

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 **1MA1/2H**

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 ►

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.CG Maths.

Hints



Pearson

Please note that these worked solutions have neither been provided nor approved by Pearson Education and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

Any writing in blue indicates what must be written in order to answer the questions and get the marks. The worked solutions have been designed to show the smallest amount of work which needs to be done to answer the question.

Anything written in green in a cloud doesn't have to be written in the exam.

Anything written in orange in a rectangle doesn't have to be written in the exam and is there to show what should be put into a calculator or measured using a ruler or protractor.

If you find any mistakes or have any requests or suggestions, please send an email to curtis@cgmaths.co.uk

Answer ALL questions.

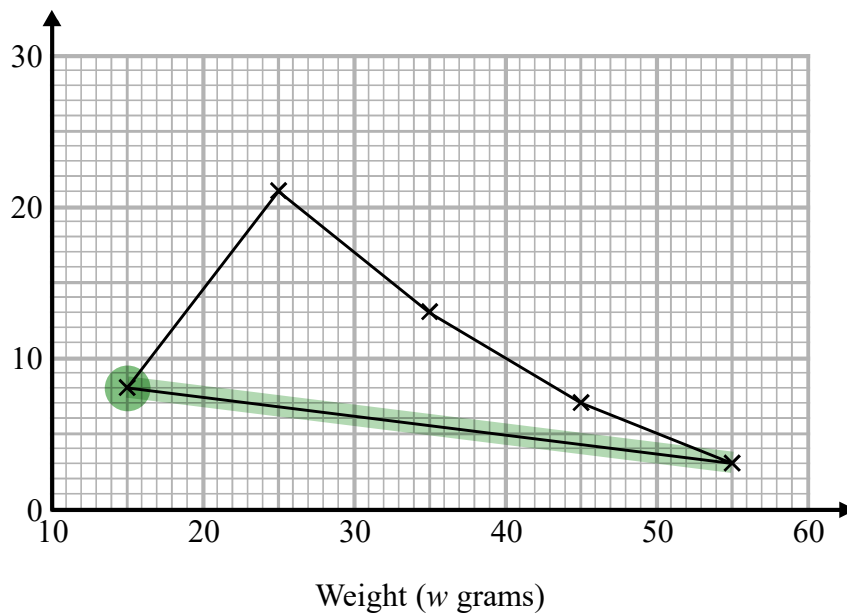
Write your answers in the spaces provided.

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
$10 < w \leq 20$	6
$20 < w \leq 30$	21
$30 < w \leq 40$	13
$40 < w \leq 50$	7
$50 < w \leq 60$	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.

Adding and subtracting half of the resolution (what it is to the nearest) works out the upper and lower bound of the measurement

..... mm \leq 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.

Work out the fraction of the stamps which Tom had then do this fraction of the 240 stamps to work out how many stamps he had. Then work out the fraction of the stamps which Tom now has and do this fraction of the 240 stamps to work out how many stamps he now has. Subtracting the number of stamps he had from the number he now has works out the difference and therefore how many he must have bought from Adam

.....
(Total for Question 3 is 4 marks)

- 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.

$17/50$ is the fraction of the sample which chose sports bag so he should order this fraction of the 700 people

.....
(2)

