

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)

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Thursday 4 June 2020

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 (a) Write 84 as a product of its prime factors.

FACT B Enter 84 in the calculator then press =. Then
press SHIFT then the button on the left

.....
(2)

- (b) Find the lowest common multiple (LCM) of 60 and 84

Express both 60 and 84 as a product of prime factors in index form. 84 was done in the previous question. The LCM is the highest power of each prime multiplied together

.....
(2)

(Total for Question 1 is 4 marks)

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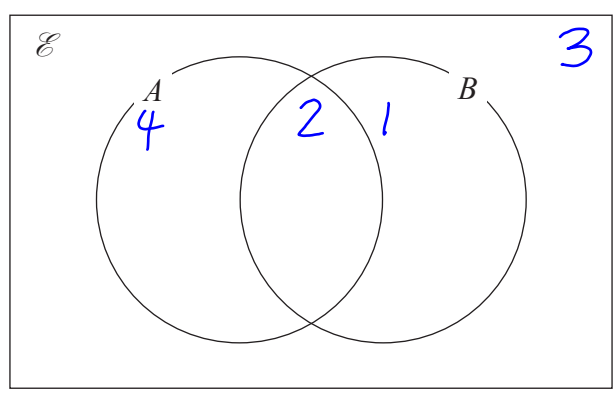
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2 $\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ ← Enter all the numbers from 1 to 10

$A = \{\text{even numbers}\}$

$B = \{\text{factors of 10}\}$ ← Whole numbers 10 can be divided by and get a whole number answer

(a) Complete the Venn diagram for this information.



A number is chosen at random from the universal set, \mathcal{E} ← Out of all of the numbers in the diagram (3)

(b) Find the probability that this number is in the set $A \cap B$

The fraction of numbers in the intersection of A and B is the probability

The intersection of A and B: both A and B at the same time

(2)

(Total for Question 2 is 5 marks)

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3 Carlo puts tins into small boxes and into large boxes.

He puts 6 tins into each small box.

He puts 20 tins into each large box.

Carlo puts a total of 3000 tins into the boxes so that

$$\text{number of tins in small boxes} : \text{number of tins in large boxes} = 2 : 3$$

Carlo says that less than 30% of the boxes filled with tins are large boxes.

Is Carlo correct?

You must show all your working.

There are 5 parts in total in the ratio and these represent a total of 3000 tins. Work out what 1 part represents. Then work out what the 2 and 3 parts represent to get how many tins are in the small and large boxes. Work out how many small and large boxes these will fill using the fact there are 6 in a small box and 20 in a large box. Express the number of large boxes as a fraction of the total number of boxes then convert it into a percentage. Compare this percentage to the 30% to see if it is less

(Total for Question 3 is 5 marks)

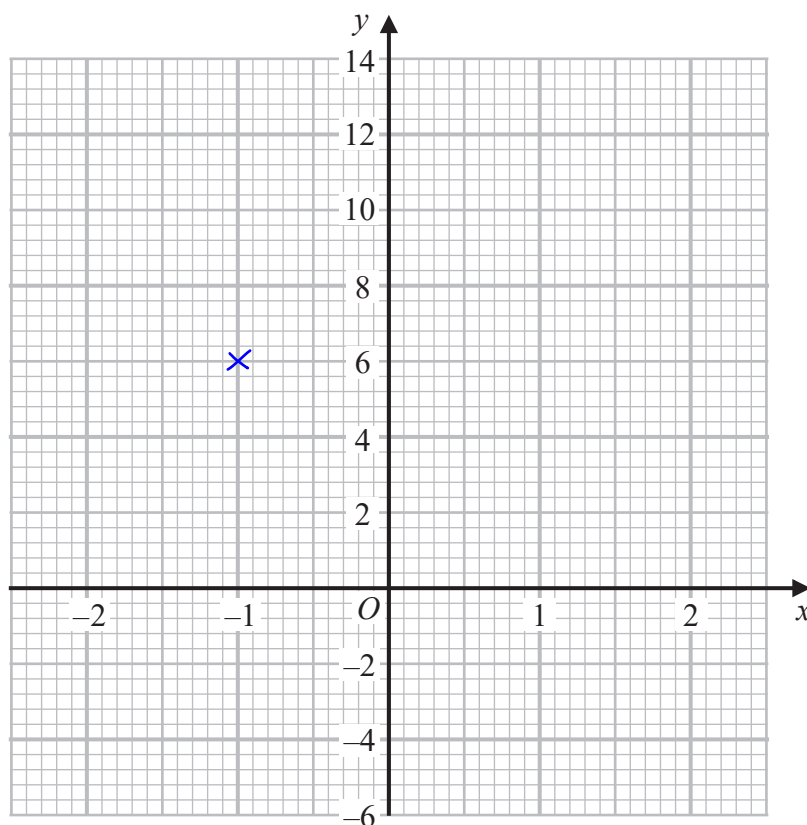
4 (a) Complete the table of values for $y = 5 - x^3$

