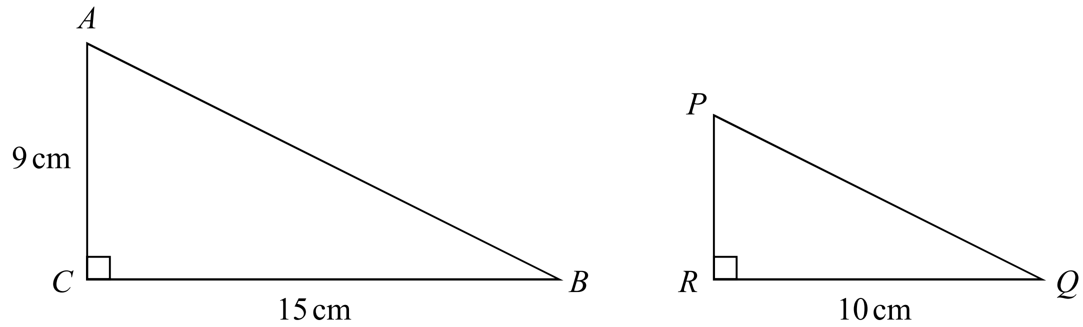
....

(Total for Question 28 is 3 marks)

P 5 8 8 6 5 A 0 1 9 2 0

Turn over

29 *ABC* and *PQR* are similar right-angled triangles.



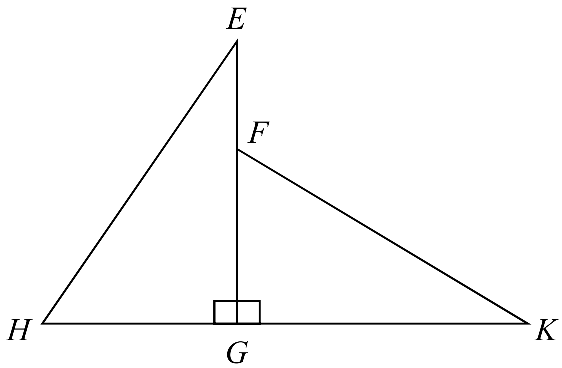
angle *ABC* = angle *PQR*

(a) Work out the length of *PR*.

.... cm

(2)

Triangle *EGH* is congruent to triangle *KGF*.



HK = 10 cm.
HG = 4 cm.

(b) Work out the length of *EF*.

.... cm

(2)

(Total for Question 29 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Centre Number	Candidate Number

Tuesday 5 November 2019

Morning (Time: 1 hour 30 minutes)	Paper Reference **1MA1/1H**

Mathematics

Paper 1 (Non-Calculator)
Higher Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may not be used.**

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over

P58866A

6/1/1/

P 5 8 8 6 6 A 0 1 2 4

Pearson

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Find the Lowest Common Multiple (LCM) of 108 and 120

....

(Total for Question 1 is 3 marks)

P 5 8 8 6 6 A 0 2 2 4

2 There are 60 people in a choir.
Half of the people in the choir are women.

The number of women in the choir is 3 times the number of men in the choir.
The rest of the people in the choir are children.

the number of children in the choir : the number of men in the choir = $n : 1$

Work out the value of n.
You must show how you get your answer.

n = ...

(Total for Question 2 is 4 marks)

---

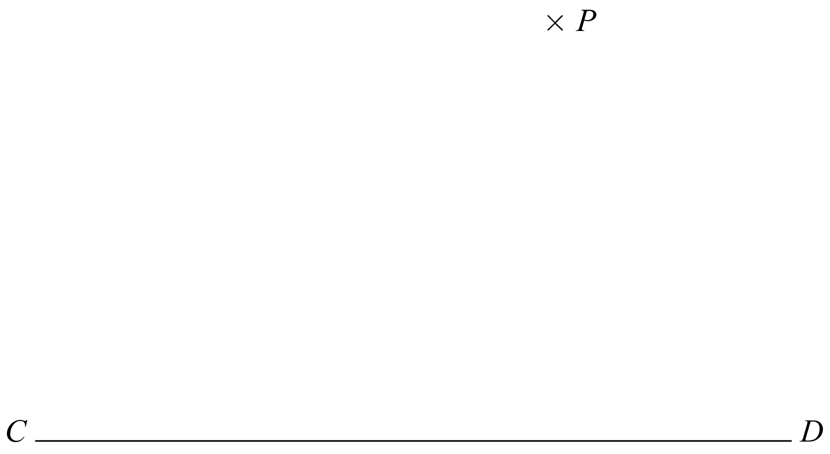
3 Work out $1\frac{3}{4} \times 1\frac{1}{3}$

Give your answer as a mixed number.

....

(Total for Question 3 is 3 marks)

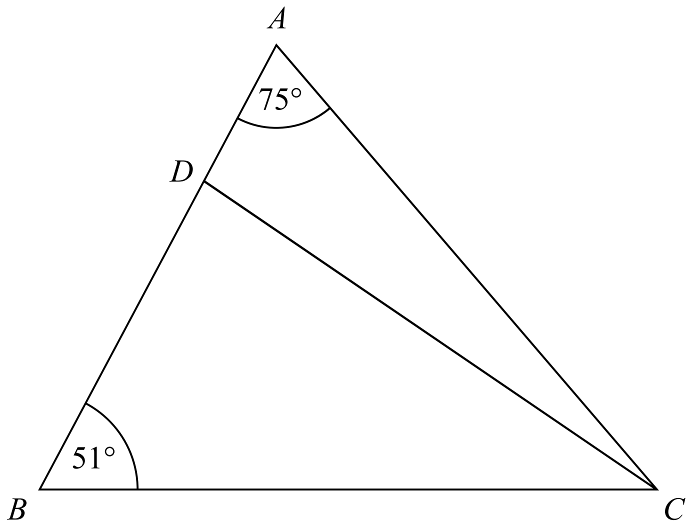
4 Use a ruler and compasses to construct the line from the point P perpendicular to the line CD.
You must show **all** construction lines.



(Total for Question 4 is 2 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

5 The diagram shows triangle *ABC*.



ADB is a straight line.

the size of angle *DCB* : the size of angle *ACD* = 2 : 1

Work out the size of angle *BDC*.

.... °

(Total for Question 5 is 4 marks)

6 4 red bricks have a mean weight of 5 kg.
5 blue bricks have a mean weight of 9 kg.
1 green brick has a weight of 6 kg.

Donna says,

"The mean weight of the 10 bricks is less than 7 kg."

Is Donna correct?
You must show how you get your answer.

(Total for Question 6 is 3 marks)

7 (a) Simplify $(p^2)^5$

....

(1)

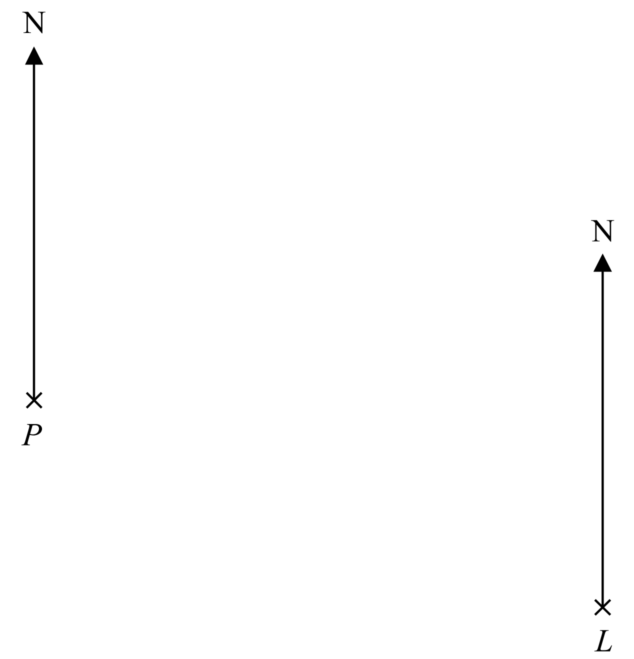
(b) Simplify $12x^7y^3 \div 6x^3y$

....

(2)

(Total for Question 7 is 3 marks)

8 The accurate scale drawing shows the positions of port P and a lighthouse L.



Scale: 1 cm represents 4 km.

Aleena sails her boat from port P on a bearing of 070°

She sails for $1\frac{1}{2}$ hours at an average speed of 12 km/h to a port Q.

Find

(i) the distance, in km, of port Q from lighthouse L,

(ii) the bearing of port Q from lighthouse L.

distance QL = ... km

bearing of Q from L = ... °

(Total for Question 8 is 5 marks)

9 A car travels for 18 minutes at an average speed of 72 km/h.

(a) How far will the car travel in these 18 minutes?

.... km

(2)

David says,

"72 kilometres per hour is faster than 20 metres per second."

(b) Is David correct?
You must show how you get your answer.

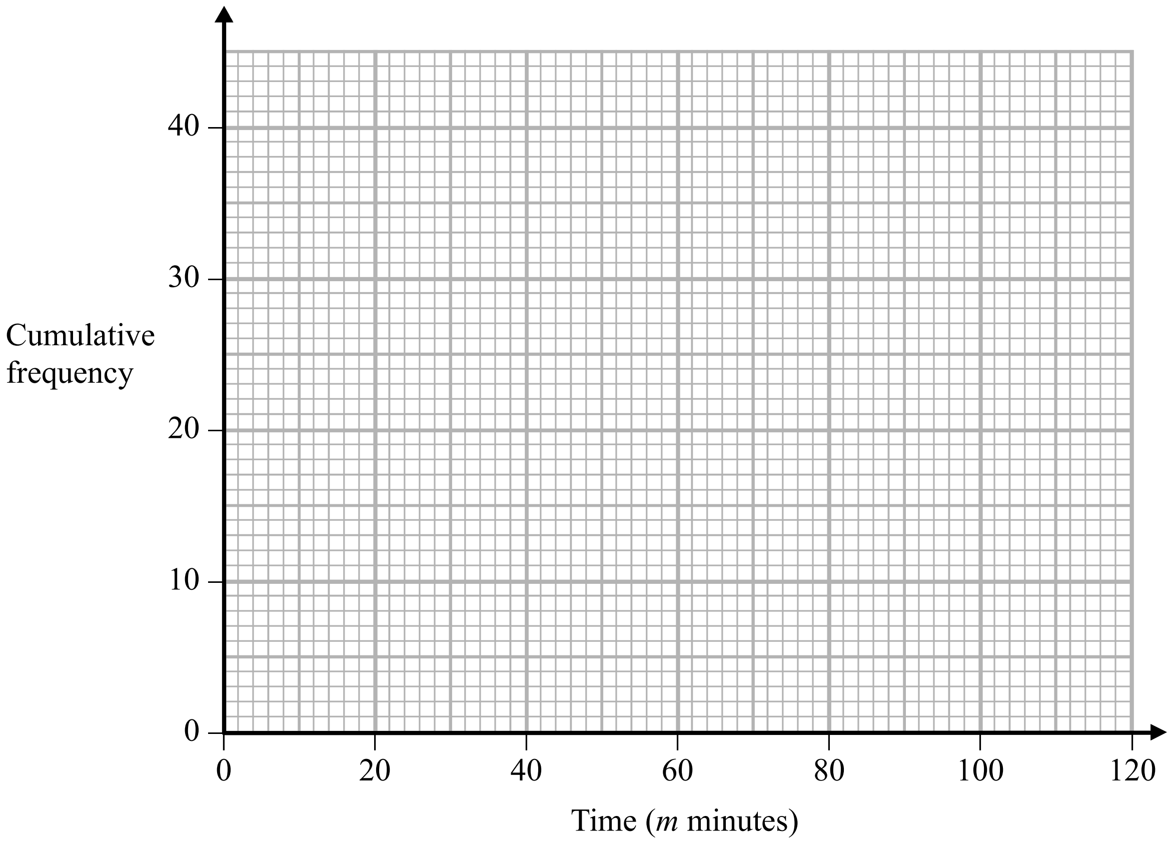
(2)

(Total for Question 9 is 4 marks)

10 The cumulative frequency table shows information about the times, in minutes, taken by 40 people to complete a puzzle.

Time (*m* minutes)	**Cumulative frequency**
$20 < m \leqslant 40$	5
$20 < m \leqslant 60$	25
$20 < m \leqslant 80$	35
$20 < m \leqslant 100$	38
$20 < m \leqslant 120$	40

(a) On the grid below, draw a cumulative frequency graph for this information.



(2)

(b) Use your graph to find an estimate for the interquartile range.

.... minutes

(2)

One of the 40 people is chosen at random.

(c) Use your graph to find an estimate for the probability that this person took between 50 minutes and 90 minutes to complete the puzzle.

....

(2)

(Total for Question 10 is 6 marks)

11 There are p counters in a bag.
12 of the counters are yellow.

Shafiq takes at random 30 counters from the bag.
5 of these 30 counters are yellow.

Work out an estimate for the value of p.

....

(Total for Question 11 is 2 marks)

12 $T = \dfrac{q}{2} + 5$

Here is Spencer's method to make q the subject of the formula.

$$2 \times T = q + 5$$

$$q = 2T - 5$$

What mistake did Spencer make in the first line of his method?

....

....

....

(Total for Question 12 is 1 mark)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

13 (a) Write $\dfrac{5}{x+1} + \dfrac{2}{3x}$ as a single fraction in its simplest form.

....

(2)

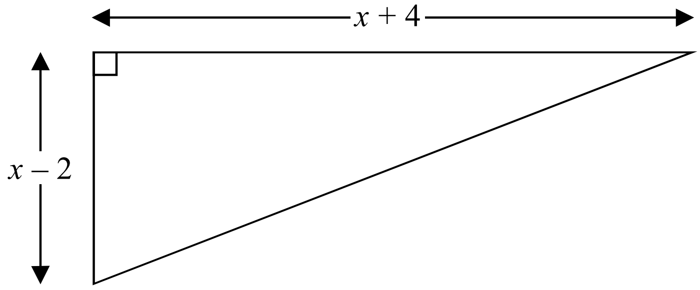
(b) Factorise $(x + y)^2 + 3(x + y)$

....

(1)

(Total for Question 13 is 3 marks)

14 The diagram shows a right-angled triangle.



All the measurements are in centimetres.

The area of the triangle is $27.5\,\text{cm}^2$

Work out the length of the shortest side of the triangle.
You must show all your working.

.... cm

(Total for Question 14 is 4 marks)

15 Express $0.4\dot{1}\dot{8}$ as a fraction.
You must show all your working.

....

(Total for Question 15 is 3 marks)

---

16 (a) Rationalise the denominator of $\dfrac{22}{\sqrt{11}}$

Give your answer in its simplest form.

....

(2)

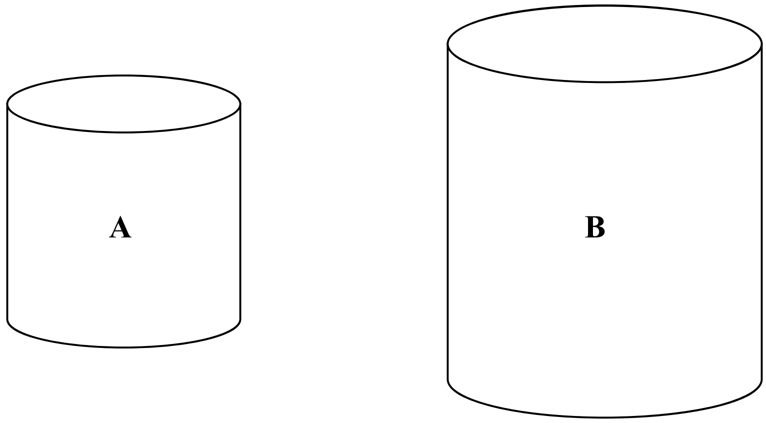
(b) Show that $\dfrac{\sqrt{3}}{2\sqrt{3}-1}$ can be written in the form $\dfrac{a+\sqrt{3}}{b}$ where a and b are integers.

(3)

(Total for Question 16 is 5 marks)

---

17 **A** and **B** are two similar cylindrical containers.



the surface area of container **A** : the surface area of container **B** = 4 : 9

Tyler fills container **A** with water.
She then pours all the water into container **B**.
Tyler repeats this and stops when container **B** is full of water.

Work out the number of times that Tyler fills container **A** with water.
You must show all your working.

....

(Total for Question 17 is 4 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

18 The function f is given by

$$f(x) = 2x^3 - 4$$

(a) Show that $f^{-1}(50) = 3$

(2)

The functions g and h are given by

$$g(x) = x + 2 \quad \text{and} \quad h(x) = x^2$$

(b) Find the values of x for which

$$hg(x) = 3x^2 + x - 1$$

....

(4)

(Total for Question 18 is 6 marks)

P 5 8 8 6 6 A 0 1 7 2 4

Turn over

19 Given that $9^{-\frac{1}{2}} = 27^{\frac{1}{4}} \div 3^{x+1}$

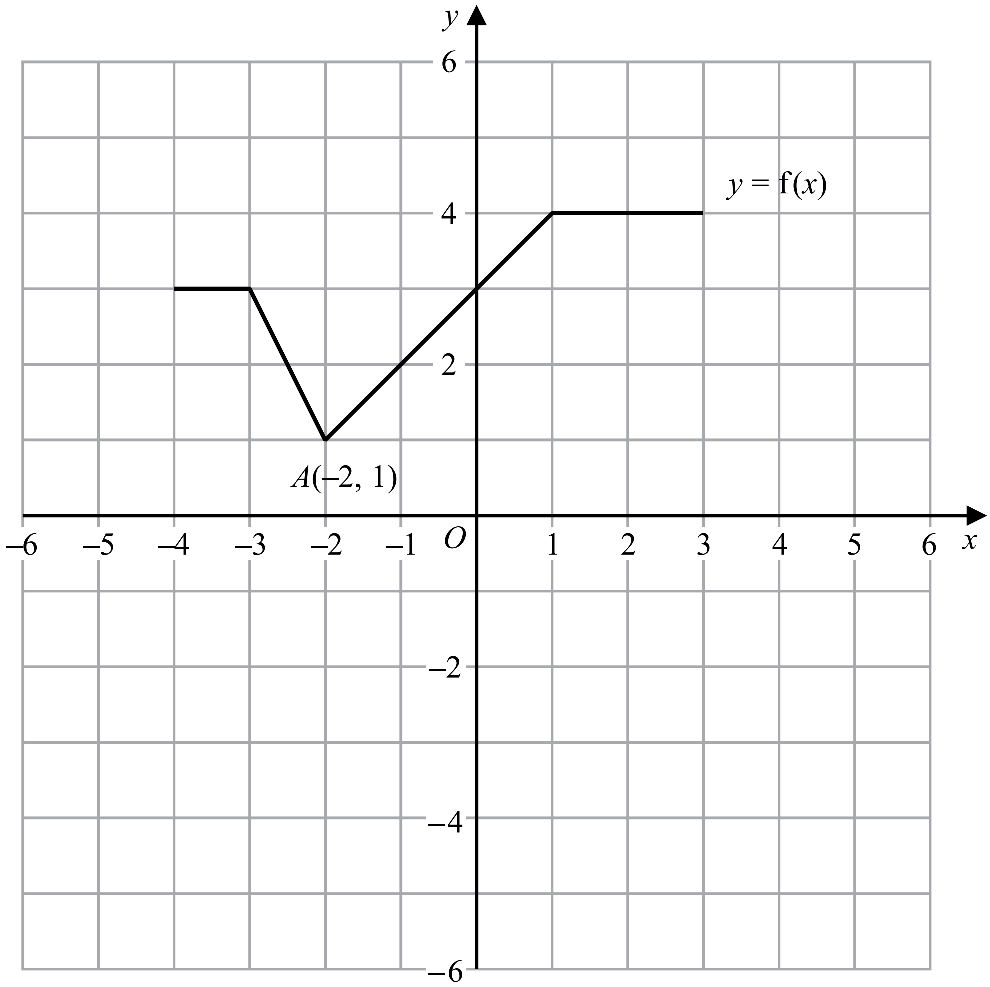
find the exact value of x.

$x =$ ....

(Total for Question 19 is 3 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

20 The graph of $y = f(x)$ is shown on the grid.



(a) On the grid, draw the graph with equation $y = f(x + 1) - 3$

(2)

Point $A(-2, 1)$ lies on the graph of $y = f(x)$.

When the graph of $y = f(x)$ is transformed to the graph with equation $y = f(-x)$, point A is mapped to point B.

(b) Write down the coordinates of point B.

(.............................. , ...)

(1)

(Total for Question 20 is 3 marks)

21 Sketch the graph of

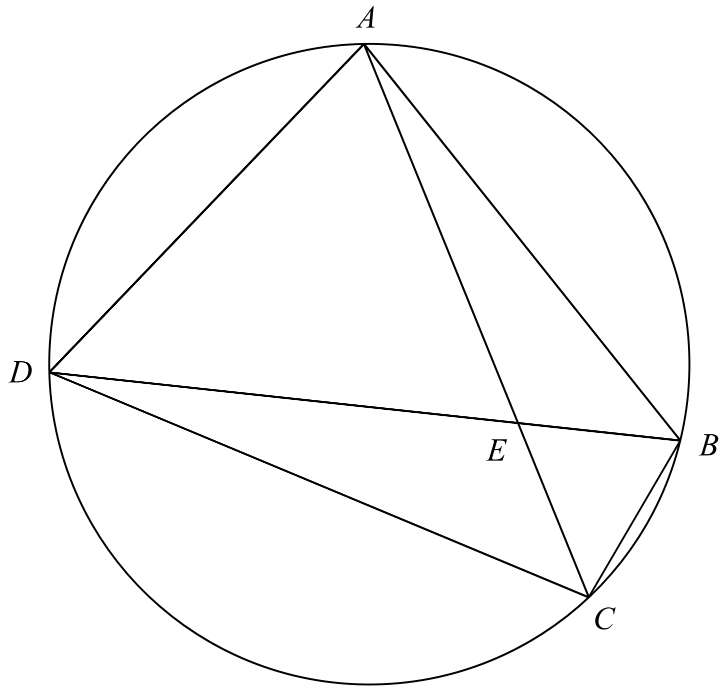
$$y = 2x^2 - 8x - 5$$

showing the coordinates of the turning point and the exact coordinates of any intercepts with the coordinate axes.

(Total for Question 21 is 5 marks)

P 5 8 8 6 6 A 0 2 0 2 4

22 *A*, *B*, *C* and *D* are four points on a circle.



AEC and *DEB* are straight lines.

Triangle *AED* is an equilateral triangle.

Prove that triangle *ABC* is congruent to triangle *DCB*.

(Total for Question 22 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

BLANK PAGE

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

BLANK PAGE

P 5 8 8 6 6 A 0 2 3 2 4

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

BLANK PAGE

Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Thursday 7 November 2019

Morning (Time: 1 hour 30 minutes) | Paper Reference **1MA1/2F**

Mathematics

Paper 2 (Calculator)
Foundation Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

6/1/1/

Pearson

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Write these numbers in order of size.
Start with the smallest number.

$$8 \qquad -4 \qquad 1 \qquad -7 \qquad -2$$

....

(Total for Question 1 is 1 mark)

---

2 Write the number 8375 correct to the nearest thousand.

....

(Total for Question 2 is 1 mark)

---

3 Write 0.23 as a percentage.

.... %

(Total for Question 3 is 1 mark)

---

4 Find the value of $\sqrt{17.64}$

....

(Total for Question 4 is 1 mark)

---

5 Find the value of 6^5

....

(Total for Question 5 is 1 mark)

6 There are 14 rows of seats in a cinema.
There are 15 seats in each row.

A film was shown in the cinema on Saturday.
Each ticket for the film cost £6.50

The tickets that were sold cost a total of £1274

How many tickets were **not** sold?

....

(Total for Question 6 is 3 marks)

7 Harry has 20 sweets.
He gives 7 of the sweets to Nadia.

What fraction of the 20 sweets does Harry have now?

....

(Total for Question 7 is 2 marks)

---

8 Here is a number machine.

input $\longrightarrow$ $\boxed{\times 8}$ $\longrightarrow$ $\boxed{-5}$ $\longrightarrow$ output

(a) Work out the output when the input is 6

....

(1)

Here is a different number machine.

input $\longrightarrow$ $\boxed{+13}$ $\longrightarrow$ $\boxed{\dots\dots}$ $\longrightarrow$ output

When the input is 17, the output is 10

(b) Complete the number machine.

(1)

(Total for Question 8 is 2 marks)

---

9 Here is a list of numbers.

6 4 8 9 4 3

(a) Work out the median.

....
(2)

Aisha picks at random one of the numbers.

(b) What is the probability that she picks an odd number?

....
(2)

Clara has five cards.
There is a number on each card.
Two of the numbers are hidden.

3	**?**	**8**	**5**	**?**

The mode of the five numbers is 3
The mean of the five numbers is 5

(c) Work out the two numbers that are hidden.

.... , ...
(2)

(Total for Question 9 is 6 marks)

10 Here is the charge at a car park in Spain.

Car park
0.024 euros per minute

Jon parked his car in this car park.

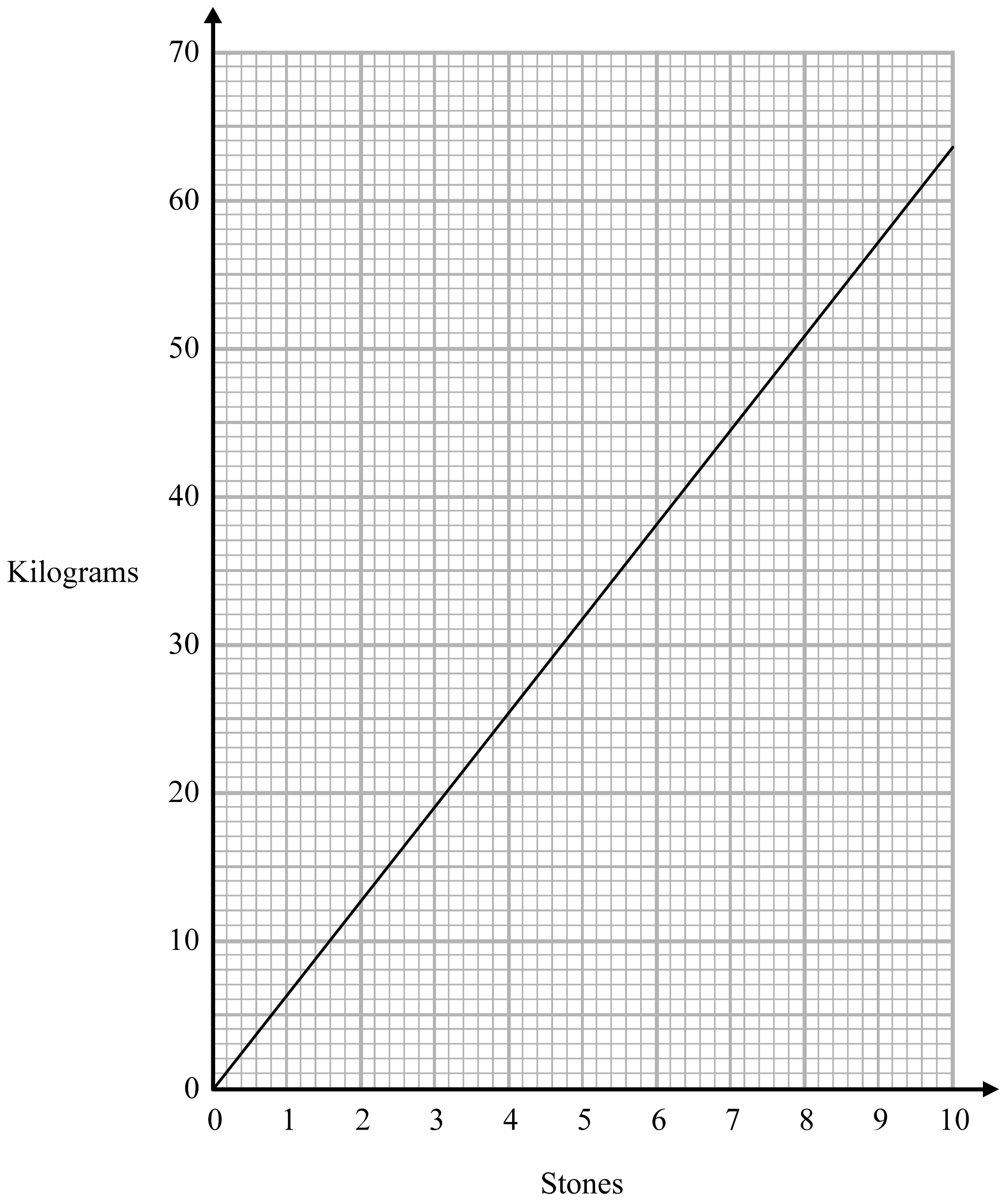
Jon drove into the car park at 10 45
When he drove out of the car park he had to pay 8.40 euros.

At what time did Jon drive out of the car park?

....

(Total for Question 10 is 3 marks)

11 You can use this graph to change between stones and kilograms.



(a) Change 3 stones to kilograms.

.... kilograms

(1)

(b) Change 80 kilograms to stones.

.... stones

(2)

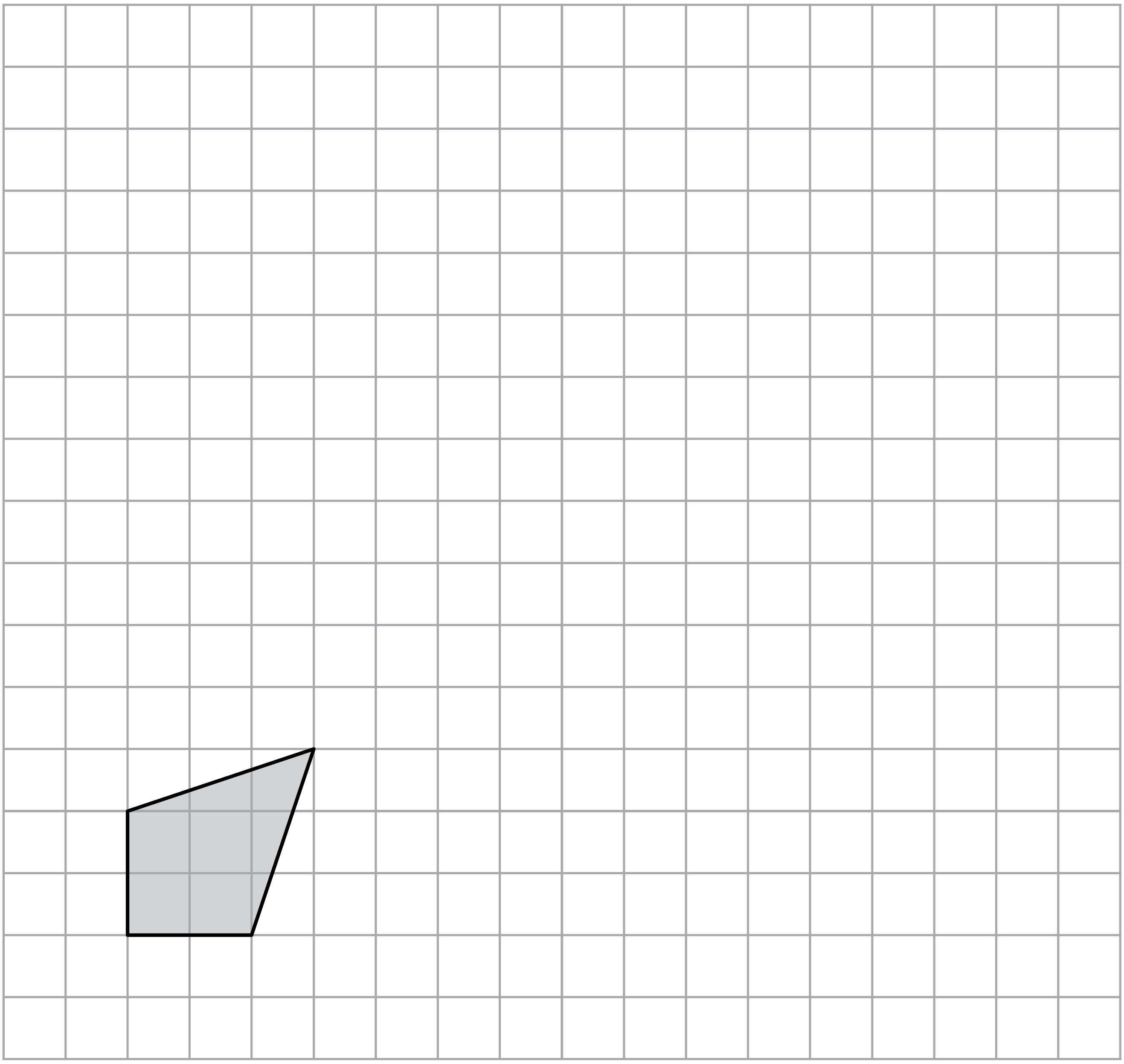
(Total for Question 11 is 3 marks)

12 Find the number that is exactly halfway between $\frac{1}{10}$ and $\frac{3}{5}$

....

(Total for Question 12 is 2 marks)

13



On the grid, draw an enlargement of the shaded shape with a scale factor of 3

(Total for Question 13 is 2 marks)

14 A shop sells compost in 20 litre bags and in 40 litre bags.
One day the shop had two special offers for the compost.

2 bags for £3.50	3 bags for £9

Which offer is the better value for money?
You must show how you get your answer.

(Total for Question 14 is 3 marks)

P 5 8 8 7 3 A 0 1 0 2 4

15 The length of a plane is 19.2 metres.

Lukas buys a scale model of the plane.
The scale of the model is 1 : 24

Work out the length of the scale model of the plane.
Give your answer in centimetres.

.... centimetres

(Total for Question 15 is 3 marks)

---

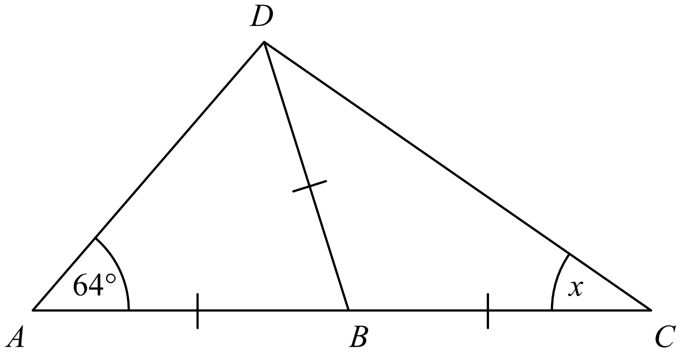
16 Maria invests £4500 in a savings account for 3 years.
The account pays simple interest at a rate of 1.8% per year.

Work out the total amount of interest Maria gets by the end of the 3 years.

£..

(Total for Question 16 is 2 marks)

17



ABC is a straight line.
$AB = BC = BD$.
Angle $DAB = 64°$

Work out the size of the angle marked x.
Give a reason for each stage of your working.

(Total for Question 17 is 4 marks)

18 Ben is n years old.
Chloe is twice as old as Ben.
Dan is five years younger than Ben.

The total of Ben's age, Chloe's age and Dan's age is T years.

(a) Find a formula for T in terms of n.

....

(3)

(b) In the table below, put a tick (✓) in the box next to the identity.

$3h + 2 = 14$	
$3a + 4b - 2c$	
$A = \pi r^2$	
$5m - 3m = 2m$	
$x + 7 \leqslant 12$	

(1)

(Total for Question 18 is 4 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

19 Here are the ingredients needed to make 16 biscuits.

Biscuits
Ingredients to make **16** biscuits
175 g of butter 75 g of sugar 250 g of flour

Anna has

500 g of butter
300 g of sugar
625 g of flour

Work out the greatest number of biscuits Anna can make.

....

(Total for Question 19 is 3 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

20 An estimate of the height, H metres, of a tall building can be found using the formula

$$H = 4f + 12$$

where the building is f floors high.

A tall building is 110 floors high.
The real height of the building is 442 m.

Seb uses the formula to find an estimate of the height of this building.
He then finds the difference between his estimate and the real height.

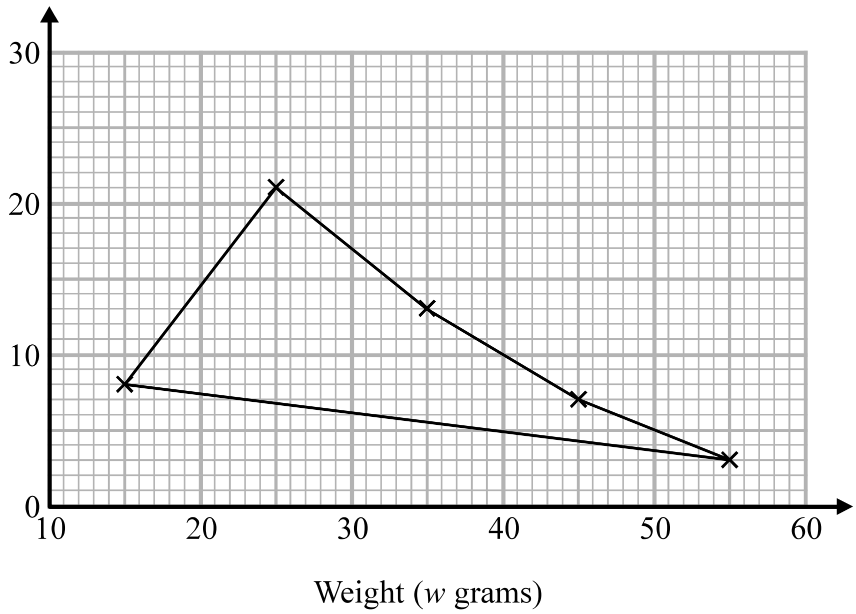
Show that this difference is less than 5% of the real height.

(Total for Question 20 is 4 marks)

21 The table shows some information about the weights of 50 potatoes.

Weight (*w* grams)	**Frequency**
$10 < w \leqslant 20$	6
$20 < w \leqslant 30$	21
$30 < w \leqslant 40$	13
$40 < w \leqslant 50$	7
$50 < w \leqslant 60$	3

Iveta drew this frequency polygon for the information in the table.
The frequency polygon is **not** fully correct.



Write down **two** things that are wrong with the frequency polygon.

1 ....

....

2 ....

....

(Total for Question 21 is 2 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

22 The length of a pencil is 128 mm correct to the nearest millimetre.

Complete the error interval for the length of the pencil.

.... mm $\leqslant$ length $<$ .... mm

(Total for Question 22 is 2 marks)

---

23 Tom and Adam have a total of 240 stamps.
The ratio of the number of Tom's stamps to the number of Adam's stamps is 3 : 7

Tom buys some stamps from Adam.
The ratio of the number of Tom's stamps to the number of Adam's stamps is now 3 : 5

How many stamps does Tom buy from Adam?
You must show all your working.

....

(Total for Question 23 is 4 marks)

---

24 Each person in a fitness club is going to get a free gift.
Stan is going to order the gifts.

Stan takes a sample of 50 people in the fitness club.
He asks each person to tell him the gift they would like.

The table shows information about his results.

Gift	**Number of people**
sports bag	17
gym towel	7
headphones	11
voucher	15

There are 700 people in the fitness club.

(i) Work out how many sports bags Stan should order.

....
(2)

(ii) Write down any assumption you made **and** explain how this could affect your answer.

....

....

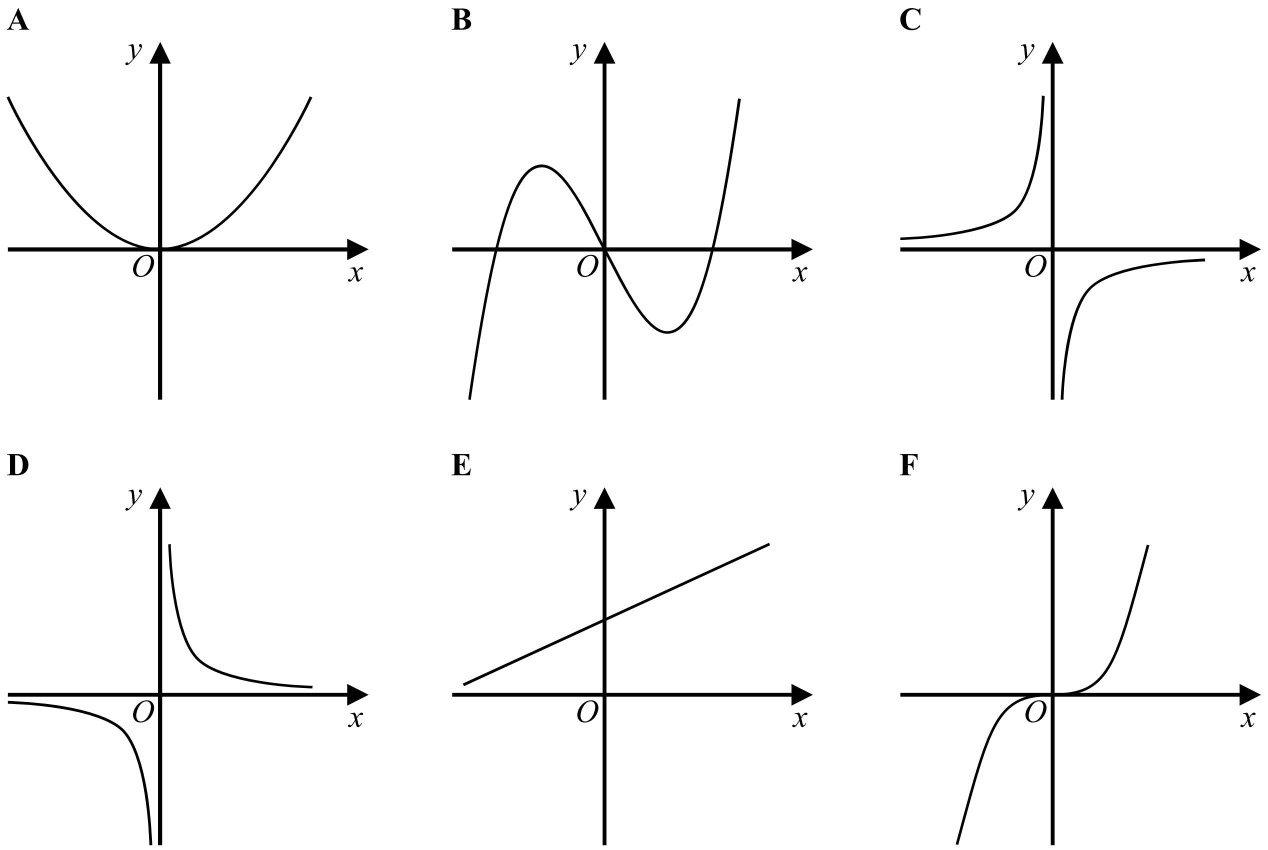
....

....
(1)

(Total for Question 24 is 3 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

25 Here are six graphs.



Write down the letter of the graph that could have the equation

(a) $y = x^3$

....

(1)

(b) $y = \dfrac{1}{x}$

....

(1)

(Total for Question 25 is 2 marks)

Turn over

26 The nth term of a sequence is $2n^2 - 1$

The nth term of a different sequence is $40 - n^2$

Show that there is only one number that is in both of these sequences.

(Total for Question 26 is 3 marks)

---

27 Work out $(3.42 \times 10^{-7}) \div (7.5 \times 10^{-6})$
Give your answer in standard form.

....

(Total for Question 27 is 2 marks)

---

28 The number of days, d, that it will take to build a house is given by

$$d = \frac{720}{n}$$

where n is the number of workers used each day.

Ali's company will take 40 days to build the house.
Hayley's company will take 30 days to build the house.

Hayley's company will have to use more workers each day than Ali's company.

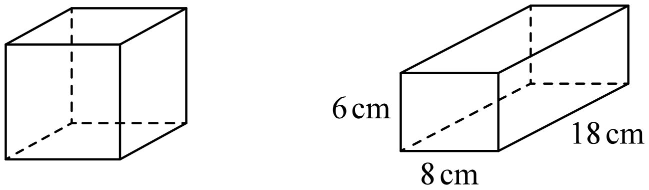
How many more?

....

(Total for Question 28 is 3 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

29 The diagram shows a cube and a cuboid.



The total surface area of the cube is equal to the total surface area of the cuboid.

Janet says,

"The volume of the cube is equal to the volume of the cuboid."

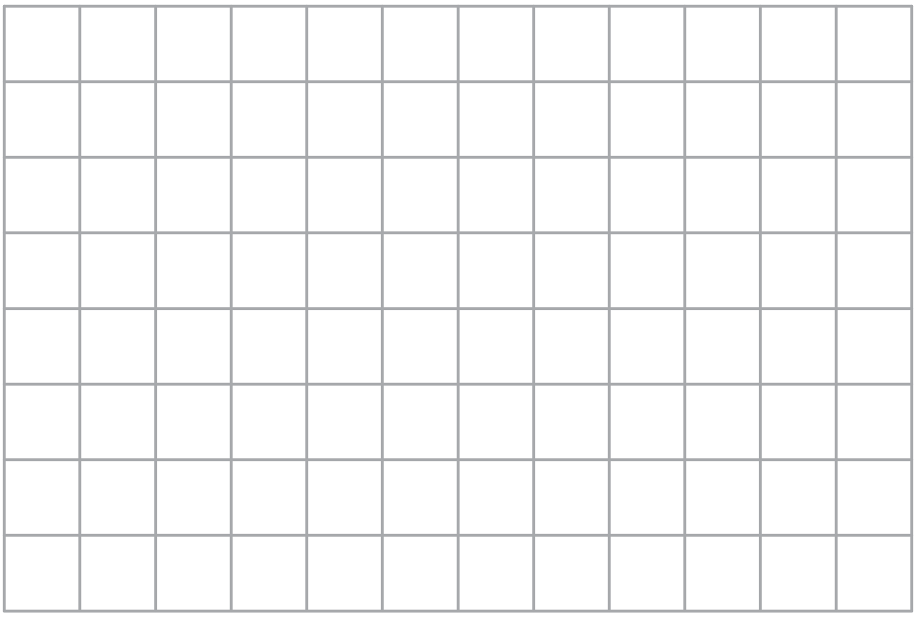
Is Janet correct?
You must show how you get your answer.

(Total for Question 29 is 5 marks)

30 Here are two column vectors.

$\mathbf{a} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$

On the grid below, draw and label the vector $\mathbf{a} - 2\mathbf{b}$



(Total for Question 30 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

BLANK PAGE

Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Centre Number | Candidate Number

Thursday 7 November 2019

Morning (Time: 1 hour 30 minutes)	Paper Reference **1MA1/2H**

Mathematics

Paper 2 (Calculator)
Higher Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over

P58874A

6/1/1/

P 5 8 8 7 4 A 0 1 2 4

Pearson

Answer ALL questions.

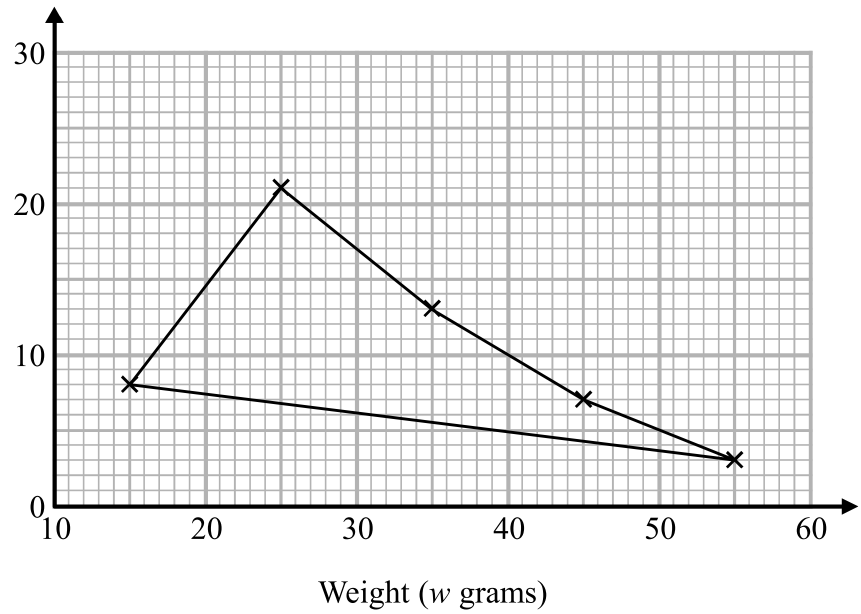
Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The table shows some information about the weights of 50 potatoes.

Weight (*w* grams)	**Frequency**
$10 < w \leqslant 20$	6
$20 < w \leqslant 30$	21
$30 < w \leqslant 40$	13
$40 < w \leqslant 50$	7
$50 < w \leqslant 60$	3

Iveta drew this frequency polygon for the information in the table.
The frequency polygon is **not** fully correct.



Write down **two** things that are wrong with the frequency polygon.

1 ....

....

2 ....

....

(Total for Question 1 is 2 marks)

2 The length of a pencil is 128 mm correct to the nearest millimetre.

Complete the error interval for the length of the pencil.

.... mm $\leqslant$ length $<$ .... mm

(Total for Question 2 is 2 marks)

---

3 Tom and Adam have a total of 240 stamps.
The ratio of the number of Tom's stamps to the number of Adam's stamps is 3 : 7

Tom buys some stamps from Adam.
The ratio of the number of Tom's stamps to the number of Adam's stamps is now 3 : 5

How many stamps does Tom buy from Adam?
You must show all your working.

....

(Total for Question 3 is 4 marks)

P 5 8 8 7 4 A 0 3 2 4

4 Each person in a fitness club is going to get a free gift.
Stan is going to order the gifts.

Stan takes a sample of 50 people in the fitness club.
He asks each person to tell him the gift they would like.

The table shows information about his results.

Gift	**Number of people**
sports bag	17
gym towel	7
headphones	11
voucher	15

There are 700 people in the fitness club.

(i) Work out how many sports bags Stan should order.

....

(2)

(ii) Write down any assumption you made **and** explain how this could affect your answer.

....

....

....

....

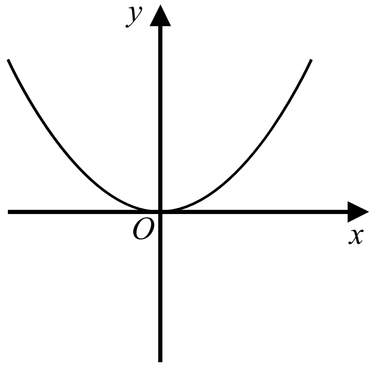
(1)

(Total for Question 4 is 3 marks)

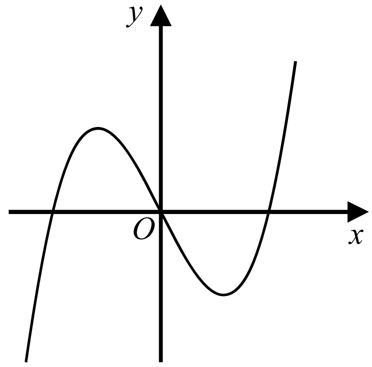
P 5 8 8 7 4 A 0 4 2 4

5 Here are six graphs.

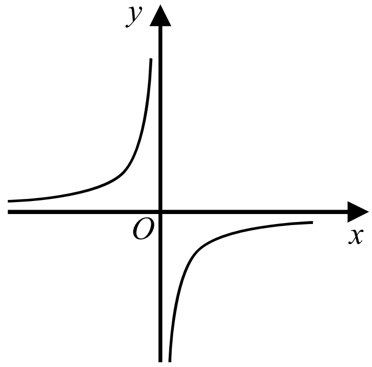
A



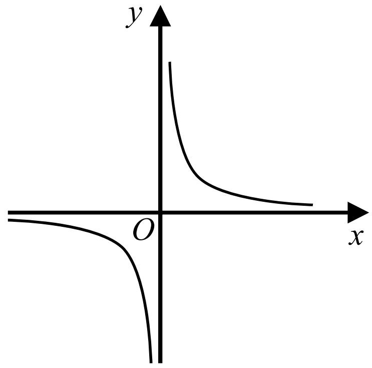
B



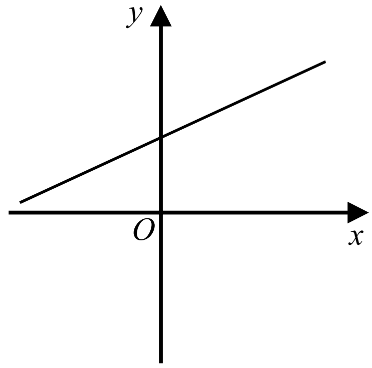
C



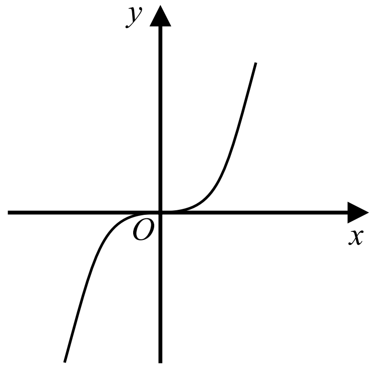
D



E



F



Write down the letter of the graph that could have the equation

(a) $y = x^3$

....
(1)

(b) $y = \dfrac{1}{x}$

....
(1)

(Total for Question 5 is 2 marks)

6 The nth term of a sequence is $2n^2 - 1$

The nth term of a different sequence is $40 - n^2$

Show that there is only one number that is in both of these sequences.

(Total for Question 6 is 3 marks)

---

7 Work out $(3.42 \times 10^{-7}) \div (7.5 \times 10^{-6})$
Give your answer in standard form.

....

(Total for Question 7 is 2 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

8 The number of days, d, that it will take to build a house is given by

$$d = \frac{720}{n}$$

where n is the number of workers used each day.

Ali's company will take 40 days to build the house.
Hayley's company will take 30 days to build the house.

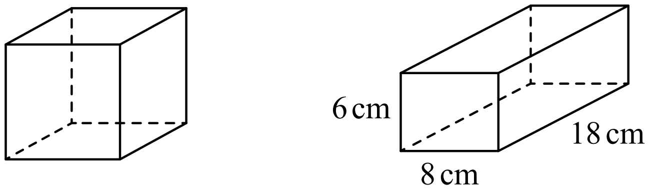
Hayley's company will have to use more workers each day than Ali's company.

How many more?

....

(Total for Question 8 is 3 marks)

9 The diagram shows a cube and a cuboid.



The total surface area of the cube is equal to the total surface area of the cuboid.

Janet says,

"The volume of the cube is equal to the volume of the cuboid."

Is Janet correct?
You must show how you get your answer.

(Total for Question 9 is 5 marks)

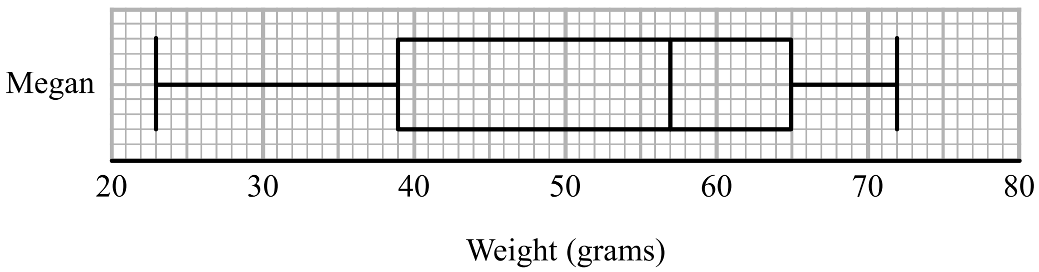
10 Make k the subject of the formula $y = \sqrt{2m - k}$

....

(Total for Question 10 is 2 marks)

11 Megan grows potatoes.

The box plot below shows information about the weights of Megan's potatoes.



Megan says that half of her potatoes weigh less than 50 grams each.

(a) Is Megan correct?
Give a reason for your answer.

....

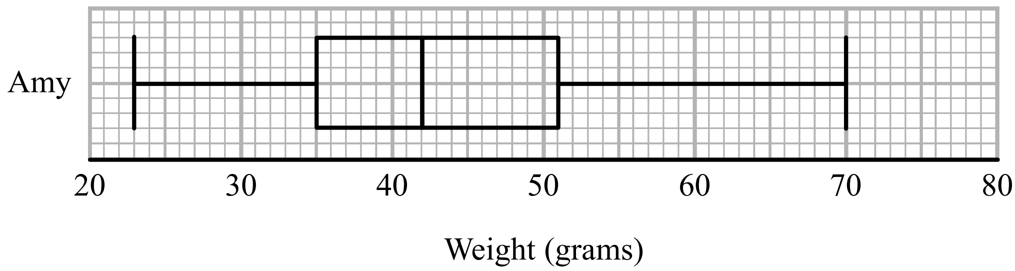
....

....

(1)

Amy also grows potatoes.

The box plot below shows information about the weights of Amy's potatoes.



(b) Compare the distribution of the weights of Megan's potatoes with the distribution of the weights of Amy's potatoes.

....

....

....

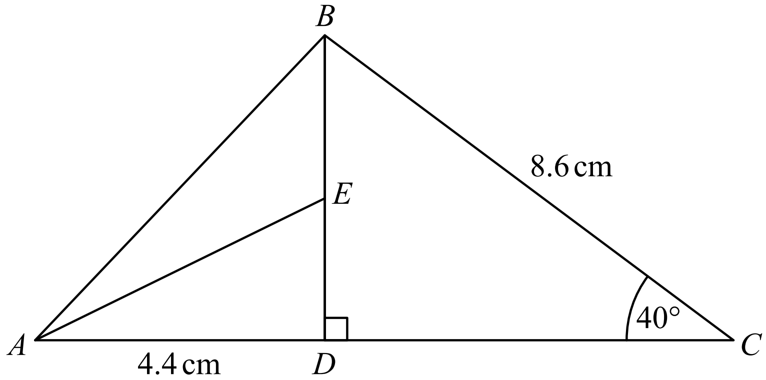
....

....

(2)

(Total for Question 11 is 3 marks)

12 The diagram shows triangle *ABC*.



ADC and *DEB* are straight lines.

$AD = 4.4$ cm
$BC = 8.6$ cm
E is the midpoint of *DB*.

Angle $CDB = 90°$
Angle $DCB = 40°$

Work out the size of angle *EAD*.
Give your answer correct to 1 decimal place.
You must show all your working.

....°

(Total for Question 12 is 4 marks)

13 Sakira invested £3550 in a savings account for 3 years.

She was paid 2.6% per annum compound interest for each of the first 2 years.
She was paid R% interest for the third year.

Sakira had £3819.21 in her savings account at the end of the 3 years.

Work out the value of R.
Give your answer correct to 1 decimal place.

....

(Total for Question 13 is 3 marks)

P 5 8 8 7 4 A 0 1 2 2 4

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

14 Sadia is going to buy a new car.
For the car, she can choose one body colour, one roof colour and one wheel type.

She can choose from

19 different body colours
25 different wheel types

The total number of ways Sadia can choose the body colour and the roof colour and the wheel type is 3325

Work out the number of different roof colours that Sadia can choose from.

....

(Total for Question 14 is 2 marks)

15 Expand and simplify $(3x + 2)(2x + 1)(x - 5)$

....

(Total for Question 15 is 3 marks)

P 5 8 8 7 4 A 0 1 3 2 4

Turn over

16 Marek has 9 cards.
There is a number on each card.

1	2	3	4	5	6	7	8	9

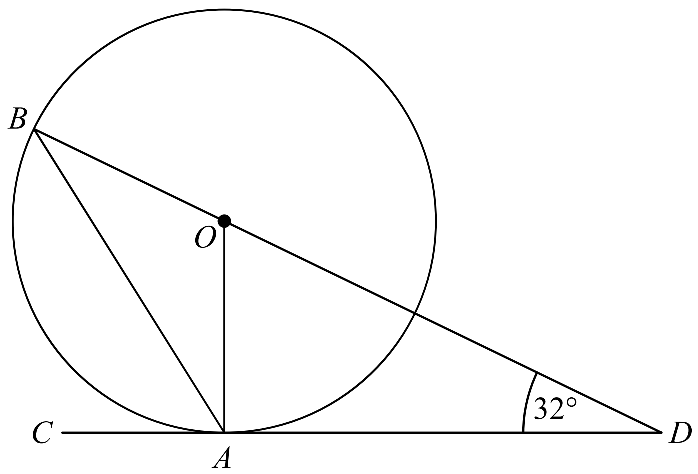
Marek takes at random two of the cards.
He works out the product of the numbers on the two cards.

Work out the probability that the product is an even number.

....

(Total for Question 16 is 3 marks)

17



A and B are points on a circle with centre O.
CAD is the tangent to the circle at A.
BOD is a straight line.

Angle $ODA = 32°$

Work out the size of angle CAB.
You must show all your working.

....°

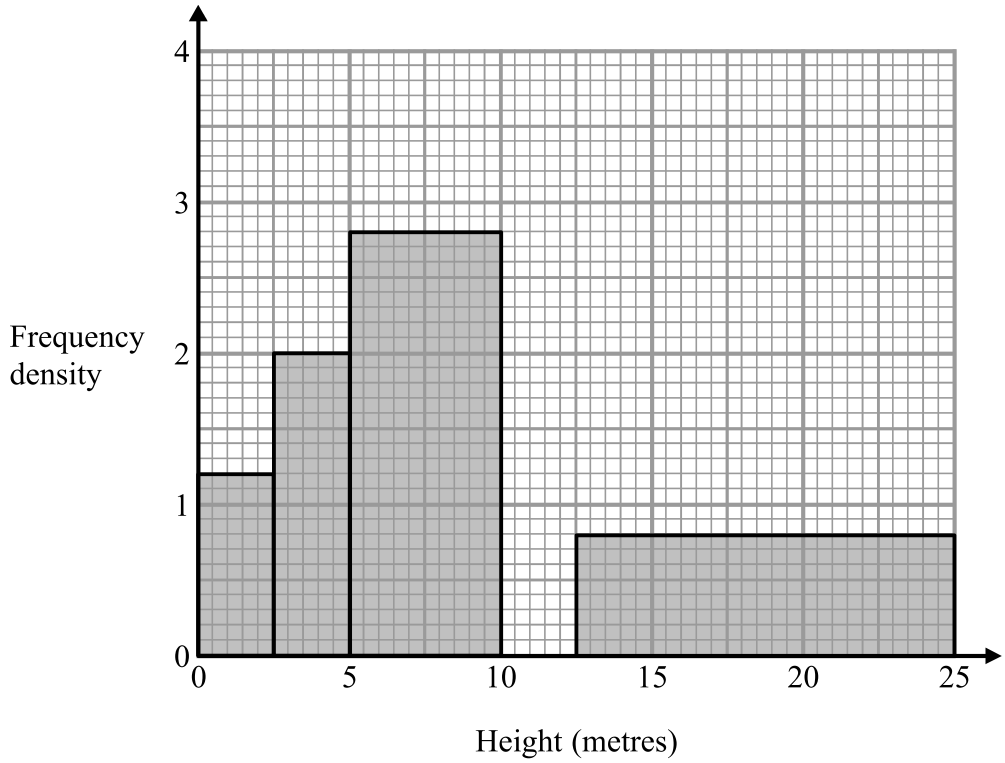
(Total for Question 17 is 3 marks)

DO NOT WRITE IN THIS AREA

Turn over

P 5 8 8 7 4 A 0 1 5 2 4

18 The histogram gives information about the heights, in metres, of the trees in a park.
The histogram is incomplete.



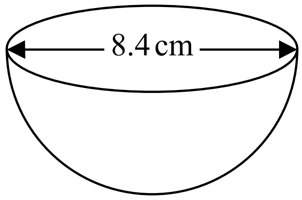
20% of the trees in the park have a height between 10 metres and 12.5 metres.
None of the trees in the park have a height greater than 25 metres.

Complete the histogram.

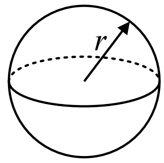
(Total for Question 18 is 3 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

19 The diagram shows a hemisphere with diameter 8.4 cm.



Volume of sphere = $\frac{4}{3}\pi r^3$



Work out the volume of the hemisphere.
Give your answer correct to 3 significant figures.

.... cm^3

(Total for Question 19 is 2 marks)

---

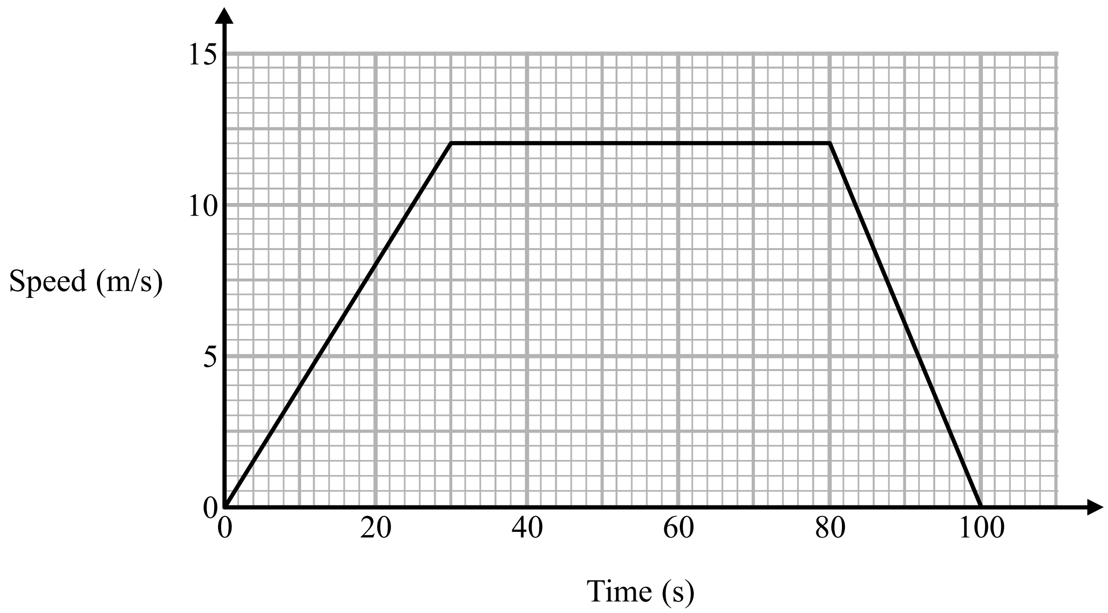
20 $d = \frac{1}{8}c^3$

$c = 10.9$ correct to 3 significant figures.

By considering bounds, work out the value of d to a suitable degree of accuracy.
Give a reason for your answer.

(Total for Question 20 is 4 marks)

21 Here is a speed-time graph for a train journey between two stations.
The journey took 100 seconds.



(a) Calculate the time taken by the train to travel half the distance between the two stations.
You must show all your working.

.... seconds
(4)

(b) Compare the acceleration of the train during the first part of its journey with the acceleration of the train during the last part of its journey.

....

....

....
(1)

(Total for Question 21 is 5 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

P 5 8 8 7 4 A 0 1 8 2 4

22 The number of rabbits on a farm at the end of month n is P_n
The number of rabbits at the end of the next month is given by $P_{n+1} = 1.2P_n - 50$

At the end of March there are 200 rabbits on the farm.

(a) Work out how many rabbits there will be on the farm at the end of June.

....

(3)

(b) Considering your results in part (a), suggest what will happen to the number of rabbits on the farm after a long time.

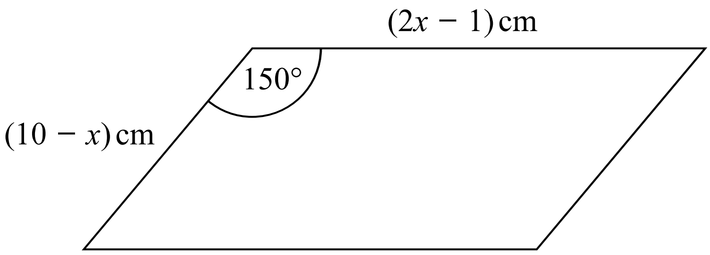
....

....

(1)

(Total for Question 22 is 4 marks)

23 The diagram shows a parallelogram.



The area of the parallelogram is greater than $15\,\text{cm}^2$

(a) Show that $2x^2 - 21x + 40 < 0$

(3)

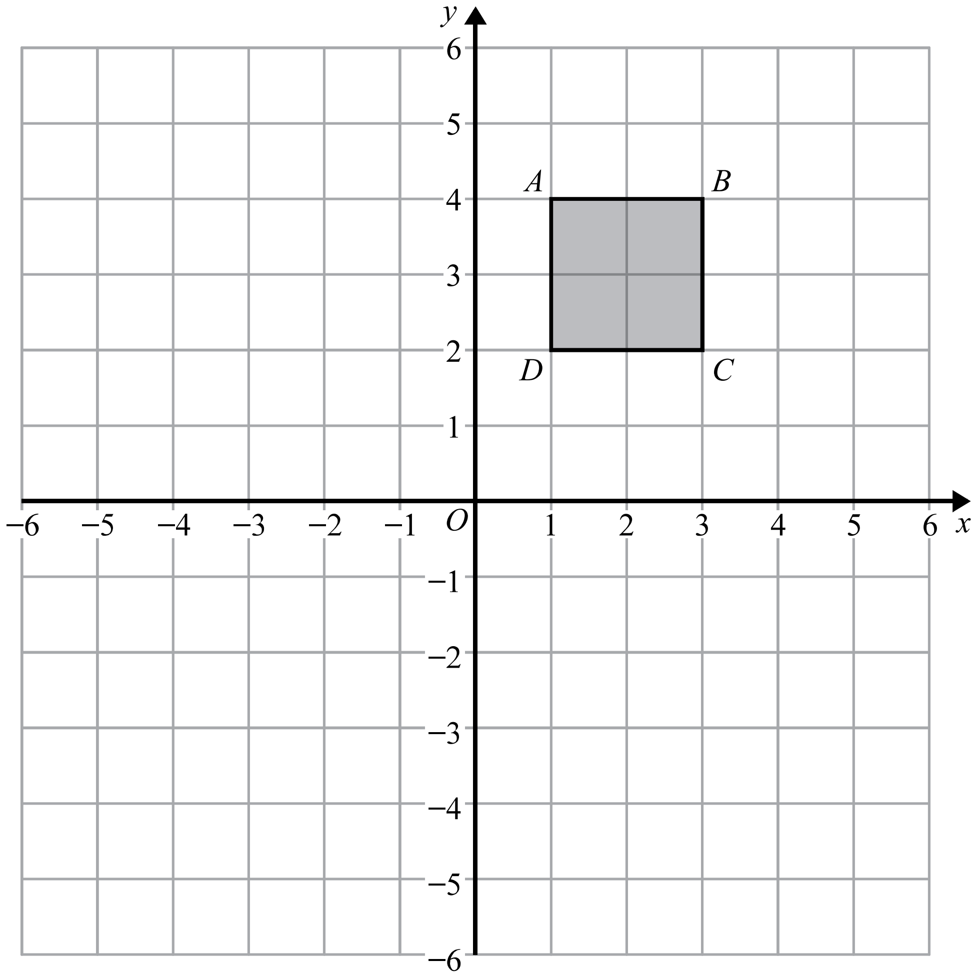
(b) Find the range of possible values of x.

....

(3)

(Total for Question 23 is 6 marks)

24



Square $ABCD$ is transformed by a combined transformation of a reflection in the line $x = -1$ followed by a rotation.

Under the combined transformation, two vertices of the square $ABCD$ are invariant.

Describe fully one possible rotation.

....

(Total for Question 24 is 2 marks)

25 The straight line **L** has equation $3x + 2y = 17$

The point A has coordinates (0, 2)
The straight line **M** is perpendicular to **L** and passes through A.

Line **L** crosses the y-axis at the point B.
Lines **L** and **M** intersect at the point C.

Work out the area of triangle ABC.
You must show all your working.

....

(Total for Question 25 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

P 5 8 8 7 4 A 0 2 3 2 4

BLANK PAGE

Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Centre Number | Candidate Number

Monday 11 November 2019

Afternoon (Time: 1 hour 30 minutes)	Paper Reference **1MA1/3F**

Mathematics

Paper 3 (Calculator)
Foundation Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

P58875A

6/1/1/

P 5 8 8 7 5 A 0 1 2 4

Pearson

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Write down two factors of 12

.... , ...

(Total for Question 1 is 1 mark)

---

2 Find $\frac{1}{3}$ of 30

....

(Total for Question 2 is 1 mark)

---

3 Write 0.7 as a fraction.

....

(Total for Question 3 is 1 mark)

---

4 Here is a list of numbers.

7 8 15 16 18 22

Write down the number from the list that is a multiple of 6

....

(Total for Question 4 is 1 mark)

---

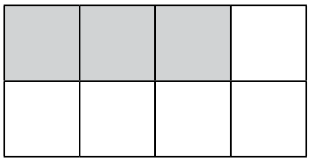
5 Change 4 kilometres into metres.

.... metres

(Total for Question 5 is 1 mark)

---

6 Here is a grid of squares.



Write down the ratio of the number of shaded squares to the number of unshaded squares.

....

(Total for Question 6 is 1 mark)

---

7 $w = 4u + 3$

Find the value of w when $u = 8$

....

(Total for Question 7 is 2 marks)

---

8 Here are the first five terms of a sequence.

1 3 6 10 15

Write down the next two terms of the sequence.

.... , ...

(Total for Question 8 is 2 marks)

---

9 Mrs Brown asked each child in her class which pet they liked best.

Here are her results.

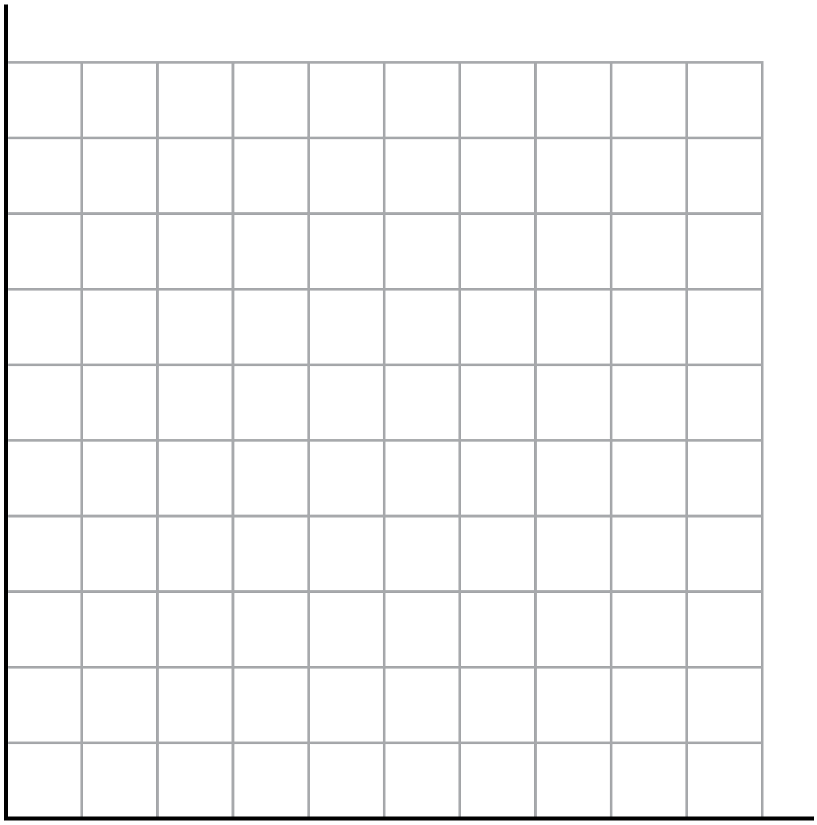
dog	rabbit	cat	dog	dog	hamster
cat	dog	rabbit	hamster	cat	cat
dog	dog	cat	dog	rabbit	dog

(a) Complete the frequency table for this information.

Pet	**Tally**	**Frequency**
dog		
rabbit		
cat		
hamster		

(2)

(b) On the grid below, draw a bar chart for this information.



(3)

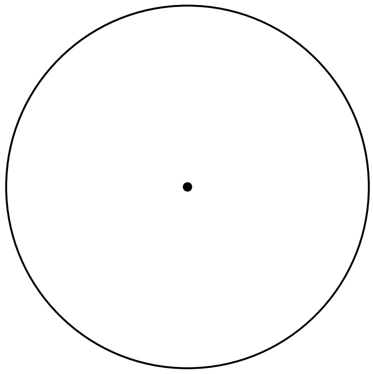
(c) Write down the most popular pet.

....

(1)

(Total for Question 9 is 6 marks)

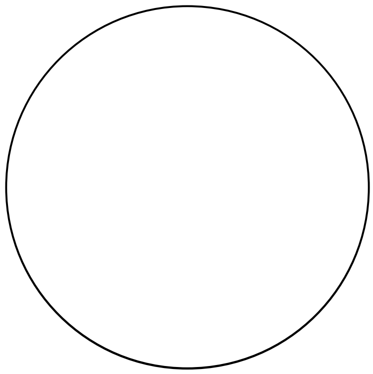
10



(a) On the diagram above, draw a diameter of the circle.

(1)

(b) On the diagram below, draw a segment of the circle.
Shade the segment.



(1)

(Total for Question 10 is 2 marks)

11 Dylan buys 13 bicycle lights for £7.50 each.
He pays with five £20 notes.

(a) How much change should Dylan get?

£...

(3)

The normal price of a bicycle is £120

In a sale, there is $\frac{1}{5}$ off the normal price of the bicycle.

(b) Work out the price of the bicycle in the sale.

£...

(2)

(Total for Question 11 is 5 marks)

12 Cornflakes are sold in two sizes of box.

Size of box	**Weight of cornflakes**
small	450 g
large	750 g

Rae buys 3 small boxes of cornflakes and some large boxes of cornflakes.
In total she buys 5850 g of cornflakes.

Work out the number of large boxes of cornflakes Rae buys.

....

(Total for Question 12 is 3 marks)

13 The stem and leaf diagram below gives information about the ages of people in a social club.

3	1	4	5			
4	0	2	2	5	6	
5	0	1	7	7	8	9
6	3	4	5	9		
7	0	4				

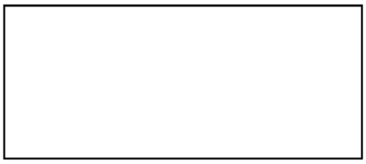
Key: 4|2 represents 42 years

Find the range of these ages.

.... years

(Total for Question 13 is 2 marks)

14 Here is a rectangle.



Coby has to find the perimeter of this rectangle.

He writes,

Perimeter = 7×3

(a) What mistake has Coby made?

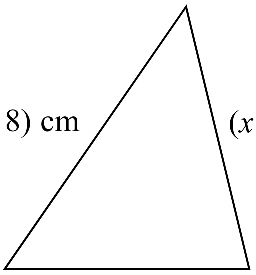
....

....

....

(1)

Here is a triangle.



Iram solves a problem about this triangle to find the value of x.

Her answer is

$x = -2$

(b) Explain why Iram's answer must be wrong.

....

....

....

(1)

(Total for Question 14 is 2 marks)

DO NOT WRITE IN THIS AREA

15 There are 800 students at a school.
Each student has either a school dinner or a packed lunch.

31% of the students have packed lunches.

55% of the students are boys.
60% of the boys have school dinners.

How many girls have packed lunches?
You must show all your working.

....

(Total for Question 15 is 4 marks)

16 In a bag there are only red counters, blue counters, green counters and yellow counters.
A counter is taken at random from the bag.

The table shows the probabilities of getting a red counter or a yellow counter.

Colour	red	blue	green	yellow
Probability	0.4	....	....	0.25

the number of blue counters : the number of green counters = 3 : 4

Complete the table.

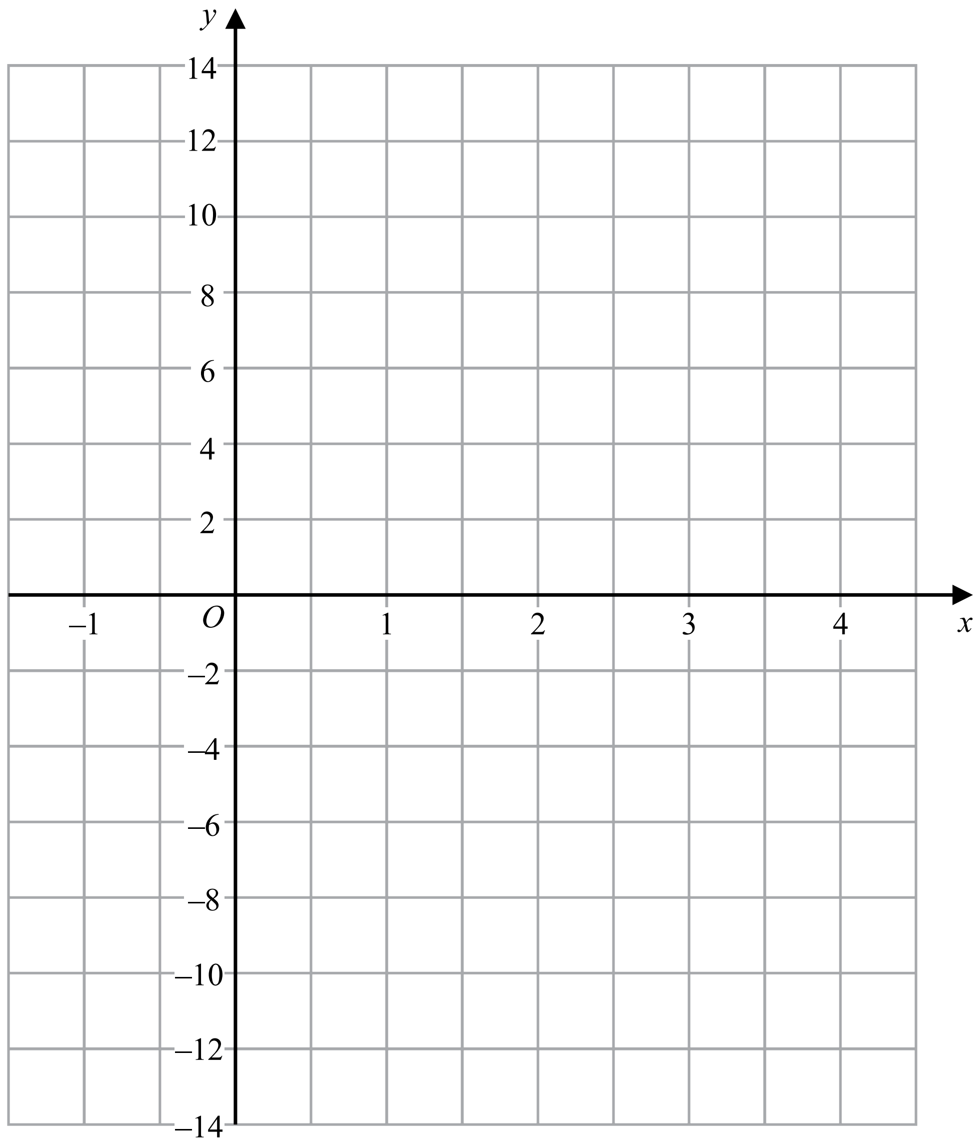
(Total for Question 16 is 4 marks)

17 (a) Complete the table of values for $y = 4x - 6$

x	-1	0	1	2	3	4
y			-2			10

(2)

(b) On the grid, draw the graph of $y = 4x - 6$ for values of x from -1 to 4



(2)

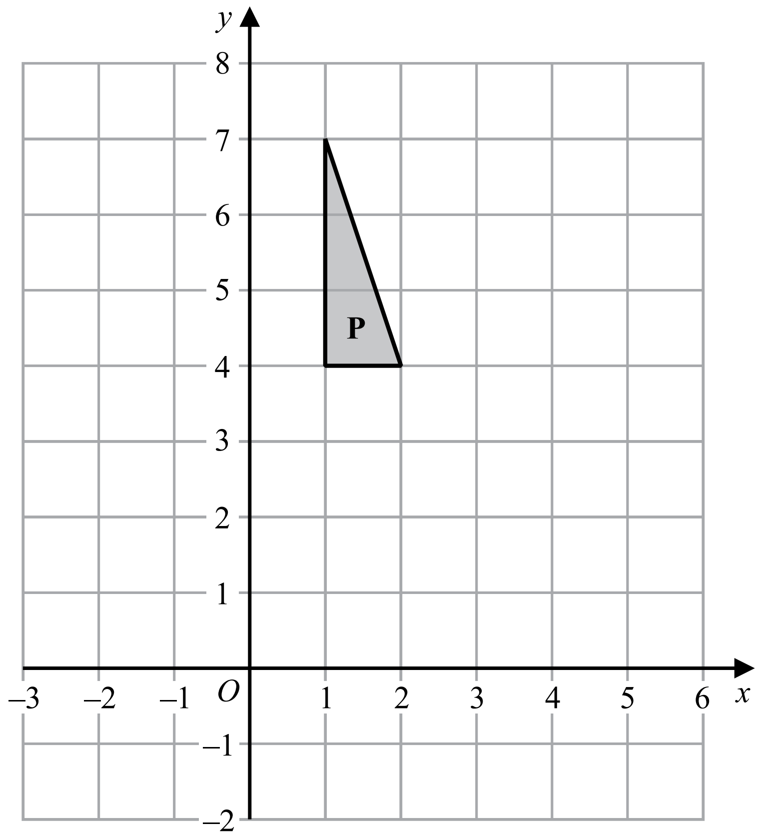
(Total for Question 17 is 4 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

18



Reflect shape **P** in the line $y = 3$

(Total for Question 18 is 2 marks)

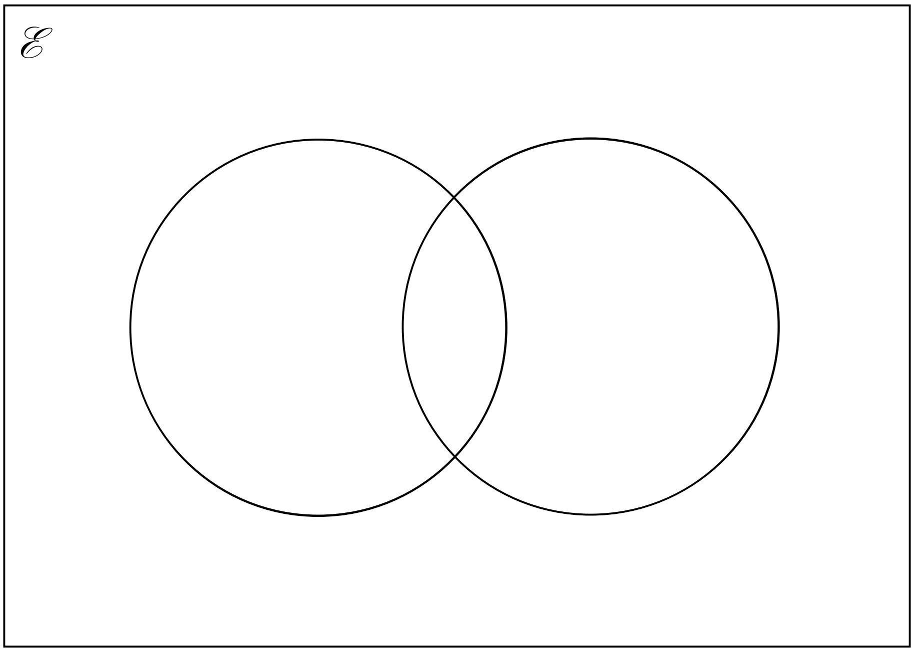
19 Solve $4(x - 6) = 44$

$x =$ ....

(Total for Question 19 is 2 marks)

20 $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13\}$
$A = \{\text{multiples of } 3\}$
$B = \{\text{even numbers}\}$

Complete the Venn diagram for this information.



(Total for Question 20 is 4 marks)

P 5 8 8 7 5 A 0 1 4 2 4

21 Franco buys a house for £146 500
He sells the house for £158 220

Calculate the percentage profit Franco makes.

.... %

(Total for Question 21 is 3 marks)

22 (a) Expand and simplify $(x + 5)(x - 9)$

....

(2)

(b) Factorise fully $9x^2 + 6x$

....

(2)

(Total for Question 22 is 4 marks)

23 (a) Use your calculator to work out $\dfrac{29^2 - 4.6}{\sqrt{35 - 1.9^3}}$

Write down all the figures on your calculator display.

....

(2)

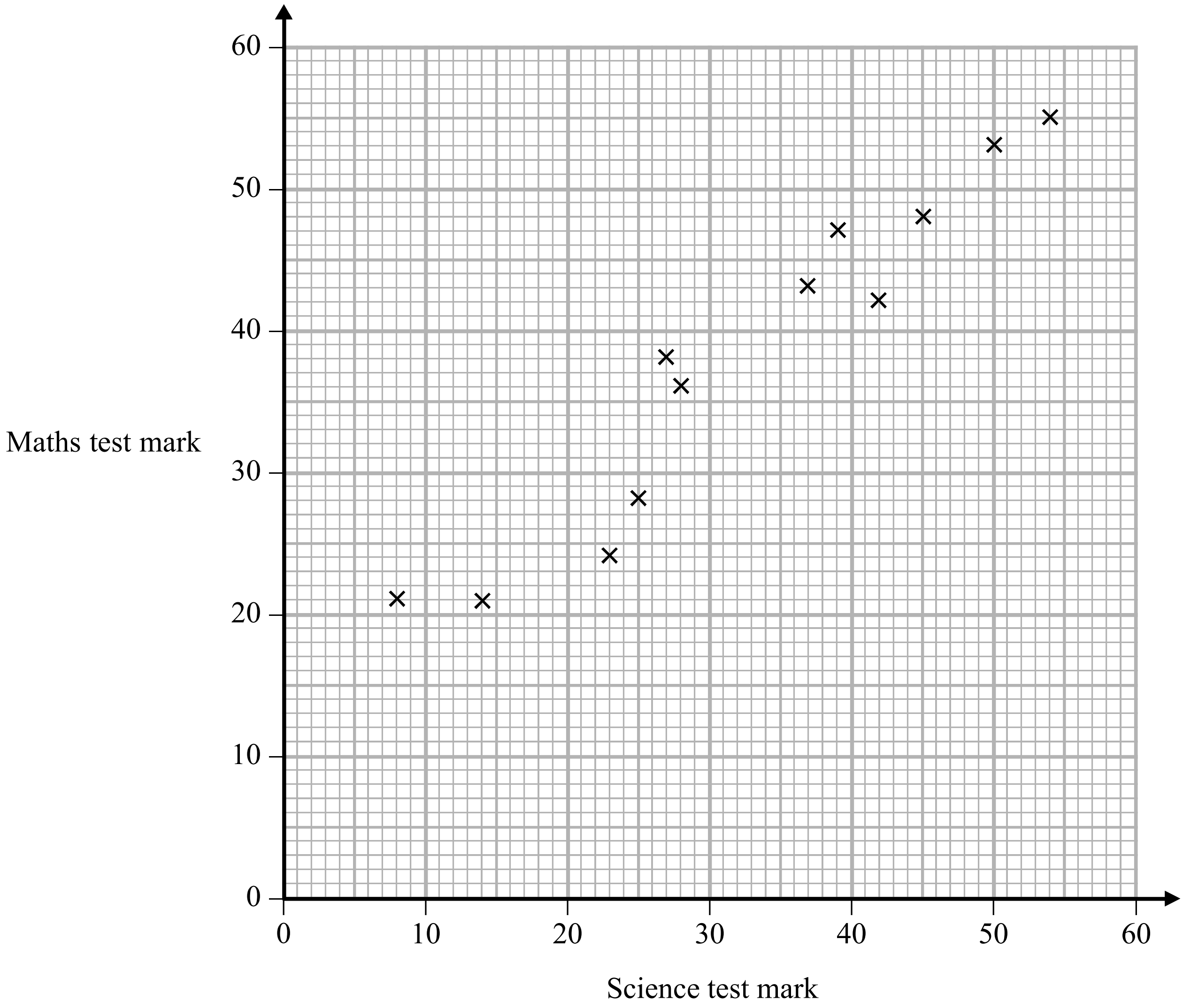
(b) Write your answer to part (a) correct to 4 significant figures.

....

(1)

(Total for Question 23 is 3 marks)

24 The scatter graph shows information about the marks a group of students got in a Science test and in a Maths test.



Jamie got a mark of 34 in the Science test.

Using the scatter graph, find an estimate for Jamie's mark in the Maths test.

....

(Total for Question 24 is 2 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

25 The table gives information about the times taken, in seconds, by 18 students to run a race.

Time (*t* seconds)	**Frequency**
$5 < t \leqslant 10$	1
$10 < t \leqslant 15$	2
$15 < t \leqslant 20$	7
$20 < t \leqslant 25$	8

Work out an estimate for the mean time.
Give your answer correct to 3 significant figures.

.... seconds

(Total for Question 25 is 3 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

26 Write 37 cm^3 in mm^3

.... mm^3

(Total for Question 26 is 1 mark)

27 Nimer was driving to a hotel.
He looked at his Sat Nav at 13 30

Time	13 30
Distance to destination	65 miles

Nimer arrived at the hotel at 14 48

Work out the average speed of the car from 13 30 to 14 48
You must show all your working.

.... mph

(Total for Question 27 is 4 marks)

28 (a) Write 32 460 000 in standard form.

....
(1)

(b) Write 4.96×10^{-3} as an ordinary number.

....
(1)

Asma was asked to compare the following two numbers.

$$A = 6.212 \times 10^8 \quad \text{and} \quad B = 4.73 \times 10^9$$

She says,

"6.212 is bigger than 4.73 so A is bigger than B."

(c) Is Asma correct?
You must give a reason for your answer.

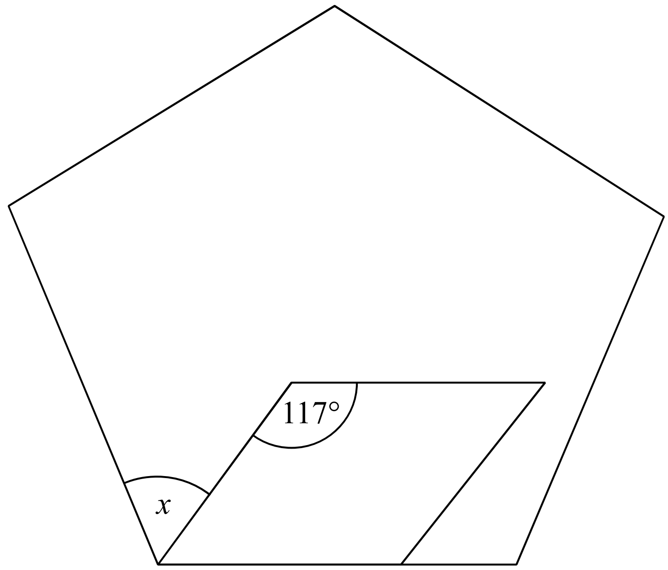
....

....

....
(1)

(Total for Question 28 is 3 marks)

29 The diagram shows a regular pentagon and a parallelogram.



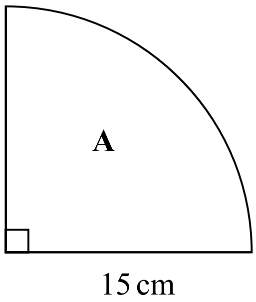
Work out the size of the angle marked *x*.
You must show all your working.

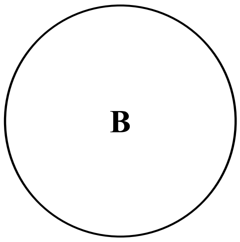
....°

(Total for Question 29 is 4 marks)

P 5 8 8 7 5 A 0 2 1 2 4

30 **A** is in the shape of a quarter circle of radius 15 cm.
B is in the shape of a circle.





The area of **A** is 9 times the area of **B**.

Show that the radius of **B** is 2.5 cm.

(Total for Question 30 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS

P 5 8 8 7 5 A 0 2 2 2 4

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

BLANK PAGE

BLANK PAGE

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Centre Number | Candidate Number

Monday 11 November 2019

Afternoon (Time: 1 hour 30 minutes) | Paper Reference **1MA1/3H**

Mathematics

Paper 3 (Calculator)
Higher Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Expand and simplify $(x + 5)(x - 9)$

....

(2)

(b) Factorise fully $9x^2 + 6x$

....

(2)

(Total for Question 1 is 4 marks)

2 (a) Use your calculator to work out $\dfrac{29^2 - 4.6}{\sqrt{35 - 1.9^3}}$

Write down all the figures on your calculator display.

....

(2)

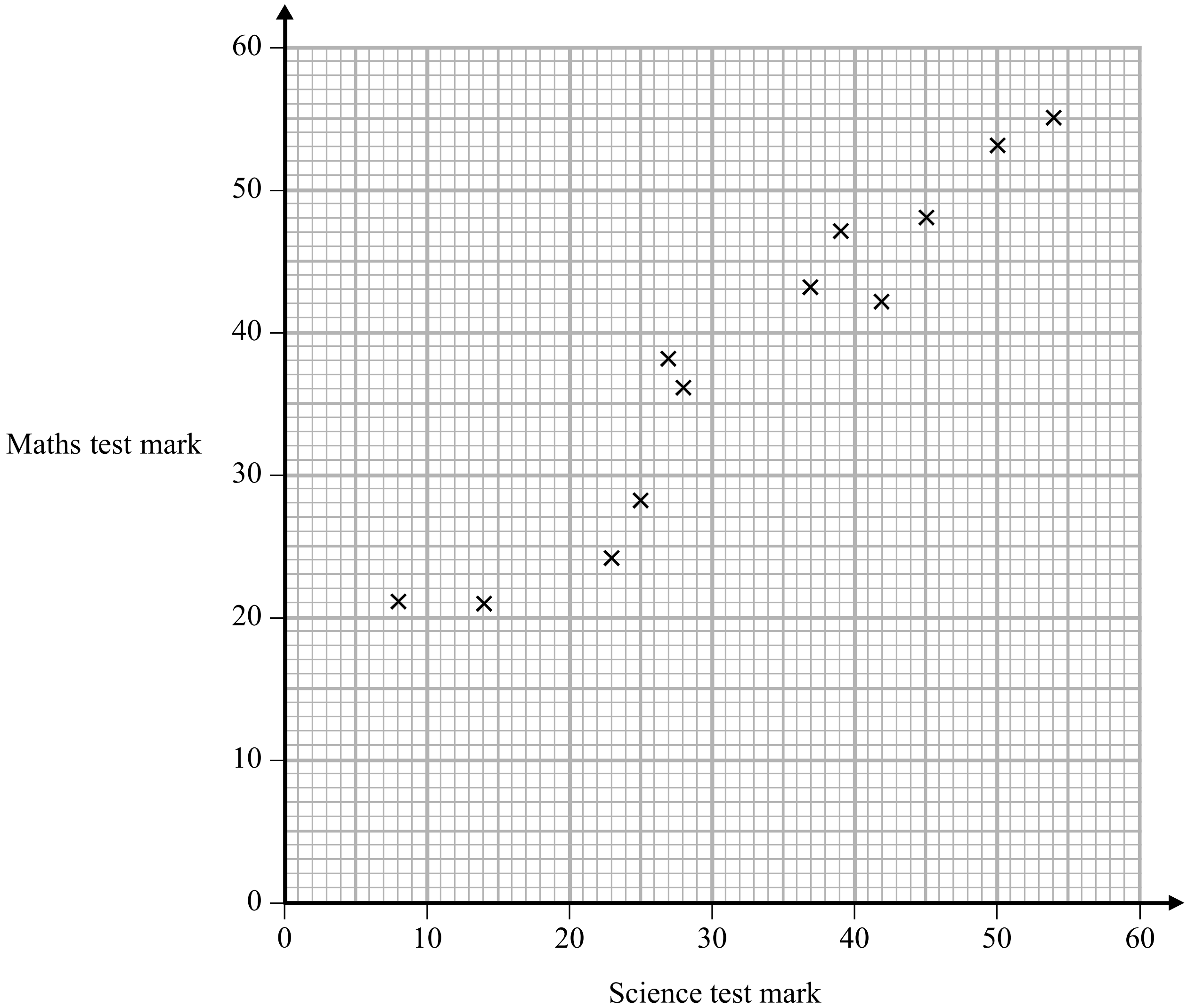
(b) Write your answer to part (a) correct to 4 significant figures.

....

(1)

(Total for Question 2 is 3 marks)

3 The scatter graph shows information about the marks a group of students got in a Science test and in a Maths test.



Jamie got a mark of 34 in the Science test.

Using the scatter graph, find an estimate for Jamie's mark in the Maths test.

....

(Total for Question 3 is 2 marks)

4 The table gives information about the times taken, in seconds, by 18 students to run a race.

Time (t seconds)	**Frequency**
$5 < t \leqslant 10$	1
$10 < t \leqslant 15$	2
$15 < t \leqslant 20$	7
$20 < t \leqslant 25$	8

Work out an estimate for the mean time.
Give your answer correct to 3 significant figures.

.... seconds

(Total for Question 4 is 3 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

5 Write 37 cm^3 in mm^3

.... mm^3

(Total for Question 5 is 1 mark)

6 Nimer was driving to a hotel.
He looked at his Sat Nav at 13 30

Time	13 30
Distance to destination	65 miles

Nimer arrived at the hotel at 14 48

Work out the average speed of the car from 13 30 to 14 48
You must show all your working.

.... mph

(Total for Question 6 is 4 marks)

P 5 8 8 7 6 R A 0 5 2 4

7 (a) Write 32 460 000 in standard form.

....

(1)

(b) Write 4.96×10^{-3} as an ordinary number.

....

(1)

Asma was asked to compare the following two numbers.

$$A = 6.212 \times 10^{8} \quad \text{and} \quad B = 4.73 \times 10^{9}$$

She says,

"6.212 is bigger than 4.73 so *A* is bigger than *B*."

(c) Is Asma correct?
You must give a reason for your answer.

....

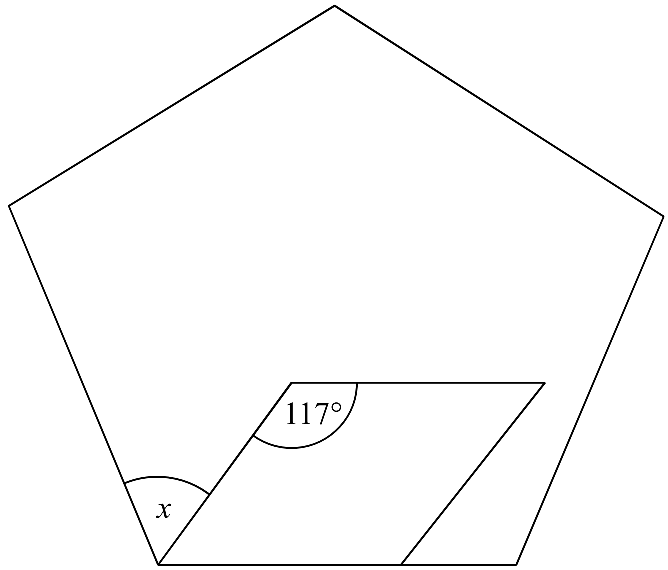
....

....

(1)

(Total for Question 7 is 3 marks)

8 The diagram shows a regular pentagon and a parallelogram.

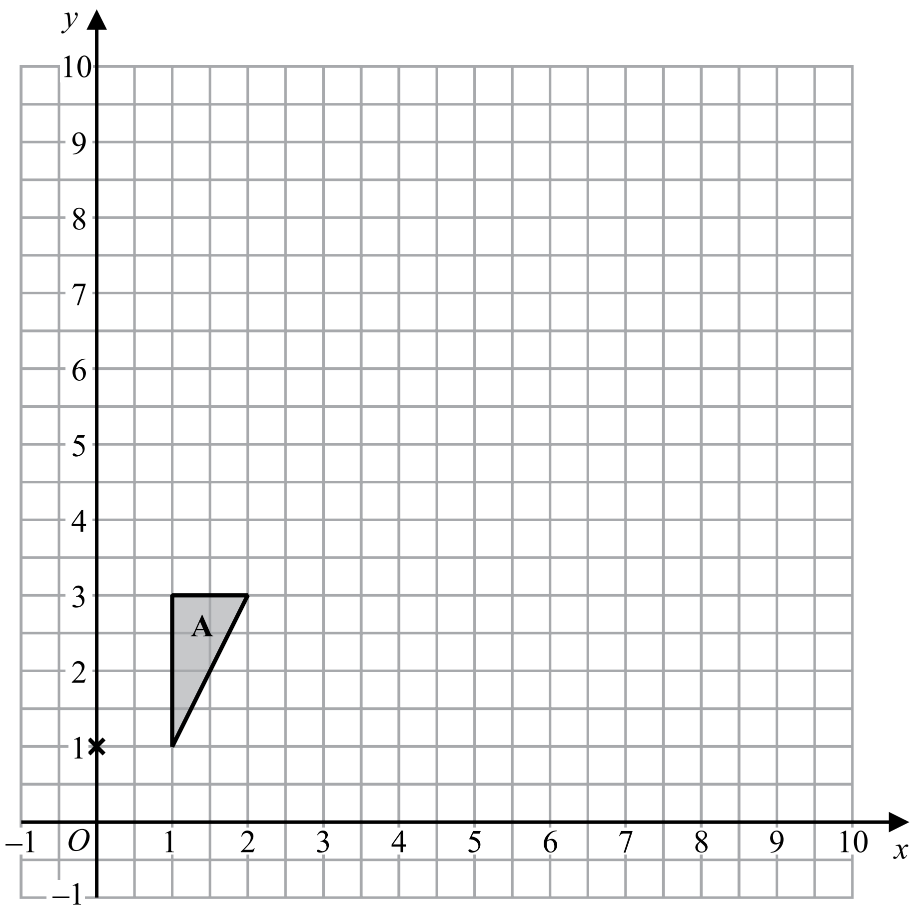


Work out the size of the angle marked *x*.
You must show all your working.

....°

(Total for Question 8 is 4 marks)

9



Enlarge triangle **A** by scale factor 2.5 with centre (0, 1)

(Total for Question 9 is 2 marks)

10 (a) Solve $\dfrac{9 + x}{7} = 11 - x$

$x =$ ....

(3)

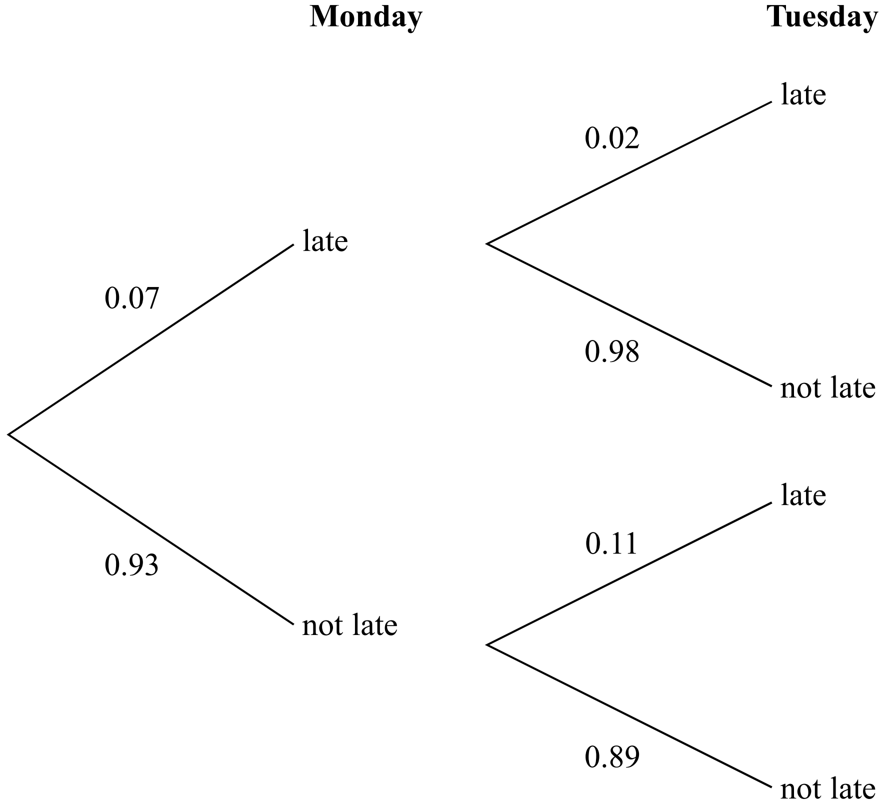
(b) Simplify $\dfrac{4(y + 3)^3}{(y + 3)^2}$

....

(1)

(Total for Question 10 is 4 marks)

11 The probability tree diagram shows the probabilities that Bismah will be late for work on two days next week.



Calculate the probability that Bismah will be late on exactly one of the two days.

....

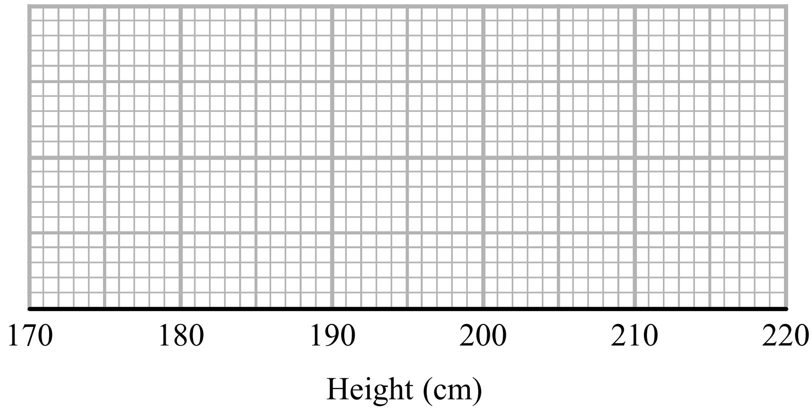
(Total for Question 11 is 3 marks)

12 The stem and leaf diagram shows information about the heights, in cm, of 23 sunflowers.

17	3	4	9				
18	6	8	8				
19	0	0	1	4	6	7	8
20	1	4	7	7	9	9	
21	4	8	8	9			

Key: 17|3 represents 173 cm

On the grid, draw a box plot for this information.



(Total for Question 12 is 3 marks)

13 Liquid A and liquid B are mixed together in the ratio 2 : 13 by volume to make liquid C.

Liquid A has density 1.21 g/cm^3
Liquid B has density 1.02 g/cm^3

A cylindrical container is filled completely with liquid C.
The cylinder has radius 3 cm and height 25 cm.

Work out the mass of the liquid in the container.
Give your answer correct to 3 significant figures.
You must show all your working.

.... g

(Total for Question 13 is 4 marks)

14 A group of people went to a restaurant.
Each person chose one starter and one main course.

starter	**main course**
soup	lasagne
prawns	curry

the number of people who chose soup : the number of people who chose prawns = 2 : 3

Of those who chose soup,
the number of people who chose lasagne : the number of people who chose curry = 5 : 3

Of those who chose prawns,
the number of people who chose lasagne : the number of people who chose curry = 1 : 5

What fraction of the people chose curry?
You must show how you get your answer.

....

(Total for Question 14 is 4 marks)

15 Prove algebraically that the sum of the squares of any two consecutive even numbers is always a multiple of 4

(Total for Question 15 is 3 marks)

---

16 y is inversely proportional to the square of x.

$y = 8$ when $x = 2.5$

Find the negative value of x when $y = \frac{8}{9}$

....

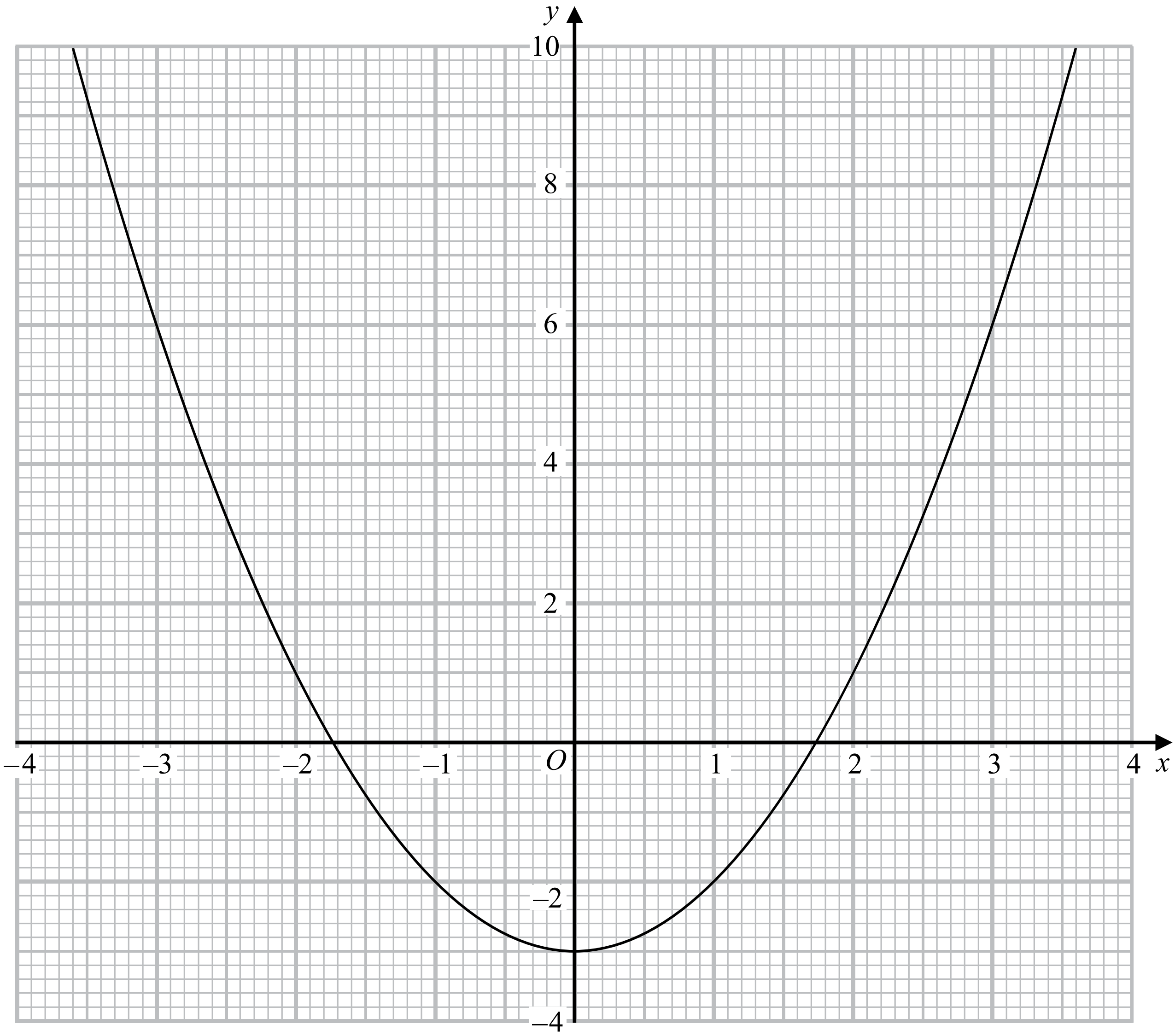
(Total for Question 16 is 3 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

17 Here is the graph of $y = x^2 - 3$

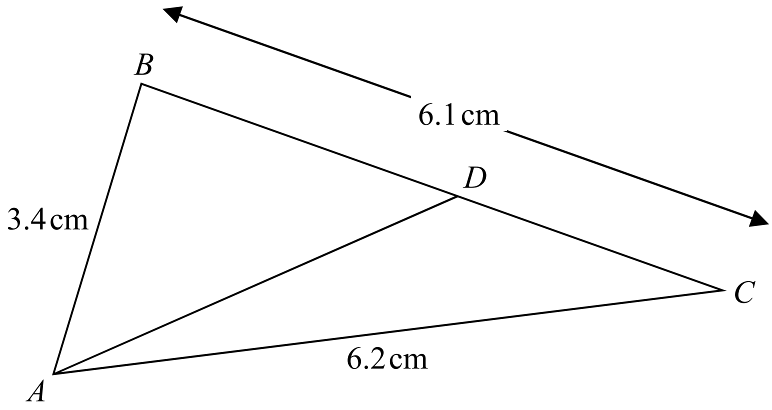


Use the graph to find estimates for the solutions to the equation $x^2 - 2x - 2 = 0$
You must show how you get your solutions.

....

(Total for Question 17 is 4 marks)

18 The diagram shows triangle ABC.



$AB = 3.4$ cm $\quad AC = 6.2$ cm $\quad BC = 6.1$ cm

D is the point on BC such that

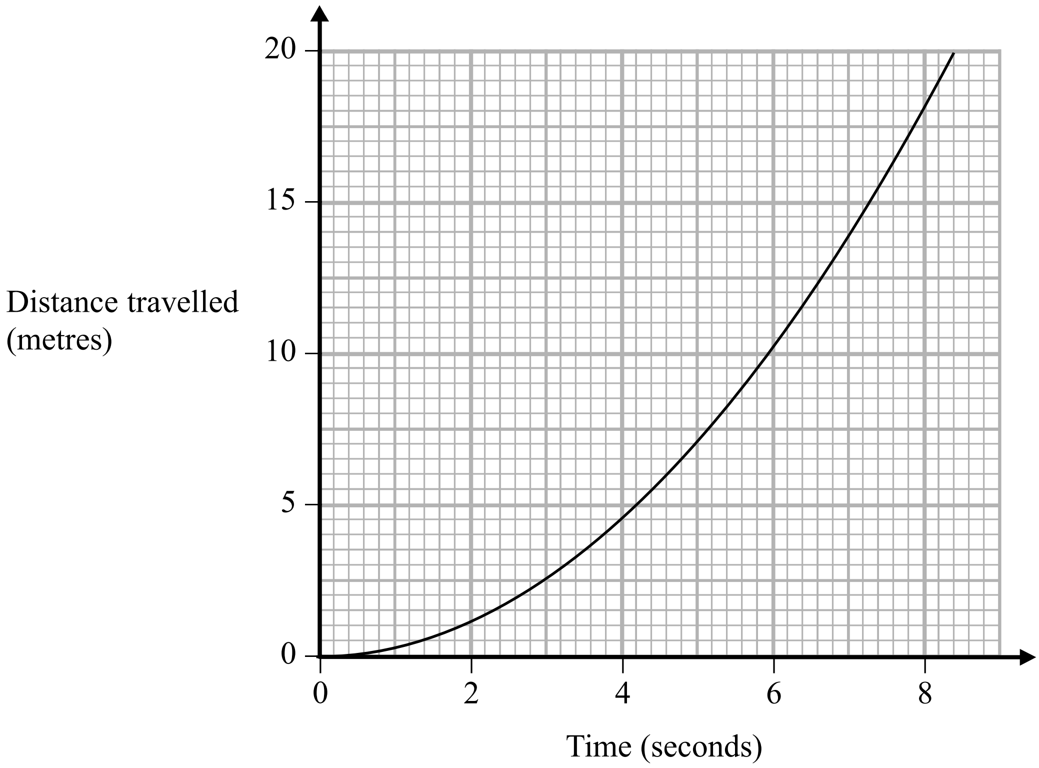
$$\text{size of angle } DAC = \frac{2}{5} \times \text{ size of angle } BCA$$

Calculate the length DC.
Give your answer correct to 3 significant figures.
You must show all your working.

.... cm

(Total for Question 18 is 5 marks)

19 The graph shows information about part of a cyclist's journey.



Work out an estimate of the speed, in m/s, of the cyclist at time 6 seconds.

.... m/s

(Total for Question 19 is 3 marks)

DO NOT WRITE IN THIS AREA

20 Here are the first five terms of a sequence.

$$-1 \qquad 0 \qquad 3 \qquad 8 \qquad 15$$

Find an expression, in terms of *n*, for the *n*th term of this sequence.

....

(Total for Question 20 is 2 marks)

21 When a biased coin is thrown 4 times, the probability of getting 4 heads is $\frac{16}{81}$

Work out the probability of getting 4 tails when the coin is thrown 4 times.

....

(Total for Question 21 is 2 marks)

22 Show that $\dfrac{7x-14}{x^2+4x-12} \div \dfrac{x-6}{x^3-36x}$ simplifies to ax where a is an integer.

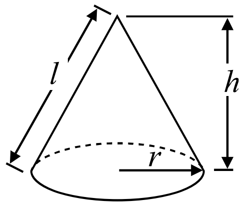
(Total for Question 22 is 4 marks)

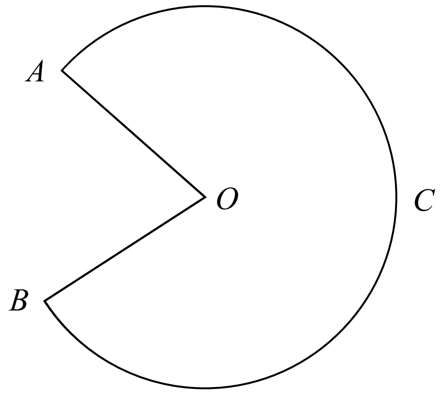
23 The diagram shows a sector $OACB$ of a circle with centre O.
The point C is the midpoint of the arc AB.

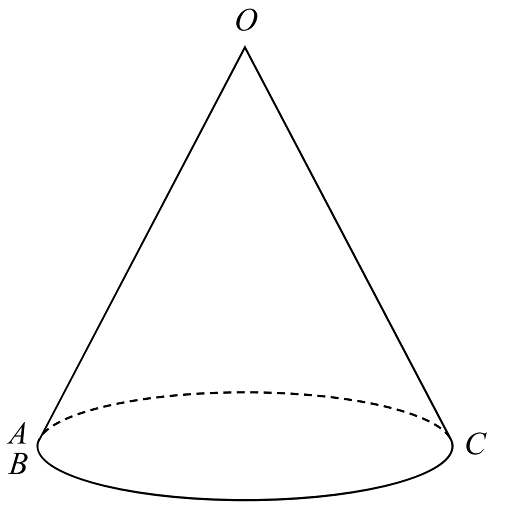
The diagram also shows a hollow cone with vertex O.
The cone is formed by joining OA and OB.

Volume of cone $= \dfrac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$







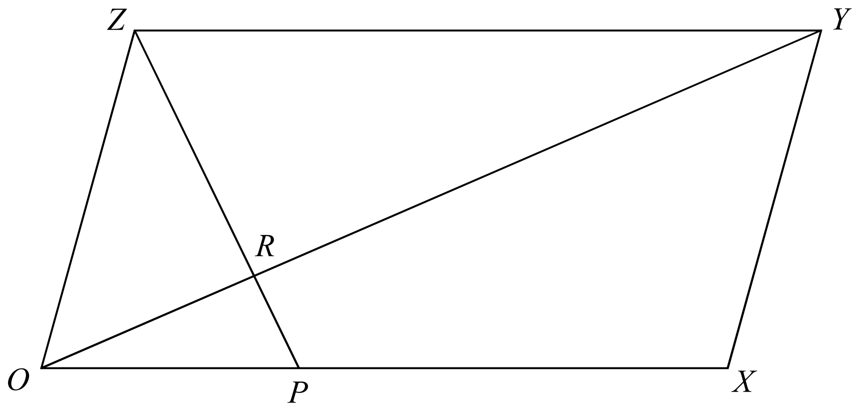
The cone has volume $56.8\,\text{cm}^3$ and height $3.6\,\text{cm}$.

Calculate the size of angle AOB of sector $OACB$.
Give your answer correct to 3 significant figures.
You must show all your working.

°

(Total for Question 23 is 5 marks)

24 *OXYZ* is a parallelogram.



$\overrightarrow{OX} = \mathbf{a}$

$\overrightarrow{OY} = \mathbf{b}$

P is the point on OX such that $OP : PX = 1 : 2$
R is the point on OY such that $OR : RY = 1 : 3$

Work out, in its simplest form, the ratio $ZP : ZR$
You must show all your working.

....

(Total for Question 24 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

BLANK PAGE

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

BLANK PAGE