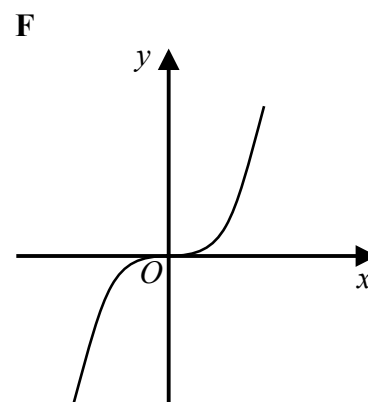
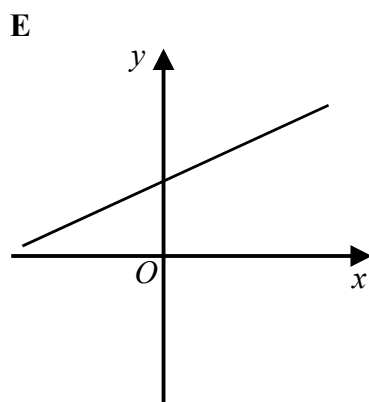
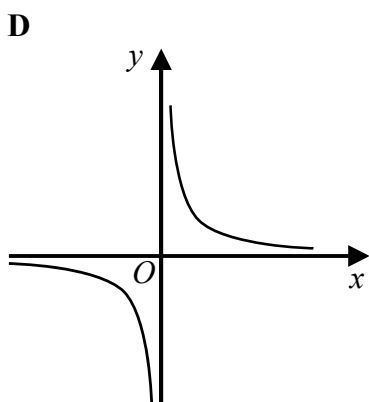
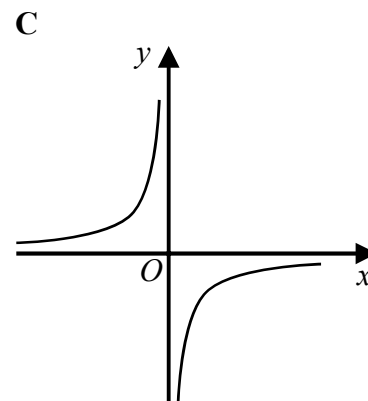
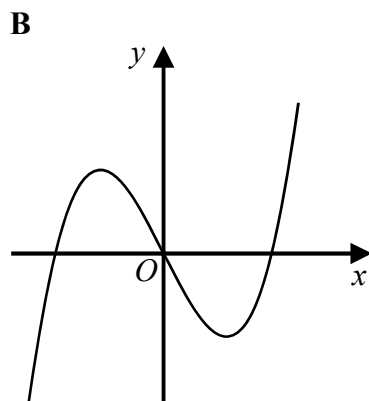
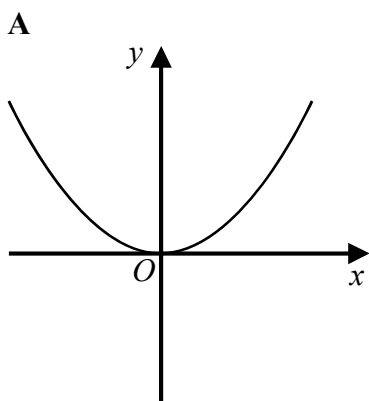
- (ii) Write down any assumption you made **and** explain how this could affect your answer.

An assumption is something taken as fact which might not actually be a fact. Is the $17/50$ of the people in the sample necessarily the same of the fraction of the 700 people who want a sports bag?

.....
.....
.....
(1)

(Total for Question 4 is 3 marks)

5 Here are six graphs.



Write down the letter of the graph that could have the equation

(a) $y = x^3$

Using table mode, enter $f(x) = x^3$. Start: -5. End: 5. Step 1

(1)

(b) $y = \frac{1}{x}$

Using table mode, enter $f(x) = 1/x$. Start: -5. End: 5. Step 1

(1)

(Total for Question 5 is 2 marks)

These give a table of values for each equation and can be compared to the six graphs

6 The n th term of a sequence is $2n^2 - 1$

The n th term of a different sequence is $40 - n^2$

Show that there is only one number that is in both of these sequences.

Using table mode, enter $f(x) = 2x^2 - 1$ and $g(x) = 40 - x^2$. Start: 1. End: 30. Step: 1

This lists out both sequences up to the 30th term. As one of the sequences is increasing and the other is decreasing, we only need to list out the sequences for the parts in which they overlap

(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.

Typing into the calculator give a decimal

Standard form is $a \times 10^n$, where $1 \leq a < 10$ and n is an integer

(Total for Question 7 is 2 marks)

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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.

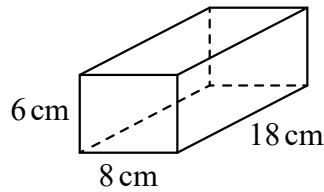
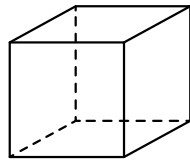
Hayley's company will have to use more workers each day than Ali's company.

How many more?