Press MENU then 3 to enter table mode. Enter $f(x) = 5 - x^3$ then press =. Ignore $g(x)$ by pressing =. Start: -2, End: 2, Step: 1. Enter the number and press = to set each of these

x	-2	-1	0	1	2
y		6			

(2)

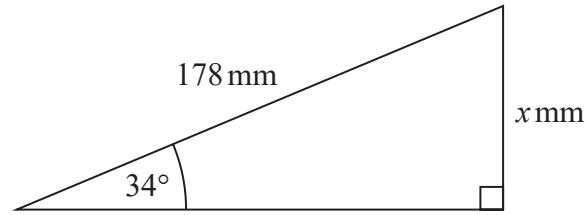
(b) On the grid below, draw the graph of $y = 5 - x^3$ for values of x from -2 to 2



(2)

(Total for Question 4 is 4 marks)

5



Work out the value of x .
Give your answer correct to 1 decimal place.

SOH CAH TOA

Writing SOH CAH TOA as formula triangles. Tick what we have and what we are trying to find. If there are two ticks on one of the formula triangles, we can use that one. To use the formula triangle, cover over what we are trying to find and the rest will tell us what to do.

S: sin of the angle, C: cos of the angle, T: tan of the angle, O: opposite, H: Hypotenuse, A: adjacent

(Total for Question 5 is 2 marks)

6 $\mathbf{a} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$

Find $2\mathbf{a} - 3\mathbf{b}$ as a column vector.

$$w \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} wx \\ wy \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} - \begin{pmatrix} v \\ w \end{pmatrix} = \begin{pmatrix} x - v \\ y - w \end{pmatrix}$$

$$\begin{pmatrix} \dots \\ \dots \end{pmatrix}$$

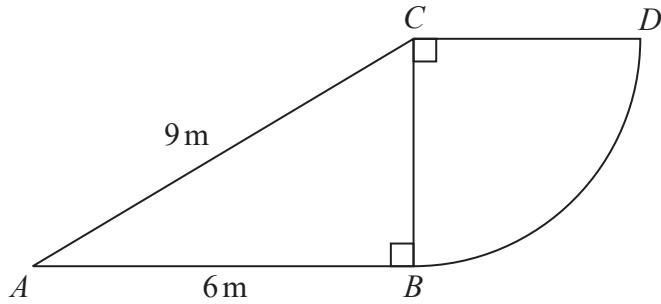
(Total for Question 6 is 2 marks)

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7 The diagram shows a right-angled triangle and a quarter circle.



The right-angled triangle ABC has angle $ABC = 90^\circ$
The quarter circle has centre C and radius CB .

Work out the area of the quarter circle.
Give your answer correct to 3 significant figures.
You must show all your working.

Area of circle = πr^2 , where r is the radius. r is side CB , which is found by using Pythagoras' Theorem in the right-angled triangle ABC . $a^2 + b^2 = c^2$, where a and b are the shorter sides and c is the longest side. Find $1/4$ of the area of the circle as it is a quarter circle

..... m²

(Total for Question 7 is 4 marks)

8 Tariq buys a laptop.

He gets a discount of 5% off the normal price.

Tariq pays £551 for the laptop.

(a) Work out the normal price of the laptop.

Let x be the normal price. Multiplying it by 0.95 works out 95% of it, which is a 5% reduction. $0.95x = 551$

£.....
(2)

Joan invests £6000 in a savings account.

The savings account pays compound interest at a rate of

2.4% for the first year

1.7% for each extra year.

(b) Work out the value of Joan's investment at the end of 3 years.

Express an increase of 2.4% as a multiplier and multiply 6000 by it. Express an increase of 1.7% as a multiplier and multiply the result by it twice

£.....
(3)

(Total for Question 8 is 5 marks)

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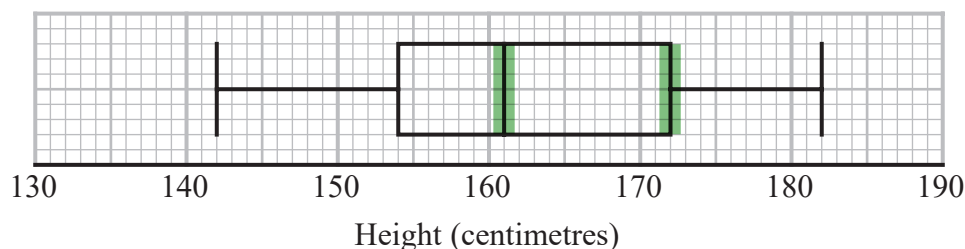
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9 Aisha recorded the heights, in centimetres, of some girls. She used her results to work out the information in this table.

Least height	142 cm
Lower quartile	154 cm
Interquartile range	17 cm
Median	162 cm
Range	40 cm

Aisha drew this box plot for the information in the table. The box plot is **not** fully correct.



Write down the two things Aisha should do to make the box plot fully correct.

1. The median and upper quartile are plotted incorrectly. Describe where they should be plotted

2. _____

(Total for Question 9 is 2 marks)

10 (a) Simplify $\left(\frac{1}{m^2}\right)^0$

Anything to the power of 0 is 1

.....
(1)

(b) Simplify $\frac{8(x-4)}{(x-4)^2}$

To simplify a fraction, divide both the numerator and denominator by a common factor

.....
(1)

(c) Simplify $(3n^4w^2)^3$

Raise everything in the bracket to the power of 3 as it is all one term. $(a^x)^y = a^{xy}$

.....
(2)

(Total for Question 10 is 4 marks)

11 Jack is in a restaurant.

There are 5 starters, 8 main courses and some desserts on the menu.

Jack is going to choose one starter, one main course and one dessert.

He says there are 240 ways that he can choose his starter, his main course and his dessert.

Could Jack be correct?

You must show how you get your answer.

Let D be the number of deserts. Using the product rule for counting: $5 \times 8 \times D =$ the total number of options. Work out what D would be to decide if Jack could be correct. If it isn't a whole number, he must be incorrect

(Total for Question 11 is 2 marks)

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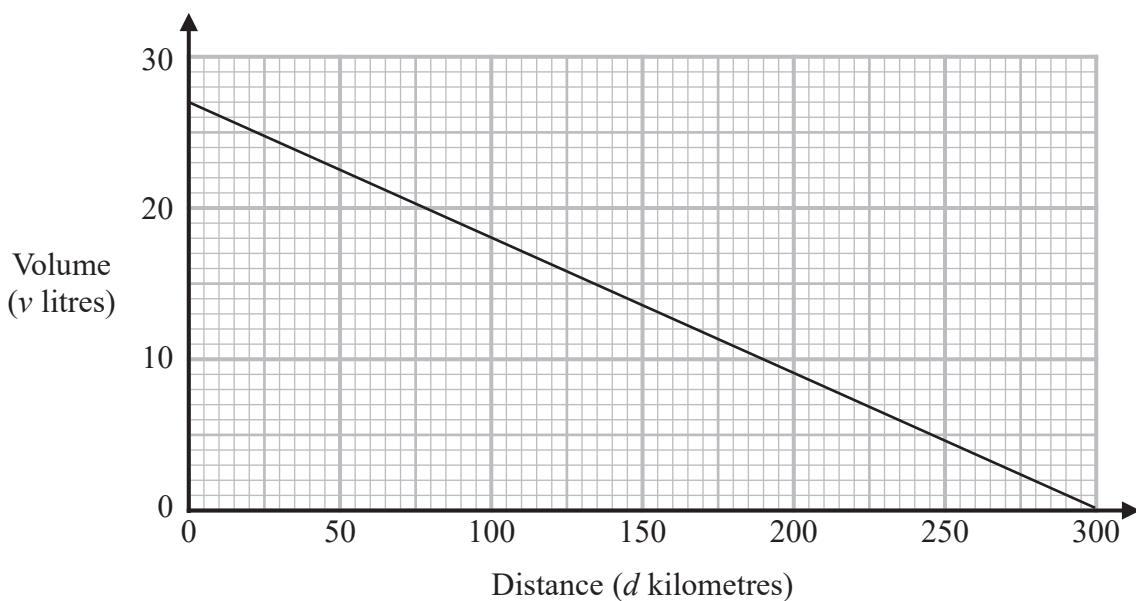
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12 The graph gives information about the volume, v litres, of petrol in the tank of Jim's car after it has travelled a distance of d kilometres.



(a) Find the gradient of the graph.

Gradient = (change in y) / (change in x). Pick two convenient points on the line which are preferably quite far apart and on grid lines to work out the change in y and x

.....
(2)

(b) Interpret what the gradient of the graph represents.

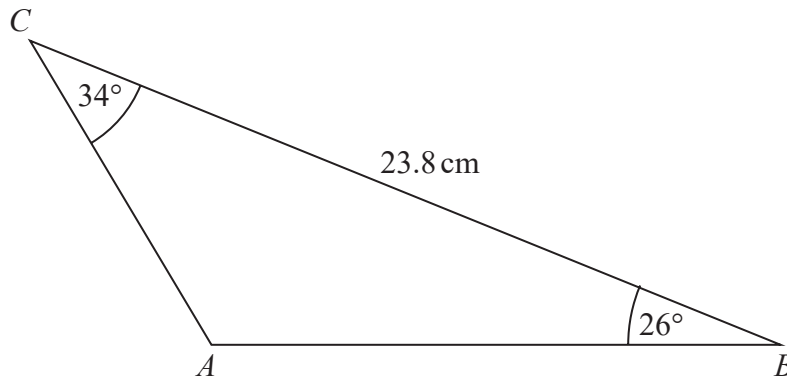
Volume of petrol used..

.....

.....
(1)

(Total for Question 12 is 3 marks)

13 Here is triangle ABC .



Work out the length of AB .

Give your answer correct to 1 decimal place.

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

The missing angle can be found. There are then two pairs of opposite sides and angles so the sine rule can be used

Find the missing angle using the fact that the angles in a triangle add to 180. Label the triangle: side a is opposite angle A and side b is opposite angle B . Ignore the ABC already labelled on the triangle when doing this. Rearrange the sine rule to make the side we are trying to find the subject then substitute in the other angles and sides

..... cm

(Total for Question 13 is 3 marks)

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14 Here are two squares, **A** and **B**.



The length of each side of square **B** is 4 cm greater than the length of each side of square **A**.
The area of square **B** is 70 cm^2 greater than the area of square **A**.

Find the area of square **B**.

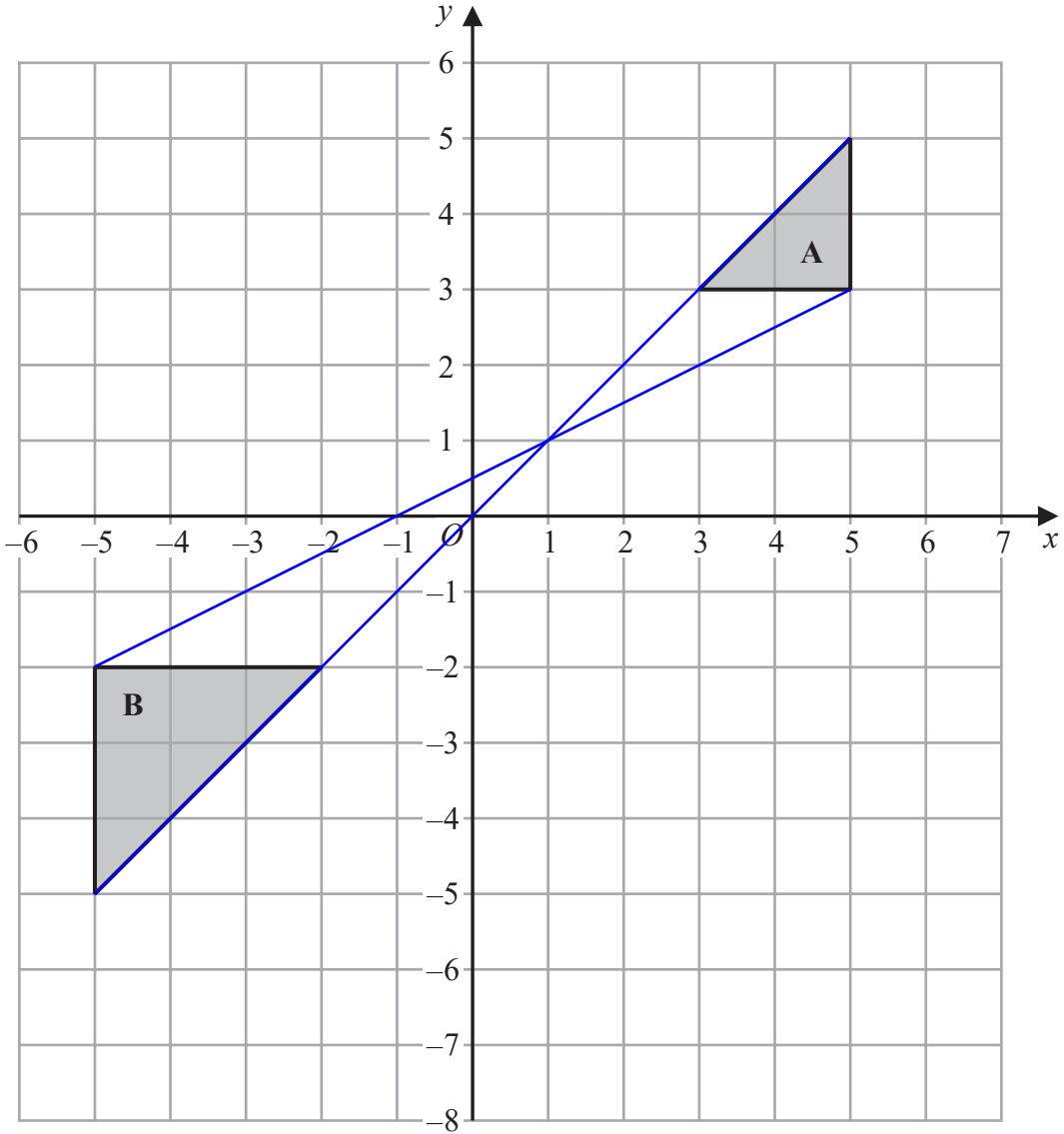
Give your answer correct to 3 significant figures.

You must show all your working.

Let x be the side length of **A**. The length of **B** must be $x + 4$. Squaring this gives the area of **B**, which is equal to the area of **A** + 70. The area of **A** = x^2 . Make an equation using this information then solve for x .
We can then work out the side length of **B** and therefore its area

..... cm^2

(Total for Question 14 is 4 marks)



Describe fully the single transformation that maps triangle A onto triangle B.

Enlargement by scale factor... from...

(Total for Question 15 is 2 marks)

16 Here are the first five terms of a quadratic sequence.

10 21 38 61 90

Find an expression, in terms of n , for the n th term of this sequence.

The sequence is in the form $an^2 + bn + c$. a is half of the second difference, the difference between the differences of each term. List out the sequence of an^2 then list what needs to be added to each term to get the original sequence. This will be a linear sequence in the form $bn + c$ where b is the amount it increases by each term and c is the 0th term

.....

(Total for Question 16 is 3 marks)

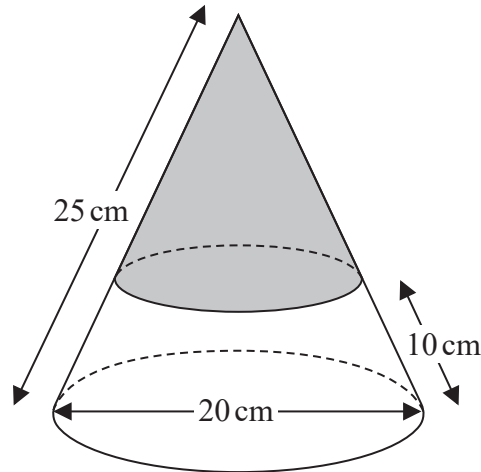
17 Write down the coordinates of the turning point on the graph of $y = (x + 12)^2 - 7$

The turning point occurs when the square bracket is equal to 0 as this is the smallest a squared number can be. When $x + 12 = 0$, $x = \dots$ When the bracket is 0, $y = \dots$

(..... ,)

(Total for Question 17 is 1 mark)

18 The diagram represents a solid cone.



Curved surface area of cone = $\pi r l$

The cone has a base diameter of 20 cm and a slant height of 25 cm.

A circle is drawn around the surface of the cone at a slant height of 10 cm above the base. The curved surface of the cone above the circle is painted grey.

Work out the area of the curved surface of the cone that is **not** painted grey.
Give your answer as a multiple of π
You must show all your working.

Subtracting the curved surface area of the grey cone from the curved surface area of the whole cone leaves the curved surface area which is not painted grey. Find the slant height of the grey cone. This can be used to work out the scale factor between the whole cone and the grey cone, which can be used to work out the radius of the grey cone

..... cm²

(Total for Question 18 is 4 marks)

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19 A hot air balloon is descending.

The height of the balloon n minutes after it starts to descend is h_n metres.

The height of the balloon $(n + 1)$ minutes after it starts to descend, h_{n+1} metres, is given by

$$h_{n+1} = K \times h_n + 20 \quad \text{where } K \text{ is a constant.}$$

The balloon starts to descend from a height of 1200 metres at 09 15

At 09 16 the height of the balloon is 1040 metres.

Work out the height of the balloon at 09 18

The formula basically means: height in the next minute = something x the current height + 20.
Rearrange to find the constant K by substituting in the values given. Then use the formula to find the height at 19 17, which can be used to find the height at 19 18

..... m

(Total for Question 19 is 4 marks)

20 There are only red sweets and yellow sweets in a bag.

There are n red sweets in the bag.

There are 8 yellow sweets in the bag.

Sajid is going to take at random a sweet from the bag and eat it.

He says that the probability that the sweet will be red is $\frac{7}{10}$

(a) Show why the probability cannot be $\frac{7}{10}$

Express the probability of getting red in terms of n , which must equal to $\frac{7}{10}$. Rearrange the equation to find n and show that it is not a whole number so is not possible

(3)

After Sajid has taken the first sweet from the bag and eaten it, he is going to take at random a second sweet from the bag.

Given that the probability that both the sweets he takes will be red is $\frac{3}{5}$

(b) work out the number of red sweets in the bag.

You must show all your working.

Red AND red. AND means to multiply the probabilities. There is one fewer red sweet and one fewer sweet in total after the first red sweet is taken. Use this to express the probability of getting both red sweets in terms of n and set it equal to $\frac{3}{5}$. Solve for n by rearranging it into the quadratic form $ax^2 + bx + c$ then using the quadratic formula. At some point the denominators will need to be eliminated by multiplying both sides by the denominators. n cannot be negative so any negative solutions are ignored

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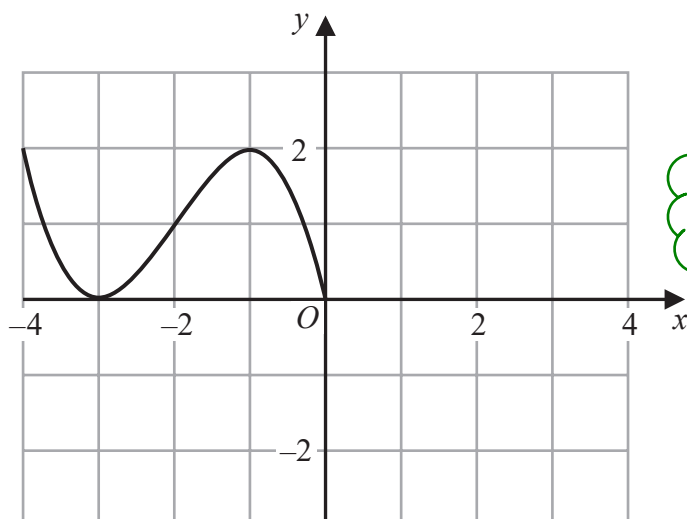
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(5)

(Total for Question 20 is 8 marks)

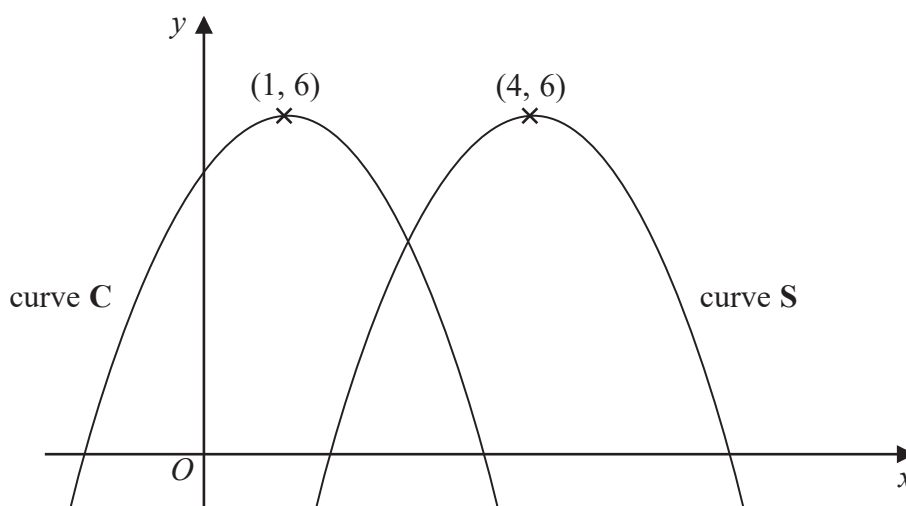
21 The graph of the curve with equation $y = f(x)$ is shown on the grid below.



x has become negative so it is a reflection in the y-axis

(a) On the grid above, sketch the graph of the curve with equation $y = f(-x)$

(2)



The curve C with equation $y = 5 + 2x - x^2$ is transformed by a translation to give the curve S such that the point (1, 6) on C is mapped to the point (4, 6) on S.

(b) Find an equation for S.

Subtracting 3 from all of the x means that it gets to the same values 3 later, so translates 3 to the right

(2)

(Total for Question 21 is 4 marks)

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22 C is a circle with centre the origin.

A tangent to C passes through the points $(-20, 0)$ and $(0, 10)$

Work out an equation of C.

You must show all your working.

The general equation of a circle with its centre at the origin is $x^2 + y^2 = r^2$. Substituting in an x and y value on the circle can find r^2 . To find an x and y value on the circle, find the coordinates of intersection between its radius and the tangent. To do this, find the equation of the tangent and the radius and solve the equations simultaneously. The general equation of a straight line is $y = mx + c$, where m is the gradient and c is the y-intercept. Gradient = (change in y)/(change in x). The tangent and radius are perpendicular so their gradients are the negative reciprocal of each other

(Total for Question 22 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS