

Write your name here	
Surname	Other names
Centre Number	Candidate Number
Pearson Edexcel International GCSE	
Mathematics A Paper 3HR  Higher Tier	
Thursday 25 May 2017 – Morning Time: 2 hours	Paper Reference 4MA0/3HR
You must have: Ruler graduated in centimetres and millimetres, protractor, 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.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- 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.
- Check your answers if you have time at the end.

Turn over ►

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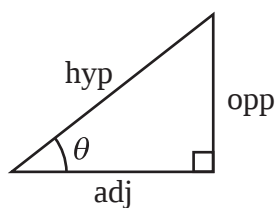
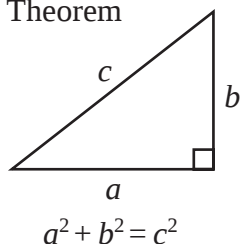
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International GCSE MATHEMATICS FORMULAE SHEET – HIGHER TIER

Pythagoras' Theorem

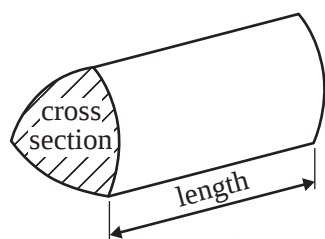


$$\begin{aligned}\text{adj} &= \text{hyp} \times \cos \theta \\ \text{opp} &= \text{hyp} \times \sin \theta \\ \text{opp} &= \text{adj} \times \tan \theta\end{aligned}$$

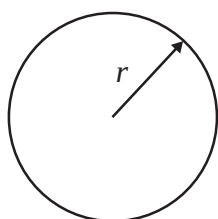
$$\text{or} \quad \sin \theta = \frac{\text{opp}}{\text{hyp}}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

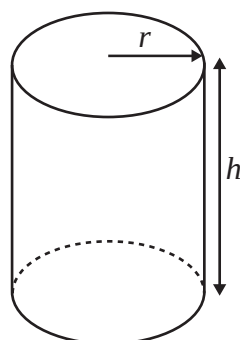


$$\text{Volume of prism} = \text{area of cross section} \times \text{length}$$



$$\text{Circumference of circle} = 2\pi r$$

$$\text{Area of circle} = \pi r^2$$

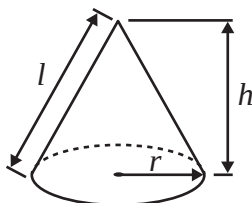


$$\text{Volume of cylinder} = \pi r^2 h$$

$$\text{Curved surface area of cylinder} = 2\pi r h$$

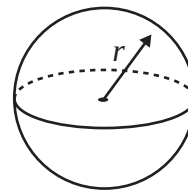
$$\text{Volume of cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Curved surface area of cone} = \pi r l$$

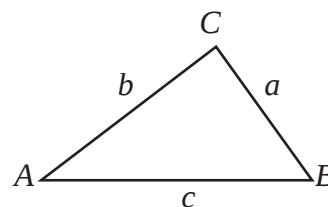


$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

$$\text{Surface area of sphere} = 4\pi r^2$$



In any triangle ABC

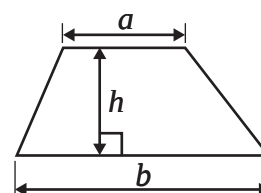


$$\text{Sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{Cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area of triangle} = \frac{1}{2} ab \sin C$$

$$\text{Area of a trapezium} = \frac{1}{2}(a + b)h$$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

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Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 $a = 6$ $b = 2.84$ $c = \sqrt{5}$

Work out the value of $\frac{a - b}{c^2}$

.....
(Total for Question 1 is 2 marks)

2 Solve $5x - 8 = x - 10$
Show clear algebraic working.

$x =$

(Total for Question 2 is 3 marks)



3

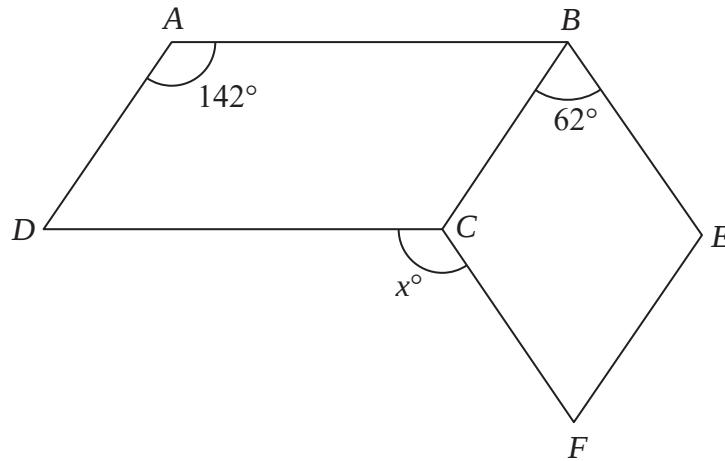


Diagram **NOT**
accurately drawn

$ABCD$ is a parallelogram.
 $BEFC$ is a rhombus.

Angle $DAB = 142^\circ$
 Angle $CBE = 62^\circ$

Calculate the value of x .

$x = \dots\dots\dots$

(Total for Question 3 is 3 marks)

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- 4 The currency in Bangladesh is the taka.
1 pound (£) = 119 taka

- (a) Change 3500 taka to pounds.
Give your answer correct to 2 decimal places.

£
(2)

The currency in Thailand is the baht.
1 pound (£) = 52 baht

- (b) Change 8500 baht to taka.
Give your answer correct to the nearest whole number.

..... taka
(3)

An aeroplane takes 2 hours and 24 minutes to fly from Bangkok to Dhaka.
The aeroplane flies a distance of 1534 km.

- (c) Work out the average speed of the aeroplane.
Give your answer in kilometres per hour correct to 3 significant figures.

..... kilometres per hour
(3)

(Total for Question 4 is 8 marks)



5 There is a World Peace Bell in South Korea.

At its widest, the bell has a circular cross section with a diameter of 2.5 m.

- (a) Work out the circumference of a circle with diameter 2.5 m.
Give your answer correct to 3 significant figures.

..... m
(2)

The World Peace Bell in South Korea has a height of 4.7 m.

At its widest, the bell has a circular cross section with a diameter of 2.5 m.

A scale model is made of the bell.

At its widest, the scale model has a circular cross section with a diameter 10 cm.

- (b) Work out the height of the scale model.
Give your answer in centimetres.

..... cm
(2)

(Total for Question 5 is 4 marks)

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- 6 Ahmed, Beth and Cleo are three friends.

The mean age, in years, of Ahmed, Beth and Cleo is 21

The mean age, in years, of Ahmed and Beth is 19

- (a) Work out Cleo's age.

..... years
(3)

Ahmed is the youngest of the three friends.

The median age, in years, of the three friends is 20

- (b) Find the range of their ages.

..... years
(3)

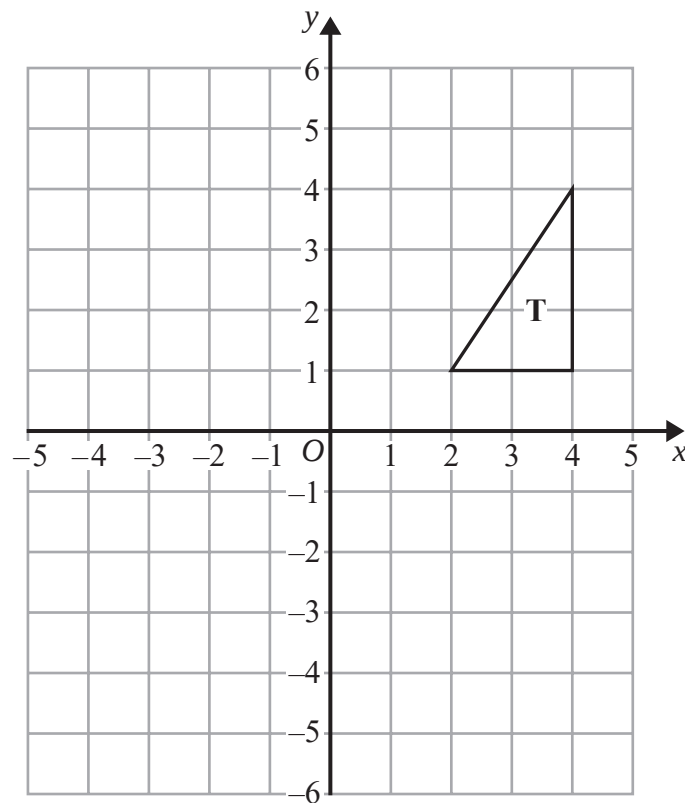
(Total for Question 6 is 6 marks)



- 7 Write 336 as a product of its prime factors.
Show your working clearly.

(Total for Question 7 is 3 marks)

8



- (a) On the grid above, rotate triangle T 90° clockwise about (0, 2).

(2)

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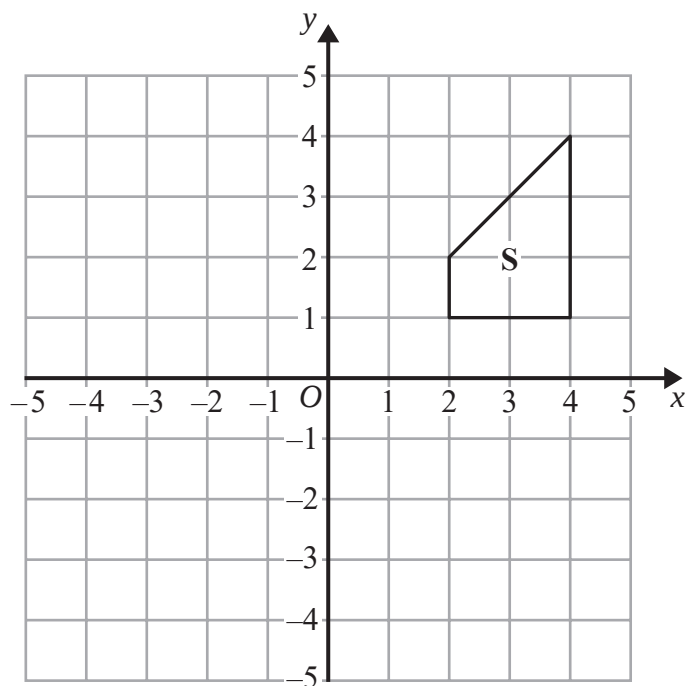
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- (b) On the grid, translate shape **S** by the vector $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$. (1)

(Total for Question 8 is 3 marks)

- 9 (a) Simplify $2e^2f \times 5e^3f$

.....
(2)

- (b) Factorise $x^2 - 5x - 6$

.....
(2)

(Total for Question 9 is 4 marks)



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- 10** The price of 1 kg of silver on 1st January 2010 was \$607
By 1st January 2015, the price of 1 kg of silver had decreased by 9.4%
- (a) Work out the price of 1 kg of silver on 1st January 2015.
Give your answer correct to the nearest dollar (\$).

\$.....
(3)

Between 1st January 2010 and 1st January 2015, the price of 1 tonne of copper decreased by 20%

This was a decrease of \$1320

- (b) Work out the price of 1 tonne of copper on 1st January 2010.

\$.....
(3)

(Total for Question 10 is 6 marks)



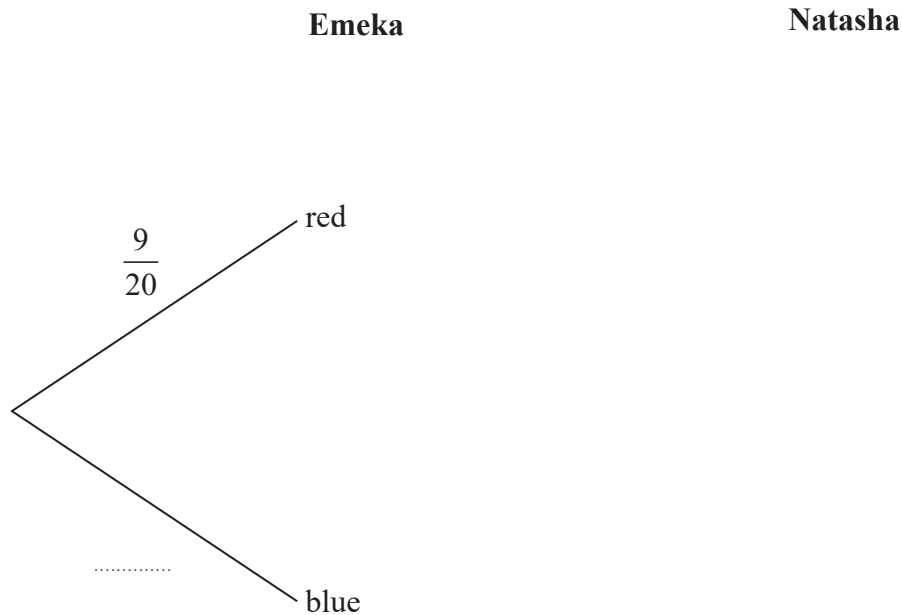
- 11 There are 9 red counters and 11 blue counters in a bag.
There are no other counters in the bag.

Emeka takes at random a counter from the bag and writes down the colour of the counter.

He puts the counter back in the bag.

Natasha takes at random a counter from the bag and writes down the colour of the counter.

- (a) Complete the probability tree diagram.



(2)

- (b) Work out the probability that Emeka takes a red counter from the bag and Natasha takes a blue counter from the bag.

(2)

- (c) Work out the probability that both counters taken from the bag are the same colour.

(3)

(Total for Question 11 is 7 marks)



- 12 The table gives information about the number of males in each age group in a survey of 100 males working in Singapore in 2014.

Age (A years)	Frequency
$15 \leq A < 20$	2
$20 \leq A < 25$	7
$25 \leq A < 30$	9
$30 \leq A < 35$	10
$35 \leq A < 40$	11
$40 \leq A < 45$	12
$45 \leq A < 50$	12
$50 \leq A < 55$	12
$55 \leq A < 60$	11
$60 \leq A < 65$	14

- (a) Complete the cumulative frequency table.

Age (A years)	Cumulative frequency
$15 \leq A < 20$	
$15 \leq A < 25$	
$15 \leq A < 30$	
$15 \leq A < 35$	
$15 \leq A < 40$	
$15 \leq A < 45$	
$15 \leq A < 50$	
$15 \leq A < 55$	
$15 \leq A < 60$	
$15 \leq A < 65$	

(1)

- (b) On the grid, draw a cumulative frequency graph for your table.

(2)

- (c) Use your graph to find an estimate for the lower quartile.

..... years

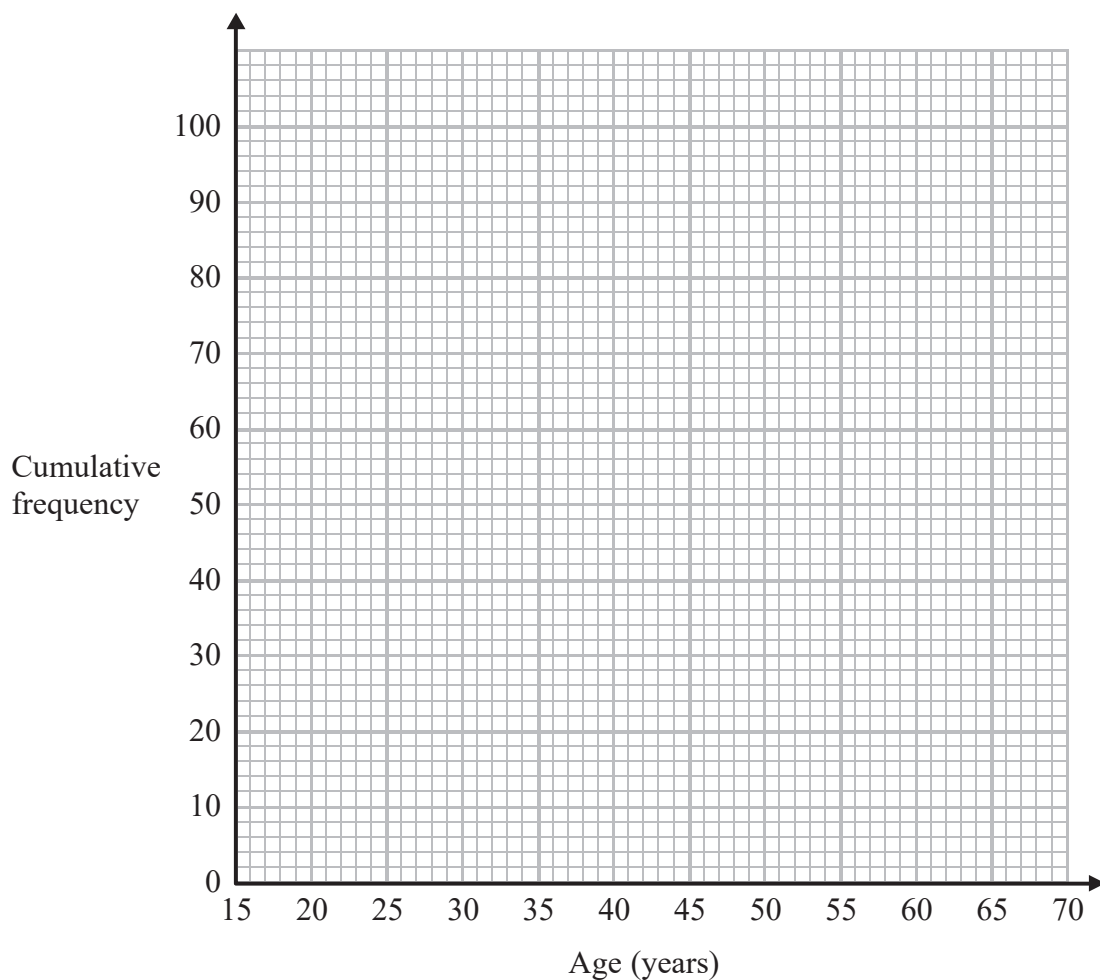
(2)

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The total number of males aged under 65 working in Singapore in 2014 was 1 200 000

Using this information and your graph,

- (d) work out an estimate for the number of males working in Singapore in 2014 who were less than 52 years old.

.....
(3)

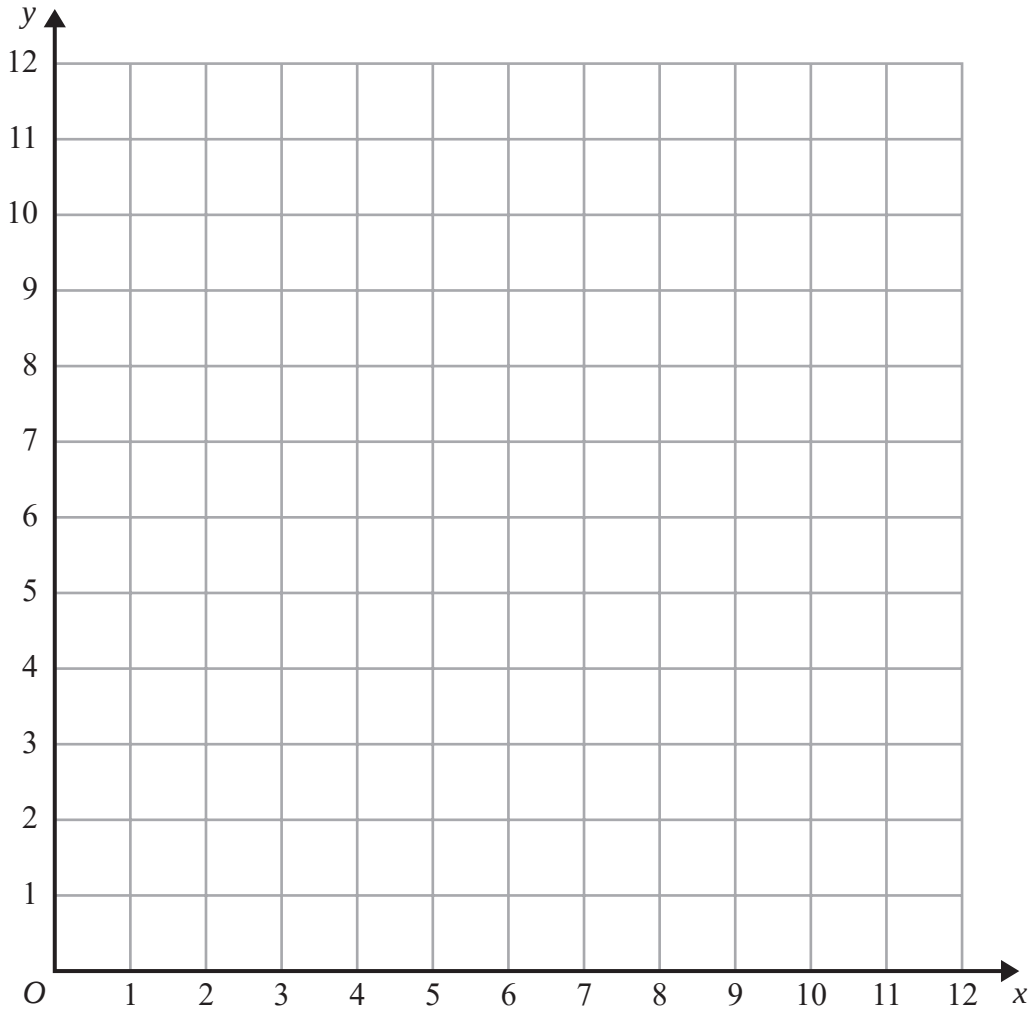
(Total for Question 12 is 8 marks)



13 On the grid, show by shading the region defined by the inequalities

$$y > 5 \quad \text{and} \quad y < 2x + 1 \quad \text{and} \quad x + y < 10$$

Label your region **R**.



(Total for Question 13 is 3 marks)

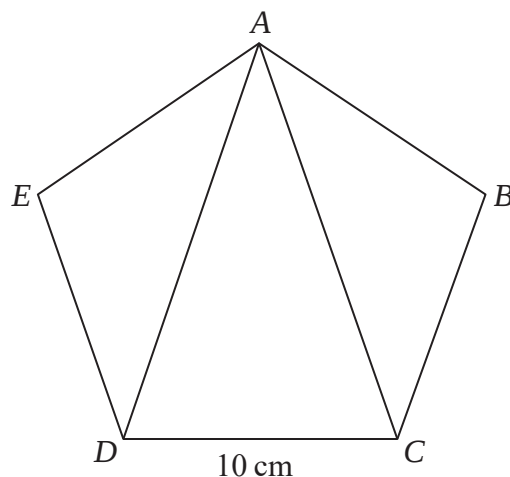
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- 14 $ABCDE$ is a regular pentagon with sides of length 10 cm.

Diagram **NOT**
accurately drawn



Calculate the area of triangle ACD .
Give your answer correct to 3 significant figures.

.....cm²

(Total for Question 14 is 6 marks)



15 For the curve C with equation

$$y = 2x^3 - 3x^2 - 12x + 9$$

(a) find $\frac{dy}{dx}$

.....
(2)

(b) Find the gradient of C at the point with coordinates (2, -11)

.....
(2)

The curve C has a gradient of -12 at the point where $x = k$ and at the point where $x = m$.
Given that $k > m$

(c) find the value of k and the value of m .

$k =$

$m =$

(3)

(Total for Question 15 is 7 marks)

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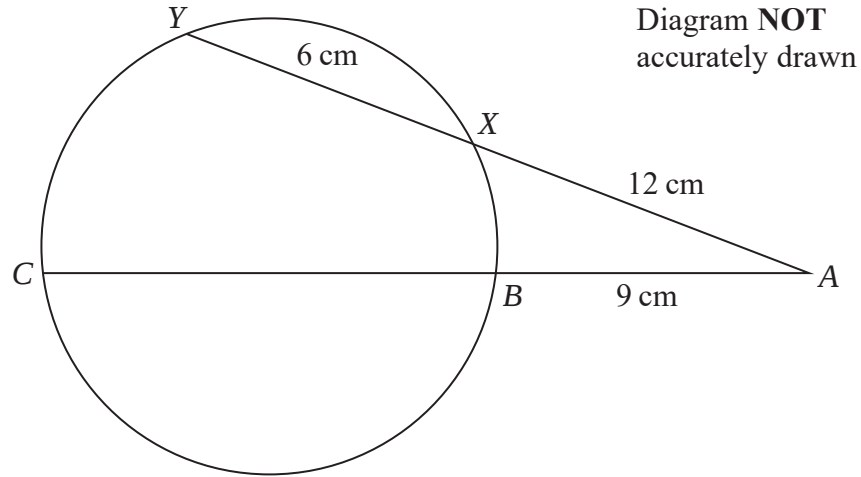


16 Make x the subject of the formula $y = \frac{ax + b}{cx + d}$

(Total for Question 16 is 4 marks)



17



The points B , C , Y and X lie on a circle.

AXY and ABC are straight lines.

$AX = 12 \text{ cm}$ $XY = 6 \text{ cm}$ $AB = 9 \text{ cm}$

Calculate the length of BC .

.....cm

(Total for Question 17 is 3 marks)

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18 Solve the simultaneous equations

$$y^2 + 4x = 12$$

$$2x + 3y = 10$$

Show clear algebraic working.

.....
(Total for Question 18 is 6 marks)



- 19 The diagram shows two solid shapes, shape **A** and shape **B**.
 Shape **A** is made of a hemisphere and a cone.
 Shape **B** is a cylinder.

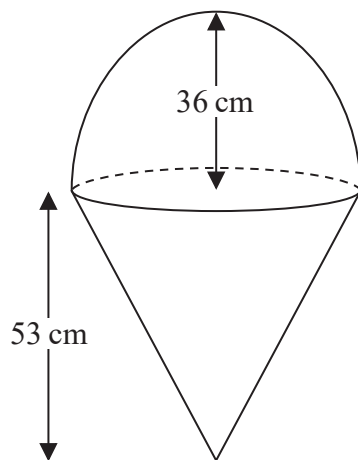
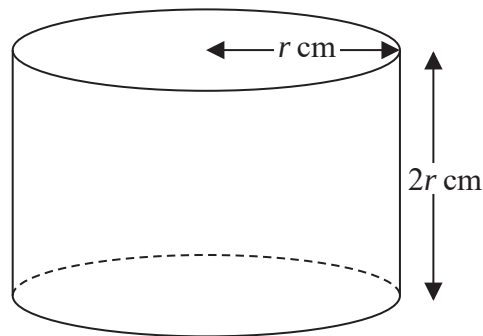
**A**

Diagram **NOT**
accurately drawn

**B**

For shape **A**

radius of the hemisphere is 36 cm
 radius of the base of the cone is 36 cm
 height of the cone is 53 cm

For shape **B**

radius of the cylinder is r cm
 height of the cylinder is $2r$ cm

The volume of shape **A** = the volume of shape **B**

Calculate the height of shape **B**.

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.....cm

(Total for Question 19 is 6 marks)



20 $k = 2^p - 1$ where p is an integer > 1

$$N = k^2 - 1$$

Show that 2^{p+1} is a factor of N

(Total for Question 20 is 3 marks)

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21 Here is a shape $ABCDE$.

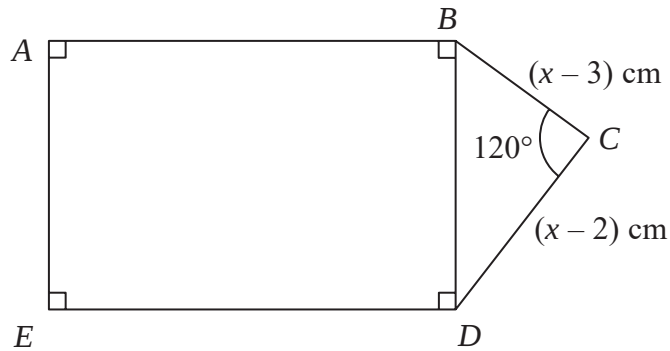


Diagram **NOT**
accurately drawn

$ABDE$ is a rectangle in which $AB = 2BD$

BCD is a triangle in which angle $BCD = 120^\circ$

$BC = (x - 3)$ cm $CD = (x - 2)$ cm

The area of the rectangle $ABDE$ is S cm²

Show that S can be expressed in the form $S = ax^2 + bx + c$
where a , b and c are integers to be found.

$S = \dots\dots\dots$

(Total for Question 21 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS



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