Rearrange the equation to make n the subject so that the number of workers can be worked out. Then substituting in the number of days needed to build the house for d will work out n , the number of workers needed. Subtracting the number of workers Ali's company will have to use from the number of workers Hayley's company will have to use works out the difference and therefore how many more workers Hayley's company uses

.....
(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.

Volume of cuboid = length \times width \times height. Volume of cube = length³. The length of the sides on the cube is found by square rooting the area of one of the square faces. The area of one of the square faces is found by dividing the total surface area of the cube by 6 as there are 6 identical square faces. The surface area of the cube is the same as the surface area of the cuboid and this is found by adding together the areas of all of the faces on the cuboid. Area of rectangle = length \times width. Opposite faces on a cuboid are the same

(Total for Question 9 is 5 marks)

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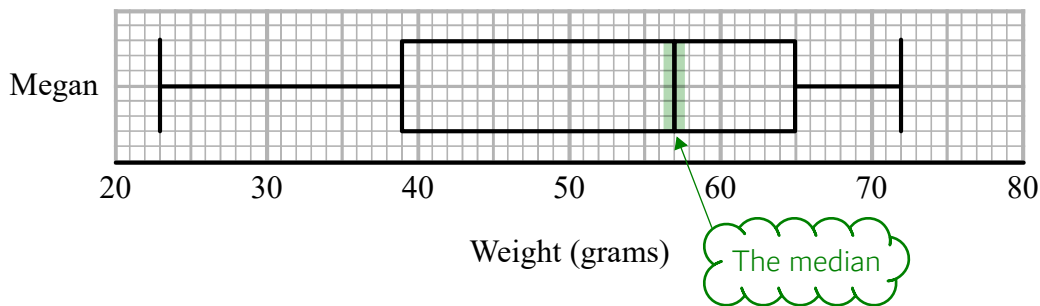
10 Make k the subject of the formula $y = \sqrt{2m - k}$

Squaring both sides of the equation eliminates the square root on the right.
Subtract $2m$ from both sides to get the k term on its own. Dividing both sides by -1 flips the signs and gets rid of the negative in front of 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?

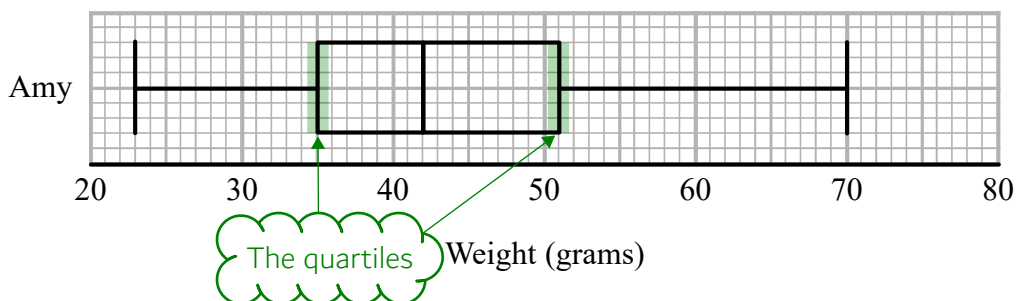
Give a reason for your answer.

... the median is more than 50

(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.

Compare the medians and the interquartile ranges.
A comparison could be stating which is greatest

(2)

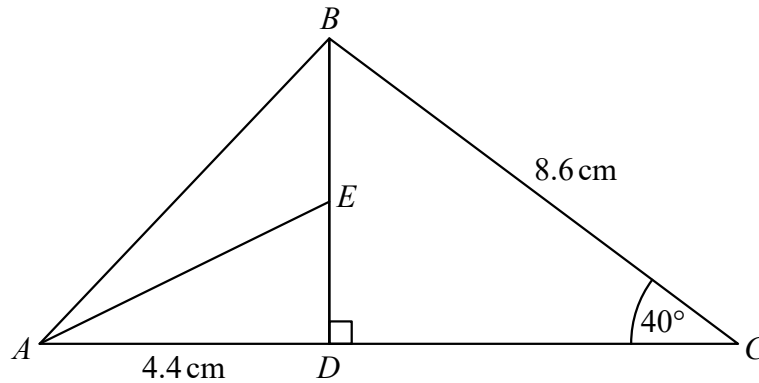
(Total for Question 11 is 3 marks)

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12 The diagram shows triangle ABC .



ADC and DEB are straight lines.

$$AD = 4.4 \text{ cm}$$

$$BC = 8.6 \text{ cm}$$

E is the midpoint of DB .

$$\text{Angle } CDB = 90^\circ$$

$$\text{Angle } DCB = 40^\circ$$

Work out the size of angle EAD .

Give your answer correct to 1 decimal place.

You must show all your working.

Right angled trigonometry can be used. Write SOH CAH TOA as formula triangles. First work with right angled triangle DBC and tick what we have and what we are trying to find (we need to find side DB). If there are two ticks on a formula triangle that one can be used. Then work with the right angled triangle AED and underline what we have. Side ED can be found once DB is found as E is the midpoint of DB and side AD is given. If there are two ticks on a formula triangle that one can be used. To use one of the formula triangles cover over what we are looking for and the rest will tell us what to do

(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.

100 + 2.6 expresses the percentage the amount of money in the savings account rises to each year for the first 2 years. Putting this over 100 converts the percentage into a fraction. Multiplying the £3550 by this fraction twice (so raising it to the power of 2) increases it by 2.6% twice. Then expressing this amount increased by $R\%$ must equal to the £3819.21. 100 + R expresses the percentage of the amount of money in the savings account rises to in the third year. Putting this over 100 converts the percentage into a fraction, which when multiplied by increases by $R\%$. Form an equation in terms of R then rearrange to find R

(Total for Question 13 is 3 marks)

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- 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.

Let R be the number of different roof colours. Using the product rule for counting expresses the total number of ways Sadia can choose the body colour and the roof colour and the wheel type. This must be equal to 3325. Rearrange the formed equation to find R

.....
(Total for Question 14 is 2 marks)

- 15 Expand and simplify $(3x + 2)(2x + 1)(x - 5)$

Expand out the first two brackets. Simplify the expansion by collecting like terms and write it multiplied by the third bracket. Expand out these two brackets. Simplify the expansion by collecting like terms

.....
(Total for Question 15 is 3 marks)

- 16 Marek has 9 cards.
There is a number on each card.

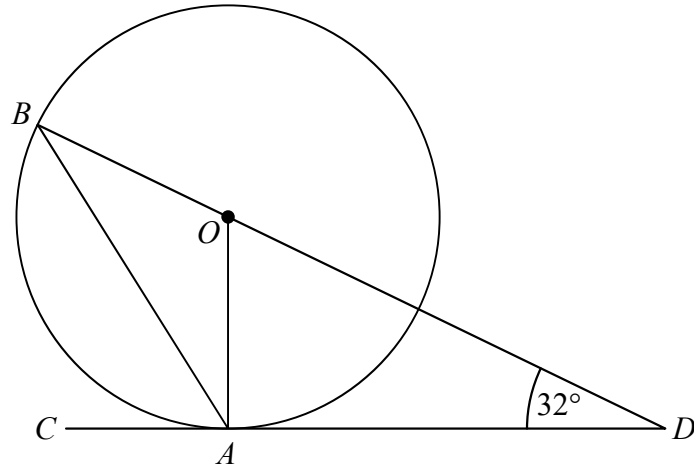


Marek takes at random two of the cards.
He works out the product of the numbers on the two cards.

Work out the probability that the product is an even number.

Systematically list out the possible outcomes using E to stand for even and O to stand for odd. Underline the outcomes which will result in an even product (which means multiplied together). AND means to multiply and OR means to add the probabilities. Consider that the first card chosen will have an effect on the probability of the second card as there will be one fewer card in total and one fewer odd or even, depending on what was picked

(Total for Question 16 is 3 marks)



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 $ODA = 32^\circ$

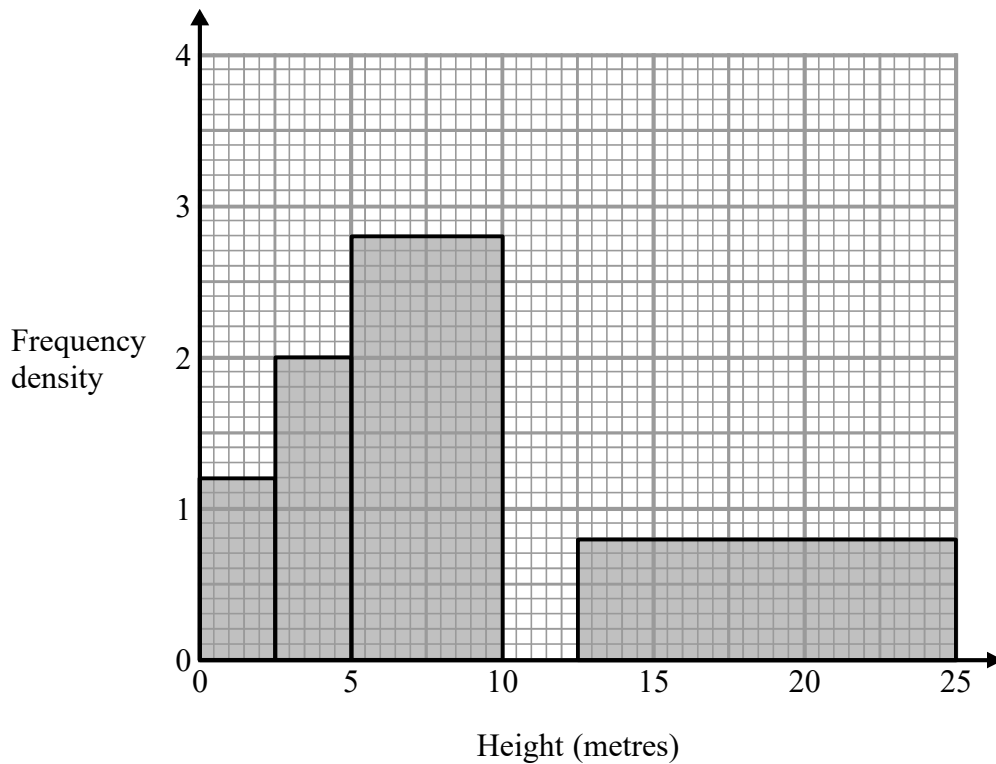
Work out the size of angle CAB .

You must show all your working.

A tangent and radius are perpendicular. There are 180 degrees in total in a triangle. Angles around a point on a straight line add up to 180. Radii are equal in length. The base angles of an isosceles triangle are equal. The working can be shown on the diagram and reasons do not need to be given

(Total for Question 17 is 3 marks)

- 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.

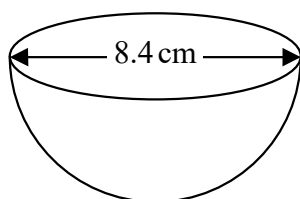
Complete the histogram.

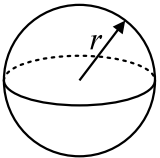
$c^F d$ ←

The area of each box gives the frequency on a histogram. Frequency = class width x frequency density. Writing this as a formula triangle where F stands for frequency, C stands for class width and d stands for frequency density

(Total for Question 18 is 3 marks)

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.

The radius is half of the diameter. Substitute the radius into the formula for the volume of a sphere to find the volume of the whole sphere. A hemisphere is half of the whole sphere

..... cm³

(Total for Question 19 is 2 marks)

20 $d = \frac{1}{8} c^3$

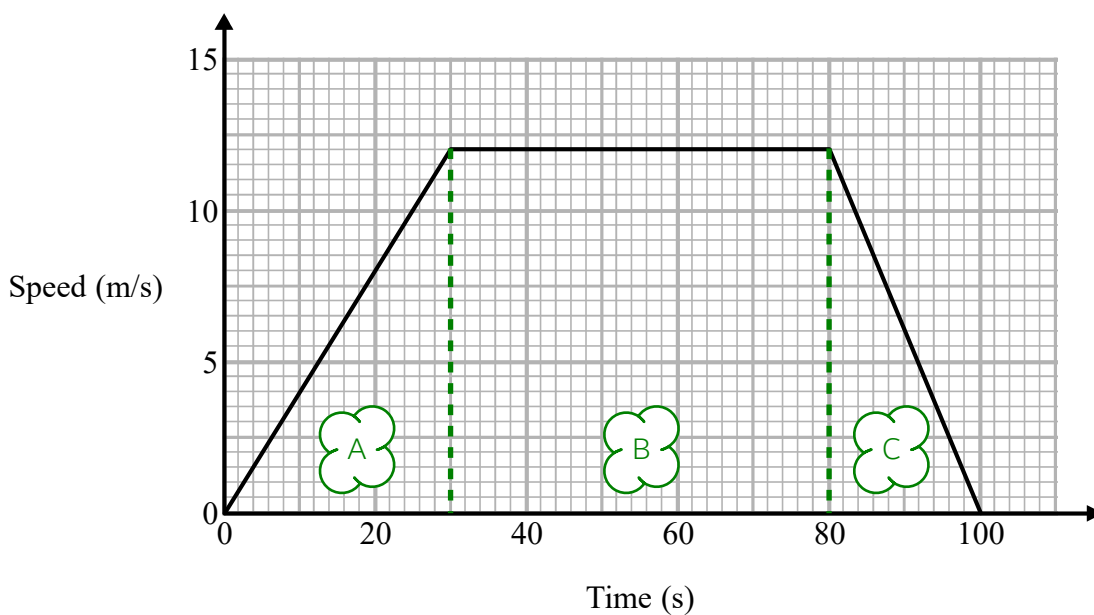
$c = 10.9$ correct to 3 significant figures.

By considering bounds, work out the value of d to a suitable degree of accuracy.
Give a reason for your answer.

Work out the upper and lower bound of d by substituting in the upper and lower bound of c into the formula. The lower bound of c is found by subtracting half of the resolution of the measurement and the upper bound of c is found by adding half of the resolution of the measurement. The resolution of the measurement is the value of the place the third significant figure of c is in (for example the first significant figure is in the tens place so if it was rounded to 1 significant figure the resolution would be 10). Then give a single value of d which both the upper and lower bound of d round to while using as many significant figures as possible

(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.

The area under the line is the distance travelled. Area of triangle = $\frac{1}{2} \times \text{base} \times \text{height}$.
Area of rectangle = length \times width. Adding all of the areas together then dividing by 2 works out half the distance between the two stations. Subtracting the area of triangle A leaves the remaining distance, which must end somewhere in the rectangle

s^d_t ← The formula triangle for distance, speed, time can be used to work out how many seconds it takes to do the remaining distance. This can be added onto the time already accounted for

..... 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.

The gradient is the acceleration, the rate in which the speed changes

(1)

(Total for Question 21 is 5 marks)

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.

Enter 200 then press =. Enter 1.2ANS - 50 and press = three times

ANS takes the previous value and substitutes it into the formula. Each time pressing equals works out the number of rabbits in the next month. As June is three months after March, the iteration formula is used three times

(3)

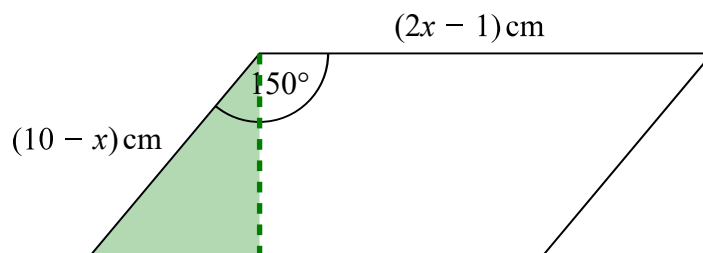
(b) Considering your results in part (a), suggest what will happen to the number of rabbits on the farm after a long time.

The pattern is likely to continue

(1)

(Total for Question 22 is 4 marks)

23 The diagram shows a parallelogram.



The area of the parallelogram is greater than 15 cm^2

(a) Show that $2x^2 - 21x + 40 < 0$

S^oH C^AHT^oA ←

Using right angled trigonometry to work out the height of the parallelogram, which is the dashed line in the green triangle

Area of parallelogram = base x height. The expression of the area must be greater than 15. Expand any brackets, simplify and rearrange the inequality to get the desired inequality. When multiplying or dividing by a negative the inequality symbol needs to flip

(3)

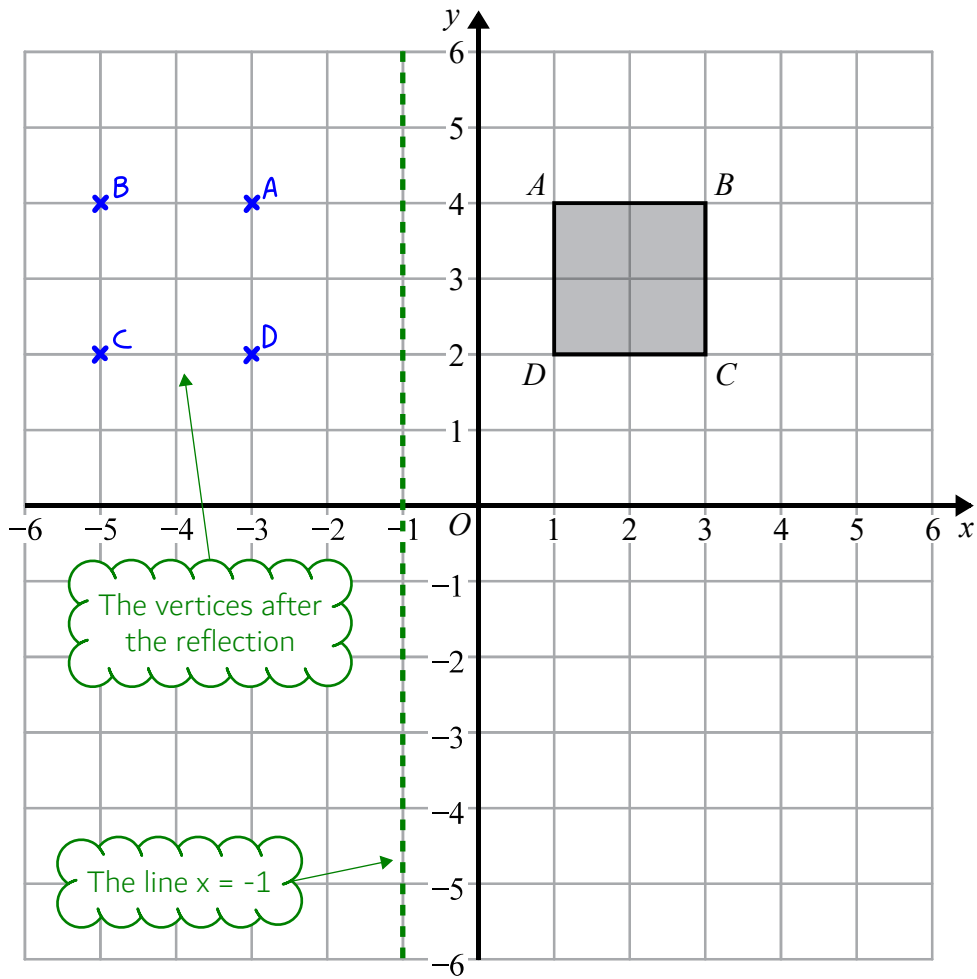
(b) Find the range of possible values of x .

Use the quadratic formula to work out what x is when the function of x is equal to 0. Then sketch the graph to visualise what the range of x must be for the function of x to be less than 0

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

(3)

(Total for Question 23 is 6 marks)



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.

Invariant means they are in the same place

(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.

Rearrange the equation of line **L** into the form $y = mx + c$, where *m* is the gradient and *c* is the *y*-intercept, to work out its gradient and where it crosses the *y*-axis. Write the equation of line **M** in the form $y = mx + c$. The gradient of line **M** is the negative reciprocal of the gradient of line **L** as they are perpendicular. The *y*-intercept is given. Solve the two equations simultaneously to work out the coordinates of point *C*. Do a sketch of points *A*, *B* and *C* to visualise the triangle. Area of triangle = $\frac{1}{2} \times \text{base} \times \text{height}$

(Total for Question 25 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS