

Pearson Edexcel iGCSE Mathematics
4MA1 Paper 2
Past Paper Collection (from 2020)


www.CasperYC.club/4xma1

Last updated: July 5, 2024

Paper Name	Page	Paper Name	Page
4MA1 2020 01 2H	1	4MA1 2022 01 2HR	269
4MA1 2020 01 2HR	29	4MA1 2022 06 2H	301
4MA1 2020 06 2H	57	4MA1 2022 06 2HR	325
4MA1 2020 06 2HR	81	4MA1 2023 01 2H	353
4MA1 2020 11 2HR	109	4MA1 2023 01 2HR	381
4MA1 2021 01 2H	133	4MA1 2023 06 2HR	411
4MA1 2021 01 2HR	161	4MA1 2023 11 2H	439
4MA1 2021 06 2H	185	4MA1 2024 06 2H	463
4MA1 2021 11 2H	213	4MA1 2024 06 2HR	491
4MA1 2022 01 2H	241		



Please check the examination details below before entering your candidate information

Candidate surname		Other names	
Pearson Edexcel International GCSE		Centre Number	Candidate Number
		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Wednesday 15 January 2020			
Morning (Time: 2 hours)		Paper Reference 4MA1/2H	
Mathematics A Paper 2H Higher Tier			
You must have: Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.			Total Marks

Instructions

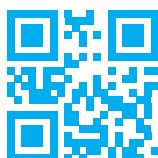
- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more 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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

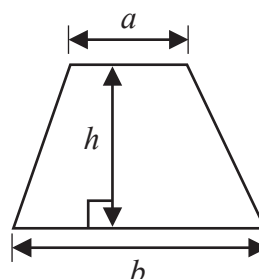
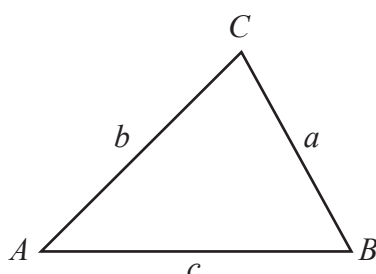
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry**

In any triangle ABC

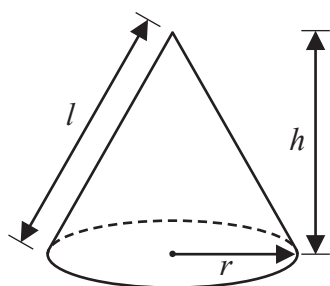
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

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

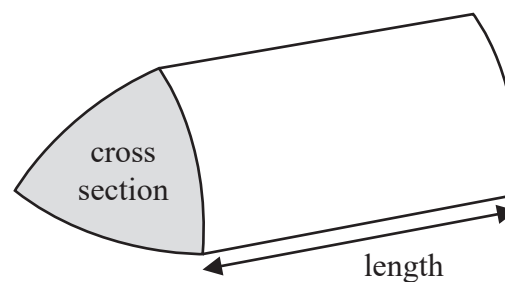
Volume of cone $= \frac{1}{3}\pi r^2 h$

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



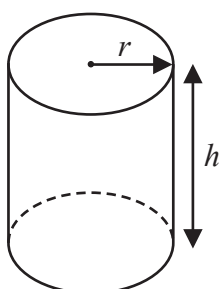
Volume of prism

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



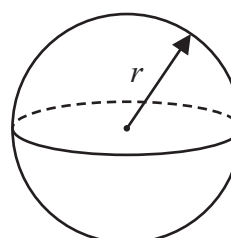
Volume of cylinder $= \pi r^2 h$

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



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

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



Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Simplify $\frac{x^9}{x^2}$

.....
(1)

(b) Write $\frac{7^8 \times 7^4}{7^3}$ as a single power of 7

.....
(2)

(Total for Question 1 is 3 marks)

2 Change 32.4 m^3 into cm^3

..... cm^3

(Total for Question 2 is 2 marks)

3 Show that $4\frac{2}{3} + 3\frac{4}{5} = 8\frac{7}{15}$

(Total for Question 3 is 3 marks)

- 4 The diagram shows a triangle.

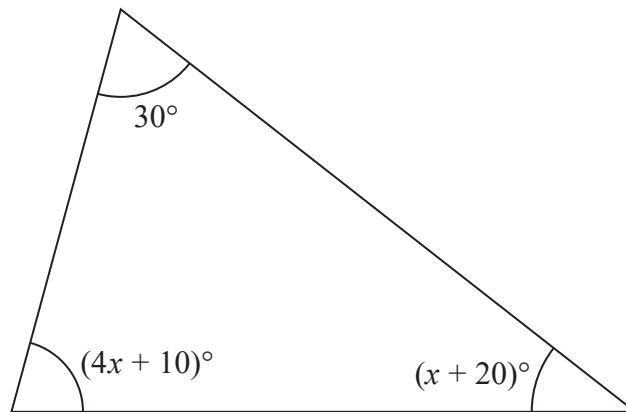


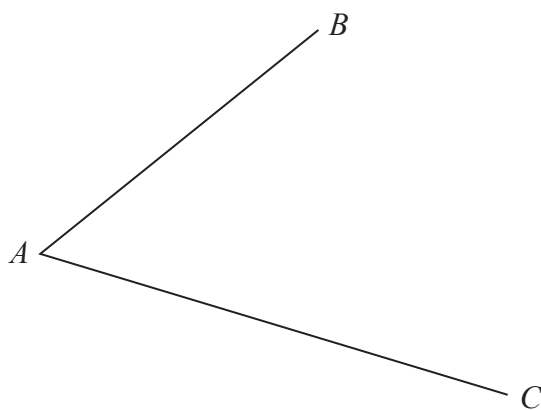
Diagram **NOT**
accurately drawn

Work out the value of x .

$x = \dots\dots\dots$

(Total for Question 4 is 4 marks)

- 5 Use ruler and compasses to construct the bisector of angle BAC .
You must show all your construction lines.



(Total for Question 5 is 2 marks)

- 6 A bag contains only red beads, blue beads, green beads and yellow beads.

The table gives the probabilities that, when a bead is taken at random from the bag, the bead will be blue or the bead will be yellow.

Colour	red	blue	green	yellow
Probability		0.24		0.31

The probability that the bead will be green is twice the probability that the bead will be red.

Sofia takes at random a bead from the bag.

She writes down the colour of the bead and puts the bead back into the bag.

She does this 180 times.

Work out an estimate for the number of times she takes a red bead from the bag.

(Total for Question 6 is 4 marks)

7 (a) Solve the inequality $2x + 7 > 4$

.....
(2)

(b) Solve $x^2 - 3x - 40 = 0$
Show clear algebraic working.

.....
(3)

(Total for Question 7 is 5 marks)

- 8 The table shows the cost, in euros, of Brigitte's car insurance in each of the years 2016, 2017 and 2018

Year	2016	2017	2018
Cost of insurance (euros)	500	545	592

Brigitte says,

"The percentage increase in the cost of my car insurance from 2017 to 2018 is more than the percentage increase in the cost of my car insurance from 2016 to 2017"

- (a) Is Brigitte correct?

You must show how you get your answer.

(4)

Henri wants to insure his car.

He gets a discount of 15% off the normal price.

Henri pays 952 euros for his car insurance after the discount.

- (b) Work out the discount that Henri gets.

..... euros

(3)

(Total for Question 8 is 7 marks)

- 9 The density of gold is 19.3 g/cm^3
A gold bar has volume 150 cm^3

Work out the mass of the gold bar.

..... g

(Total for Question 9 is 2 marks)

- 10 Change a speed of 50 metres per second to a speed in kilometres per hour.

..... kilometres per hour

(Total for Question 10 is 3 marks)

- 11 The diagram shows a shaded shape $ABCD$ made from a semicircle ABC and a right-angled triangle ACD .

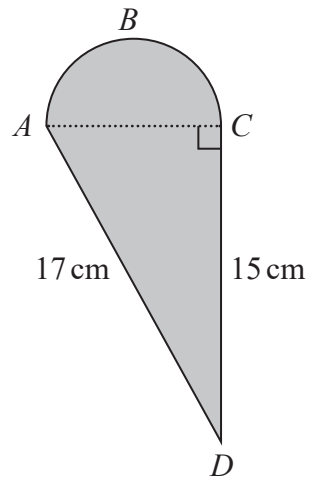


Diagram **NOT**
accurately drawn

AC is the diameter of the semicircle ABC .

Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 11 is 5 marks)

12 Astrid wants to buy some oil.

She can buy the oil from either Dane Oil or Arctic Oil.

Here is information about the price that each company will charge Astrid.

Dane Oil	Arctic Oil
(4.2×10^5) litres for 2 500 000 Krone	(8.6×10^5) litres for 770 000 Dollars

Astrid wants to get the better value for money for the oil.

$$1 \text{ Dollar} = 6.57 \text{ Krone}$$

From which company should she buy her oil, Dane Oil or Arctic Oil?

You must show your working.

(Total for Question 12 is 4 marks)

13

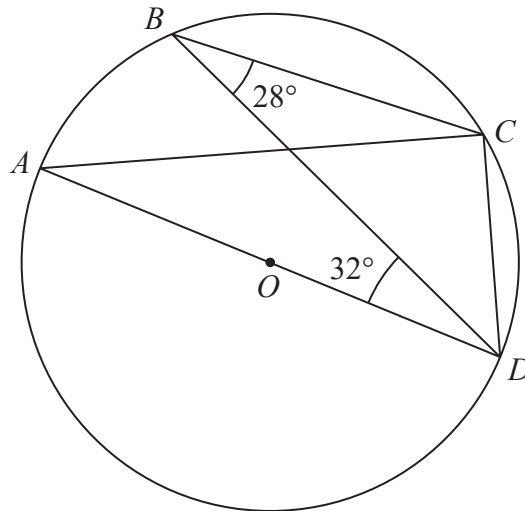


Diagram **NOT**
accurately drawn

A , B , C and D are points on a circle, centre O .
 AOD is a diameter of the circle.

Angle $CBD = 28^\circ$

Angle $BDA = 32^\circ$

Find the size of angle BDC .

Give a reason for each stage of your working.

(Total for Question 13 is 4 marks)

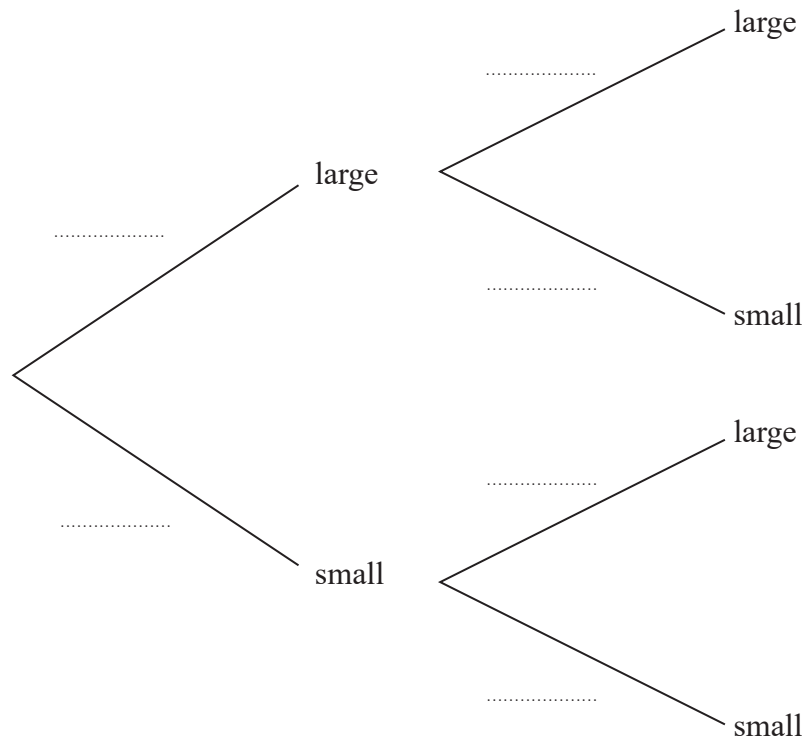
14 There are 20 glasses in a cupboard.

13 of the glasses are large

7 of the glasses are small

Roberto takes at random two glasses from the cupboard.

(a) Complete the probability tree diagram.



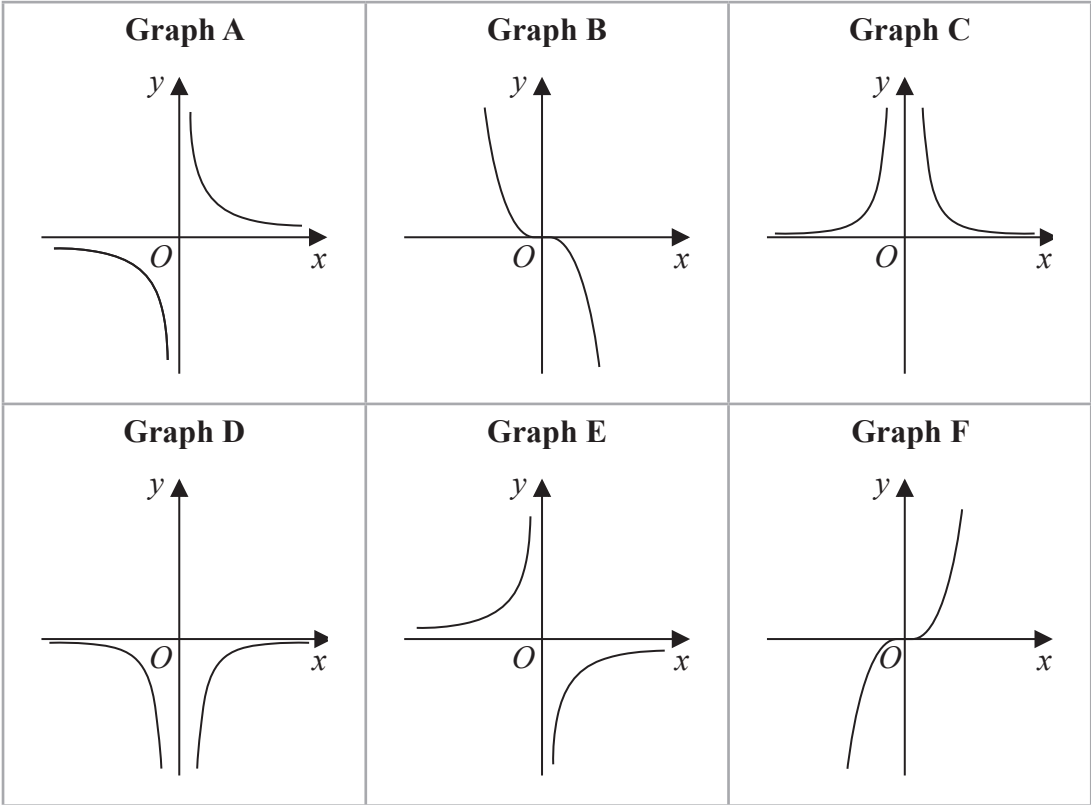
(2)

(b) Work out the probability that Roberto takes two small glasses.

(2)

(Total for Question 14 is 4 marks)

15 Here are six graphs.



Complete the table below with the letter of the graph that could represent each given equation.

Write your answers on the dotted lines.

Equation	Graph
$y = \frac{2}{x^2}$
$y = -\frac{1}{2}x^3$
$y = -\frac{5}{x}$

(Total for Question 15 is 3 marks)

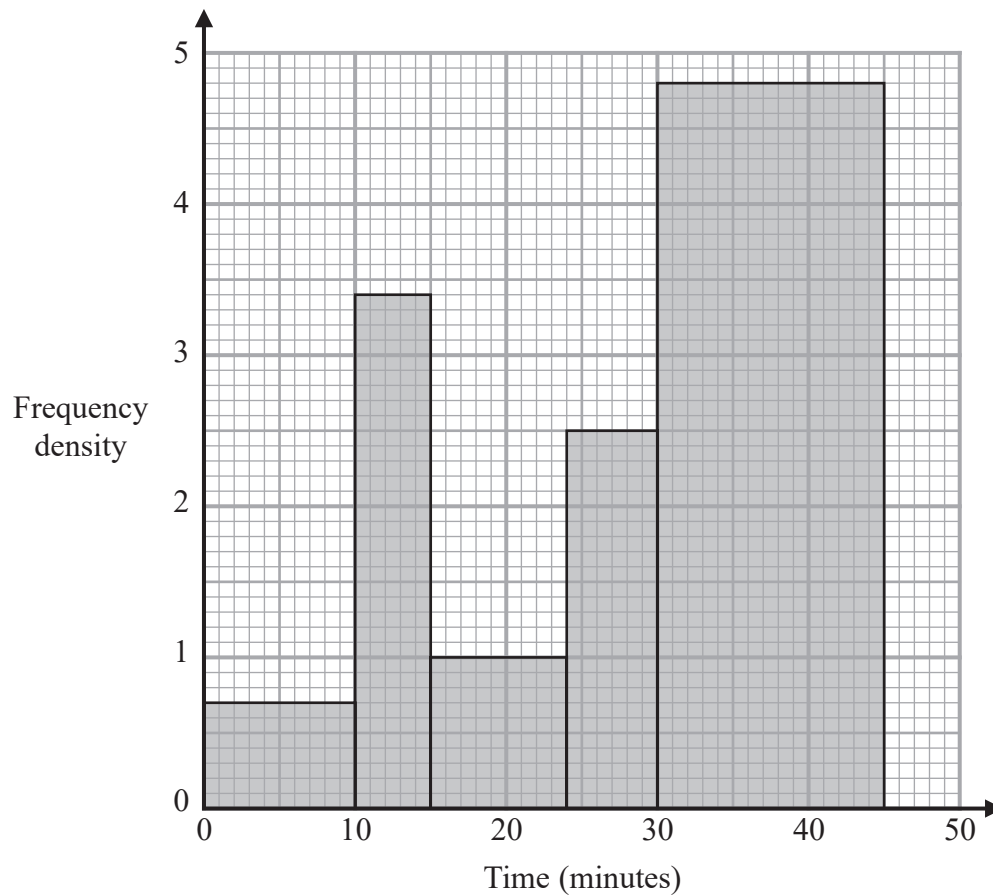
16 Make x the subject of $y = \sqrt{\frac{x+1}{x-4}}$

.....
(Total for Question 16 is 4 marks)

- 17** Prove that the difference between two consecutive square numbers is always an odd number.
Show clear algebraic working.

(Total for Question 17 is 3 marks)

- 18 The histogram gives information about the times, in minutes, that some customers spent in a supermarket.



- (a) Work out an estimate for the proportion of these customers who spent between 17 minutes and 35 minutes in the supermarket.

One of the customers is selected at random.

Given that this customer had spent more than 30 minutes in the supermarket,

(b) find the probability that this customer spent more than 36 minutes in the supermarket.

.....
(2)

(Total for Question 18 is 5 marks)

19 (a) Write down an equation of a line that is parallel to the line with equation $y = 7 - 4x$

.....
(1)

The line **L** passes through the points with coordinates $(-3, 1)$ and $(2, -2)$

(b) Find an equation of the line that is perpendicular to **L** and passes through the point with coordinates $(-6, 4)$

Give your answer in the form $ax + by + c = 0$ where a , b and c are integers.

.....
(4)

(Total for Question 19 is 5 marks)

20 The area of a rectangle is 18 cm^2

The length of the rectangle is $(\sqrt{7} + 1) \text{ cm}$.

Without using a calculator and showing each stage of your working,

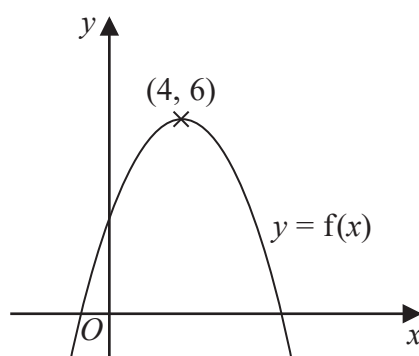
find the width of the rectangle.

Give your answer in the form $a\sqrt{b} + c$ where a , b and c are integers.

..... cm

(Total for Question 20 is 3 marks)

21 The diagram shows a sketch of part of the curve with equation $y = f(x)$



There is one maximum point on this curve.

The coordinates of this maximum point are (4, 6)

(a) Write down the coordinates of the maximum point on the curve with equation

(i) $y = f(x + 4)$

(.....,)

(ii) $y = f(2x)$

(.....,)

(2)

The equation of a curve **C** is $y = x^2 + 3x + 4$

The curve **C** is transformed to curve **S** under the translation $\begin{pmatrix} 4 \\ 6 \end{pmatrix}$

(b) Find an equation of curve **S**.

You do not need to simplify the equation.

(2)

(Total for Question 21 is 4 marks)

- 22** The line with equation $y = x + 2$ intersects the curve with equation $x^2 + y^2 - 2y = 24$ at the points A and B .

Find the coordinates of A and B .
Show clear algebraic working.

(..... ,)

(..... ,)

(Total for Question 22 is 5 marks)

23

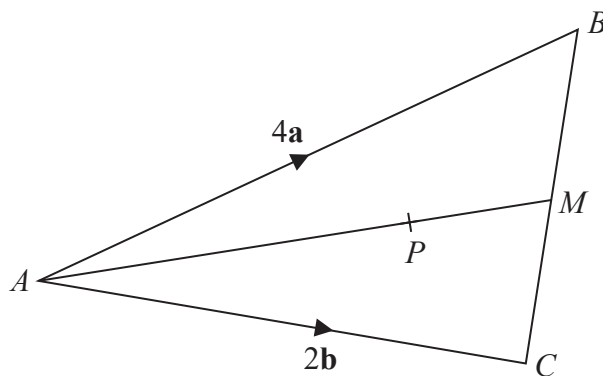


Diagram **NOT**
accurately drawn

ABC is a triangle.
The midpoint of BC is M .
 P is a point on AM .

$$\vec{AB} = 4\mathbf{a}$$

$$\vec{AC} = 2\mathbf{b}$$

$$\vec{AP} = \frac{3}{2}\mathbf{a} + \frac{3}{4}\mathbf{b}$$

Find the ratio $AP:PM$

(Total for Question 23 is 3 marks)

24 Express

$$\left(\frac{4}{2x-5} - \frac{3}{2x-3} \right) \div \frac{9x-4x^3}{6x^2-17x+5}$$

as a single fraction in its simplest form.

.....
(Total for Question 24 is 4 marks)

25 Mario is going to save \$50 in the year 2021

He is going to continue to save, up to and including the year 2070, by increasing the amount he saves each year by \$ k

Mario will save a total of \$33 125 from 2021 to 2070

Work out the value of k .

$k = \dots\dots\dots$

(Total for Question 25 is 3 marks)

26 Here is a sector, AOB , of a circle with centre O and angle $AOB = x^\circ$

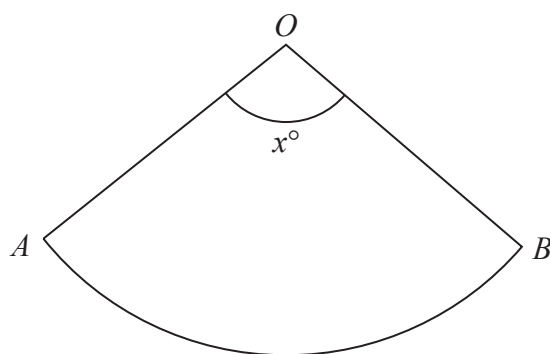


Diagram **NOT**
accurately drawn

The sector can form the curved surface of a cone by joining OA to OB .

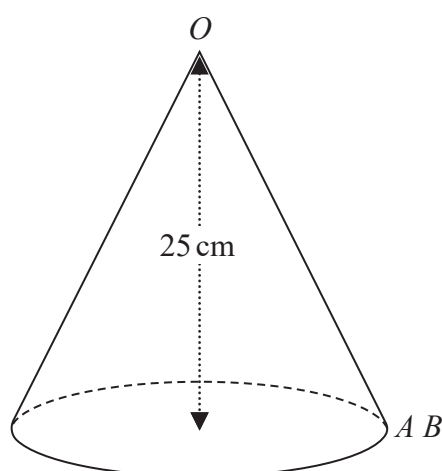


Diagram **NOT**
accurately drawn

The height of the cone is 25 cm .

The volume of the cone is 1600 cm^3

Work out the value of x .

Give your answer correct to the nearest whole number.


$x = \dots\dots\dots$

(Total for Question 26 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

Please check the examination details below before entering your candidate information

Candidate surname		Other names	
Pearson Edexcel		Centre Number	Candidate Number
International GCSE		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Wednesday 15 January 2020			
Morning (Time: 2 hours)		Paper Reference 4MA1/2HR	
Mathematics A Paper 2HR Higher Tier			
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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

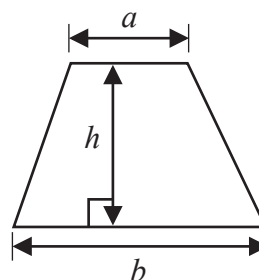
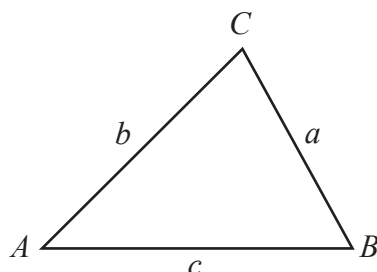
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

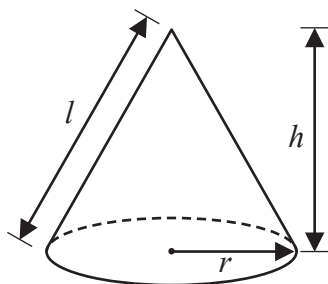
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

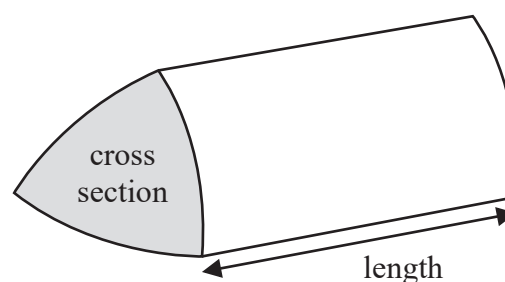
Area of triangle $= \frac{1}{2}ab \sin C$

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

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

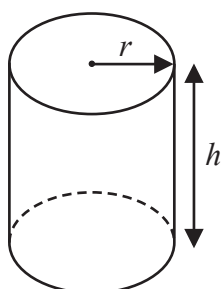
**Volume of prism**

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



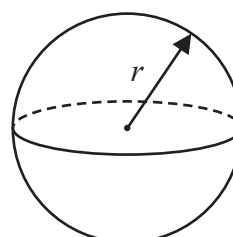
Volume of cylinder $= \pi r^2 h$

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



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

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



Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** (a) Write $5^{17} \times 5^2$ as a single power of 5

.....
(1)

- (b) Write 800 as a product of its prime factors.
Show your working clearly.

.....
(2)

(Total for Question 1 is 3 marks)

- 2 The table gives information about the amount of money, in £, that Fiona spent in a grocery store each week during 2019

Amount spent (£ x)	Frequency
$0 \leq x < 20$	5
$20 \leq x < 40$	11
$40 \leq x < 60$	8
$60 \leq x < 80$	19
$80 \leq x < 100$	9

Work out an estimate for the total amount of money that Fiona spent in the grocery store during 2019

£.....

(Total for Question 2 is 3 marks)

3 Three tins, A , B and C , each contain buttons.

Tin A contains x buttons.

Tin B contains 4 times the number of buttons that tin A contains.

Tin C contains 7 fewer buttons than tin A .

The total number of buttons in the three tins is 137

Work out the number of buttons in tin C .

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

- 4 The diagram shows a rectangle and a diagonal of the rectangle.

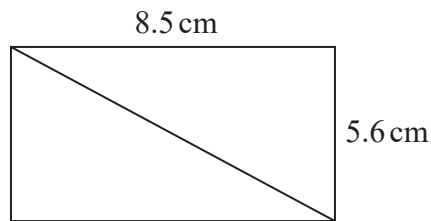


Diagram **NOT**
accurately drawn

Work out the length of the diagonal of the rectangle.
Give your answer correct to 1 decimal place.

..... cm

(Total for Question 4 is 3 marks)

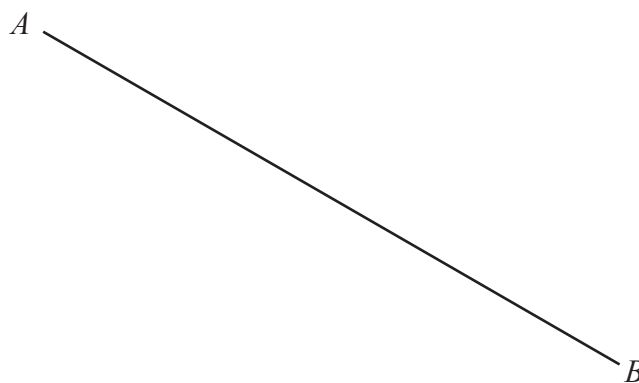
- 5 A plane takes 3 hours 36 minutes to fly from the Cayman Islands to New York.
The plane flies a distance of 2470 km.

Work out the average speed of the plane in km/h.
Give your answer correct to the nearest whole number.

..... km/h

(Total for Question 5 is 3 marks)

- 6 Use ruler and compasses only to construct the perpendicular bisector of the line AB .
You must show all your construction lines.



(Total for Question 6 is 2 marks)

7 Solve the simultaneous equations

$$\begin{aligned} 3x + 5y &= 6 \\ 7x - 5y &= -11 \end{aligned}$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question 7 is 3 marks)

8 Hamish buys a new car for \$20 000
The car depreciates in value by 19% each year.

Work out the value of the car at the end of 3 years.
Give your answer to the nearest \$.

$$\text{\$} \dots\dots\dots$$

(Total for Question 8 is 3 marks)

- 9 The diagram shows a box in the shape of a cuboid.

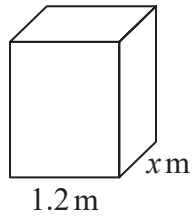


Diagram **NOT**
accurately drawn

The box is put on a table.

The face of the box in contact with the table has length 1.2 metres and width x metres.

The force exerted by the box on the table is 27 newtons.

The pressure on the table due to the box is 30 newtons/m^2

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Work out the value of x .

$$x = \dots\dots\dots$$

(Total for Question 9 is 3 marks)

10 The table shows information about the surface area of each of the world’s oceans.

Ocean	Surface area in square kilometres
Pacific	1.56×10^8
Indian	6.86×10^7
Southern	2.03×10^7
Arctic	1.41×10^7
Atlantic	1.06×10^8

- (a) Work out the difference, in square kilometres, between the surface area of the Atlantic Ocean and the surface area of the Indian Ocean.
Give your answer in standard form.

..... square kilometres
(2)

The surface area of the Pacific Ocean is k times the surface area of the Arctic Ocean.

- (b) Work out the value of k .
Give your answer correct to the nearest whole number.

$k =$
(1)

(Total for Question 10 is 3 marks)

- 11 (a) Write down the integer values of x that satisfy the inequality $-2 < x \leq 4$

.....
(2)

The region **R**, shown shaded in the diagram, is bounded by three straight lines.

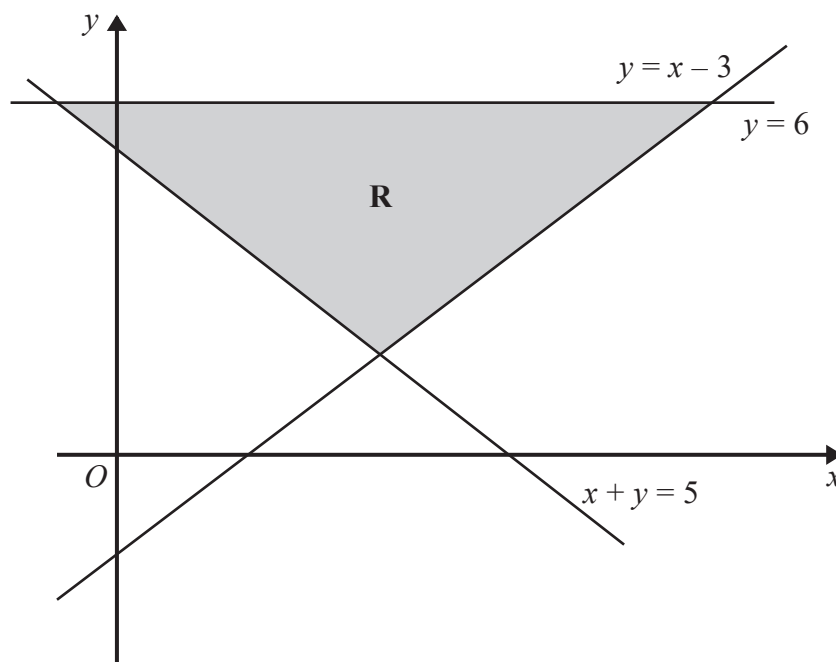


Diagram **NOT**
accurately drawn

- (b) Write down the three inequalities that define the region **R**.

.....
.....
.....
(2)

(Total for Question 11 is 4 marks)

- 12 The diagram shows two congruent isosceles triangles and parts of two congruent regular polygons, **X** and **Y**.

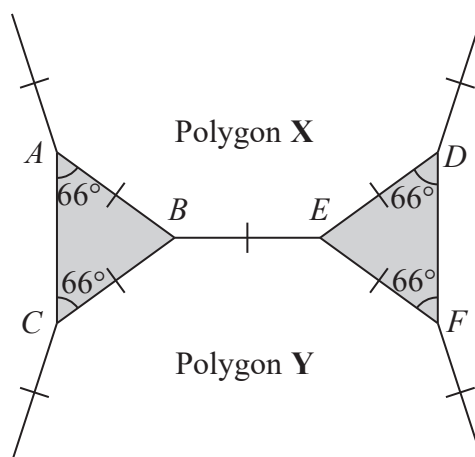


Diagram **NOT**
accurately drawn

The two regular polygons each have n sides.

Work out the value of n .

$n = \dots\dots\dots$

(Total for Question 12 is 3 marks)

13

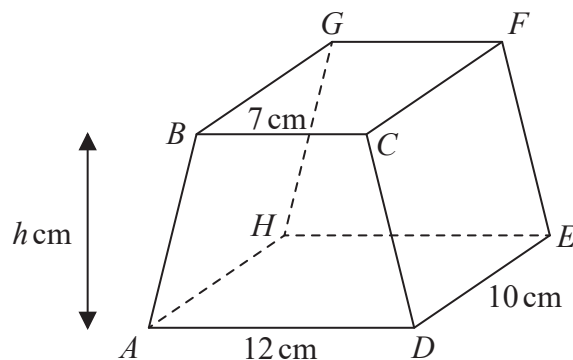


Diagram **NOT**
accurately drawn

The diagram shows a prism $ABCDEFGH$ in which $ABCD$ is a trapezium with BC parallel to AD and $CDEF$ is a rectangle.

$$BC = 7 \text{ cm} \quad AD = 12 \text{ cm} \quad DE = 10 \text{ cm}$$

The height of trapezium $ABCD$ is $h \text{ cm}$

The volume of the prism is 608 cm^3

Work out the value of h .

$$h = \dots\dots\dots$$

(Total for Question 13 is 3 marks)

14 Max kept a record of the marks he scored in each of the 11 spelling tests he took one term.

Here are his marks.

18 5 7 12 11 18 15 16 17 13 14

Find the interquartile range of the marks.

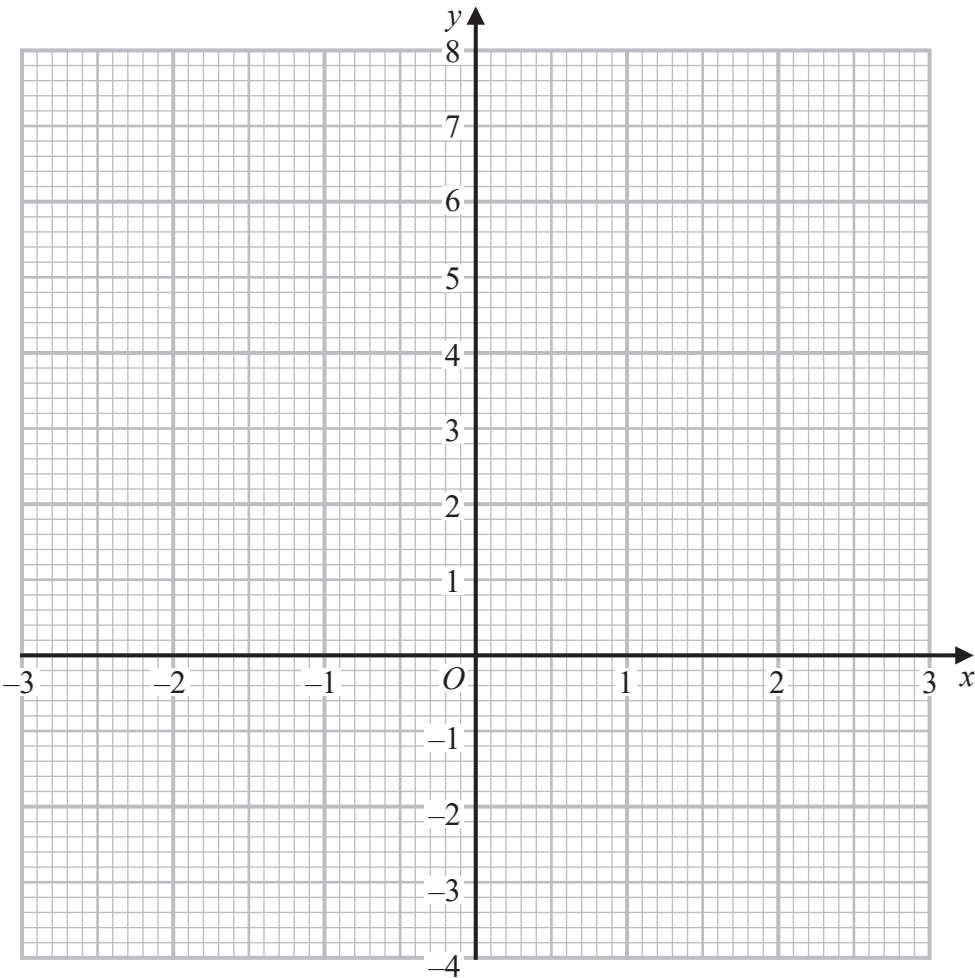
.....
(Total for Question 14 is 3 marks)

15 (a) Complete the table of values for $y = x^2 - \frac{x}{2} - 3$

x	-3	-2	-1	0	1	2	3
y	7.5				-2.5		4.5

(2)

(b) On the grid, draw the graph of $y = x^2 - \frac{x}{2} - 3$ for values of x from -3 to 3



(2)

(Total for Question 15 is 4 marks)

16 Cody has two bags of counters, bag **A** and bag **B**.

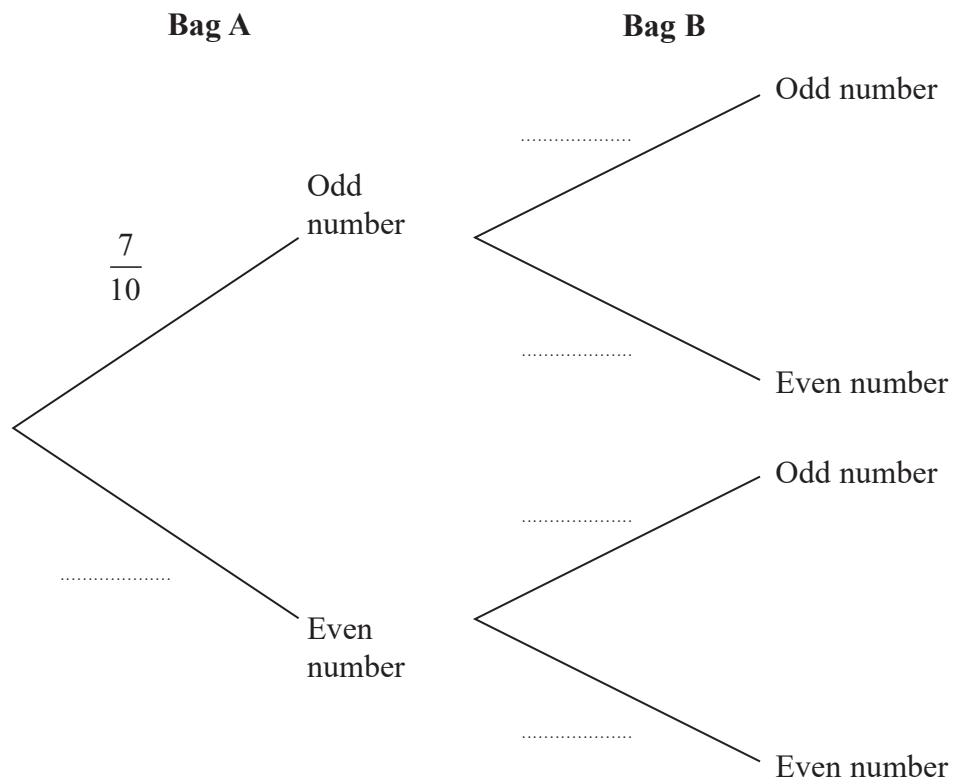
Each of the counters has either an odd number or an even number written on it.

There are 10 counters in bag **A** and 7 of these counters have an **odd** number written on them.

There are 12 counters in bag **B** and 7 of these counters have an **odd** number written on them.

Cody is going to take at random a counter from bag **A** and a counter from bag **B**.

(a) Complete the probability tree diagram.



(2)

- (b) Calculate the probability that the total of the numbers on the two counters will be an odd number.

.....
(3)

Harriet also has a bag of counters.

Each of her counters also has either an odd number or an even number written on it.

Harriet is going to take at random a counter from her bag of counters.

The probability that the number on each of Cody's two counters **and** the number on

Harriet's counter will all be even is $\frac{3}{100}$

- (c) Find the least number of counters that Harriet has in her bag.
Show your working clearly.

.....
(3)

(Total for Question 16 is 8 marks)

17 Some students in a school were asked the following question.

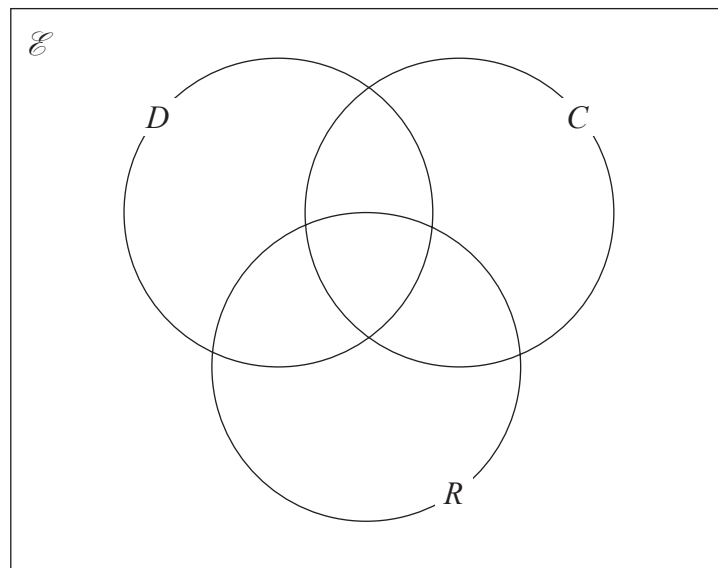
“Do you have a dog (D), a cat (C) or a rabbit (R)?”

Of these students

- 28 have a dog
- 18 have a cat
- 20 have a rabbit
- 8 have both a cat and a rabbit
- 9 have both a dog and a rabbit
- x have both a dog and a cat
- 6 have a dog, a cat and a rabbit
- 5 have not got a dog or a cat or a rabbit

(a) Using this information, complete the Venn diagram to show the number of students in each appropriate subset.

Give the numbers in terms of x where necessary.



(3)

Given that a total of 50 students answered the question,

(b) work out the value of x .

$x = \dots\dots\dots$

(2)

(c) Find $n(C' \cap D')$

.....
(1)

(Total for Question 17 is 6 marks)

18

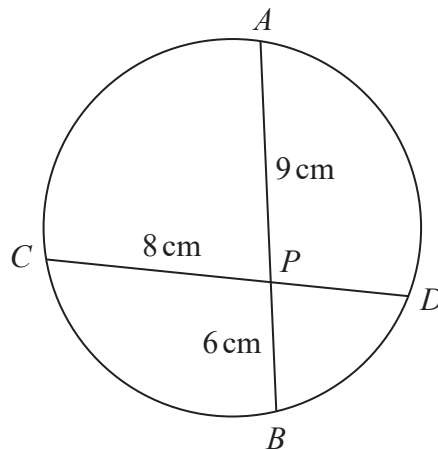


Diagram **NOT**
accurately drawn

APB and CPD are chords of a circle.

$AP = 9 \text{ cm}$ $PB = 6 \text{ cm}$ $CP = 8 \text{ cm}$

Calculate the length of PD .

..... cm

(Total for Question 18 is 2 marks)

19 (a) Solve $\frac{4-3x}{5} - \frac{3x-5}{2} = -3$

Show clear algebraic working.

$x = \dots\dots\dots$
(3)

(b) Solve the inequality $5y^2 - 17y \leq 40$

$\dots\dots\dots$
(3)

(Total for Question 19 is 6 marks)

20 The diagram shows two similar vases, **A** and **B**.

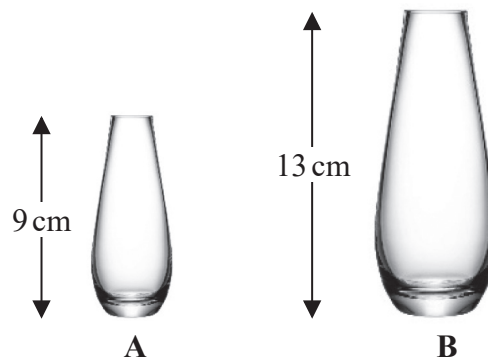


Diagram **NOT**
accurately drawn

The height of vase **A** is 9 cm and the height of vase **B** is 13 cm.

Given that

$$\text{surface area of vase A} + \text{surface area of vase B} = 1800 \text{ cm}^2$$

calculate the surface area of vase **A**.

..... cm²

(Total for Question 20 is 4 marks)

21 (a) Simplify fully $\frac{10x^2 + 23x + 12}{4x^2 - 9}$

$$2^{2y} \times 2^{3y+2} = \frac{8^{5y}}{4^n}$$

.....
(3)

- (b) Find an expression for n in terms of y .
Show clear algebraic working and simplify your expression.

.....
(4)

(Total for Question 21 is 7 marks)

- 22** The first term of an arithmetic series S is -6
The sum of the first 30 terms of S is 2865
Find the 9th term of S .

.....
(Total for Question 22 is 4 marks)

- 23** Express $7 - 12x - 2x^2$ in the form $a + b(x + c)^2$ where a , b and c are integers.

.....
(Total for Question 23 is 3 marks)

24 L_1 and L_2 are two straight lines.

The origin of the coordinate axes is O .

L_1 has equation $5x + 10y = 8$

L_2 is perpendicular to L_1 and passes through the point with coordinates $(8, 6)$

L_2 crosses the x -axis at the point A .

L_2 intersects the straight line with equation $x = -3$ at the point B .

Find the area of triangle AOB .

Show your working clearly.

.....
(Total for Question 24 is 5 marks)

25 N is a multiple of 5

$$A = N + 1$$

$$B = N - 1$$

Prove, using algebra, that $A^2 - B^2$ is always a multiple of 20

(Total for Question 25 is 3 marks)

26 The diagram shows trapezium $OACB$.

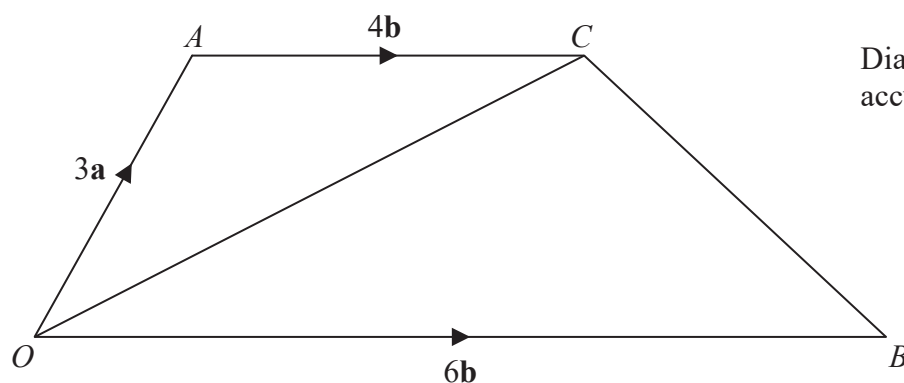


Diagram **NOT**
accurately drawn

$$\vec{OA} = 3\mathbf{a} \quad \vec{OB} = 6\mathbf{b} \quad \vec{AC} = 4\mathbf{b}$$

N is the point on OC such that ANB is a straight line.

Find \vec{ON} as a simplified expression in terms of \mathbf{a} and \mathbf{b} .


(Total for Question 26 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

BLANK PAGE

Please check the examination details below before entering your candidate information

Candidate surname		Other names	
Pearson Edexcel International GCSE		Centre Number <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Candidate Number <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Thursday 4 June 2020			
Morning (Time: 2 hours)		Paper Reference 4MA1/2H	
Mathematics A Paper 2H 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 <input type="text"/>

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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

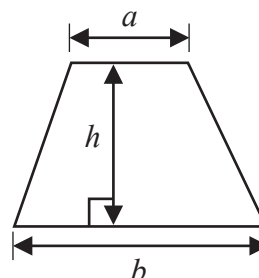
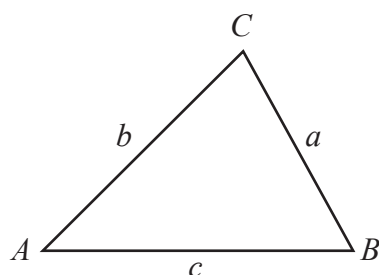
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

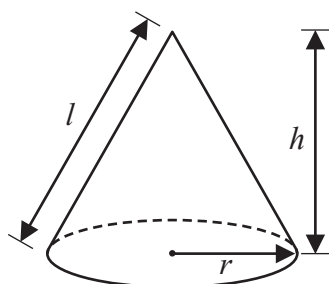
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

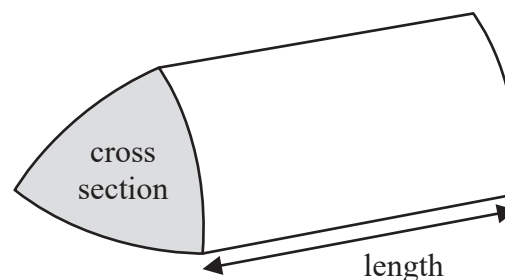
Area of triangle $= \frac{1}{2}ab \sin C$

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

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

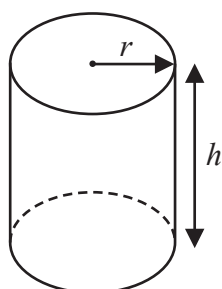
**Volume of prism**

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



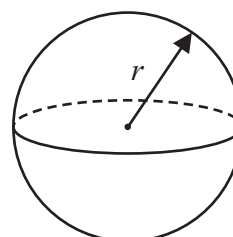
Volume of cylinder $= \pi r^2 h$

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



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

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



Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Simplify $g^6 \times g^4$

.....
(1)

(b) Simplify $k^{10} \div k^3$

.....
(1)

(c) Simplify $(3cd^4)^2$

.....
(2)

(d) Solve the inequality $4x + 7 > 2$

.....
(2)

(Total for Question 1 is 6 marks)

2 The table shows information about the lengths of time, in minutes, 120 customers spent in a supermarket.

Length of time (L minutes)	Frequency
$20 < L \leq 30$	6
$30 < L \leq 40$	26
$40 < L \leq 50$	31
$50 < L \leq 60$	40
$60 < L \leq 70$	17

(a) Write down the modal class.

.....
(1)

(b) Work out an estimate for the mean length of time spent by the 120 customers in the supermarket.

.....minutes
(4)

(Total for Question 2 is 5 marks)

3

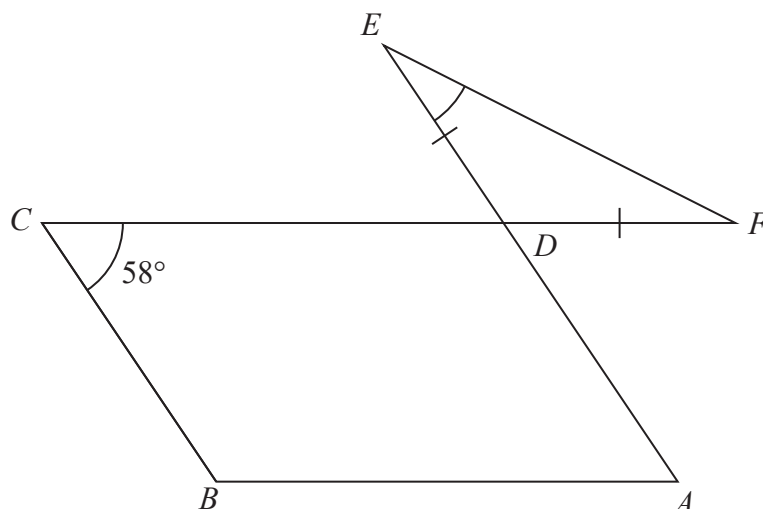


Diagram **NOT**
accurately drawn

The diagram shows a parallelogram $ABCD$ and an isosceles triangle DEF in which $DE = DF$

CDF and ADE are straight lines.

Angle $BCD = 58^\circ$

Work out the size of angle DEF .

Give a reason for each stage of your working.

.....^o

(Total for Question 3 is 5 marks)

- 4 Andreas, Isla and Paulo share some money in the ratios 3 : 2 : 5

The **total** amount of money that Isla and Paulo receive is £76 more than the amount of money that Andreas receives.

Andreas buys a video game for £48.50 with some of his share of the money.

Work out how much money Andreas has left from his share of the money when he has bought the video game.

£.....

(Total for Question 4 is 4 marks)

- 5 Himari's annual salary is 3 130 000 Japanese Yen (JPY).
She gets a salary increase of 4%

(a) Work out Himari's salary after this increase.

.....JPY
(3)

Kaito bought a car.

The value of the car when Kaito bought it was 750 000 JPY.

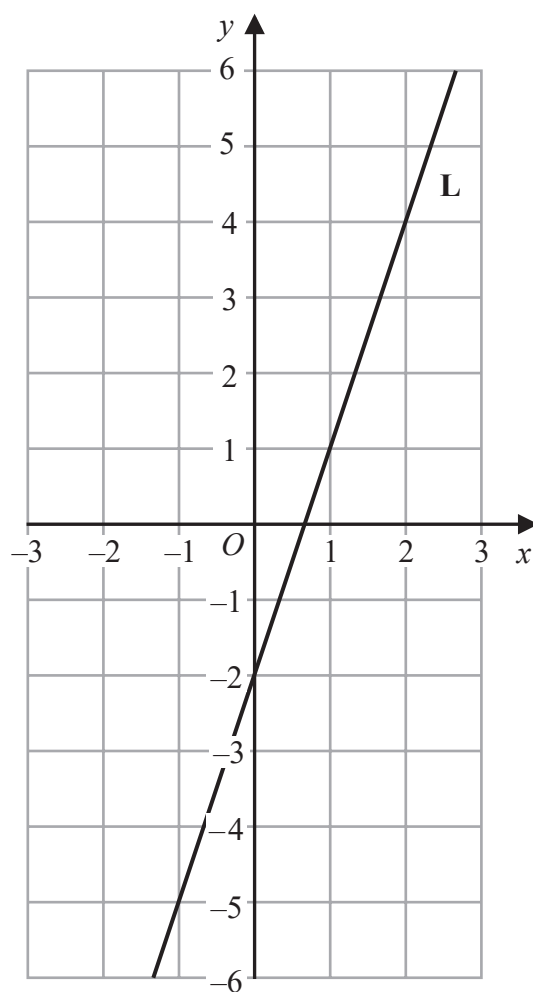
At the end of each year, the value of his car had depreciated by 15%

- (b) Work out the value of Kaito's car at the end of 3 years.
Give your answer correct to the nearest JPY.

.....JPY
(3)

(Total for Question 5 is 6 marks)

- 6 The line **L** is shown on the grid.



Find an equation for **L**.

(Total for Question 6 is 2 marks)

- 7 The diagram shows a right-angled triangle.

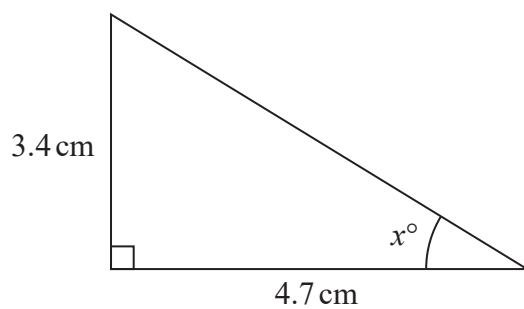


Diagram **NOT**
accurately drawn

Calculate the value of x .
Give your answer correct to one decimal place.

$x =$

(Total for Question 7 is 3 marks)

- 8 The diagram shows an isosceles triangle.

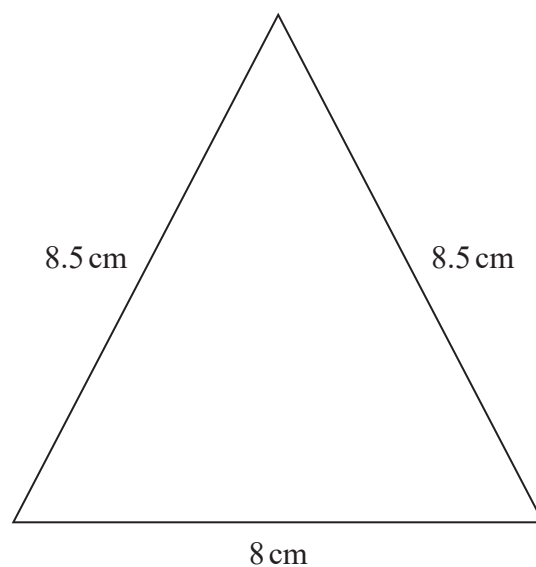


Diagram **NOT**
accurately drawn

Work out the area of the triangle.

.....cm²

(Total for Question 8 is 4 marks)

- 9 The diagram shows a solid cylinder with radius 3 m.

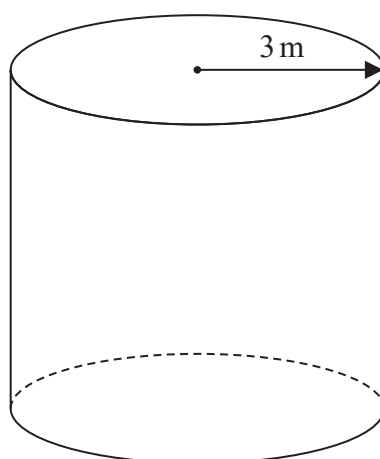


Diagram **NOT**
accurately drawn

The volume of the cylinder is $72\pi \text{ m}^3$

Calculate the **total** surface area of the cylinder.
Give your answer correct to 3 significant figures.

..... m^2

(Total for Question 9 is 5 marks)

10 The table shows information about the number of minutes each of 120 buses was late last Monday.

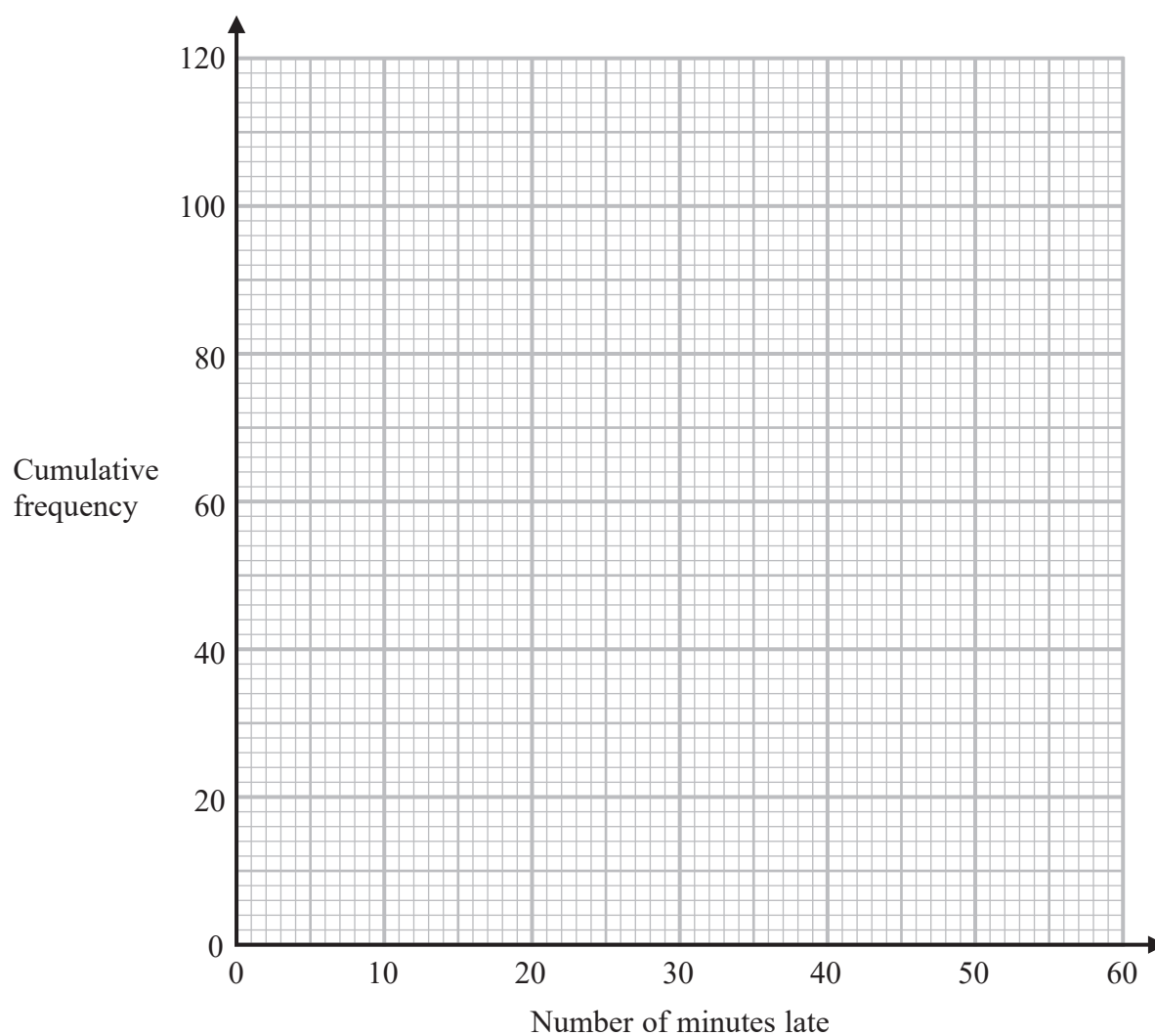
Number of minutes late (L)	Frequency
$0 < L \leq 10$	10
$10 < L \leq 20$	16
$20 < L \leq 30$	44
$30 < L \leq 40$	29
$40 < L \leq 50$	15
$50 < L \leq 60$	6

(a) Complete the cumulative frequency table below.

Number of minutes late (L)	Cumulative frequency
$0 < L \leq 10$	
$0 < L \leq 20$	
$0 < L \leq 30$	
$0 < L \leq 40$	
$0 < L \leq 50$	
$0 < L \leq 60$	

(1)

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



(2)

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

.....minutes
(2)

(d) Use your graph to find an estimate for the number of buses that were more than 48 minutes late last Monday.

.....
(2)

(Total for Question 10 is 7 marks)

11 (a) Simplify fully $(8e^{15})^{\frac{2}{3}}$

.....
(2)

(b) Express $\left(\frac{y}{2}\right)^{-4}$ in the form ay^n where a and n are integers.

.....
(2)

(c) Solve $\frac{4x-2}{3} - \frac{5-3x}{4} = 6$

Show clear algebraic working.

$x =$
(4)

(Total for Question 11 is 8 marks)

12 Given that $\frac{3^x}{9^{3x}} = 81$

find the value of x .

Show clear algebraic working.

$$x = \dots\dots\dots$$

(Total for Question 12 is 3 marks)

13 Use algebra to show that $0.\dot{6}\dot{8}\dot{1} = \frac{15}{22}$

(Total for Question 13 is 2 marks)

14 $\mathcal{E} = \{\text{integers } x \text{ such that } 10 \leq x \leq 25\}$

$$A = \{x : x < 18\}$$

$$B = \{x : 13 \leq x < 22\}$$

(a) Write down $n(A)$

.....
(1)

(b) List the members of the set $(A \cup B)'$

.....
(2)

(c) List the members of the set $A' \cap B$

.....
(2)

$C \subset A$, $C \subset B$ and $n(C) = 5$

(d) List the members of the set C

.....
(1)

(Total for Question 14 is 6 marks)

15 Make x the subject of $y = \frac{5 - 2x}{x + 3}$

.....
(Total for Question 15 is 4 marks)

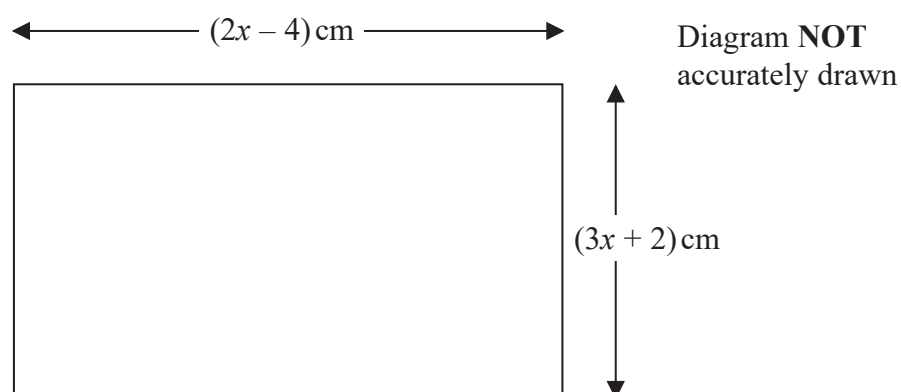
16 Solve the simultaneous equations

$$\begin{aligned}3xy - y^2 &= 8 \\ x - 2y &= 1\end{aligned}$$

Show clear algebraic working.

(Total for Question 16 is 5 marks)

17 The diagram shows a rectangle.



The area of the rectangle is $A \text{ cm}^2$

Given that $A < 3x + 27$
find the range of possible values for x .

(Total for Question 17 is 5 marks)

18 The diagram shows cuboid $ABCDEFGH$.

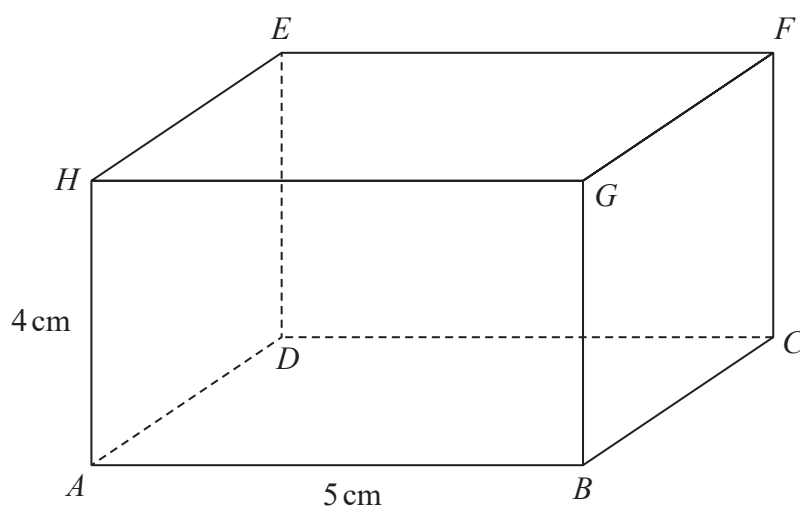


Diagram **NOT**
accurately drawn

$$AB = 5\text{ cm}$$

$$AH = 4\text{ cm}$$

The size of the angle between CH and the plane $ABCD$ is 35°

Calculate the volume of the cuboid.

Give your answer correct to 3 significant figures.

..... cm^3

(Total for Question 18 is 5 marks)

19 OAB is a triangle.

$$\overrightarrow{OA} = \mathbf{a} \quad \overrightarrow{OB} = \mathbf{b}$$

The point C lies on OA such that $OC : CA = 1 : 2$

The point D lies on OB such that $OD : DB = 1 : 2$

Using a vector method, prove that $ABDC$ is a trapezium.

(Total for Question 19 is 3 marks)

20 A bag contains X counters.

There are only red counters and blue counters in the bag.

There are 4 more blue counters than red counters in the bag.

Finty takes at random 2 counters from the bag.

The probability that Finty takes 2 blue counters from the bag is $\frac{3}{8}$

Work out the value of X .

Show clear algebraic working.

.....
(Total for Question 20 is 5 marks)

21 The function f is such that $f(x) = 5 + 6x - x^2$ for $x \leq 3$

(a) Express $5 + 6x - x^2$ in the form $p - (x - q)^2$ where p and q are constants.

.....
(2)

(b) Using your answer to part (a), find the range of values of x for which $f^{-1}(x)$ is positive.


.....
(5)

(Total for Question 21 is 7 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

Please check the examination details below before entering your candidate information

Candidate surname		Other names	
Pearson Edexcel International GCSE		Centre Number <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Candidate Number <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Thursday 4 June 2020			
Morning (Time: 2 hours)		Paper Reference 4MA1/2HR	
Mathematics A Paper 2HR 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 <input type="text"/>	

Instructions

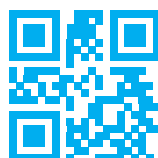
- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more 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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

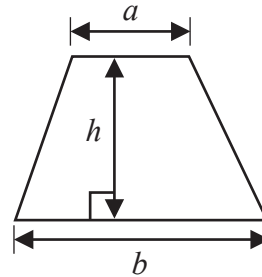
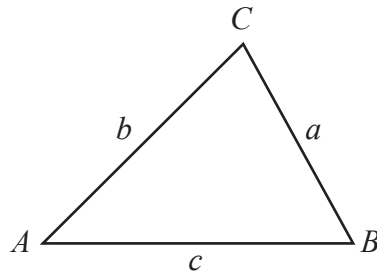
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

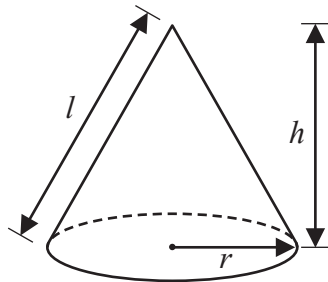
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

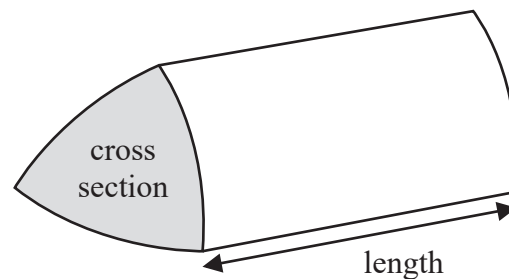
Area of triangle $= \frac{1}{2}ab \sin C$

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

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

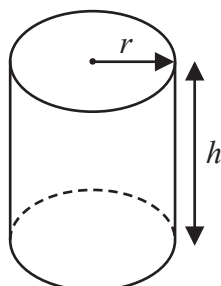
**Volume of prism**

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



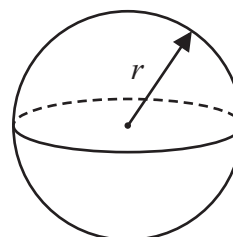
Volume of cylinder $= \pi r^2 h$

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



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

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



Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** The probability that a spinner will land on blue is 0.4

Rayyan is going to spin the spinner 280 times.

Work out an estimate for the number of times the spinner will land on blue.

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

- 2** Write 880 as a product of powers of its prime factors.
Show your working clearly.

.....
(Total for Question 2 is 3 marks)

3 (a) Write 2.46×10^6 as an ordinary number.

.....
(1)

(b) Write 0.000 74 in standard form.

.....
(1)

(c) Work out $(5.6 \times 10^6) + (2.3 \times 10^5)$

.....
(2)

(Total for Question 3 is 4 marks)

- 4 Alexa has five cards.
Each card has a number on it.

The table gives information about the numbers on the five cards.

Total	Median	Mode	Range
45	8	5	10

Using the information in the table, complete each card by writing its number on it.

(Total for Question 4 is 3 marks)

- 5 The length of a book is 33.8 cm, correct to one decimal place.

(a) Write down the lower bound of the length of the book.

..... cm
(1)

(b) Write down the upper bound of the length of the book.

..... cm
(1)

(Total for Question 5 is 2 marks)

- 6 Nav has worked out $\frac{68.3 \times 42.8}{0.021}$ on his calculator.

His answer is 139201.9048

Without using a calculator and using suitable approximations, check that his answer is sensible.
Show your working clearly.

(Total for Question 6 is 2 marks)

7 Markus makes a steel framework.

The framework is in the shape of the right-angled triangle ABC shown in the diagram.

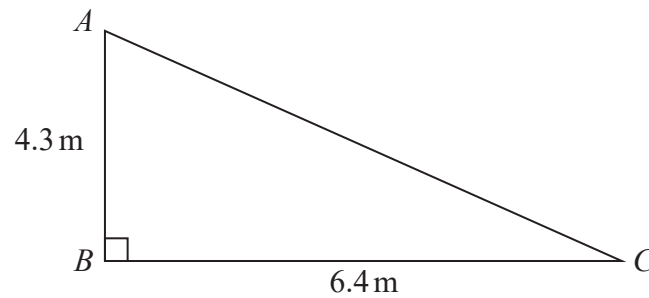


Diagram **NOT**
accurately drawn

The steel that Markus uses costs \$22 per metre.

The steel can **only** be bought in a length that is a whole number of metres.

Work out the total cost of the steel that Markus buys in order to make the framework.

\$.....

(Total for Question 7 is 4 marks)

8 Alison buys 2 boxes of strawberries, box **A** and box **B**.

Box **A** contains 15 strawberries.

The strawberries in box **A** have a mean weight of 24 grams.

Box **B** contains 25 strawberries.

The strawberries in box **B** have a mean weight of 18 grams.

Alison puts all 40 strawberries into a bowl.

Work out the mean weight of the 40 strawberries.

..... grams

(Total for Question 8 is 3 marks)

9 (a) Factorise $x^2 - x - 42$

.....
(2)

(b) Solve the inequality $3x + 15 < 8x + 3$

Show clear algebraic working.

.....
(3)

(Total for Question 9 is 5 marks)

10 Given that $150^x = 1$

(a) write down the value of x .

$x =$
(1)

Given that $3^{-8} \div 3^{-6} = 3^n$

(b) find the value of n .

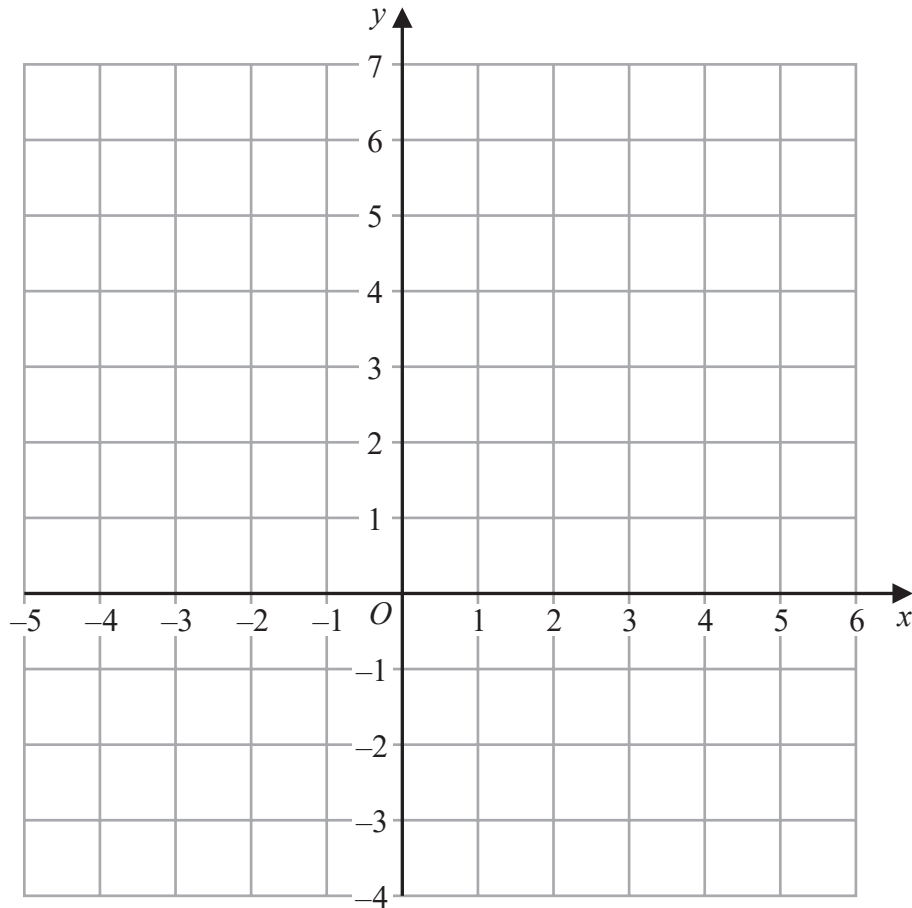
$n =$
(1)

(Total for Question 10 is 2 marks)

11 Show, by shading on the grid, the region that satisfies all three of the inequalities

$$x \leq 4 \quad \text{and} \quad y \geq -2 \quad \text{and} \quad y \leq x$$

Label the region **R**.



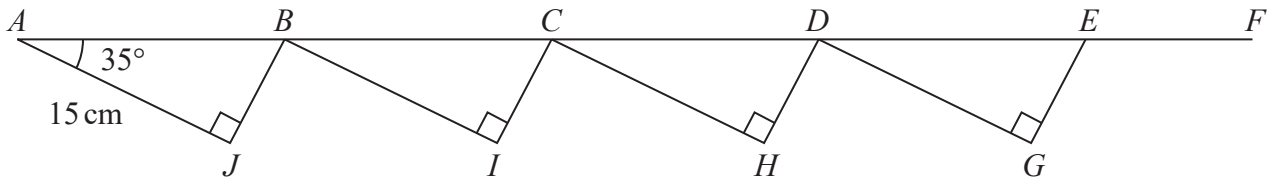
(Total for Question 11 is 3 marks)

12 Find the gradient of the straight line with equation $5x + 2y = 7$

(Total for Question 12 is 2 marks)

- 13 The diagram shows four congruent right-angled triangles ABJ , BCI , CDH and DEG .
The diagram also shows the straight line $ABCDEF$.

Diagram **NOT**
accurately drawn



$AJ = 15 \text{ cm}$
Angle $BAJ = 35^\circ$

$AF = 80 \text{ cm}$

Work out the length of EF .
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 13 is 5 marks)

14 Sandeep sat 11 tests in January 2020

Each test was marked out of 60

Here are his test results.

45 41 35 44 38 47 47 39 37 43 42

(a) Find the interquartile range of these test results.

Show your working clearly.

.....
(3)

Sandeep also sat some tests in May 2020

Each test was marked out of 60

The median of the May 2020 test results is 42

The interquartile range of the May 2020 test results is 12

(b) In which month, January or May, were Sandeep's test results more consistent?

Give a reason for your answer.

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

(Total for Question 14 is 4 marks)

15 Platinum nuggets are in the shape of a solid cylinder.

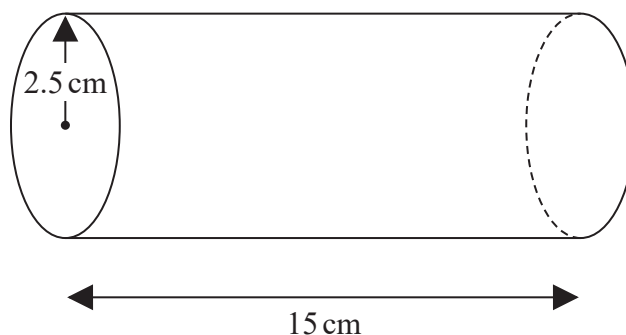


Diagram **NOT**
accurately drawn

The radius of each cylinder is 2.5 cm.

The length of each cylinder is 15 cm.

The density of platinum is 21.5 g/cm^3

The greatest mass that Jacques can carry is 30 kg.

Can Jacques carry 5 platinum nuggets at the same time?

You must show all your working.

(Total for Question 15 is 5 marks)

16

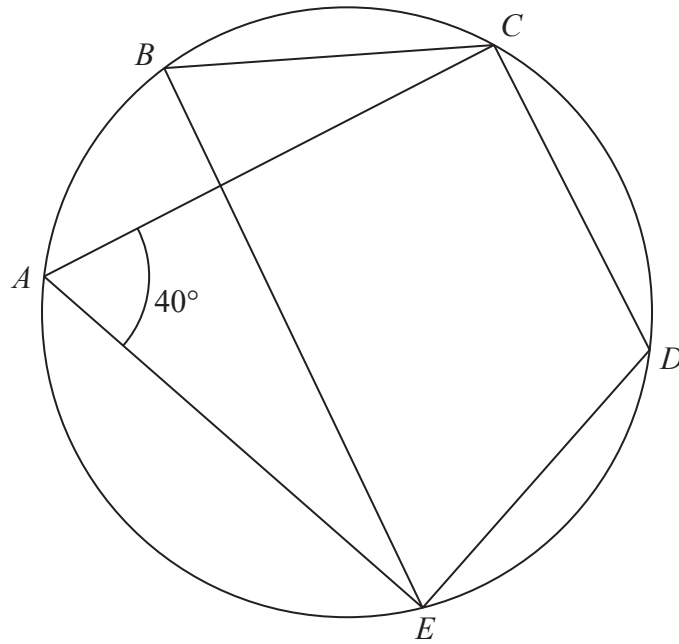


Diagram **NOT**
accurately drawn

A, B, C, D and E are points on a circle.

Angle $EAC = 40^\circ$

(a) (i) Write down the size of angle EBC .

.....
(1)

(ii) Give a reason for your answer.

.....
(1)

(b) Find the size of angle EDC .

.....
(1)

(Total for Question 16 is 3 marks)

17 Given that $n > 0$

make n the subject of the formula $y = \frac{n^2 + d}{n^2}$

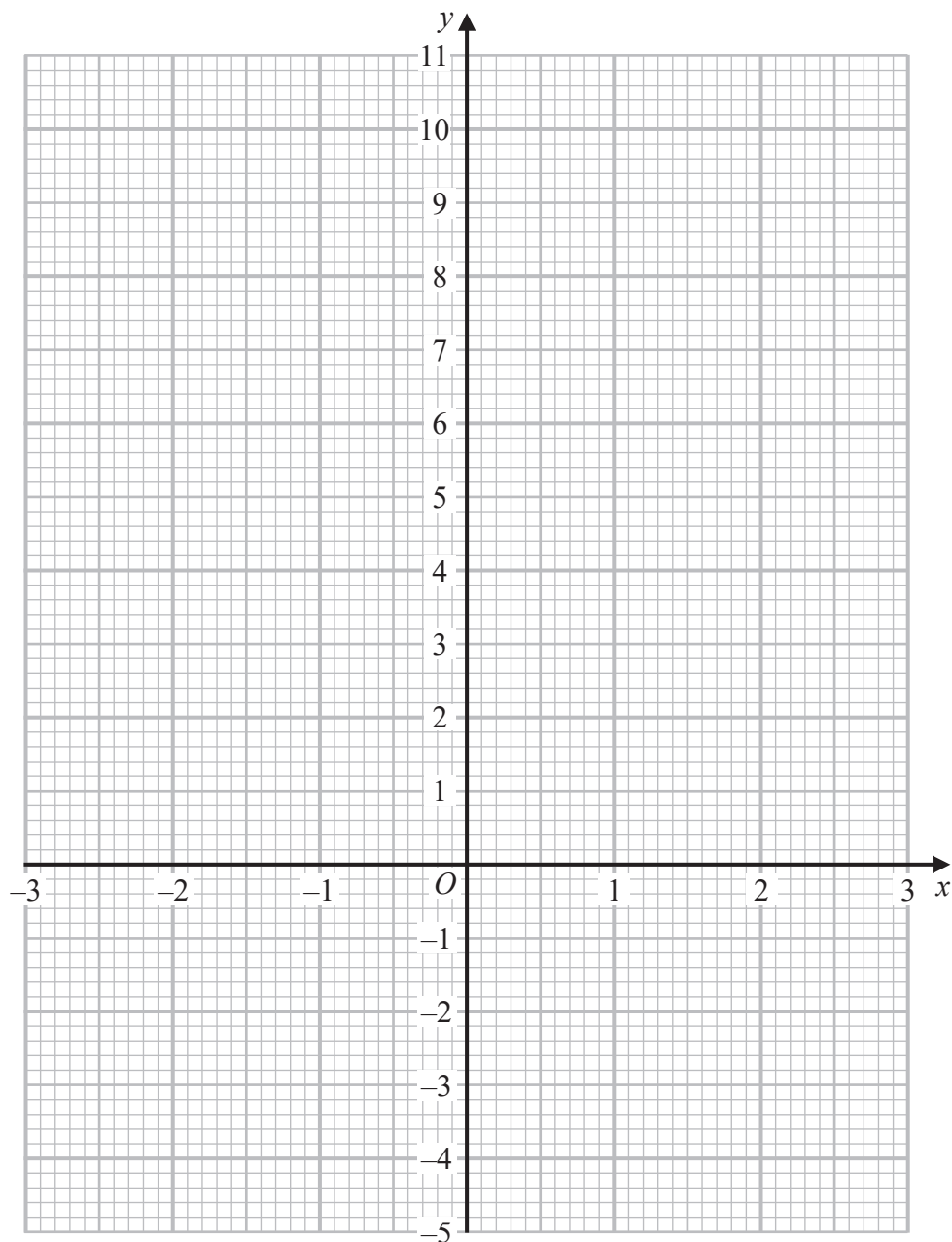
.....
(Total for Question 17 is 4 marks)

18 (a) Complete the table of values for $y = \frac{1}{2}x^3 - 2x + 3$

x	-3	-2	-1	0	1	2	3
y	-4.5			3		3	

(2)

(b) On the grid, draw the graph of $y = \frac{1}{2}x^3 - 2x + 3$ for $-3 \leq x \leq 3$



(2)

- (c) By drawing a suitable straight line on the grid, find an estimate for the solution of the equation $\frac{1}{2}x^3 - x + 4 = 0$

$x = \dots\dots\dots$
(2)

(Total for Question 18 is 6 marks)

19

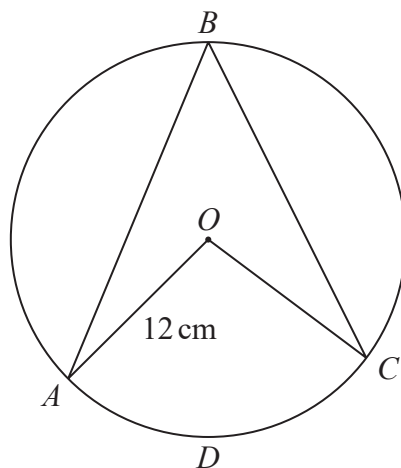


Diagram **NOT**
accurately drawn

A , B , C and D are points on a circle with centre O and radius 12 cm .

The area of the sector $OADC$ of the circle is 100 cm^2

Work out the size of angle ABC .

Give your answer correct to 3 significant figures.

(Total for Question 19 is 4 marks)

20 T is inversely proportional to m^2

$$T = 30 \text{ when } m = 0.5$$

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

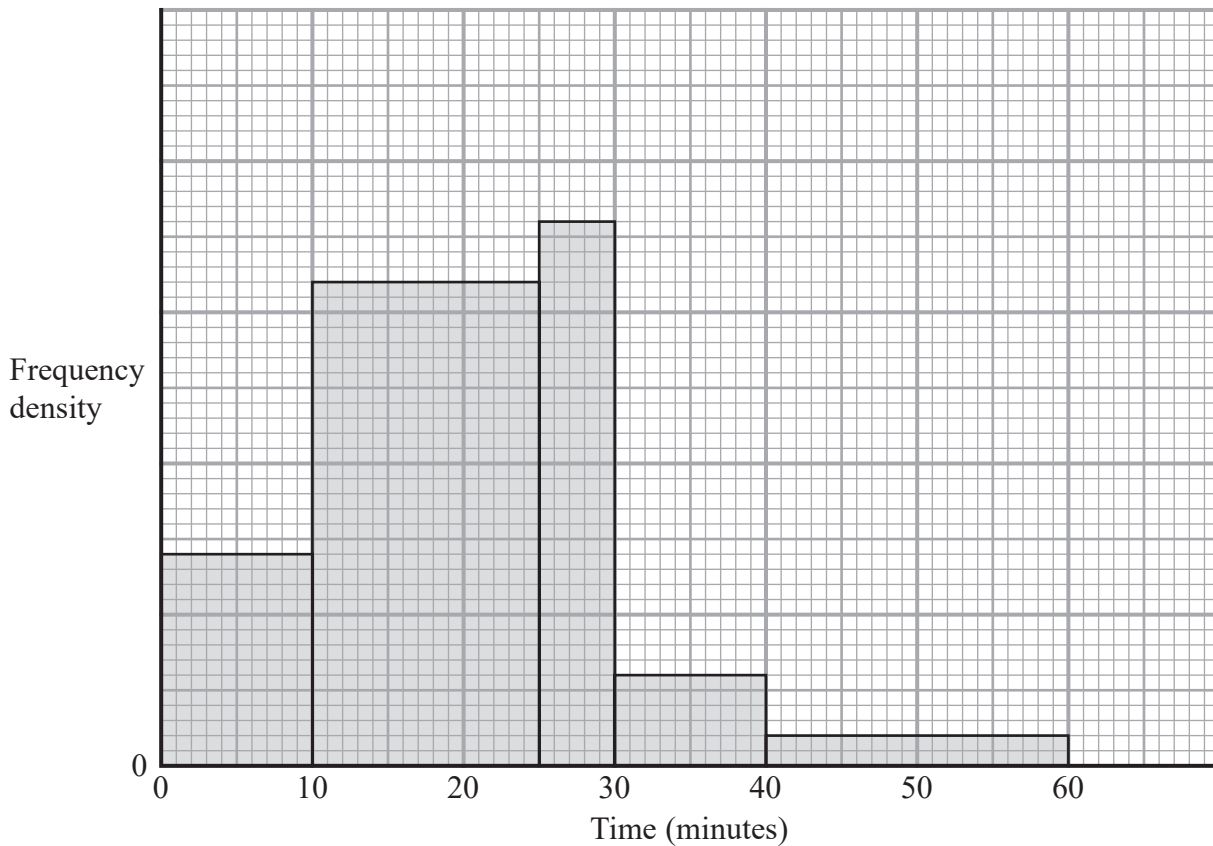
.....
(3)

(b) Work out the value of T when $m = 0.1$

.....
(1)

(Total for Question 20 is 4 marks)

- 21** The histogram gives information about the times, in minutes, some customers had to wait to be served in a restaurant.



14 customers had to wait less than 10 minutes to be served.

Work out the number of customers who had to wait less than 60 minutes to be served.

(Total for Question 21 is 3 marks)

- 22** The curve with equation $x^2 - x + y^2 = 10$ and the straight line with equation $x - y = -4$ intersect at the points A and B .

Work out the exact length of AB .

Show your working clearly and give your answer in the form $\frac{\sqrt{a}}{2}$ where a is an integer.

.....
(Total for Question 22 is 6 marks)

23 P and Q are two points.

The coordinates of P are $(-1, 6)$

The coordinates of Q are $(5, -4)$

Find an equation of the perpendicular bisector of PQ .

Give your answer in the form $ax + by + c = 0$ where a , b and c are integers.

.....
(Total for Question 23 is 6 marks)

24 (a) Write $7 + 12x - 3x^2$ in the form $a + b(x + c)^2$ where a , b and c are integers.

.....
(4)

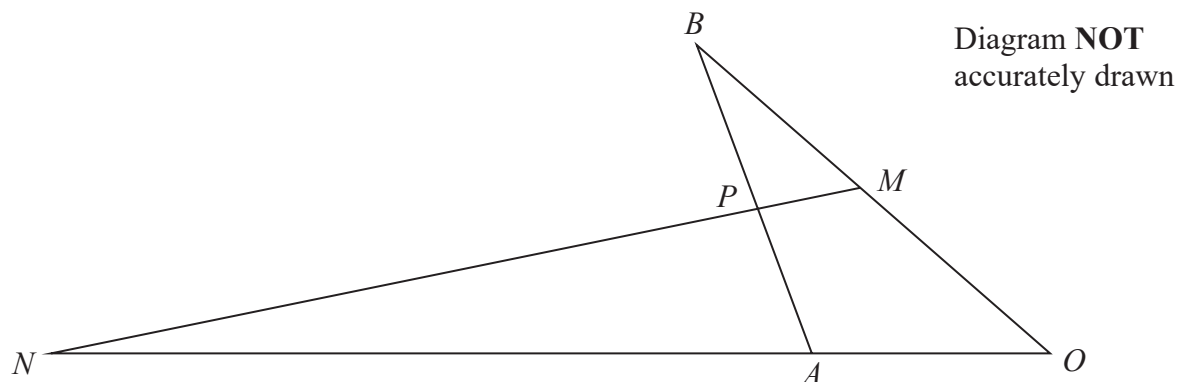
The curve **C** has equation $y = 7 + 12x - 3x^2$
The point A is the turning point on **C**.

(b) Using your answer to part (a), write down the coordinates of A .

(..... ,)
(1)

(Total for Question 24 is 5 marks)

25



OAN , OMB , APB and MPN are straight lines.

$$OA:AN = 1:4$$

$$OM:MB = 1:1$$

$$\vec{OA} = 2\mathbf{a} \quad \vec{OB} = 2\mathbf{b}$$

By using a vector method, find the ratio $AP:PB$
Give your answer in its simplest form.

.....

(Total for Question 25 is 5 marks)

Turn over for Question 26

- 26 A, B, D and E are points on a circle.
 ABC and EDC are straight lines.

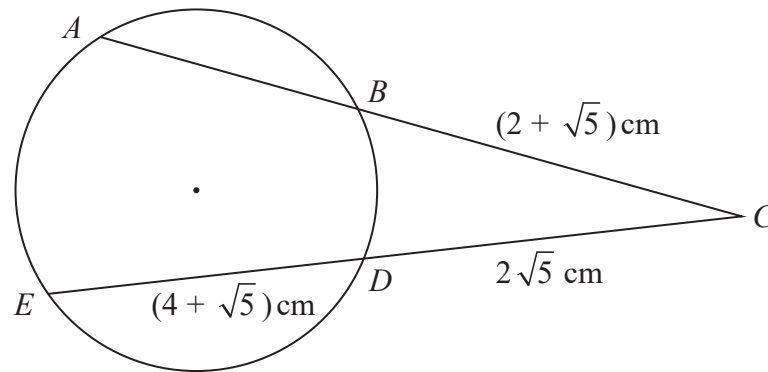


Diagram **NOT**
 accurately drawn

$$BC = (2 + \sqrt{5}) \text{ cm}$$

$$ED = (4 + \sqrt{5}) \text{ cm}$$

$$DC = 2\sqrt{5} \text{ cm}$$


Show that the length of AB is $(p\sqrt{5} + q) \text{ cm}$, where p and q are integers whose values are to be found.

Show your working clearly.

(Total for Question 26 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

Please check the examination details below before entering your candidate information			
Candidate surname		Other names	
Pearson Edexcel International GCSE		Centre Number <div style="display: flex; justify-content: space-around;"> <div style="width: 20px; height: 20px; border: 1px solid black;"></div> <div style="width: 20px; height: 20px; border: 1px solid black;"></div> <div style="width: 20px; height: 20px; border: 1px solid black;"></div> <div style="width: 20px; height: 20px; border: 1px solid black;"></div> <div style="width: 20px; height: 20px; border: 1px solid black;"></div> </div>	Candidate Number <div style="display: flex; justify-content: space-around;"> <div style="width: 20px; height: 20px; border: 1px solid black;"></div> <div style="width: 20px; height: 20px; border: 1px solid black;"></div> <div style="width: 20px; height: 20px; border: 1px solid black;"></div> <div style="width: 20px; height: 20px; border: 1px solid black;"></div> </div>
<h2 style="margin: 0;">Thursday 5 November 2020</h2>			
Morning (Time: 2 hours)		Paper Reference 4MA1/2H	
<h1 style="margin: 0;">Mathematics A</h1> <h2 style="margin: 0;">Paper 2H</h2> <h3 style="margin: 0;">Higher Tier</h3>			
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

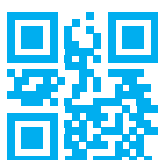
- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more 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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

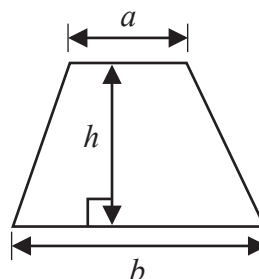
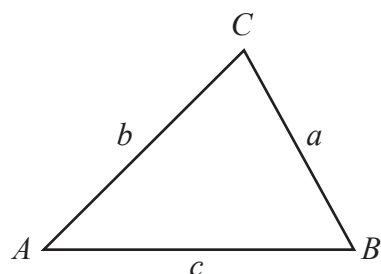
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

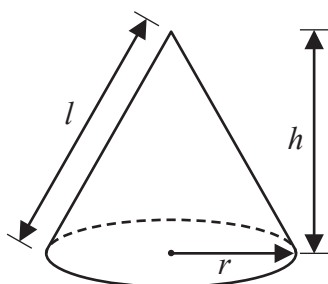
$$\text{Sine Rule} \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

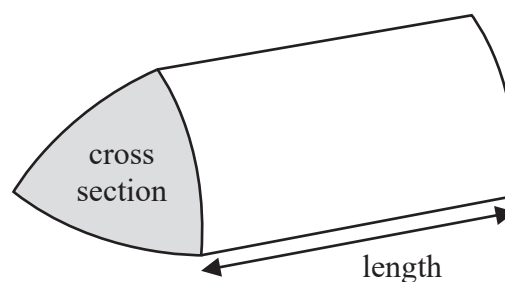
$$\text{Area of triangle} = \frac{1}{2}ab \sin C$$

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

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

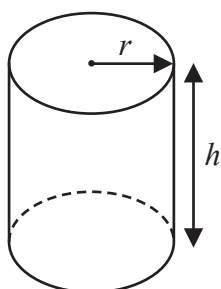
**Volume of prism**

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



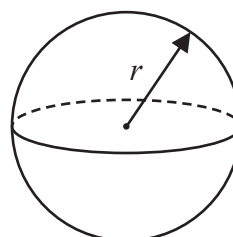
$$\text{Volume of cylinder} = \pi r^2 h$$

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



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

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



Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Simplify $g^6 \times g^4$

.....
(1)

(b) Simplify $k^{10} \div k^3$

.....
(1)

(c) Simplify $(3cd^4)^2$

.....
(2)

(d) Solve the inequality $4x + 7 > 2$

.....
(2)

(Total for Question 1 is 6 marks)

2 The table shows information about the lengths of time, in minutes, 120 customers spent in a supermarket.

Length of time (L minutes)	Frequency
$20 < L \leq 30$	6
$30 < L \leq 40$	26
$40 < L \leq 50$	31
$50 < L \leq 60$	40
$60 < L \leq 70$	17

(a) Write down the modal class.

.....
(1)

(b) Work out an estimate for the mean length of time spent by the 120 customers in the supermarket.

.....minutes
(4)

(Total for Question 2 is 5 marks)

3

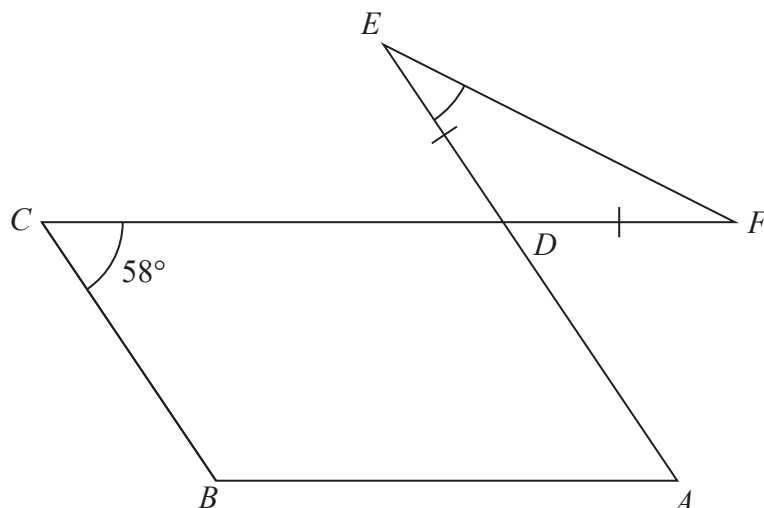


Diagram **NOT**
accurately drawn

The diagram shows a parallelogram $ABCD$ and an isosceles triangle DEF in which $DE = DF$

CDF and ADE are straight lines.

Angle $BCD = 58^\circ$

Work out the size of angle DEF .

Give a reason for each stage of your working.

.....^o

(Total for Question 3 is 5 marks)

- 4 Andreas, Isla and Paulo share some money in the ratios 3 : 2 : 5

The **total** amount of money that Isla and Paulo receive is £76 more than the amount of money that Andreas receives.

Andreas buys a video game for £48.50 with some of his share of the money.

Work out how much money Andreas has left from his share of the money when he has bought the video game.

£.....

(Total for Question 4 is 4 marks)

- 5 Himari's annual salary is 3 130 000 Japanese Yen (JPY).
She gets a salary increase of 4%

(a) Work out Himari's salary after this increase.

.....JPY
(3)

Kaito bought a car.

The value of the car when Kaito bought it was 750 000 JPY.

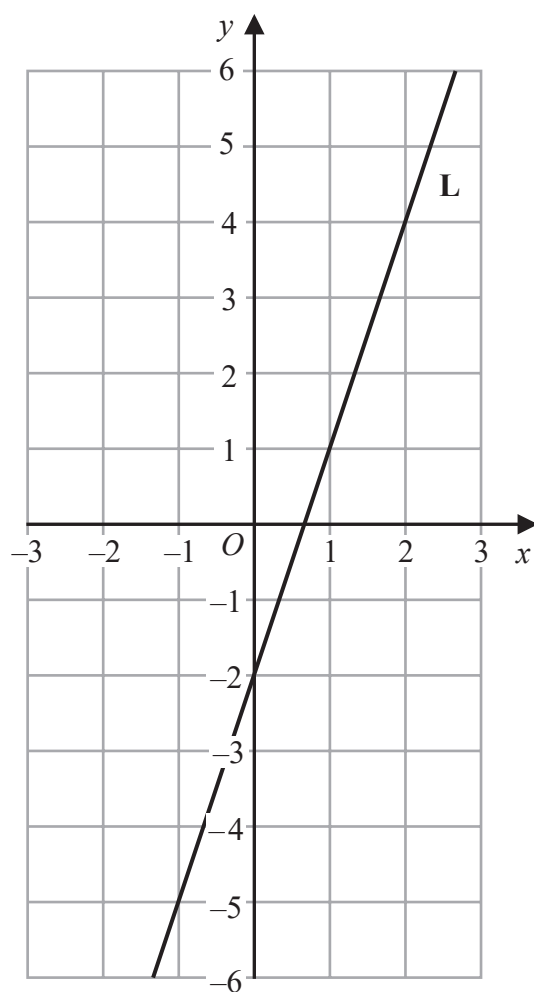
At the end of each year, the value of his car had depreciated by 15%

- (b) Work out the value of Kaito's car at the end of 3 years.
Give your answer correct to the nearest JPY.

.....JPY
(3)

(Total for Question 5 is 6 marks)

- 6 The line **L** is shown on the grid.



Find an equation for **L**.

(Total for Question 6 is 2 marks)

- 7 The diagram shows a right-angled triangle.

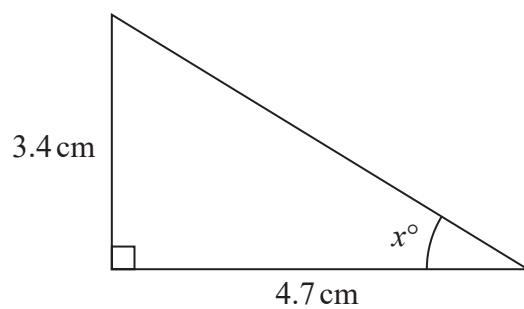


Diagram **NOT**
accurately drawn

Calculate the value of x .
Give your answer correct to one decimal place.

$x =$

(Total for Question 7 is 3 marks)

- 8 The diagram shows an isosceles triangle.

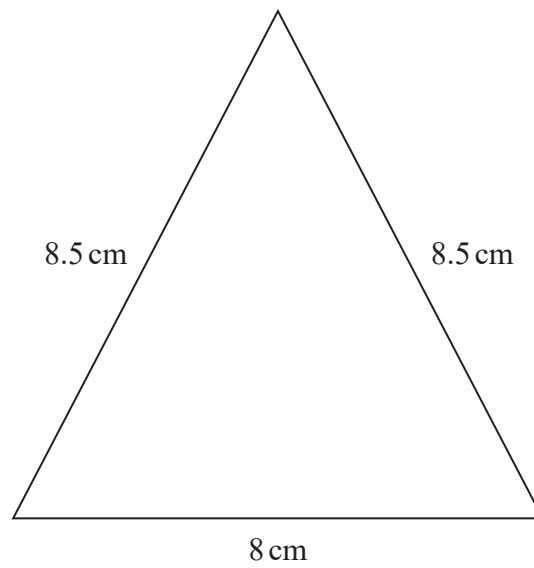


Diagram **NOT**
accurately drawn

Work out the area of the triangle.

.....cm²

(Total for Question 8 is 4 marks)

- 9 The diagram shows a solid cylinder with radius 3 m.

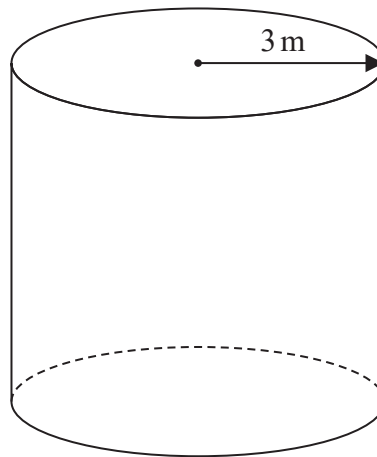


Diagram **NOT**
accurately drawn

The volume of the cylinder is $72\pi \text{ m}^3$

Calculate the **total** surface area of the cylinder.
Give your answer correct to 3 significant figures.

..... m^2

(Total for Question 9 is 5 marks)

10 The table shows information about the number of minutes each of 120 buses was late last Monday.

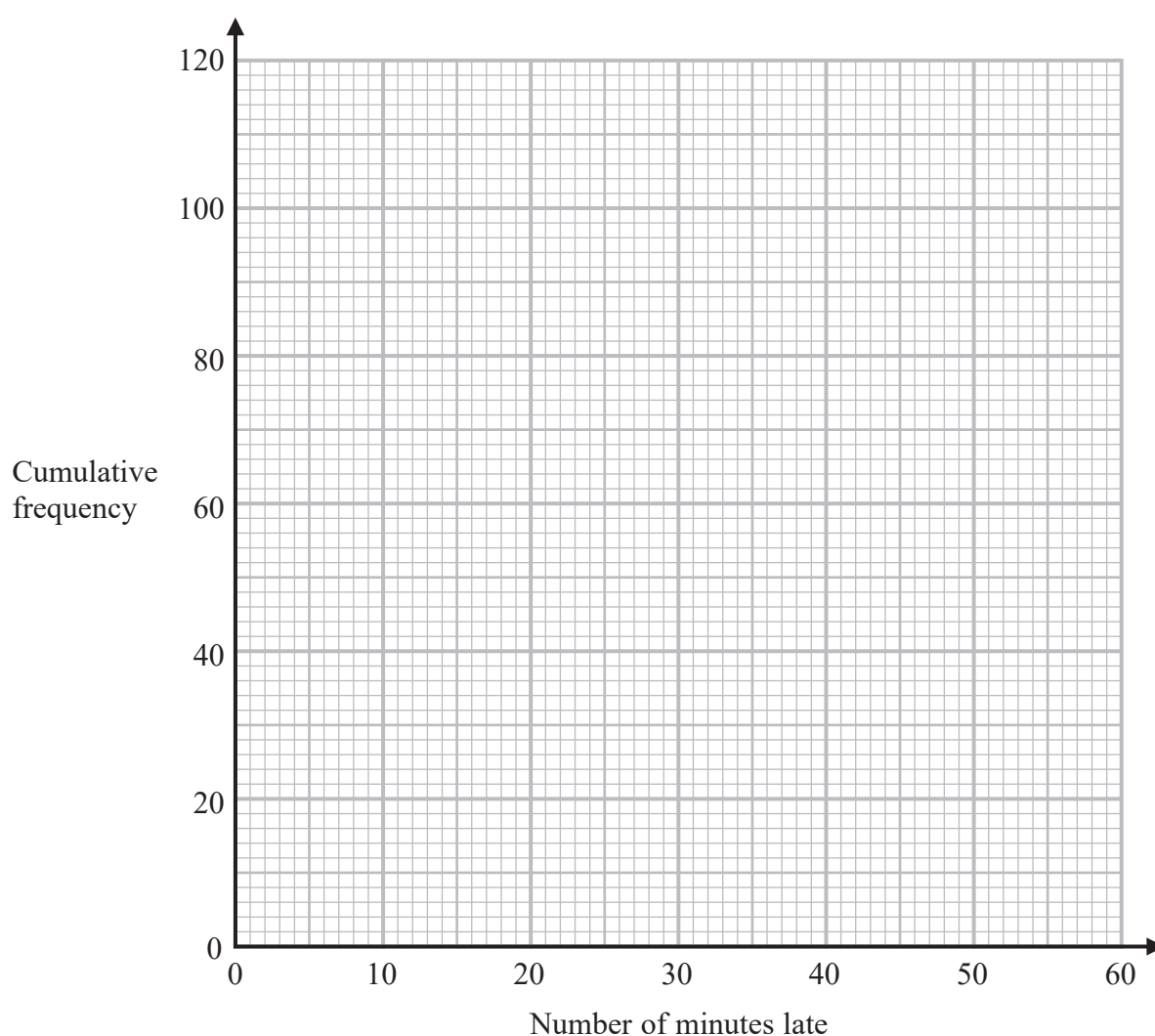
Number of minutes late (L)	Frequency
$0 < L \leq 10$	10
$10 < L \leq 20$	16
$20 < L \leq 30$	44
$30 < L \leq 40$	29
$40 < L \leq 50$	15
$50 < L \leq 60$	6

(a) Complete the cumulative frequency table below.

Number of minutes late (L)	Cumulative frequency
$0 < L \leq 10$	
$0 < L \leq 20$	
$0 < L \leq 30$	
$0 < L \leq 40$	
$0 < L \leq 50$	
$0 < L \leq 60$	

(1)

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



(2)

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

.....minutes
(2)

(d) Use your graph to find an estimate for the number of buses that were more than 48 minutes late last Monday.

.....
(2)

(Total for Question 10 is 7 marks)

11 (a) Simplify fully $(8e^{15})^{\frac{2}{3}}$

.....
(2)

(b) Express $\left(\frac{y}{2}\right)^{-4}$ in the form ay^n where a and n are integers.

.....
(2)

(c) Solve $\frac{4x-2}{3} - \frac{5-3x}{4} = 6$

Show clear algebraic working.

$x =$
(4)

(Total for Question 11 is 8 marks)

12 Given that $\frac{3^x}{9^{3x}} = 81$

find the value of x .

Show clear algebraic working.

$$x = \dots\dots\dots$$

(Total for Question 12 is 3 marks)

13 Use algebra to show that $0.6\dot{8}\dot{1} = \frac{15}{22}$

(Total for Question 13 is 2 marks)

14 $\mathcal{E} = \{\text{integers } x \text{ such that } 10 \leq x \leq 25\}$

$$A = \{x : x < 18\}$$

$$B = \{x : 13 \leq x < 22\}$$

(a) Write down $n(A)$

.....
(1)

(b) List the members of the set $(A \cup B)'$

.....
(2)

(c) List the members of the set $A' \cap B$

.....
(2)

$C \subset A$, $C \subset B$ and $n(C) = 5$

(d) List the members of the set C

.....
(1)

(Total for Question 14 is 6 marks)

15 Make x the subject of $y = \frac{5 - 2x}{x + 3}$

.....
(Total for Question 15 is 4 marks)

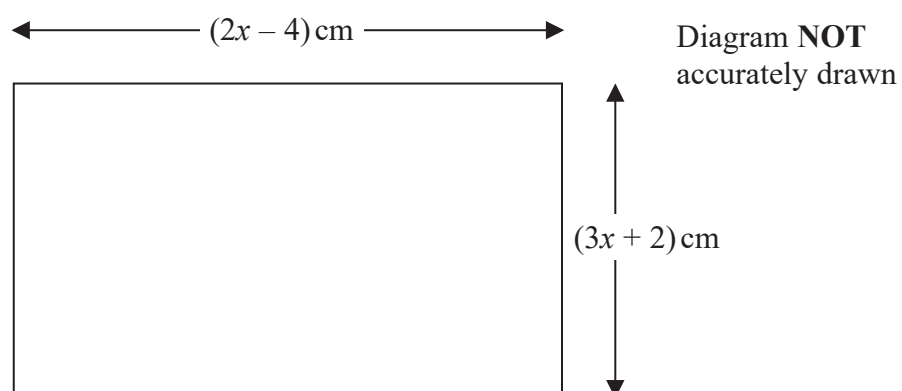
16 Solve the simultaneous equations

$$\begin{aligned}3xy - y^2 &= 8 \\ x - 2y &= 1\end{aligned}$$

Show clear algebraic working.

(Total for Question 16 is 5 marks)

17 The diagram shows a rectangle.



The area of the rectangle is $A \text{ cm}^2$

Given that $A < 3x + 27$

find the range of possible values for x .

(Total for Question 17 is 5 marks)

18 The diagram shows cuboid $ABCDEFGH$.

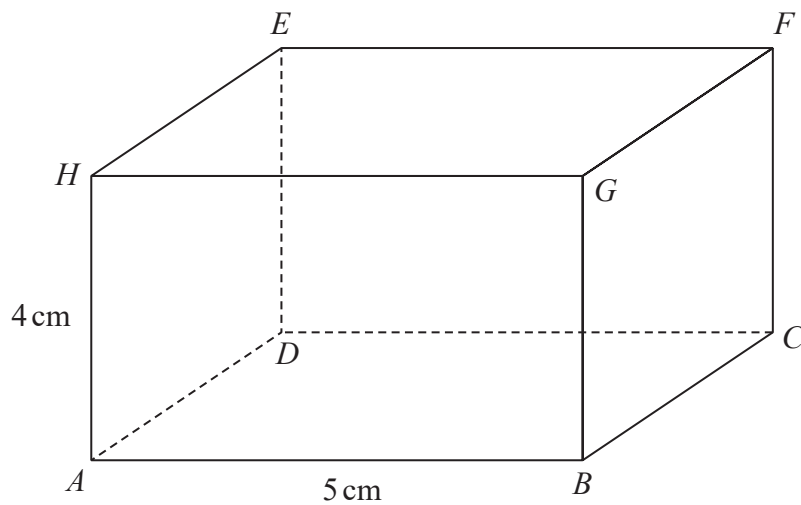


Diagram **NOT**
accurately drawn

$$AB = 5 \text{ cm}$$

$$AH = 4 \text{ cm}$$

The size of the angle between CH and the plane $ABCD$ is 35°

Calculate the volume of the cuboid.

Give your answer correct to 3 significant figures.

..... cm^3

(Total for Question 18 is 5 marks)

19 OAB is a triangle.

$$\vec{OA} = \mathbf{a} \quad \vec{OB} = \mathbf{b}$$

The point C lies on OA such that $OC : CA = 1 : 2$

The point D lies on OB such that $OD : DB = 1 : 2$

Using a vector method, prove that $ABDC$ is a trapezium.

(Total for Question 19 is 3 marks)

20 A bag contains X counters.

There are only red counters and blue counters in the bag.

There are 4 more blue counters than red counters in the bag.

Finty takes at random 2 counters from the bag.

The probability that Finty takes 2 blue counters from the bag is $\frac{3}{8}$

Work out the value of X .

Show clear algebraic working.

.....
(Total for Question 20 is 5 marks)

21 The function f is such that $f(x) = 5 + 6x - x^2$ for $x \leq 3$

(a) Express $5 + 6x - x^2$ in the form $p - (x - q)^2$ where p and q are constants.

.....
(2)


(b) Using your answer to part (a), find the range of values of x for which $f^{-1}(x)$ is positive.

.....
(5)

(Total for Question 21 is 7 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

Please check the examination details below before entering your candidate information			
Candidate surname		Other names	
Pearson Edexcel		Centre Number	Candidate Number
International GCSE		<input style="width: 30px; height: 30px; border: 1px solid black;" type="text"/> <input style="width: 30px; height: 30px; border: 1px solid black;" type="text"/> <input style="width: 30px; height: 30px; border: 1px solid black;" type="text"/> <input style="width: 30px; height: 30px; border: 1px solid black;" type="text"/> <input style="width: 30px; height: 30px; border: 1px solid black;" type="text"/>	<input style="width: 30px; height: 30px; border: 1px solid black;" type="text"/> <input style="width: 30px; height: 30px; border: 1px solid black;" type="text"/> <input style="width: 30px; height: 30px; border: 1px solid black;" type="text"/> <input style="width: 30px; height: 30px; border: 1px solid black;" type="text"/>
Wednesday 13 January 2021			
Afternoon (Time: 2 hours)		Paper Reference 4MA1/2H	
Mathematics A Paper 2H Higher Tier			
You must have: Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.			Total Marks <div style="border: 1px solid black; height: 40px; width: 100%; margin-top: 5px;"></div>

Instructions

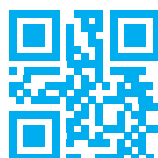
- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more 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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

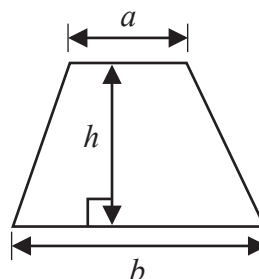
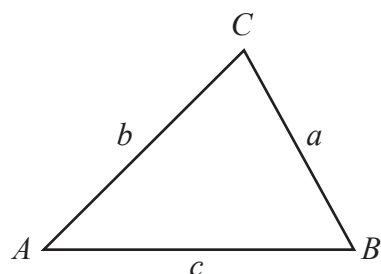
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

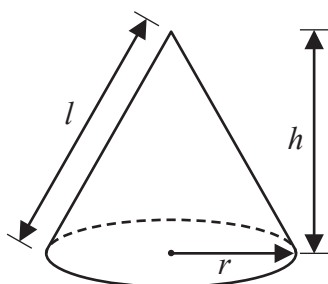
$$\text{Sine Rule} \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

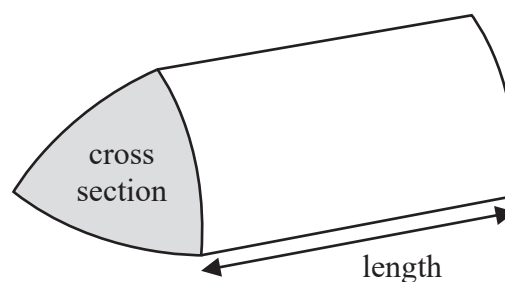
$$\text{Area of triangle} = \frac{1}{2}ab \sin C$$

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

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

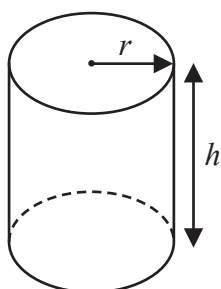
**Volume of prism**

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



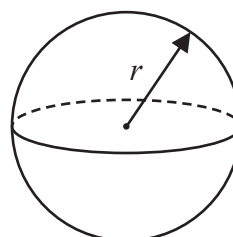
$$\text{Volume of cylinder} = \pi r^2 h$$

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



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

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



Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** A train takes 6 hours 39 minutes to travel from New Delhi to Kanpur.
The train travels a distance of 429 km.

Work out the average speed of the train.

Give your answer in km/h correct to one decimal place.

..... km/h

(Total for Question 1 is 3 marks)

2 Ava writes down five whole numbers.

For these five numbers

the median is 7

the mode is 8

the range is 5

Find a possible value for each of the five numbers that Ava writes down.

(Total for Question 2 is 3 marks)

3 Gladys buys a table for \$465 to sell in her shop.

She sells the table for \$520

- (a) Work out the percentage profit that Gladys makes from the sale of the table.
Give your answer correct to 3 significant figures.

.....%
(3)

Gladys has a sale in her shop.

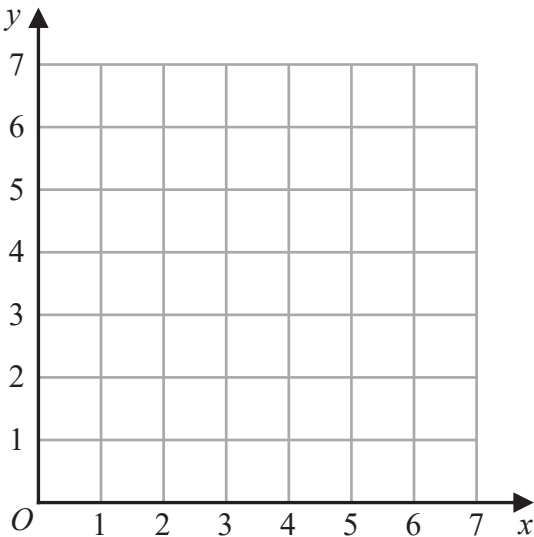
She decreases all the normal prices by 12%
The normal price of an armchair was \$550

- (b) Work out the sale price of the armchair.

\$.....
(3)

(Total for Question 3 is 6 marks)

4



(a) On the grid, draw and **label** the straight line with equation

(i) $x = 1.5$

(ii) $y = x$

(iii) $x + y = 6$

(3)

(b) Show, by shading on the grid, the region that satisfies **all three** of the inequalities

$x \geq 1.5$ $y \geq x$ $x + y \leq 6$

Label the region **R**.

(1)

(Total for Question 4 is 4 marks)

- 5 (a) Expand and simplify $4x(2x + 5) - 3x(2x - 3)$

.....
(2)

Given that $\frac{y^5 \times y^n}{y^6} = y^{13}$

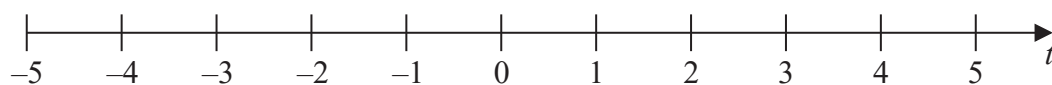
- (b) work out the value of n .

$n =$
(2)

- (c) (i) Solve the inequality $7t - 8 < 2t + 7$

.....
(2)

- (ii) On the number line below, represent the solution set of the inequality solved in part (c)(i)



(1)

(Total for Question 5 is 7 marks)

6 (a) Write down the value of y^0

.....
(1)

(b) Work out $\frac{9.6 \times 10^{141} + 6.4 \times 10^{140}}{3.2 \times 10^{16}}$

Give your answer in standard form.

.....
(3)

(Total for Question 6 is 4 marks)

7 There are 5 cocoa pods in a bag.
The mean weight of the 5 cocoa pods is 398 grams.

A sixth cocoa pod is put into the bag.
The mean weight of the 6 cocoa pods is 401 grams.

Work out the weight of the sixth cocoa pod that is put into the bag.

..... grams

(Total for Question 7 is 3 marks)

- 8 A , B and C are points on a circle with centre O .

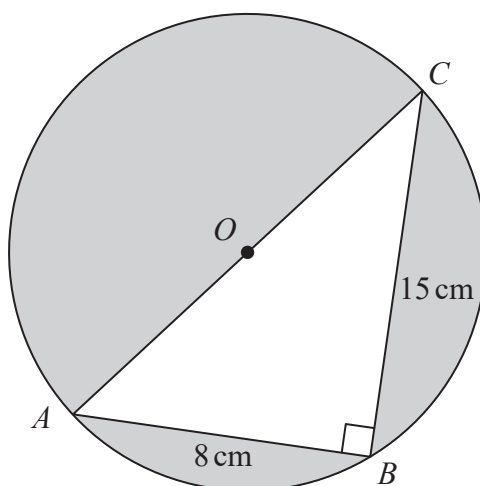


Diagram **NOT**
accurately drawn

AOC is a diameter of the circle.

$AB = 8\text{ cm}$ $BC = 15\text{ cm}$

Angle $ABC = 90^\circ$

Work out the total area of the regions shown shaded in the diagram.
Give your answer correct to 3 significant figures.

..... cm²**(Total for Question 8 is 5 marks)****9**

$$A = 2^3 \times 3^2 \times 5^2 \times 11$$

$$B = 2^4 \times 3 \times 5^4 \times 13$$

Find the lowest common multiple (LCM) of A and B .

Give your answer as a product of powers of prime numbers.

(Total for Question 9 is 2 marks)

10 The people working for a company work in Team A or in Team B.

number of people in Team A : number of people in Team B = 3 : 4

$\frac{4}{5}$ of Team A work full time.

24% of Team B work full time.

Work out what fraction of the people working for the company work full time.
Give your fraction in its simplest form.

(Total for Question 10 is 3 marks)

11 Simplify fully $\left(\frac{9t^4w^9}{18t^6w^{10}}\right)^{-2}$

.....
(Total for Question 11 is 3 marks)

12 15 people were asked how long, in minutes, they had been waiting for a bus.

Here are the results.

2 3 3 4 5 6 6 8 9 10 11 13 14 15 18

Find the interquartile range of these times.

..... minutes

(Total for Question 12 is 2 marks)

13 P, Q, R, S and T are points on a circle with centre O .

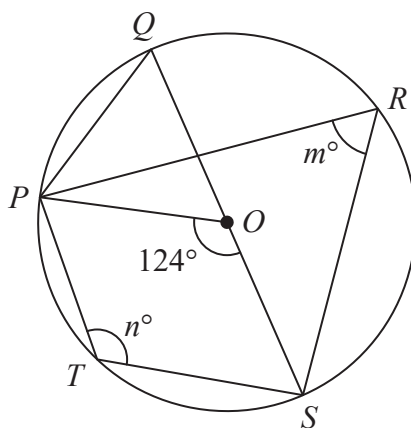


Diagram **NOT**
accurately drawn

QOS is a diameter of the circle.

angle $POS = 124^\circ$

angle $PRS = m^\circ$

angle $PTS = n^\circ$

(a) Find the value of

(i) m

.....

(ii) n

.....

(2)

(b) Find the size of angle QPO .

.....

(1)

(Total for Question 13 is 3 marks)

14 (a) Solve $\frac{9a-7}{5} - \frac{3a-7}{4} = 4.55$

Show clear algebraic working.

$a = \dots\dots\dots$
(3)

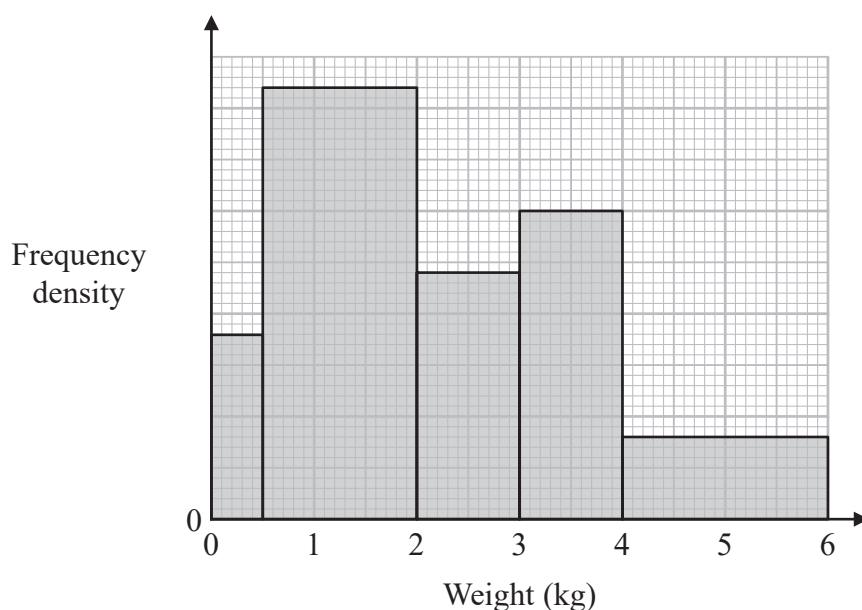
(b) Make c the subject of the formula $p = \sqrt{\frac{ac+8}{3+c}}$

$\dots\dots\dots$
(4)

(Total for Question 14 is 7 marks)

15 A postman records the weight of each parcel that he delivers.

The histogram shows information about the weights of all the parcels that the postman delivered last Monday. No parcels weighed more than 6 kg.



63 of the parcels that the postman delivered last Monday each had a weight between 0.5 kg and 2 kg.

(a) Work out the total number of parcels the postman delivered last Monday.

.....
(3)

The postman picks at random two of the records of the parcels he delivered last Monday.

(b) Work out an estimate for the probability that each parcel weighed more than 2.25 kg.

.....
(3)

(Total for Question 15 is 6 marks)

16 Some students were asked the following question.

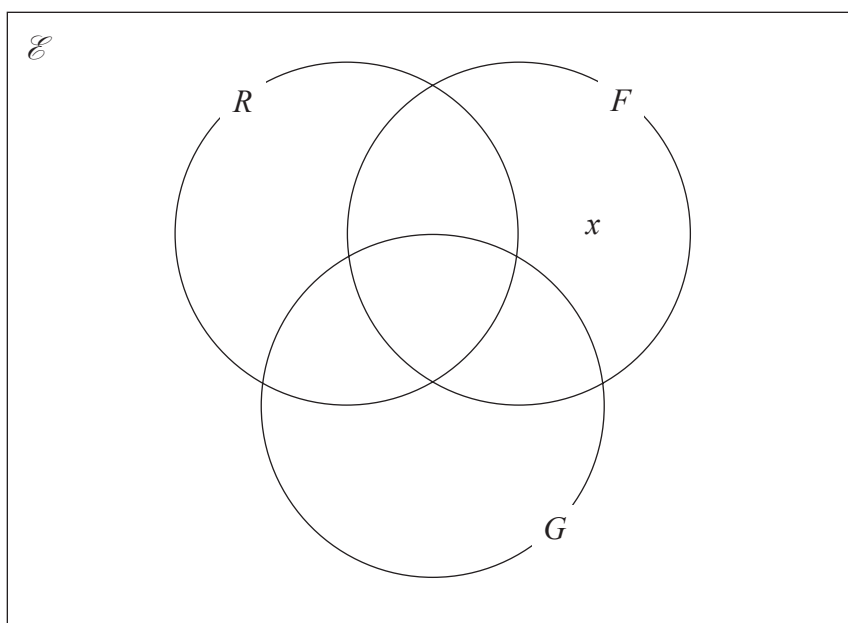
“Which of the subjects Russian (R), French (F) and German (G) do you study?”

Of these students

- 4 study all three of Russian, French and German
- 10 study Russian and French
- 13 study French and German
- 6 study Russian and German
- 24 study German
- 11 study none of the three subjects
- the number who study Russian only is twice the number who study French only.

Let x be the number of students who study French only.

- (a) Show all this information on the Venn diagram, giving the number of students in each appropriate subset, in terms of x where necessary.



(3)

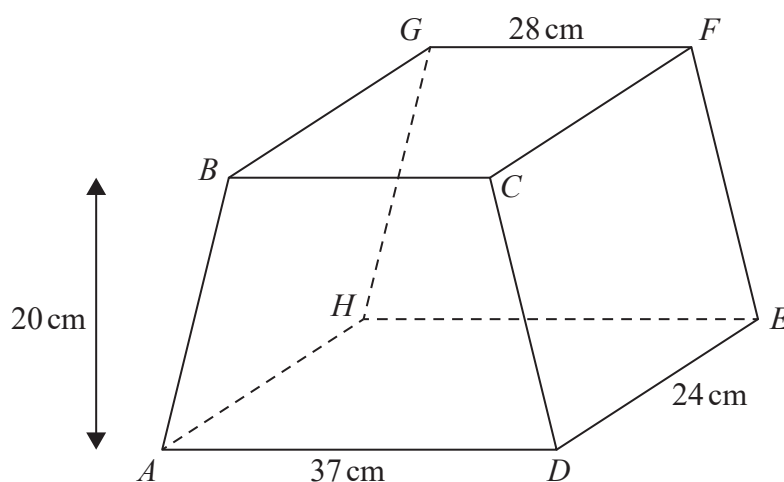
Given that the number of students who were asked the question was 80

- (b) work out the number of these students that study Russian.

(3)

(Total for Question 16 is 6 marks)

17 The diagram shows a solid prism $ABCDEFGH$.



The trapezium $ABCD$, in which AD is parallel to BC , is a cross section of the prism.

The base $ADEH$ of the prism is a horizontal plane.

$ADEH$ and $BCFG$ are rectangles.

The midpoint of BC is vertically above the midpoint of AD so that $BA = CD$.

$$AD = 37 \text{ cm} \qquad GF = 28 \text{ cm} \qquad DE = 24 \text{ cm}$$

The perpendicular distance between edges AD and BC is 20 cm.

(a) Work out the total surface area of the prism.

..... cm²

(4)

- (b) Calculate the size of the angle between AF and the plane $ADEH$.
Give your answer correct to one decimal place.

°

(3)

(Total for Question 17 is 7 marks)

18 A rectangle $ABCD$ is to be drawn on a centimetre grid such that

A has coordinates $(-4, -2)$

B has coordinates $(1, 10)$

C has coordinates $(19, a)$

D has coordinates (b, c)

(a) Work out the value of a , the value of b and the value of c .

$a =$

$b =$

$c =$

(4)

(b) Calculate the perimeter, in centimetres, of rectangle $ABCD$.

..... cm

(3)

(Total for Question 18 is 7 marks)

- 19** A particle P is moving along a straight line.
The fixed point O lies on this line.

At time t seconds where $t \geq 0$, the displacement, s metres, of P from O is given by

$$s = t^3 + 5t^2 - 8t + 10$$

Find the displacement of P from O when P is instantaneously at rest.

Give your answer in the form $\frac{a}{b}$ where a and b are integers.

..... metres

(Total for Question 19 is 5 marks)

20

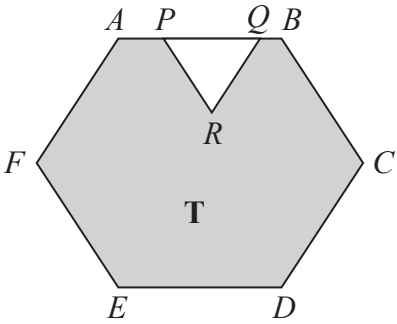


Diagram **NOT**
accurately drawn

The diagram shows a shaded region **T** formed by removing an equilateral triangle PQR from a regular hexagon $ABCDEF$.

The points P and Q lie on AB such that $AB = 1.5 \times PQ$

Given that the area of region **T** is $72\sqrt{3} \text{ cm}^2$

work out the length of PQ .

..... cm

(Total for Question 20 is 4 marks)

21 Write $\frac{25x^2 - 64}{5x^2 - 13x - 6} \times \frac{x^2 - 8x + 15}{5x + 8} - (x - 7)$

as a single fraction in its simplest form.
Show clear algebraic working.

.....
(Total for Question 21 is 4 marks)

Turn over for Question 22

- 22 The diagram shows a sector OBC of a circle with centre O and radius $(6 + x)$ cm.

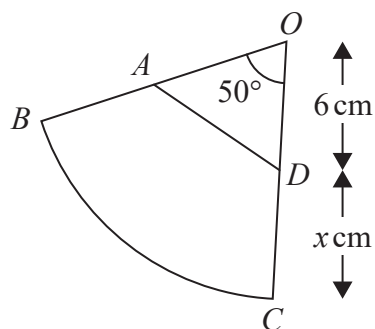


Diagram **NOT**
accurately drawn

A is the point on OB and D is the point on OC such that $OA = OD = 6$ cm

Angle $BOC = 50^\circ$

Given that

the perimeter of sector $OBC = 2 \times$ the perimeter of triangle OAD

find the value of x .


Give your answer correct to 3 significant figures.

$x =$

(Total for Question 22 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

Please check the examination details below before entering your candidate information			
Candidate surname		Other names	
Pearson Edexcel		Centre Number	
International GCSE		Candidate Number	
Wednesday 13 January 2021			
Afternoon (Time: 2 hours)		Paper Reference 4MA1/2HR	
Mathematics A Paper 2HR Higher Tier			
You must have: Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.			Total Marks <div style="border: 1px solid black; height: 40px; width: 100%;"></div>

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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

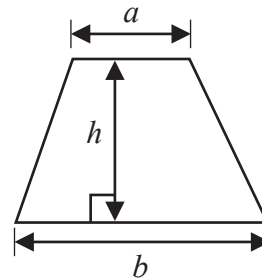
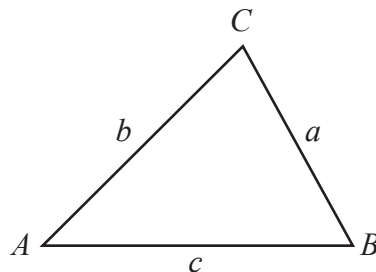
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

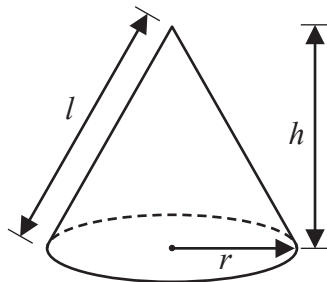
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

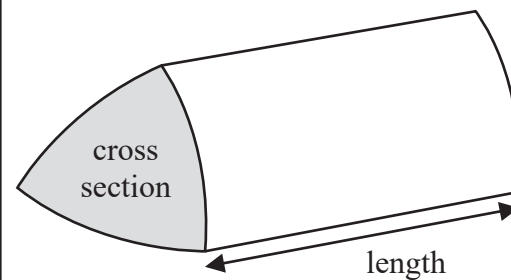
Area of triangle $= \frac{1}{2}ab \sin C$

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

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

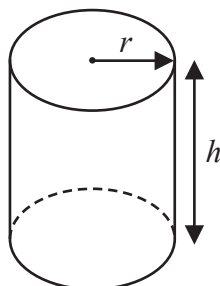
**Volume of prism**

= area of cross section \times length



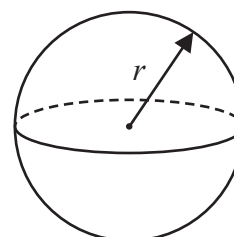
Volume of cylinder $= \pi r^2 h$

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



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

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



Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 $w = 5y^2 - y^3$

(a) Work out the value of w when $y = -2$

$w = \dots\dots\dots$
(2)

(b) Factorise fully $8p^2 - 2p$

$\dots\dots\dots$
(2)

(c) Expand $4t(3t - 2)$

$\dots\dots\dots$
(2)

(d) Expand and simplify $(5x - 2)(x + 4)$

$\dots\dots\dots$
(2)

(Total for Question 1 is 8 marks)

- 2 The diagram shows a rectangle $ABCD$ and a semicircle with diameter AB where $AB = 12$ cm. The point E lies on DC and also on the semicircle.

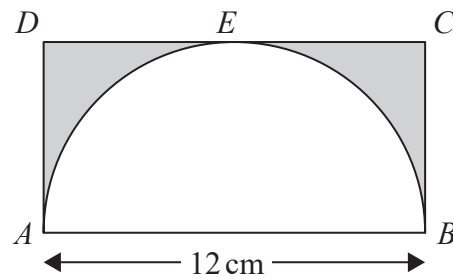


Diagram **NOT**
accurately drawn

Work out the area of the shaded region.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 2 is 3 marks)

3 $\mathcal{E} = \{21, 22, 23, 24, 25, 26, 27, 28, 29, 30\}$
 $A = \{22, 24, 26, 28, 30\}$
 $B = \{21, 24, 27, 30\}$

(a) List the members of the set

(i) $A \cap B$

.....

(ii) A'

.....

(2)

$C = \{23, 25, 29\}$

(b) Using set notation, find an expression for C in terms of A and B .

.....

(1)

(Total for Question 3 is 3 marks)

4 (a) Simplify $(3k^2)^4$

.....

(2)

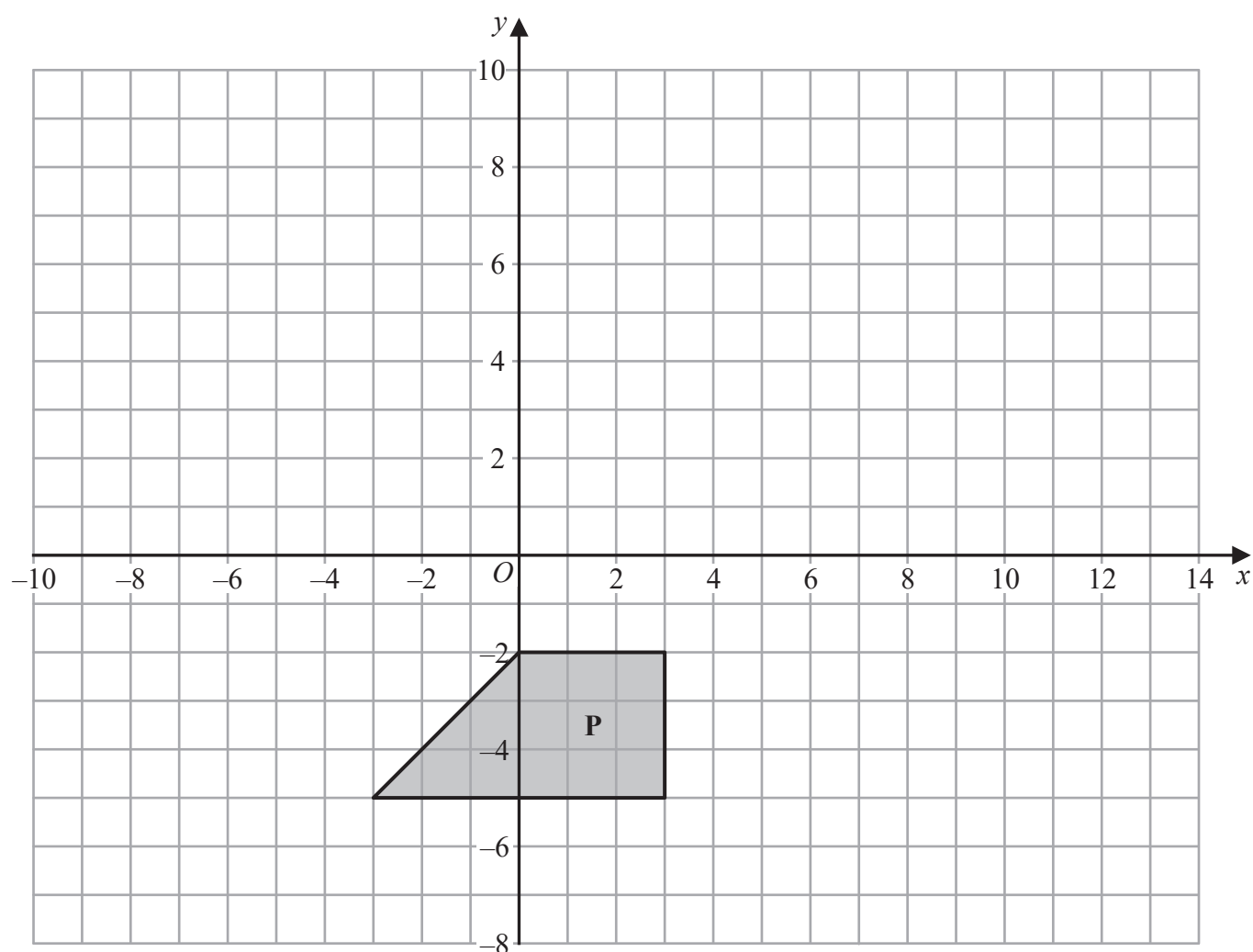
(b) Simplify $(21m^4n) \div (3n^{-5})$

.....

(2)

(Total for Question 4 is 4 marks)

5 Here is a shape **P** drawn on a grid of squares.



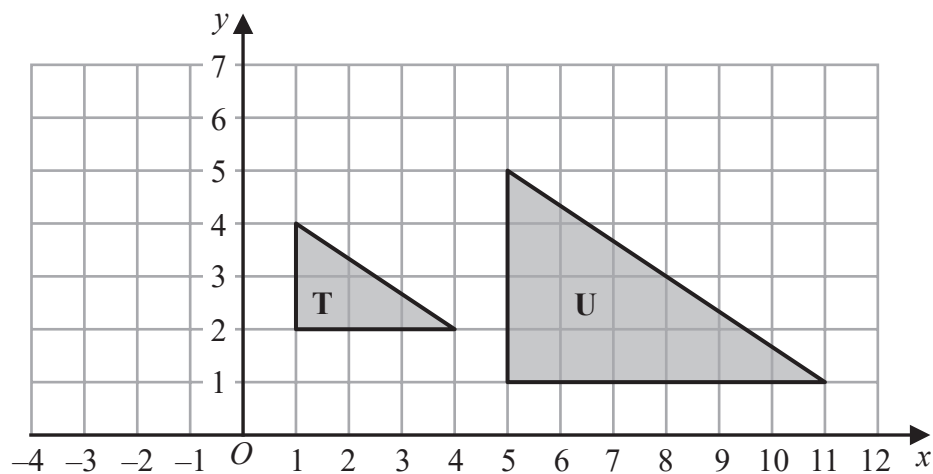
- (a) On the grid, rotate shape **P** 180° about the point $(-3, 2)$
Label the new shape **Q**.

(2)

- (b) On the grid, translate shape **P** by the vector $\begin{pmatrix} 10 \\ 8 \end{pmatrix}$
Label the new shape **R**.

(1)

Here are triangle T and triangle U drawn on a grid of squares.



(c) Describe fully the single transformation that maps triangle T onto triangle U.

(3)

(Total for Question 5 is 6 marks)

- 6 On Wednesday, the price of 1 litre of petrol was £1.26
The price of petrol on Wednesday was 5% more than the price of petrol on the previous Monday.

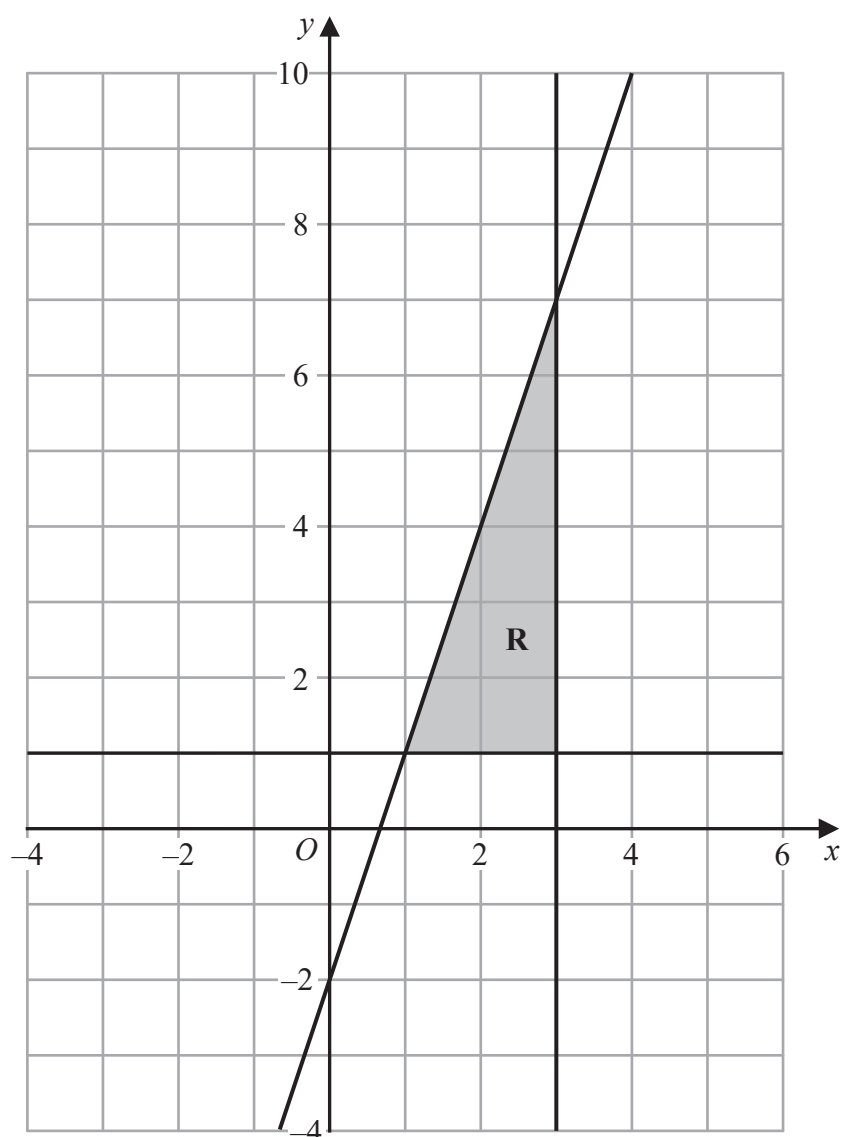
Calculate the price of 30 litres of petrol on the previous Monday.

£.....

(Total for Question 6 is 3 marks)

- 7 The shaded region **R**, shown in the diagram below, is bounded by the straight line with equation $y = 3x - 2$ and by two other straight lines.

Write down the three inequalities that define region **R**.



.....
.....
.....

(Total for Question 7 is 3 marks)

- 8 The table gives the length of the coastline, in kilometres, of each of five oceans.

Ocean	Length of coastline (km)
Arctic	4.539×10^4
Atlantic	1.119×10^5
Pacific	1.357×10^5
Indian	6.653×10^4
Southern	1.797×10^4

- (a) Which ocean has the greatest length of coastline?

.....
(1)

- (b) Calculate the difference between the length of the Atlantic Ocean's coastline and the length of the Southern Ocean's coastline.
Give your answer in standard form.

..... km
(2)

(Total for Question 8 is 3 marks)

- 9 Solve $x^2 - 21x + 20 = 0$
Show your working clearly.

.....
(Total for Question 9 is 3 marks)

- 10** A mathematics teacher at a school asked a group of students how far, in kilometres, each student had travelled to get to school that day.

The table gives information about their answers.

Distance travelled (d km)	Number of students
$0 < d \leq 2$	x
$2 < d \leq 4$	11
$4 < d \leq 6$	8
$6 < d \leq 8$	6
$8 < d \leq 10$	5

The teacher calculated that an estimate for the mean distance travelled by the whole group of students was 4.25 km.

Work out the value of x .
Show your working clearly.

$x = \dots\dots\dots$

(Total for Question 10 is 4 marks)

- 11 A circle centre O has radius 9 cm.

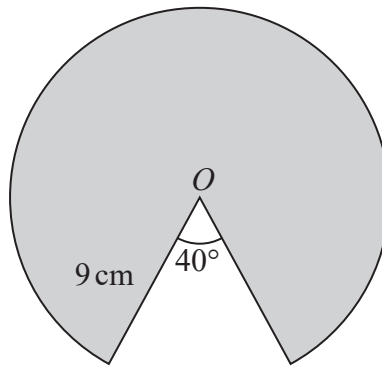


Diagram **NOT**
accurately drawn

Calculate the perimeter of the shaded sector of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 11 is 4 marks)

- 12 Solve the simultaneous equations $2x + 7y = 17$
 $5x + 3y = -1$

Show clear algebraic working.

$x =$

$y =$

(Total for Question 12 is 4 marks)

- 13** The diagram shows two hot air balloons.
 A is a point on the base of one of the balloons and B is a point on the base of the other balloon.

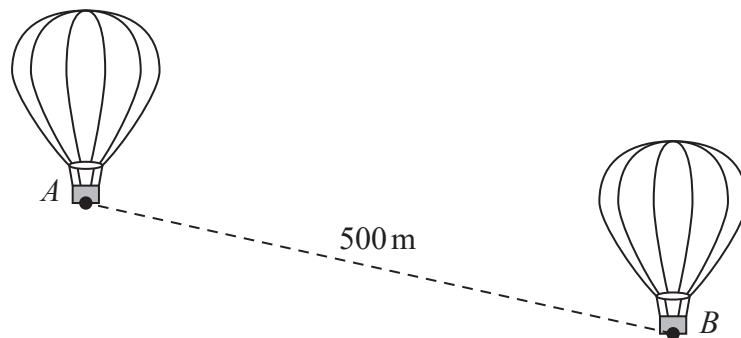


Diagram **NOT**
accurately drawn

The distance between A and B is 500 metres.
 The angle of depression of B from A is 23°

Calculate the vertical height of A above B .
 Give your answer correct to one decimal place.

..... metres

(Total for Question 13 is 3 marks)

14 Simon bought a house at the beginning of 2018

The value of Simon's house had decreased by 15% by the end of 2018

The house increased in value during both 2019 and 2020

The percentage increases in the value of the house during 2019 and 2020 were the same.

The value of Simon's house at the end of 2020 was 2.85% greater than the amount he paid for his house at the beginning of 2018

Calculate the percentage increase in the value of the house during 2019

.....%

(Total for Question 14 is 4 marks)

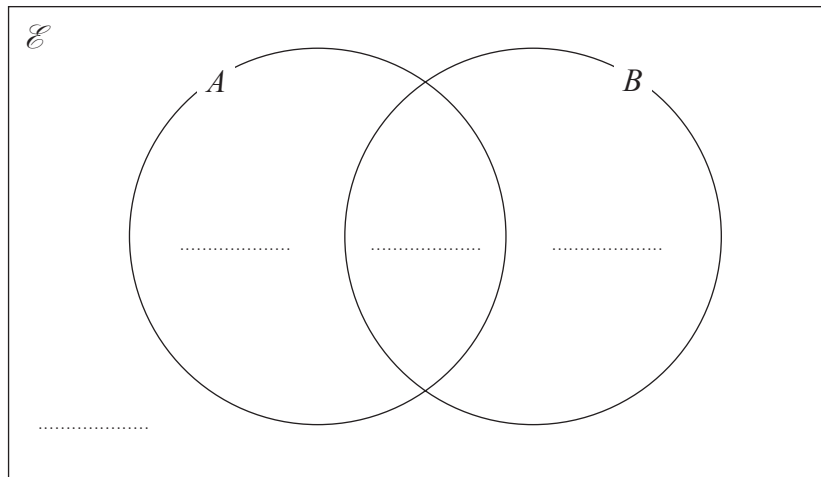
15 Prove algebraically that the product of any two odd numbers is always an odd number.

(Total for Question 15 is 4 marks)

16 Two events A and B are such that $n(A) = 62$ $n(B) = 30$ and $n(A \cup B) = 68$

Given that $n(\mathcal{E}) = 80$

(a) complete the Venn diagram to show the number of elements in each region.



(2)

An element is chosen at random from \mathcal{E} .

(b) Using the Venn diagram, find the probability that this element is in

(i) $A \cap B$

(1)

(ii) $A \cup B'$

(2)

(Total for Question 16 is 5 marks)

17 The functions f and g are defined as

$$f(x) = x^2 + 6$$

$$g(x) = x - 10$$

(a) Find $fg(3)$

.....
(2)

(b) Solve the equation $fg(x) = f(x)$
Show clear algebraic working.

.....
(3)

The function h is defined as

$$h(x) = \frac{2x - 4}{x}$$

(c) State the value of x that cannot be included in the domain of h

.....
(1)

(d) Express the inverse function h^{-1} in the form $h^{-1}(x) = \dots$

$$h^{-1}(x) = \dots$$

(3)

(Total for Question 17 is 9 marks)

18 Solve the equation

$$\frac{5}{x+2} + \frac{3}{x^2+2x} = 2$$

Show clear algebraic working.

.....
(Total for Question 18 is 5 marks)

- 19 (a) Simplify $8^2 \times \sqrt[3]{4^6}$
 Give your answer in the form 2^a where a is an integer.
 Show each stage of your working clearly.

.....
 (3)

Given that $n^{\left(-\frac{4}{5}\right)} = \left(\frac{1}{2}\right)^4$ where $n > 0$

- (b) find the value of n .

$n =$
 (4)

(Total for Question 19 is 7 marks)

20 A , B and C are points on a circle with centre O .

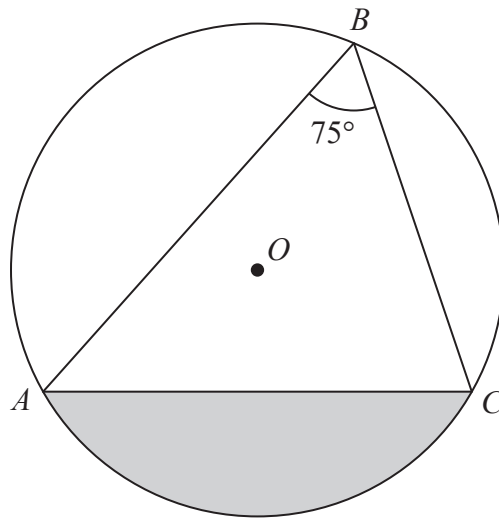


Diagram **NOT**
accurately drawn

Angle $ABC = 75^\circ$

The area of the shaded segment is 200 cm^2

Calculate the radius of the circle.

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 20 is 5 marks)

- 21** A bag contains n beads.
6 of the beads are red and the rest are blue.

Ravi is going to take at random 2 beads from the bag.

The probability that the 2 beads will be of the same colour is $\frac{9}{17}$

Using algebra, and showing each stage of your working, calculate the value of n .

$n = \dots\dots\dots$

(Total for Question 21 is 6 marks)

Turn over for Question 22

- 22 ABC is an isosceles triangle in a horizontal plane.
The point T is vertically above B .

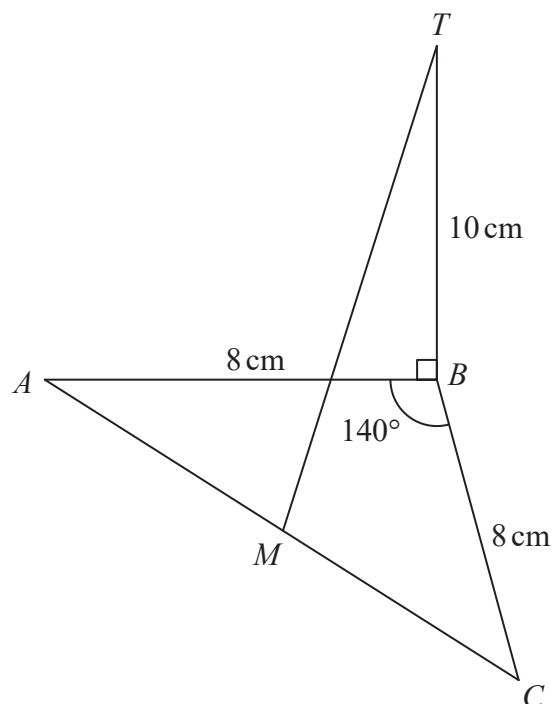


Diagram **NOT**
accurately drawn

Angle $ABC = 140^\circ$

$AB = BC = 8 \text{ cm}$

$TB = 10 \text{ cm}$

M is the midpoint of AC .

Calculate the size of the angle between MT and the horizontal plane ABC .
Give your answer correct to one decimal place.


o

(Total for Question 22 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

Please check the examination details below before entering your candidate information

Candidate surname		Other names	
Pearson Edexcel		Centre Number	Candidate Number
International GCSE		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Time 2 hours	Paper reference	4MA1/2H	
Mathematics A			
PAPER 2H			
Higher Tier			
You must have: Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.		Total Marks	

Instructions

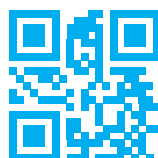
- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more 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.
- Good luck with your examination.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

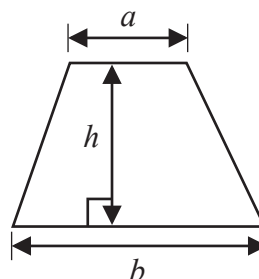
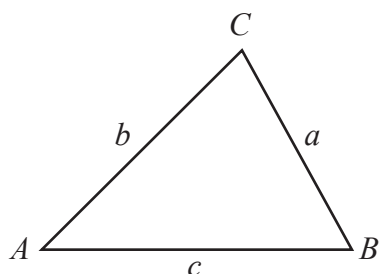
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

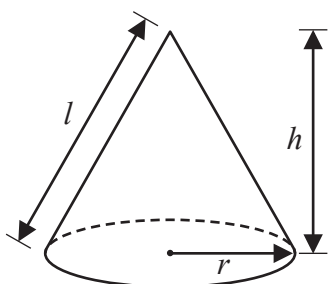
$$\text{Sine Rule} \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

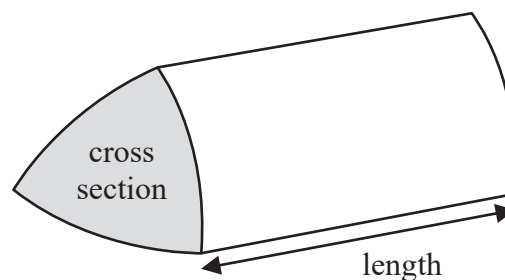
$$\text{Area of triangle} = \frac{1}{2}ab \sin C$$

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

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

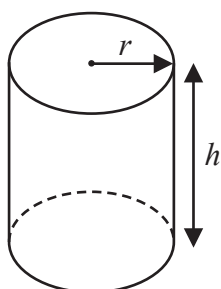
**Volume of prism**

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



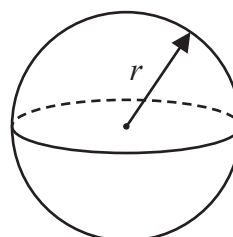
$$\text{Volume of cylinder} = \pi r^2 h$$

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



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

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



Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** Write 600 as a product of powers of its prime factors.
Show your working clearly.

.....
(Total for Question 1 is 3 marks)

2 Show that $2\frac{4}{7} \div 1\frac{1}{8} = 2\frac{2}{7}$

(Total for Question 2 is 3 marks)

- 3 The bearing of Paris from London is 149°
Work out the bearing of London from Paris.

.....
(Total for Question 3 is 2 marks)

4 $\mathcal{E} = \{\text{letters of the alphabet}\}$

$B = \{\text{b, r, a, z, i, l}\}$

$I = \{\text{i, r, e, l, a, n, d}\}$

(a) List the members of the set

(i) $B \cup I$

(ii) $B \cap I'$

(2)

$K = \{\text{k, e, n, y, a}\}$

Cody writes down the statement $B \cap K = \emptyset$

Cody's statement is wrong.

(b) Explain why.

(1)

(Total for Question 4 is 3 marks)

5

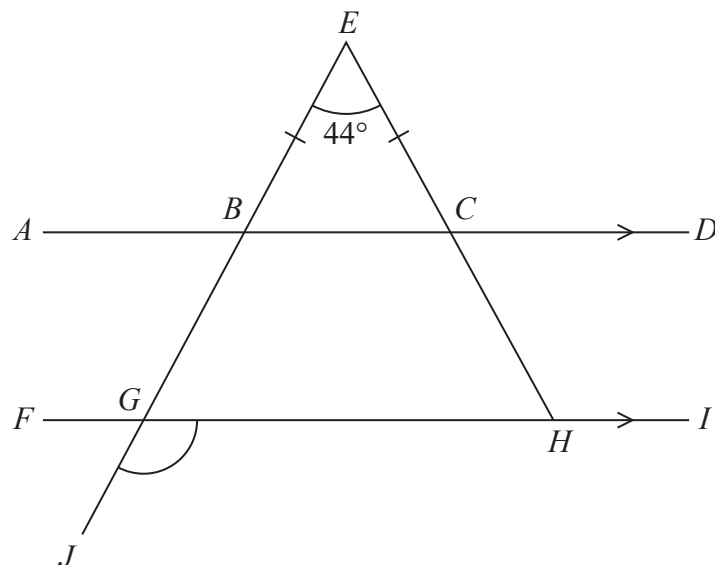


Diagram **NOT**
accurately drawn

$ABCD$ and $FGHI$ are parallel straight lines.
 $EBGJ$ and ECH are straight lines.

$BE = CE$
 Angle $BEC = 44^\circ$

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

o

(Total for Question 5 is 5 marks)

6 Mariana sells bags of bird food.

The bags that Mariana sold last week each contained 12 kg of seeds.

The bags that she is going to sell next week will each contain a mixture of nuts and seeds where for each bag

$$\text{weight of nuts : weight of seeds} = 4 : 5$$

The total weight of the nuts and the seeds in each bag will be 19.35 kg

The weight of seeds in each bag that Mariana sells next week will be less than the weight of seeds in each bag that Mariana sold last week.

Work out this decrease as a percentage of the weight of seeds in each bag that Mariana sold last week.

Give your answer correct to one decimal place.

..... %

(Total for Question 6 is 4 marks)

7 Here is a right-angled triangle.

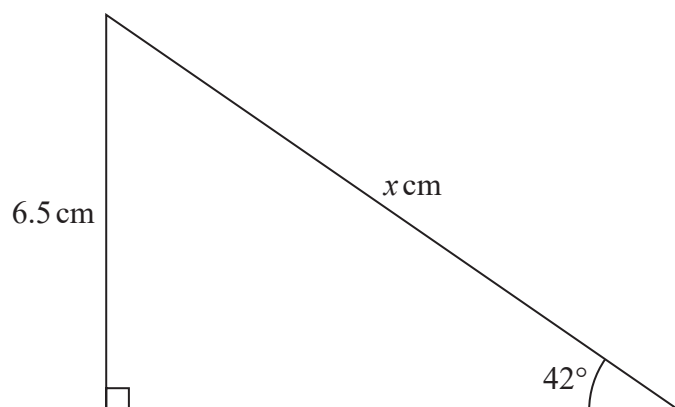


Diagram **NOT**
accurately drawn

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

$x =$

(Total for Question 7 is 3 marks)

8 Solve the simultaneous equations

$$5a + 2c = 10$$

$$2a - 4c = 7$$

Show clear algebraic working.

$$a = \dots\dots\dots$$

$$c = \dots\dots\dots$$

(Total for Question 8 is 3 marks)

9 (i) Factorise $x^2 + 2x - 24$

.....
(2)

(ii) Hence solve $x^2 + 2x - 24 = 0$

.....
(1)

(Total for Question 9 is 3 marks)

10 Here is a triangular prism.

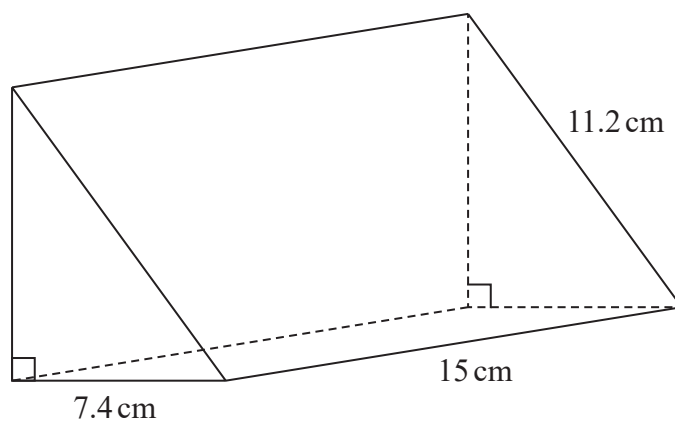


Diagram **NOT**
accurately drawn

Work out the volume of the prism.
Give your answer correct to 3 significant figures.

..... cm^3

(Total for Question 10 is 5 marks)

11 Chengbo sold a house for 180 000 yuan.

The amount for which he sold the house is 24% more than the amount he paid for the house.

- (a) Work out how much Chengbo paid for the house.
Give your answer correct to 3 significant figures.

..... yuan
(3)

Zhi bought a house on 1st January 2017

When she bought the house, its value was 120 000 yuan.

The value of the house increased by 1.8% per year.

- (b) Work out the value of Zhi's house on 1st January 2020
Give your answer correct to 3 significant figures.

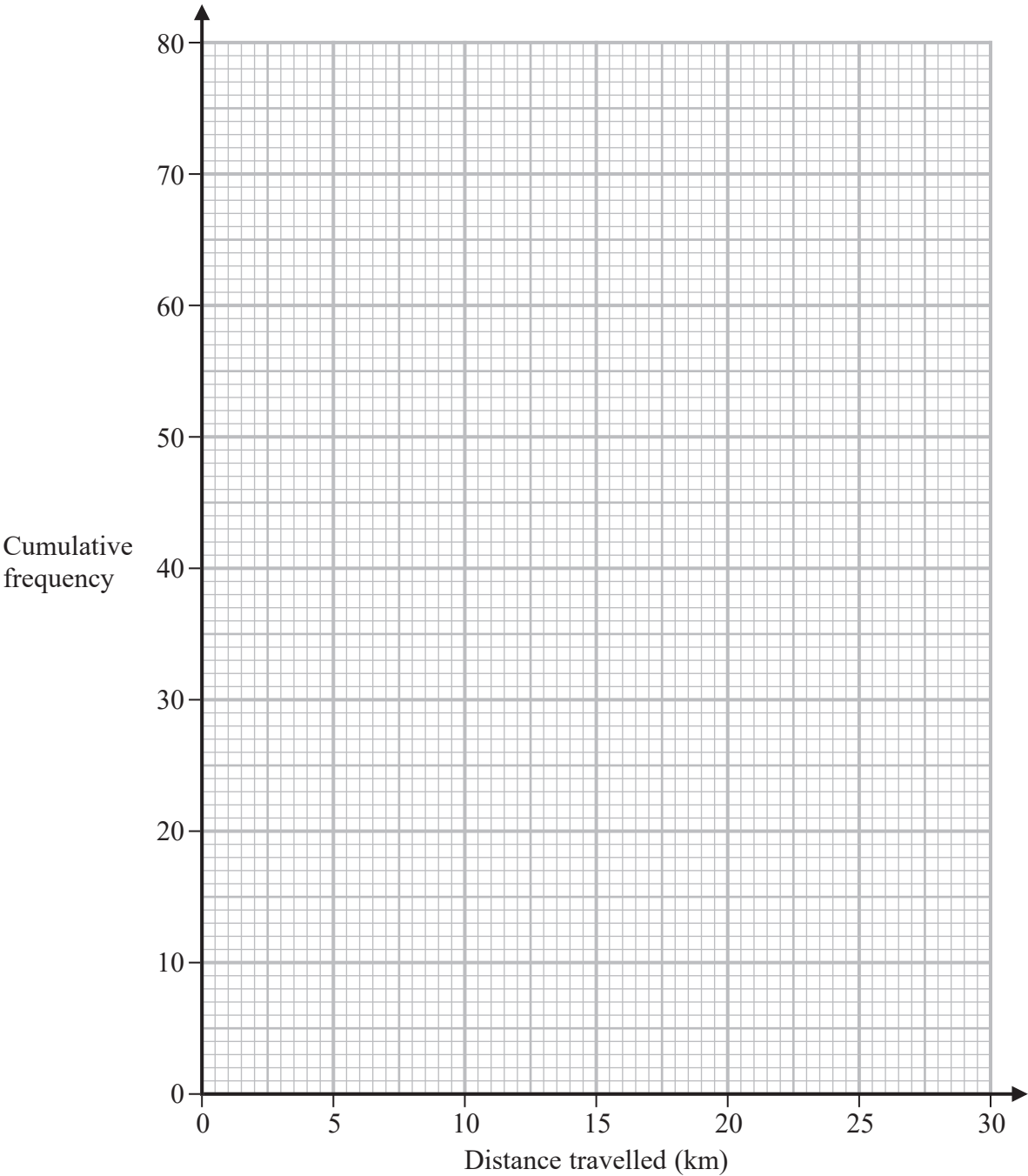
..... yuan
(3)

(Total for Question 11 is 6 marks)

12 The cumulative frequency table gives information about the distance, in kilometres, that each of 80 workers travel from home to work at Office A.

Distance travelled (d km)	Cumulative frequency
$0 < d \leq 5$	17
$0 < d \leq 10$	32
$0 < d \leq 15$	57
$0 < d \leq 20$	70
$0 < d \leq 25$	76
$0 < d \leq 30$	80

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



(2)

(b) Use your graph to find an estimate for the median distance travelled.

..... km
(1)

(c) Use your graph to find an estimate for the interquartile range of the distances travelled.

..... km
(2)

For Office *B*, the median distance workers travel from home to work is 15 km and the interquartile range is 5 km.

(d) Use the information above to compare the distances that workers at Office *A* and workers at Office *B* travel from home to work.
Write down **two** comparisons.

1.....

.....

.....

2.....

.....

.....

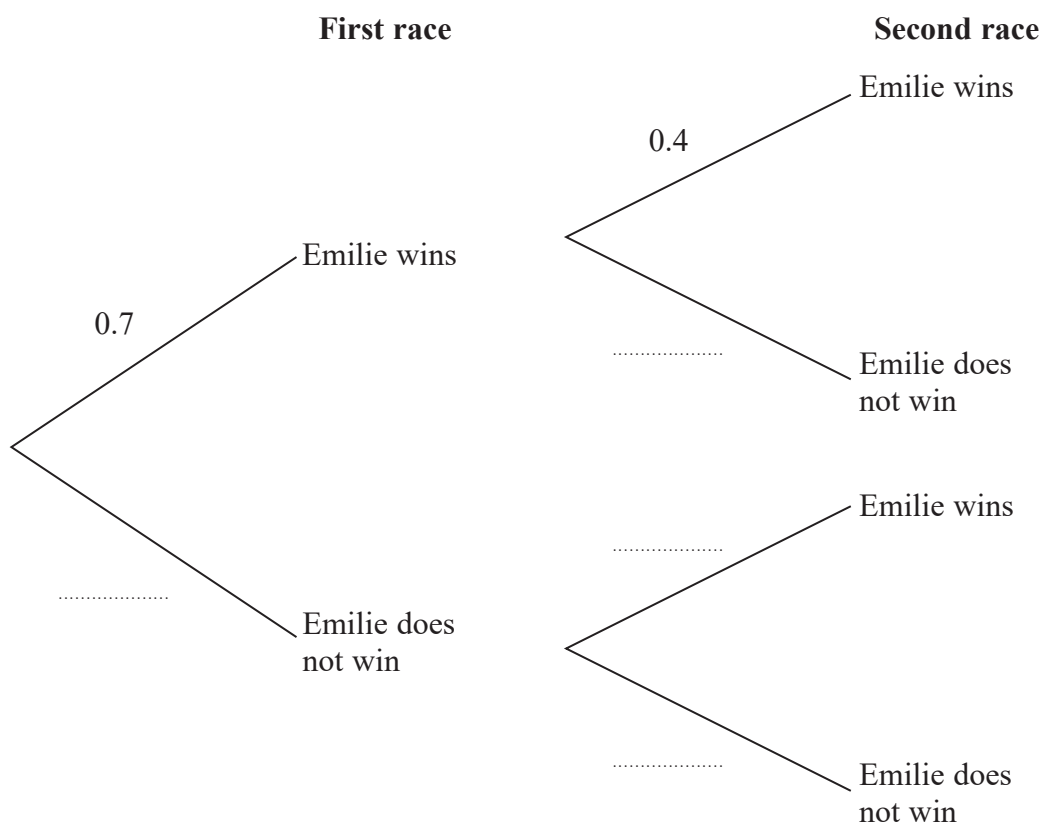
(2)

(Total for Question 12 is 7 marks)

13 Emilie takes part in two races.

The probability that she wins the first race is 0.7
 The probability that she wins the second race is 0.4
 The outcomes of the two races are independent.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Emilie wins exactly one of the two races.

(3)

Emilie is going to take part in a third race.

If she wins both of the first two races, the probability that she will win the third race is 0.6

If she wins exactly one of the first two races, the probability that she will win the third race is 0.3

(c) Work out the probability that Emilie will win exactly two of the three races.

.....
(3)

(Total for Question 13 is 8 marks)

14 Simplify fully $\left(\frac{9x^4}{16y^{10}}\right)^{-\frac{1}{2}}$

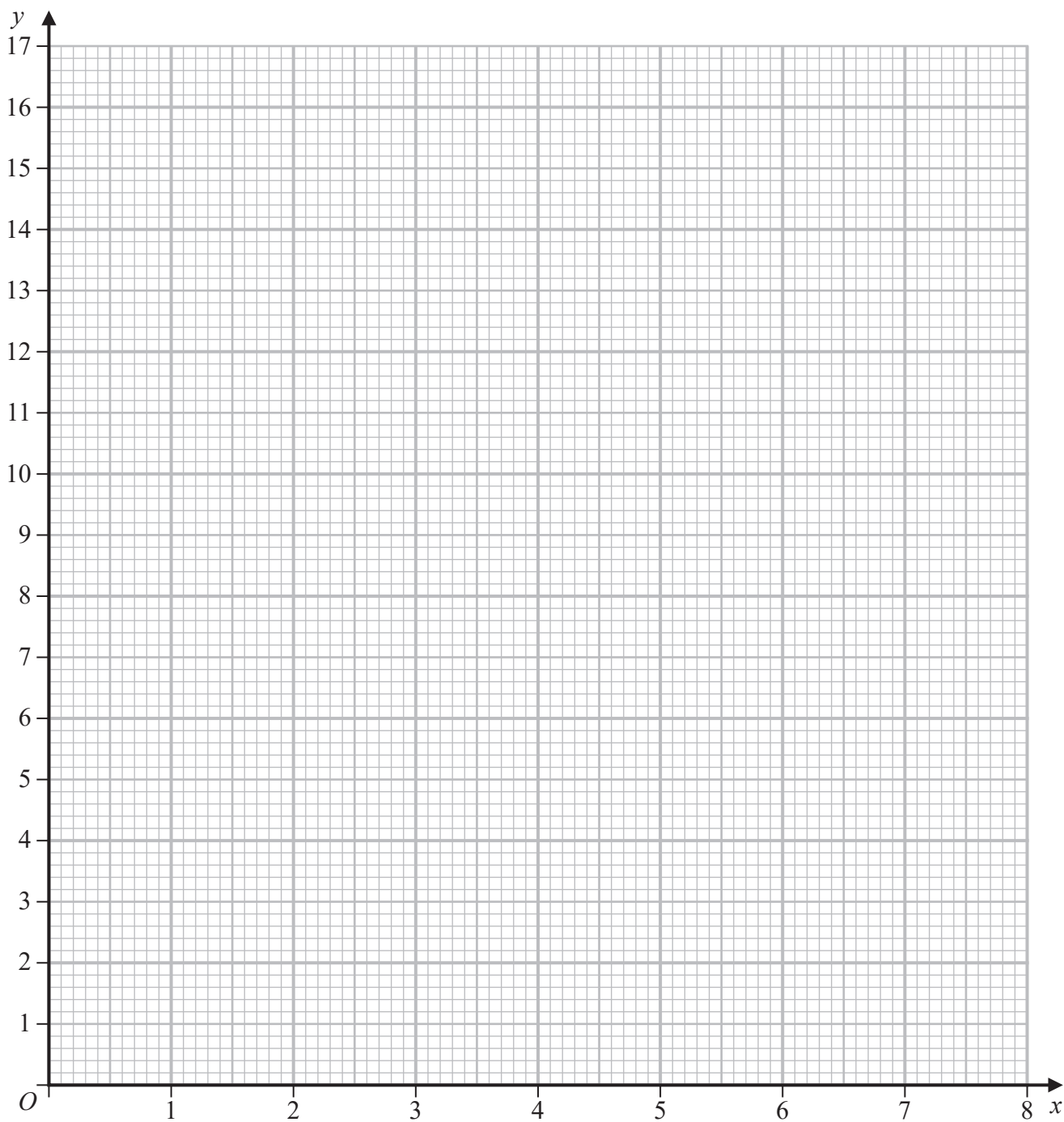
(Total for Question 14 is 3 marks)

15 (a) Complete the table of values for $y = \frac{1}{x}(x^2 + 4)$

x	0.25	0.5	1	2	4	8
y	16.25					8.5

(2)

(b) On the grid, draw the graph of $y = \frac{1}{x}(x^2 + 4)$ for $0.25 \leq x \leq 8$



(2)

(Total for Question 15 is 4 marks)

16 A is inversely proportional to the square of r

$$A = 5 \text{ when } r = 0.3$$

(a) Find a formula for A in terms of r

.....
(3)

(b) Find the value of A when $r = 7.5A$

$$A = \text{.....}$$

(3)

(Total for Question 16 is 6 marks)

17 The straight line **L** passes through the points $(4, -1)$ and $(6, 4)$

The straight line **M** is perpendicular to **L** and intersects the y -axis at the point $(0, 8)$

Find the coordinates of the point where **M** intersects the x -axis.

(..... ,)

(Total for Question 17 is 4 marks)

18

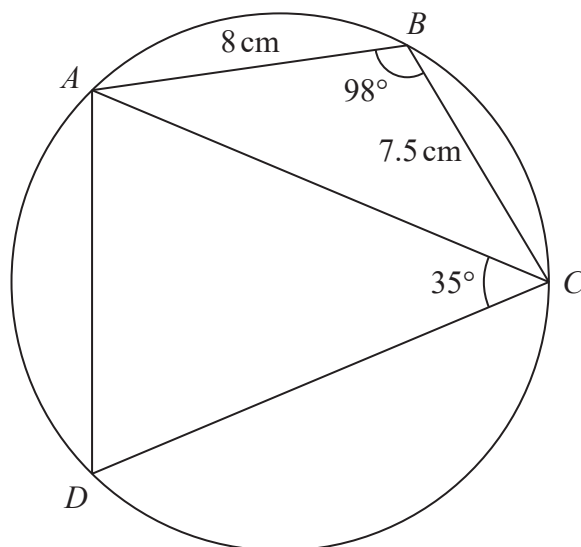


Diagram **NOT**
accurately drawn

$ABCD$ is a quadrilateral where A , B , C and D are points on a circle.

$$AB = 8 \text{ cm}$$

$$BC = 7.5 \text{ cm}$$

$$\text{Angle } ABC = 98^\circ$$

$$\text{Angle } ACD = 35^\circ$$

Work out the perimeter of quadrilateral $ABCD$.

Give your answer correct to one decimal place.

..... cm

(Total for Question 18 is 6 marks)

19 Solve the simultaneous equations

$$\begin{aligned}y &= 3 - 2x \\ x^2 + y^2 &= 18\end{aligned}$$

Show clear algebraic working.

(Total for Question 19 is 5 marks)

20 Mathematically similar wooden blocks are made in a workshop.

There are small blocks and there are large blocks.

The volume of each small block is 300 cm^3

Given that

the surface area of each small block : the surface area of each large block = $25 : 36$

work out the volume of each large block.

..... cm^3

(Total for Question 20 is 3 marks)

- 21** The point A is the only stationary point on the curve with equation $y = kx^2 + \frac{16}{x}$ where k is a constant.

Given that the coordinates of A are $\left(\frac{2}{3}, a\right)$

find the value of a .

Show your working clearly.

$a = \dots\dots\dots$

(Total for Question 21 is 5 marks)

- 22** The curve **S** has equation $y = f(x)$ where $f(x) = x^2$
The curve **T** has equation $y = g(x)$ where $g(x) = 2x^2 - 12x + 13$

By writing $g(x)$ in the form $a(x - b)^2 - c$, where a , b and c are constants,
describe fully a series of transformations that map the curve **S** onto the curve **T**.

.....

.....

.....

(Total for Question 22 is 4 marks)

23 Pippa has a box containing N pens.

There are only black pens and red pens in the box.

The number of black pens in the box is 3 more than the number of red pens.

Pippa is going to take at random 2 pens from the box.

The probability that she will take a black pen **followed** by a red pen is $\frac{9}{35}$

Find the possible values of N .


Show clear algebraic working.

.....
(Total for Question 23 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

Please check the examination details below before entering your candidate information

Candidate surname					Other names						
Pearson Edexcel		Centre Number					Candidate Number				
		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>					<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>				
International GCSE											
Time 2 hours		Paper reference		4MA1/2H							
Mathematics A PAPER 2H Higher Tier											
											
You must have: Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.										Total Marks <input type="text"/>	

Instructions

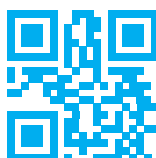
- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more 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.
- Good luck with your examination.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

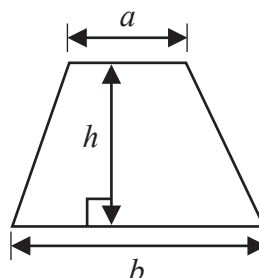
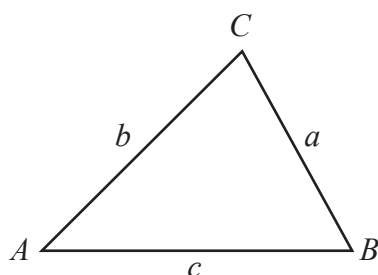
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

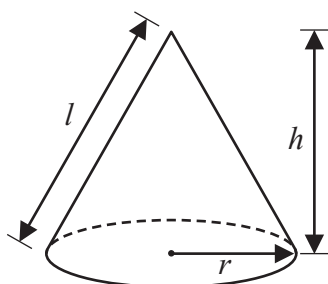
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

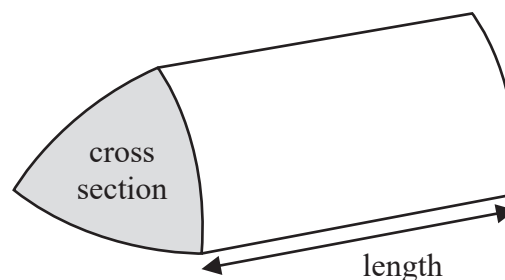
Area of triangle $= \frac{1}{2}ab \sin C$

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

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

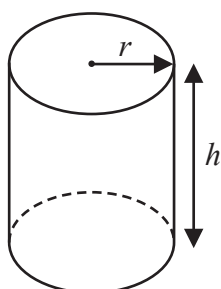
**Volume of prism**

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



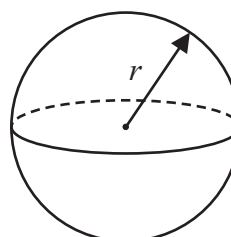
Volume of cylinder $= \pi r^2 h$

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



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

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



Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** (a) Write down the value of m , given that $3^4 \times 3^5 = 3^m$

$m = \dots\dots\dots$
(1)

- (b) Write down the value of n , given that $(5^3)^7 = 5^n$

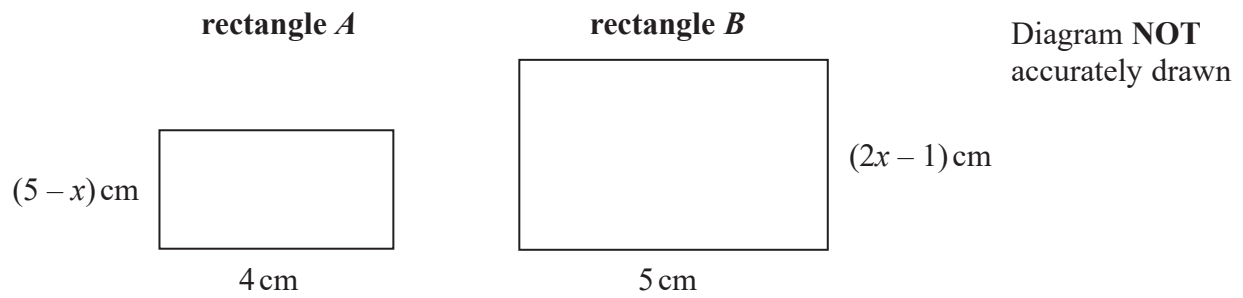
$n = \dots\dots\dots$
(1)

- (c) Find the value of p , given that $\frac{7^8 \times 7^2}{7^p} = 7^6$

$p = \dots\dots\dots$
(2)

(Total for Question 1 is 4 marks)

- 2 Here are two rectangles, rectangle A and rectangle B .



The area of rectangle B is twice the area of rectangle A .

Work out the value of x .

Show your working clearly.

$$x = \dots\dots\dots$$

(Total for Question 2 is 4 marks)

- 3 The table gives information about the amounts of money, in euros, that 70 of Anjali's friends spent last Saturday.

Money spent (S euros)	Frequency
$0 < S \leq 8$	6
$8 < S \leq 16$	14
$16 < S \leq 24$	19
$24 < S \leq 32$	25
$32 < S \leq 40$	6

One of Anjali's 70 friends is going to be chosen at random.

- (a) Find the probability that this friend spent more than 24 euros last Saturday.

.....
(1)

- (b) Work out an estimate for the mean amount of money spent by Anjali's friends last Saturday.
Give your answer correct to 2 decimal places.

..... euros
(4)

(Total for Question 3 is 5 marks)

4 ABC and DEF are similar triangles.

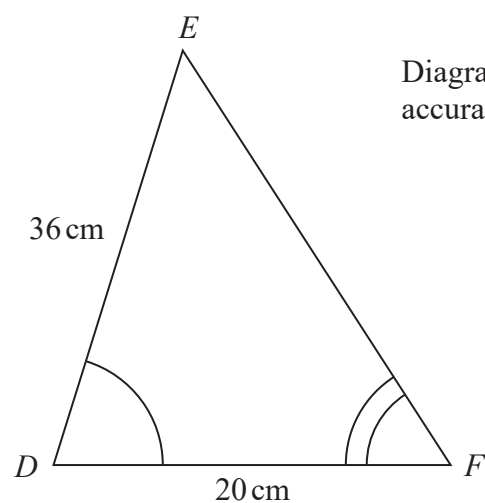
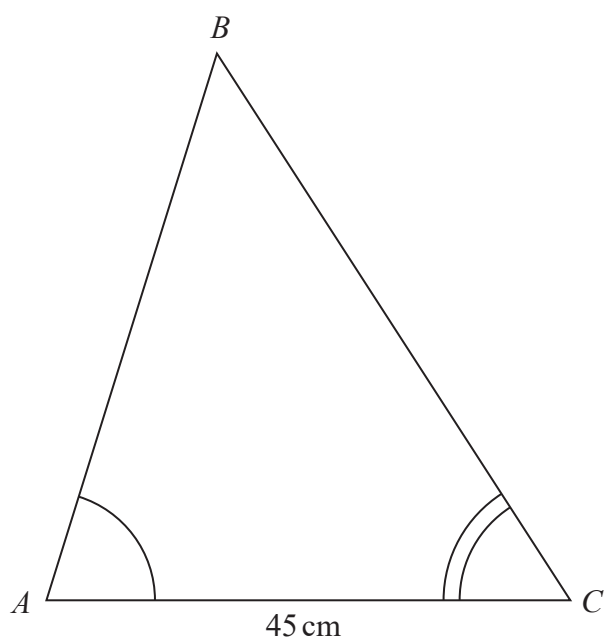


Diagram **NOT**
accurately drawn

(a) Work out the length of AB .

..... cm
(2)

Given that $BC = 54\text{ cm}$,

(b) work out the length of EF .

..... cm
(2)

(Total for Question 4 is 4 marks)

- 5 The diagram shows a regular octagon $ABCDHIJK$ and a pentagon $DEFGH$.

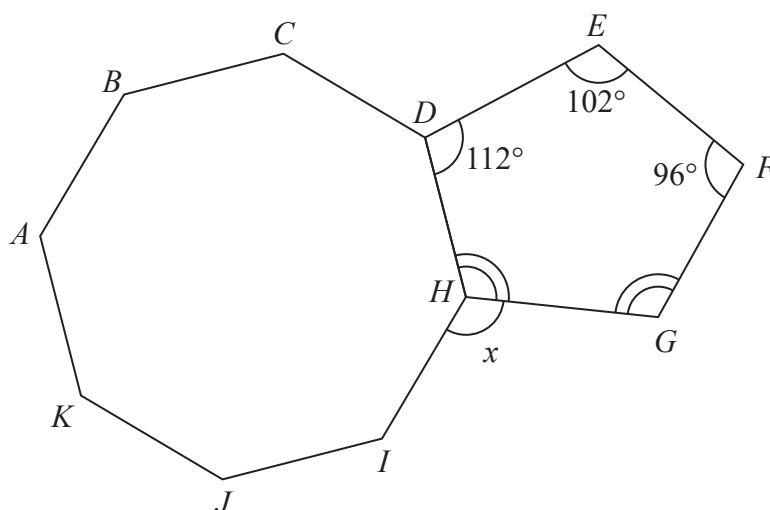


Diagram **NOT**
accurately drawn

Angle $GHD = \text{angle } FGH$.

Work out the size of the angle marked x .
Show your working clearly.

(Total for Question 5 is 5 marks)

- 6 Victor buys 12 bottles of apple juice for a total cost of \$21
Victor sells all 12 bottles at \$2.45 each bottle.

Work out Victor's percentage profit.

.....%

(Total for Question 6 is 3 marks)

7 Ali and Badia each have 25 000 dollars to invest.

Cyclone Bank	Tornado Bank
Invest 25 000 dollars 4.5% compound interest per year for 3 years	Invest 25 000 dollars Receive 1150 dollars interest each year for 3 years

Ali invests in the Cyclone Bank for 3 years.

Badia invests in the Tornado Bank for 3 years.

By the end of the 3 years, Ali will have received more interest than Badia.

How much more?

Show your working clearly.

Give your answer correct to the nearest dollar.

..... dollars

(Total for Question 7 is 4 marks)

8 (a) Simplify $(3x^2y)^0$

.....
(1)

(b) (i) Factorise $x^2 - 5x - 36$

.....
(2)

(ii) Hence solve $x^2 - 5x - 36 = 0$

.....
(1)

(Total for Question 8 is 4 marks)

- 9 A rainwater tank contains 2.4×10^7 raindrops.
The rainwater tank also contains 1.75×10^6 bacteria.
- (a) Work out the number of bacteria per raindrop in the tank.
Give your answer in standard form correct to 2 significant figures.

.....
(3)

A drop of rainwater contains 5.01×10^{21} atoms.

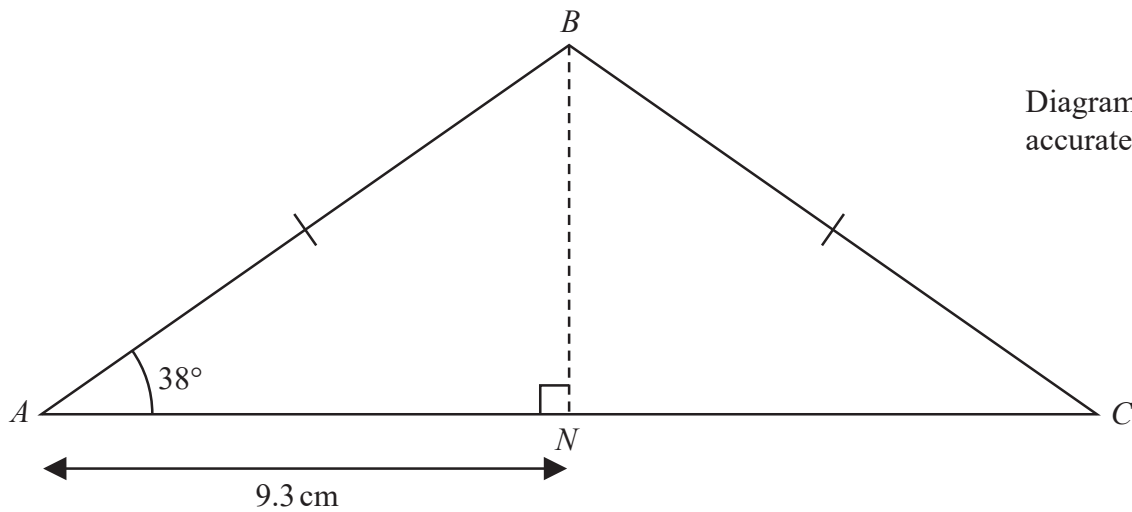
In a drop of rainwater the number of atoms is 3 times the number of molecules.

- (b) Work out the number of molecules in the rainwater tank.
Give your answer in standard form correct to one significant figure.

..... molecules
(2)

(Total for Question 9 is 5 marks)

10 ABC is an isosceles triangle with $BA = BC$.



N is the point on AC such that $AN = 9.3$ cm and BN is perpendicular to AC .

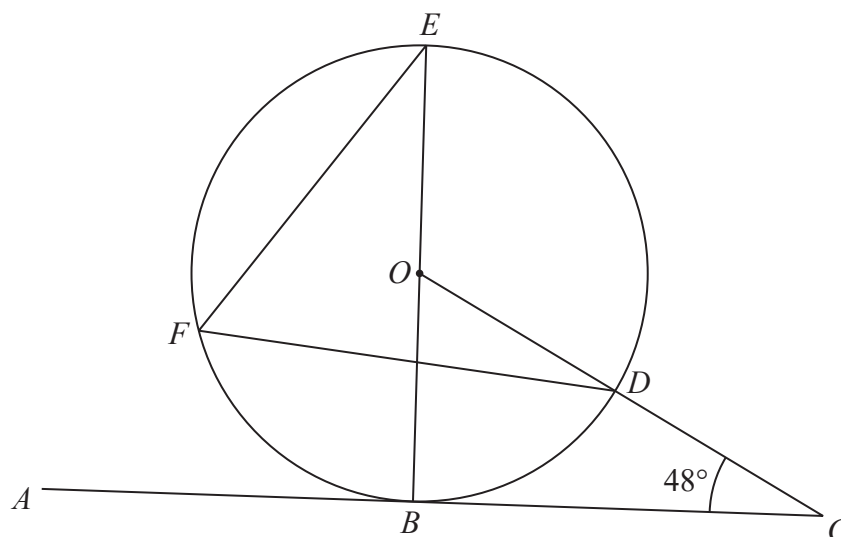
Work out the perimeter of triangle ABC .

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 10 is 4 marks)

11

Diagram **NOT**
accurately drawn

B, D, E and F are points on a circle, centre O .

ABC is a tangent to the circle.

ODC is a straight line.

BOE is a diameter of the circle.

Angle $BCD = 48^\circ$

Find the size of angle DFE .

(Total for Question 11 is 3 marks)

12 (a) Simplify $(64p^9q^{12})^{\frac{2}{3}}$

(2)

(b) Write as a single fraction $\frac{2}{3x} + \frac{4}{5x} - \frac{9}{10x}$

Give your answer in its simplest form.

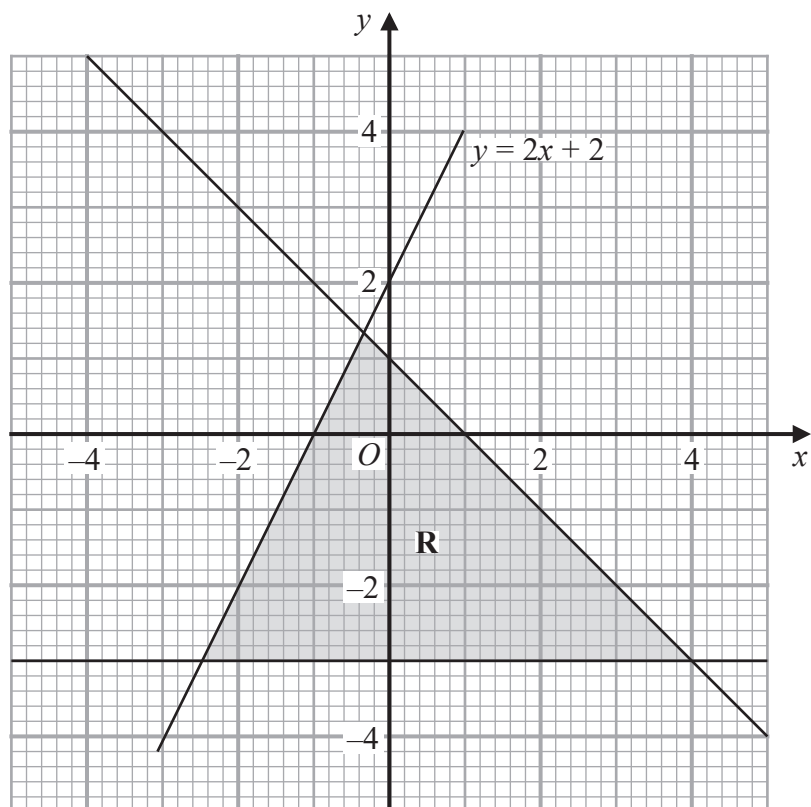
(2)

- (c) Expand and simplify $4x(x - 5)(2x + 3)$
Show your working clearly.

.....
(3)

(Total for Question 12 is 7 marks)

13



The region **R**, shown shaded in the diagram, is bounded by three straight lines.

Write down the three inequalities that define **R**.

.....

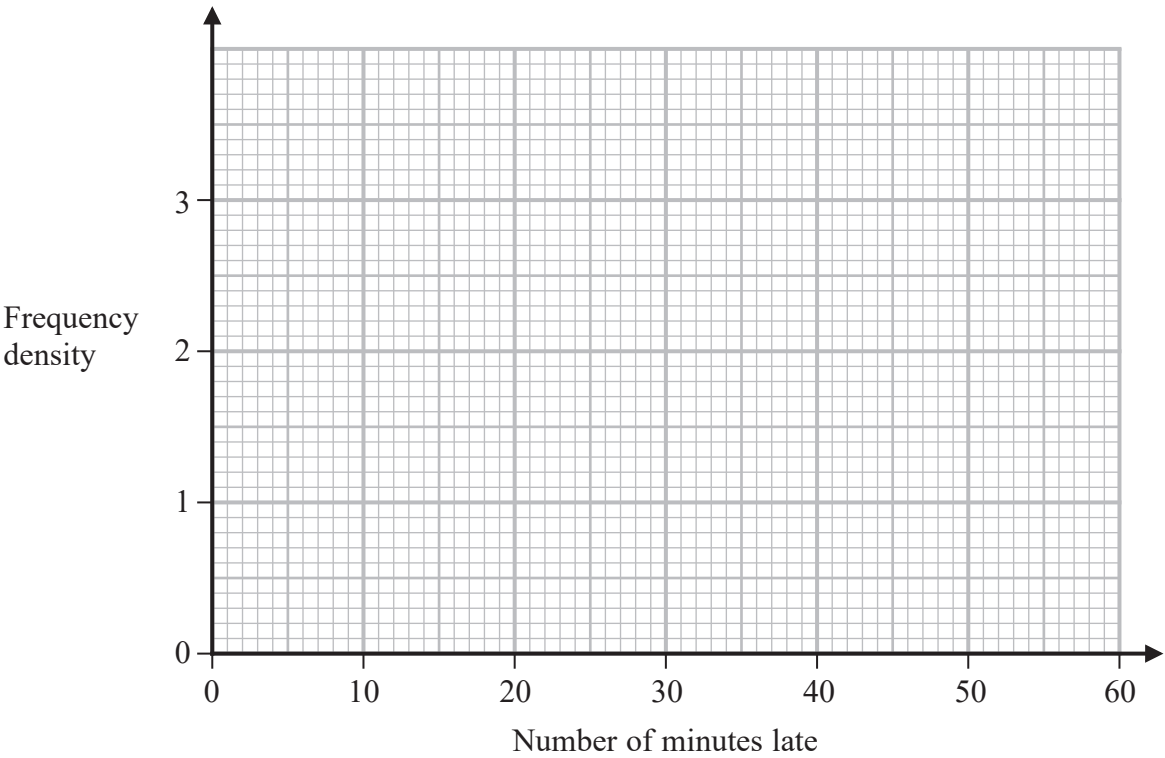
(Total for Question 13 is 3 marks)

14 Manuel collected information about the flights that arrived late at an airport last month.

The table gives information about the number of minutes that these flights were late.

Minutes late (L minutes)	Frequency
$0 < L \leq 10$	8
$10 < L \leq 15$	13
$15 < L \leq 25$	19
$25 < L \leq 40$	24
$40 < L \leq 60$	6

(a) On the grid, draw a histogram for this information.



(3)

Manuel selected at random a flight that was late by 25 minutes or less from his results.

(b) Work out an estimate for the probability that this flight was late by 5 minutes or less.

(2)

(Total for Question 14 is 5 marks)

15 The functions f and g are such that

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

$$g(x) = \frac{x}{3x + 1}$$

(a) State the value of x that cannot be included in any domain of g

.....
(1)

(b) Find $gf(x)$
Simplify your answer.

$gf(x) =$
(2)

(c) Express the inverse function g^{-1} in the form $g^{-1}(x) = \dots$

$g^{-1}(x) =$
(3)

(Total for Question 15 is 6 marks)

16 A box contains 15 counters.

There are 4 red counters, 5 green counters and the rest are yellow counters.

Niklas takes at random a counter from the box and writes down the colour of his counter.
He then puts the counter back into the box.

Sasha then takes at random a counter from the box and writes down the colour of her counter.

Work out the probability that the counters taken by Niklas and Sasha both have the same colour.

.....
(Total for Question 16 is 3 marks)

17 Express $\frac{8}{\sqrt{5}-1}$ in the form $\sqrt{a} + b$ where a and b are integers.

Show each stage of your working clearly.

.....
(Total for Question 17 is 3 marks)

18 Here is a quadrilateral $ABCD$.

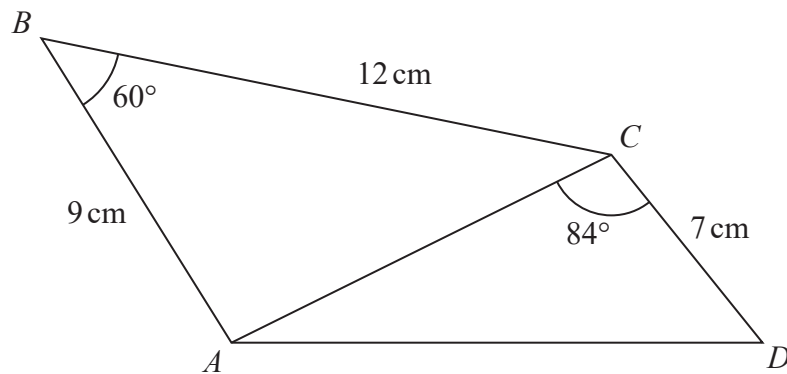


Diagram **NOT**
accurately drawn

Calculate the area of quadrilateral $ABCD$.
Give your answer correct to 3 significant figures.
Show your working clearly.

..... cm^2

(Total for Question 18 is 5 marks)

- 19** The straight line **L** has equation $x - y = 3$
The curve **C** has equation $3x^2 - y^2 + xy = 9$

L and **C** intersect at the points *P* and *Q*.

Find the coordinates of the midpoint of *PQ*.
Show clear algebraic working.

(..... ,)

(Total for Question 19 is 6 marks)

20 Here are the first four terms of an arithmetic series.

$$k \quad \frac{3k}{4} \quad \frac{k}{2} \quad \frac{k}{4}$$

Given that the 15th term of the series is $(90 + 2k)$,

calculate the sum of the first 30 terms of the series.

.....
(Total for Question 20 is 5 marks)

- 21** The curve **C** has equation $y = f(x)$ where $f(x) = 9 - 3(x + 2)^2$
The point **A** is the maximum point on **C**.

(a) Write down the coordinates of **A**.

(..... ,)
(1)

The curve **C** is transformed to the curve **S** by a translation of $\begin{pmatrix} 4 \\ 0 \end{pmatrix}$

(b) Find an equation for the curve **S**.

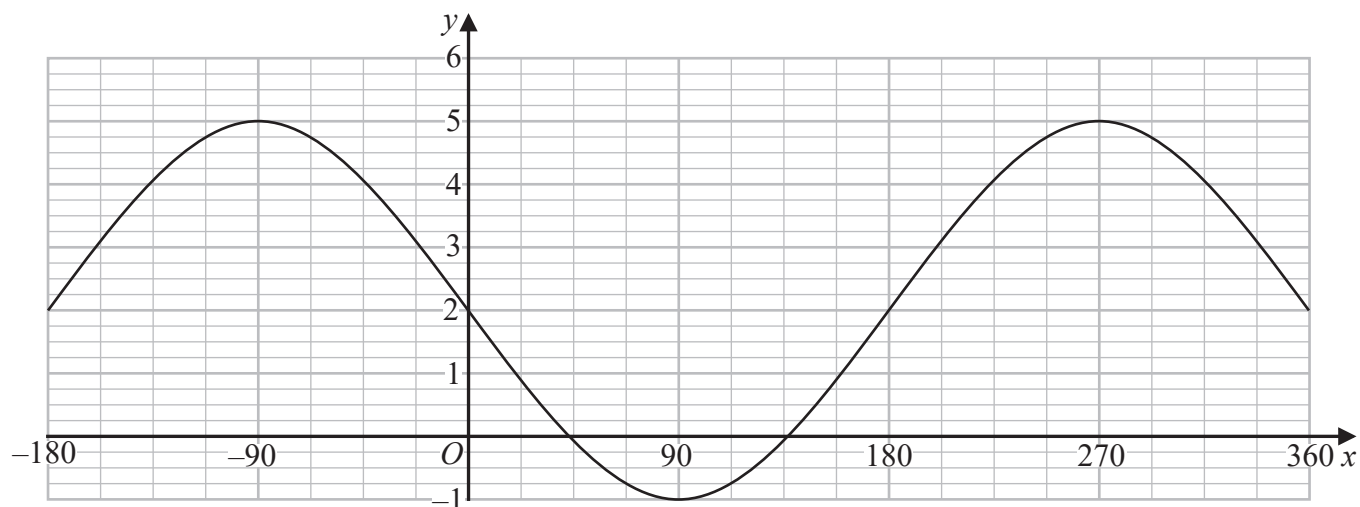
.....
(1)

The curve **C** is transformed to the curve **T**.
The curve **T** has equation $y = 3(x + 2)^2 - 9$

(c) Describe fully the transformation that maps curve **C** onto curve **T**.

.....
(1)

The graph of $y = a \cos (x - b)^\circ + c$ for $-180 \leq x \leq 360$ is drawn on the grid below.



(d) Find the value of a , the value of b and the value of c .

$a =$

$b =$

$c =$

(3)

(Total for Question 21 is 6 marks)

- 22 The diagram shows a sphere of diameter x cm and a pyramid $ABCDE$ with a horizontal rectangular base $BCDE$.

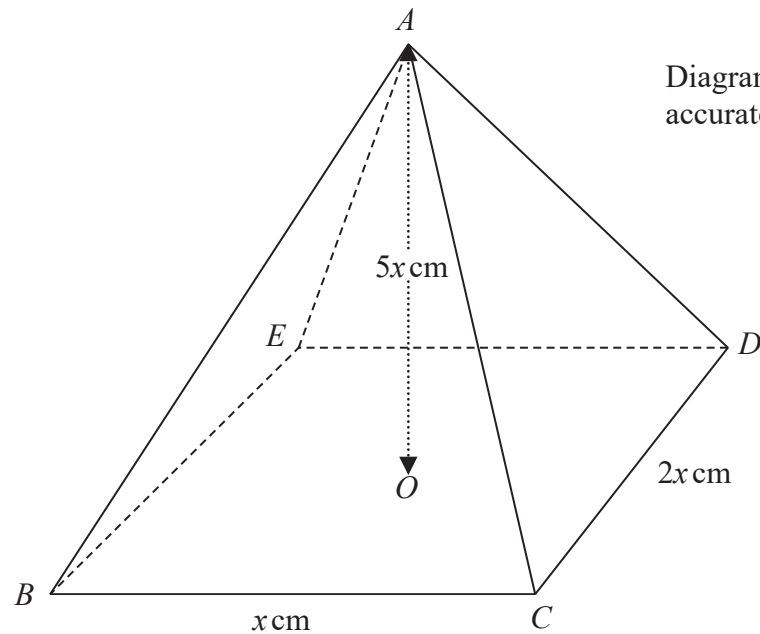
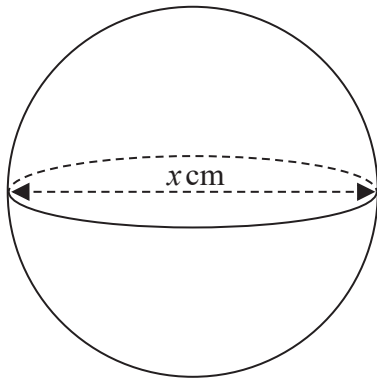


Diagram **NOT** accurately drawn

The vertex A of the pyramid is vertically above the centre O of the base so that $AB = AC = AD = AE$.

$BC = x$ cm, $CD = 2x$ cm and $AO = 5x$ cm.

The volume of the sphere is 288π cm³

Calculate the total surface area of the pyramid.
Give your answer correct to the nearest cm²

..... cm²

(Total for Question 22 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

Please check the examination details below before entering your candidate information


Candidate surname					Other names				
Centre Number					Candidate Number				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

Pearson Edexcel International GCSE

Time 2 hours

Paper reference **4MA1/2H**

Mathematics A
PAPER 2H
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

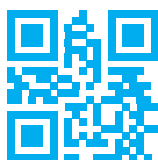
- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more 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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

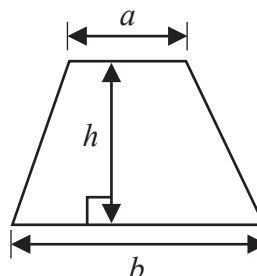
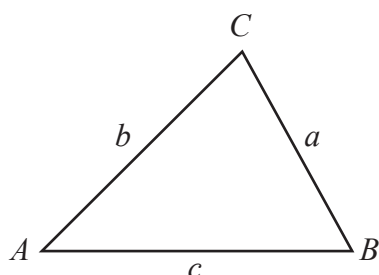
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry**

In any triangle ABC

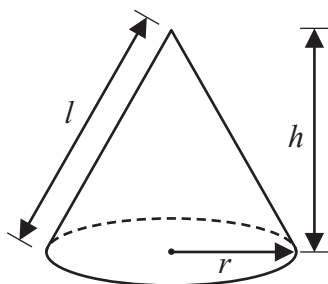
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

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

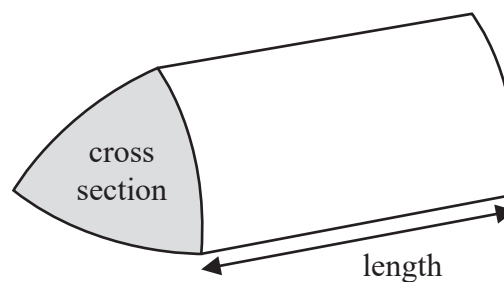
Volume of cone $= \frac{1}{3}\pi r^2 h$

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



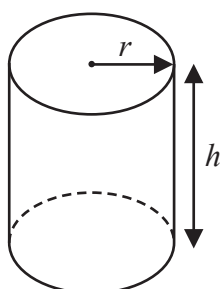
Volume of prism

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



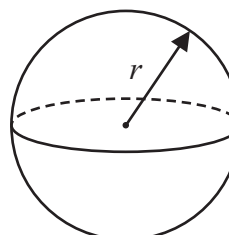
Volume of cylinder $= \pi r^2 h$

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



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

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



Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Expand and simplify $(y + 4)(2 - y)$

.....
(2)

(b) Factorise fully $15b^5c - 35b^3c^9$

.....
(2)

(Total for Question 1 is 4 marks)

2 Show that $6\frac{3}{4} \div 2\frac{4}{7} = 2\frac{5}{8}$

(Total for Question 2 is 3 marks)

3

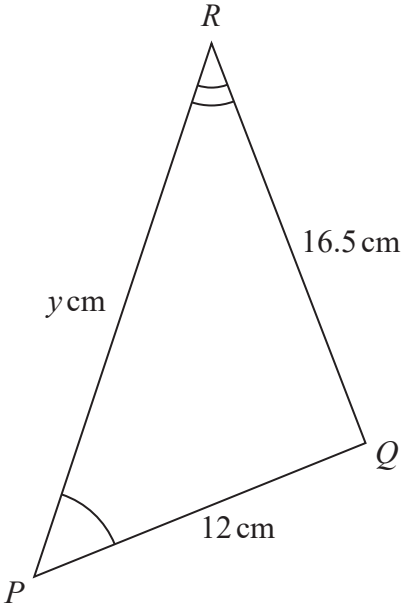
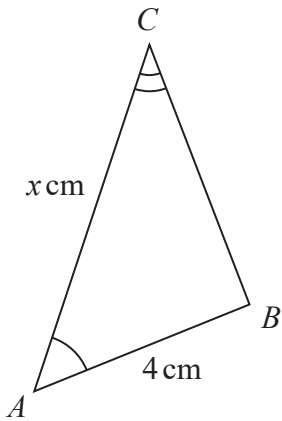


Diagram **NOT**
accurately drawn

Triangle ABC is similar to triangle PQR

$AB = 4\text{ cm}$ $PQ = 12\text{ cm}$ $RQ = 16.5\text{ cm}$ $AC = x\text{ cm}$ $PR = y\text{ cm}$

(a) Calculate the length of BC

..... cm
(2)

(b) Write down an expression for y in terms of x

$y =$
(1)

(Total for Question 3 is 3 marks)

4 Each side of a regular octagon has a length of 18 mm, correct to the nearest 0.5 mm

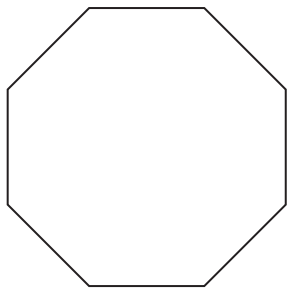


Diagram **NOT**
accurately drawn

(a) Write down the lower bound of the length of each side of the octagon.

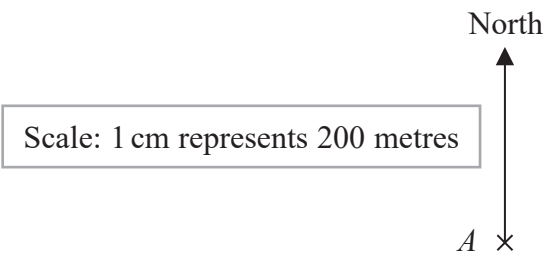
..... mm
(1)

(b) Write down the upper bound of the length of each side of the octagon.

..... mm
(1)

(Total for Question 4 is 2 marks)

5 The scale diagram shows the position on a map of a house, *A*



House *C* is on a bearing of 110° from *A*
The distance from *A* to *C* is 700 m

- (a) Mark the position of *C* on the diagram with a cross (×)
Label your cross *C*

(3)

- (b) Write the scale of the map in the form $1:n$

1 :
(1)

(Total for Question 5 is 4 marks)

6 A bag contains only pink sweets, white sweets, green sweets and red sweets.

The table gives each of the probabilities that, when a sweet is taken at random from the bag, the sweet will be green or the sweet will be red.

Sweet	pink	white	green	red
Probability			0.2	0.35

The ratio
number of pink sweets : number of white sweets = 2 : 1

There are 28 red sweets in the bag.

Work out the number of white sweets in the bag.

(Total for Question 6 is 5 marks)

- 7 Find the lowest common multiple (LCM) of 28, 42 and 63
Show your working clearly.

.....

(Total for Question 7 is 3 marks)

8 The table gives information about the average house price in England in 2018 and in 2019

Year	2017	2018	2019
Average house price (£)		228 314	231 776

- (a) Work out the percentage increase in the average house price from 2018 to 2019
Give your answer correct to one decimal place.

..... %
(2)

The average house price in 2019 was 7.7% greater than the average house price in 2017

- (b) Work out the average house price in 2017
Give your answer correct to 3 significant figures.

£
(3)

(Total for Question 8 is 5 marks)

9 The frequency table gives information about the number of points scored by a player.

Number of points	Frequency
0	13
1	17
2	8
3	x
4	11

The mean number of points scored is 2

Work out the value of x

$x = \dots\dots\dots$

(Total for Question 9 is 4 marks)

10 Solve the simultaneous equations

$$3x + 5y = 3.1$$

$$6x + 3y = 3.75$$

Show clear algebraic working.

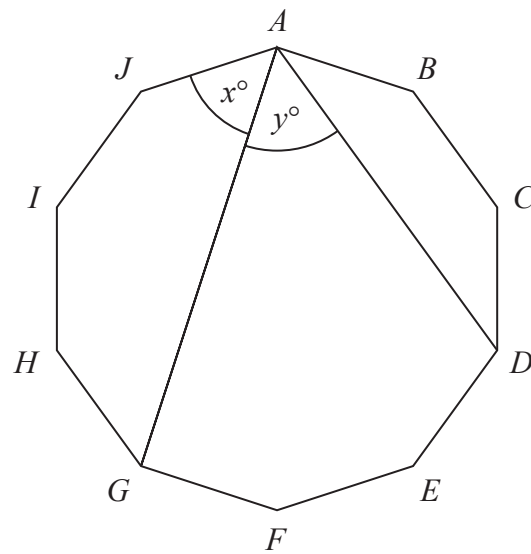
$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question 10 is 3 marks)

11 The diagram shows a regular 10-sided polygon, $ABCDEFGHIJ$

Diagram **NOT**
accurately drawn



Show that $x = y$

(Total for Question 11 is 4 marks)

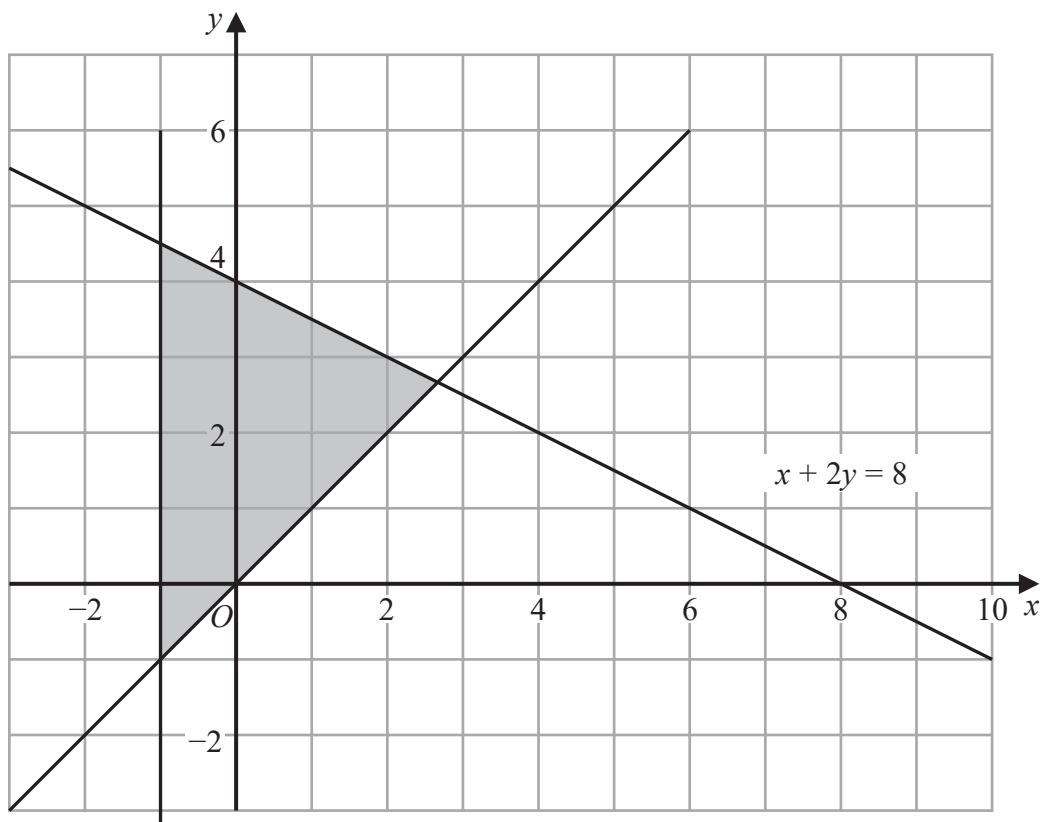
12 $a = 6 \times 10^{40}$

Work out the value of a^3

Give your answer in standard form.

(Total for Question 12 is 3 marks)

- 13 The shaded region in the diagram is bounded by three lines.
The equation of one of the lines is given.

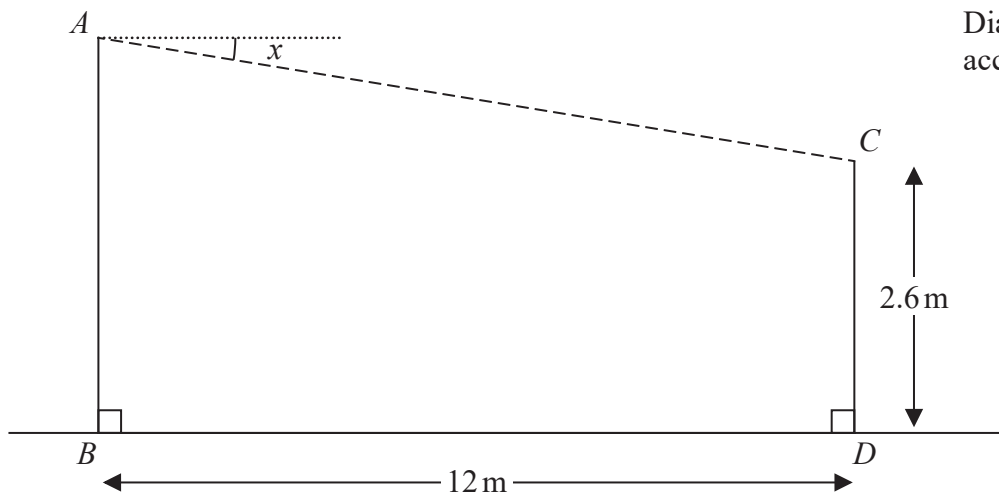


Write down three inequalities that define the shaded region.

.....

(Total for Question 13 is 3 marks)

- 14 A zip wire is shown as the dashed line AC in the diagram.



The zip wire is supported by two vertical posts AB and CD standing on horizontal ground.

$$CD = 2.6 \text{ m} \quad BD = 12 \text{ m}$$

The zip wire makes an angle x with the horizontal, as shown in the diagram.
The design of the zip wire requires the angle x to be at least 5°

Work out the least possible height of the post AB
Give your answer correct to 3 significant figures.

..... m

(Total for Question 14 is 3 marks)

15 Diyar recorded the distance, in kilometres, that he cycled each day for 11 days.
Here are his results.

8 10 12 13 5 23 21 7 5 16 14

Find the interquartile range of his results.

..... km

(Total for Question 15 is 3 marks)

16 D, E, F and G are points on a circle, centre O

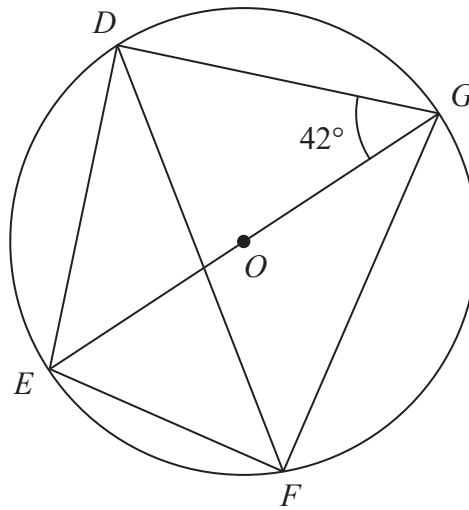


Diagram **NOT**
accurately drawn

EOG is a diameter of the circle.

Angle $EGD = 42^\circ$

Calculate the size of angle DFG

Give a reason for each stage of your working.

Angle $DFG = \dots\dots\dots^\circ$

(Total for Question 16 is 4 marks)

17 Show that $\frac{\sqrt{12}}{\sqrt{3} + 2}$

can be written in the form $a + \sqrt{b}$ where a and b are integers.

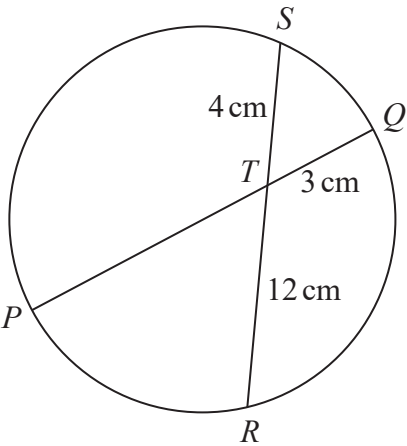
(Total for Question 17 is 3 marks)

- 18** Prove that when the sum of the squares of any two consecutive odd numbers is divided by 8, the remainder is always 2
Show clear algebraic working.

(Total for Question 18 is 3 marks)

19

Diagram **NOT** accurately drawn



PTQ is a diameter of a circle.
 RTS is a chord of the circle.

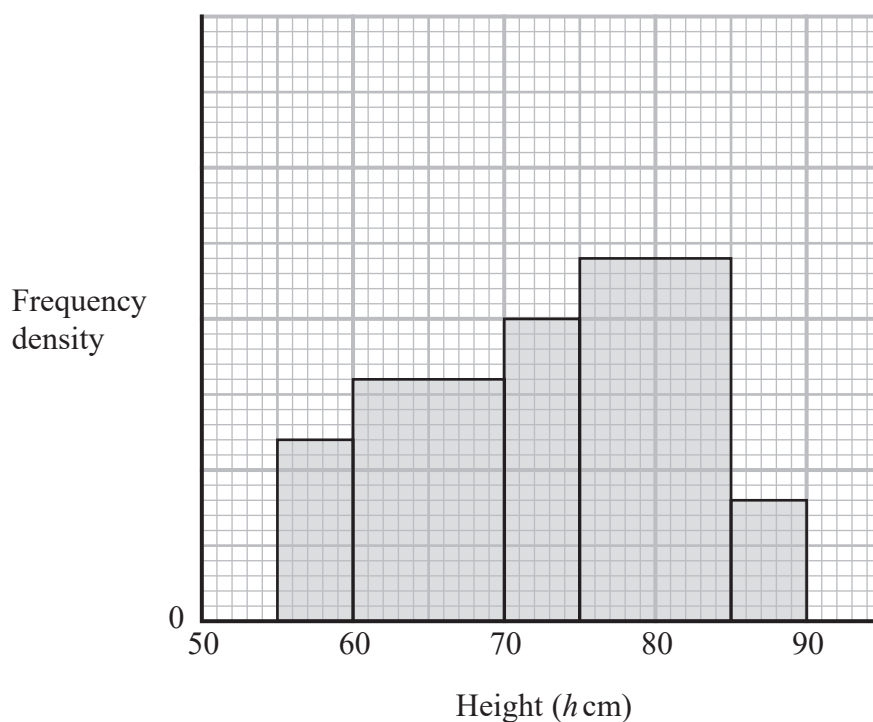
$TQ = 3\text{ cm}$ $ST = 4\text{ cm}$ $TR = 12\text{ cm}$

Calculate the radius of the circle.

..... cm

(Total for Question 19 is 3 marks)

20 The histogram gives information about the heights, h cm, of some tomato plants.



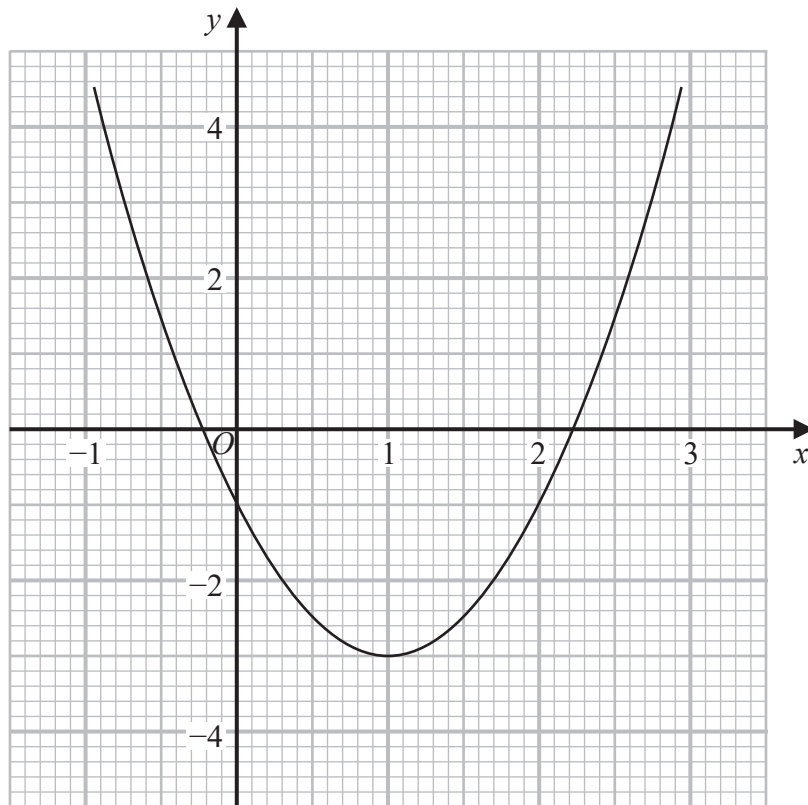
There are 12 tomato plants for which $75 < h \leq 85$

One of the tomato plants is selected at random.

Find an estimate for the probability that this tomato plant has a height greater than 82.5 cm

(Total for Question 20 is 4 marks)

21 Part of the graph of $y = 2x^2 - 4x - 1$ is shown on the grid.



- (a) Use the graph to find estimates for the solutions of the equation $2x^2 - 4x - 1 = 0$
Give your solutions correct to one decimal place.

.....
(2)

- (b) By drawing a suitable straight line on the grid, find estimates for the solutions of the equation $x^2 - x - 1 = 0$
Show your working clearly.
Give your solutions correct to one decimal place.

.....
(3)

(Total for Question 21 is 5 marks)

22 Here is a rectangle.

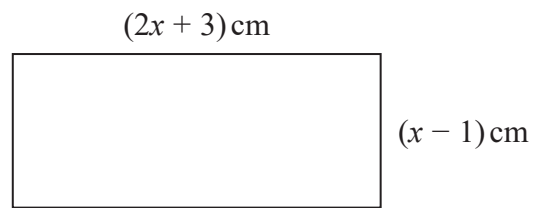


Diagram **NOT**
accurately drawn

Given that the area of the rectangle is less than 75 cm^2

find the range of possible values of x

.....
(Total for Question 22 is 5 marks)

23 The diagram shows triangle PQR

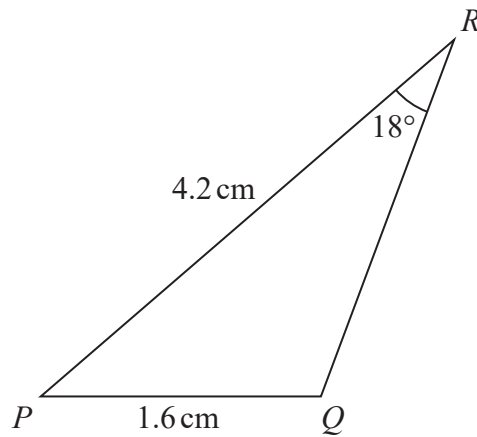


Diagram **NOT**
accurately drawn

$$PQ = 1.6 \text{ cm}$$

$$PR = 4.2 \text{ cm}$$

$$\text{Angle } PRQ = 18^\circ$$

Given that angle PQR is obtuse,

work out the area of triangle PQR

Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 23 is 6 marks)

24 A particle P moves along a straight line that passes through the fixed point O

The displacement, x metres, of P from O at time t seconds, where $t \geq 0$, is given by

$$x = 4t^3 - 27t + 8$$

The direction of motion of P reverses when P is at the point A on the line.

The acceleration of P at the instant when P is at A is $a \text{ m/s}^2$

Find the value of a

$$a = \dots\dots\dots$$

(Total for Question 24 is 5 marks)

25 The function g is defined as

$$g:x \mapsto 5 + 6x - x^2 \quad \text{with domain } \{x:x \geq 3\}$$

(a) Express the inverse function g^{-1} in the form $g^{-1}:x \mapsto \dots$

$$g^{-1}:x \mapsto \dots \quad (4)$$

(b) State the domain of g^{-1}

$$\dots \quad (1)$$

(Total for Question 25 is 5 marks)

- 26** An arithmetic series has first term a and common difference d , where d is a prime number.

The sum of the first n terms of the series is S_n and

$$S_m = 39$$

$$S_{2m} = 320$$

Find the value of d and the value of m
Show clear algebraic working.

$$d = \dots\dots\dots$$

$$m = \dots\dots\dots$$

(Total for Question 26 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

Pearson Edexcel International GCSE


Time 2 hours

Paper reference **4MA1/2HR**

Mathematics A

PAPER 2HR

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.
- 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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

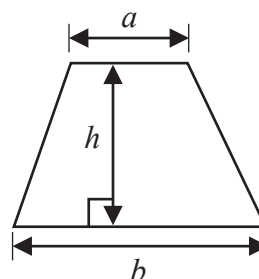
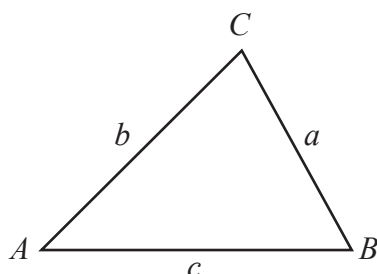
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

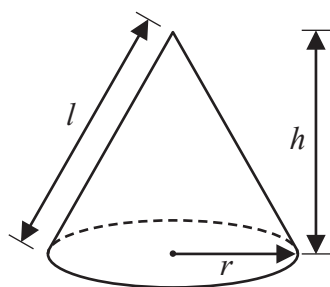
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

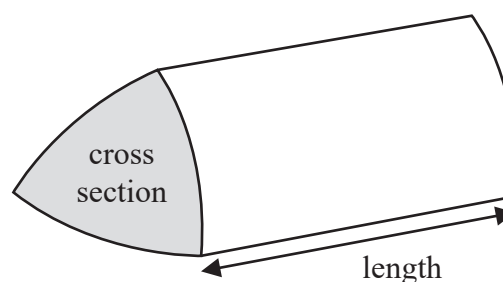
Area of triangle $= \frac{1}{2}ab \sin C$

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

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

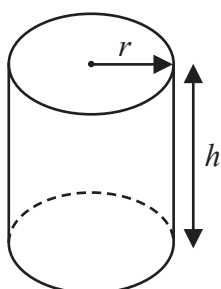
**Volume of prism**

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



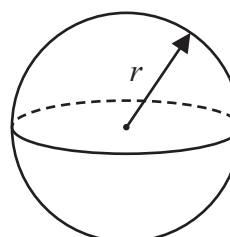
Volume of cylinder $= \pi r^2 h$

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



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

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



Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** A tin contains tea bags with a choice of four different flavours of tea.
The four flavours of tea are Assam or Darjeeling or Nilgiri or Rize.

Sara takes at random a tea bag from the tin.

The table shows each of the probabilities that the flavour of the tea Sara takes is Assam or Darjeeling or Rize.

Flavour of tea	Assam	Darjeeling	Nilgiri	Rize
Probability	0.38	0.24		0.16

- (a) Work out the probability that the flavour of the tea Sara takes is Nilgiri.

.....
(2)

- (b) Work out the probability that the flavour of the tea Sara takes is either Darjeeling or Rize.

.....
(2)

(Total for Question 1 is 4 marks)

2 Mary saves for a holiday each year.

In 2020 she saved a total of \$720

In 2021, each month she saved \$78

The total amount Mary saved in 2021 was $P\%$ more than the total she saved in 2020

(a) Work out the value of P

(4)

Roberto is going to go on holiday.

He has two coupons that will save him money on his holiday.

Coupon A

18% off the cost of the
accommodation

Coupon B

12.5% off the total cost of the
accommodation **and** the flights

For Roberto's holiday

the cost of the accommodation is \$1600

the cost of the flights is \$800

Roberto can only use one of the coupons.

He wants to save as much money as he can.

(b) Which of the two coupons, **A** or **B**, should he use?

Show your working clearly.

(3)

(Total for Question 2 is 7 marks)

3 (a) Solve $4y + 5 > 12$

.....
(2)

(b) Solve $6x - 5 = \frac{4x - 7}{2}$

Show clear algebraic working.

$x =$
(3)

(Total for Question 3 is 5 marks)

- 4 The diagram shows a regular octagon $ABCDEFGH$ and a regular pentagon $ABIJK$

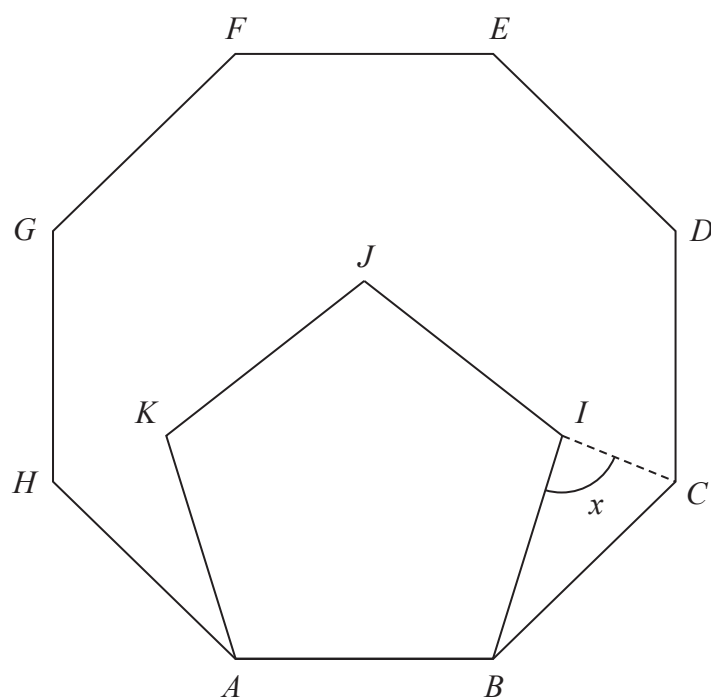


Diagram **NOT**
accurately drawn

Work out the size of the angle x

(Total for Question 4 is 4 marks)

- 5 Shane invests 7200 dollars for 3 years in a savings account.
He gets 2.5% per year compound interest.

How much money will Shane have in his savings account at the end of 3 years?
Give your answer to the nearest dollar.

..... dollars

(Total for Question 5 is 3 marks)

6 (a) Write down the value of x^0

.....
(1)

Given that $2^{-3} \times 2^9 = 2^n$

(b) find the value of n

$n =$
(1)

Given that $\frac{7^{206} \times 7^m}{7^{214}} = 7^{-3}$

(c) find the value of m

$m =$
(2)

(Total for Question 6 is 4 marks)

- 7 (a) Write down an equation of the straight line with gradient -3 and which passes through the point with coordinates $(0, 5)$

.....
(2)

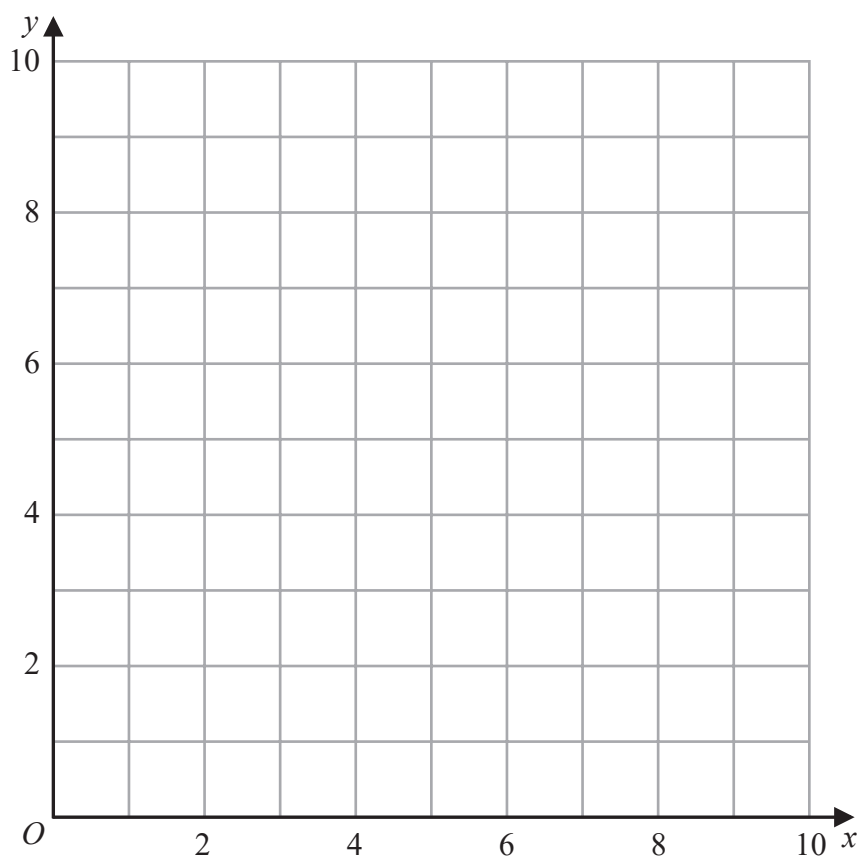
- (b) Show, by shading on the grid, the region defined by **all three** of the inequalities

$$x \leq 6$$

$$y \geq 2$$

$$y \leq x + 1$$

Label the region **R**



(3)

(Total for Question 7 is 5 marks)

8 A scientist is investigating the weight of 50 tigers.

Here is some information about these tigers.

	Type of tiger	
	Siberian	Bengal
Number of tigers	22	28
Mean weight of tigers (kg)	260	

The mean weight of all 50 tigers is 218 kg

Work out the mean weight of the Bengal tigers.

..... kg

(Total for Question 8 is 3 marks)

- 9 In the diagram, ABC is a right-angled triangle and DEF is a semicircular arc.

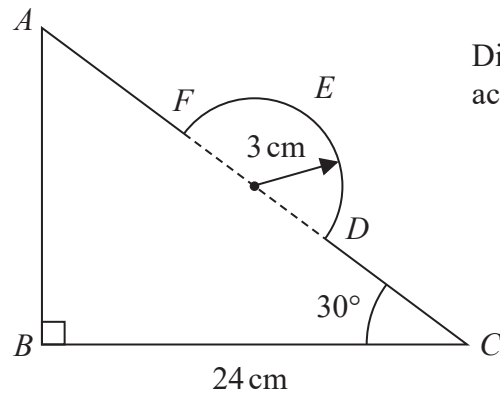


Diagram **NOT**
accurately drawn

In triangle ABC

$$BC = 24 \text{ cm}$$

$$\text{angle } ABC = 90^\circ$$

$$\text{angle } BCA = 30^\circ$$

The points D and F lie on AC so that DF is the diameter of the semicircular arc DEF
The radius of the semicircular arc is 3 cm.

Work out the length of $AFEDC$

Give your answer correct to 2 significant figures.

..... cm

(Total for Question 9 is 5 marks)

10 The table gives information about the population and the total amount of money, in dollars, spent on healthcare for two countries in 2016

Country	Total population	Total spent on healthcare (\$)
Austria	8.7×10^6	4.2×10^{10}
Luxembourg	6.3×10^5	3.7×10^9

Work out how much more was spent **per person** on healthcare in Luxembourg than in Austria.
Give your answer correct to the nearest whole number.

..... dollars

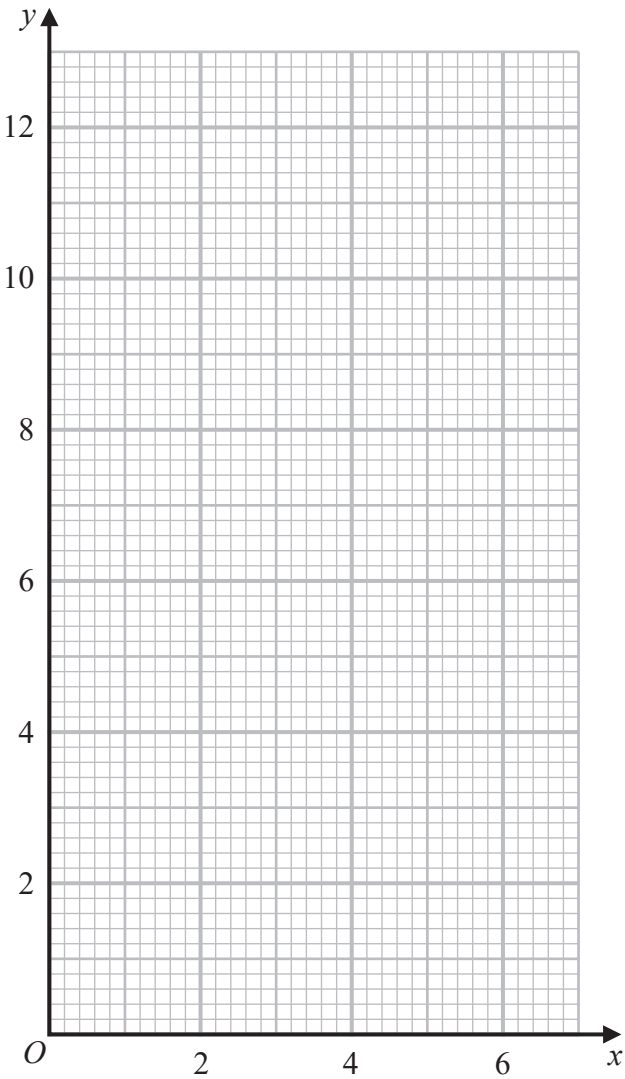
(Total for Question 10 is 3 marks)

11 (a) Complete the table of values for $y = \frac{6}{x}$

x	0.5	1	2	3	4	5	6
y		6		2			1

(2)

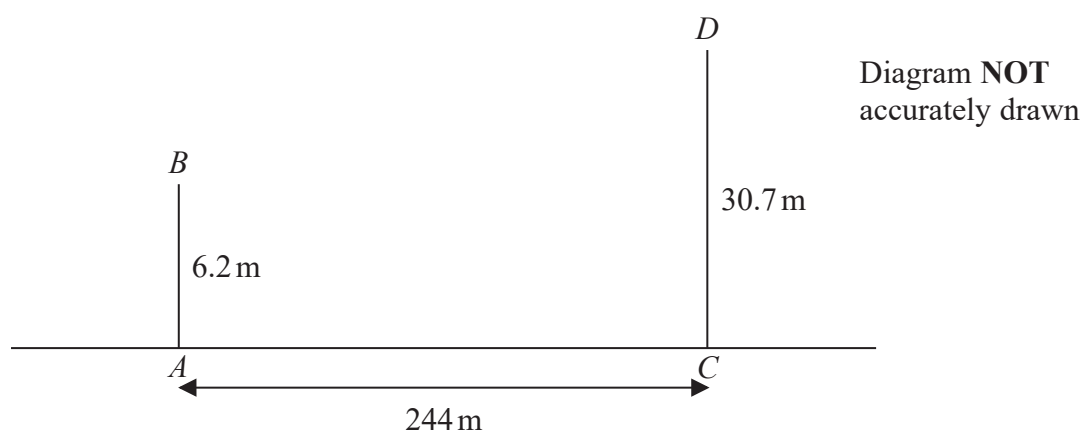
(b) On the grid, draw the graph of $y = \frac{6}{x}$ for $0.5 \leq x \leq 6$



(2)

(Total for Question 11 is 4 marks)

- 12 The diagram shows two vertical phone masts, AB and CD , on horizontal ground.



$$AB = 6.2 \text{ m} \quad AC = 244 \text{ m} \quad CD = 30.7 \text{ m}$$

Work out the size of the angle of depression of B from D
Give your answer correct to one decimal place.

(Total for Question 12 is 3 marks)

13 $a = \sqrt{8} + 4$

$$b = \sqrt{8} - 4$$

$(a - b)(a + b)$ can be written in the form $y\sqrt{4y}$

Find the value of y

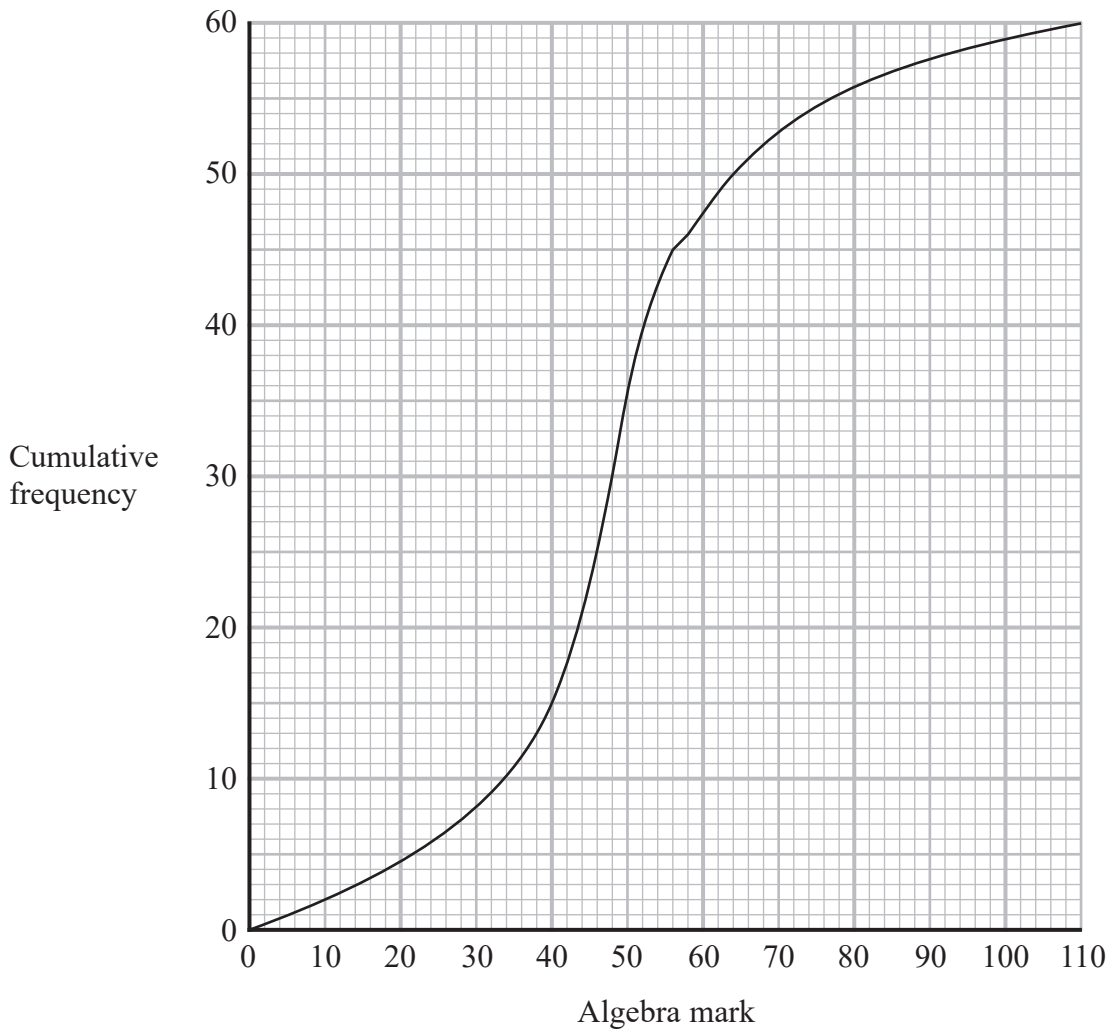
Show your working clearly.

$$y = \dots\dots\dots$$

(Total for Question 13 is 3 marks)

- 14** A group of 60 students each sat an algebra test and a geometry test.
Each test was marked out of 110

The cumulative frequency graph gives information about the marks gained by the 60 students in the algebra test.



- (a) Use the graph to find an estimate for the median mark in the algebra test.

.....
(1)

- (b) Use the graph to find an estimate for the number of students who gained 58 marks or less in the algebra test.

.....
(1)

- (c) Use the graph to find an estimate for the interquartile range of the marks gained in the algebra test.

.....
(2)

The interquartile range of the marks gained in the geometry test is 9

Luis says

“The students’ marks are more spread out in the algebra test than in the geometry test.”

- (d) Is Luis correct?
Give a reason for your answer.

.....
(1)

To be awarded a grade A in the algebra test, a student had to gain a mark greater than 64

Two students are to be selected at random from the 60 students in the group.

- (e) Use the graph to find an estimate for the probability that both of these students were awarded a grade A in the algebra test.

.....
(3)

(Total for Question 14 is 8 marks)

15 Make t the subject of $n^2 = \frac{4d + t^3}{t^3}$

.....
(Total for Question 15 is 4 marks)

16 The diagram shows quadrilateral $ABCD$

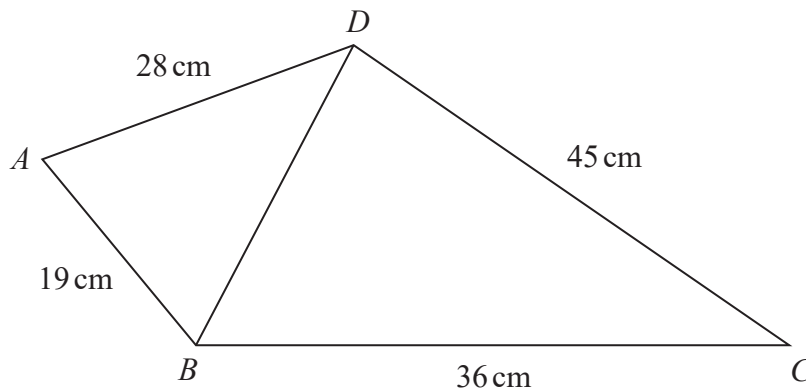


Diagram **NOT**
accurately drawn

The angle BCD is acute.

Given that the area of triangle $BCD = 405\text{ cm}^2$

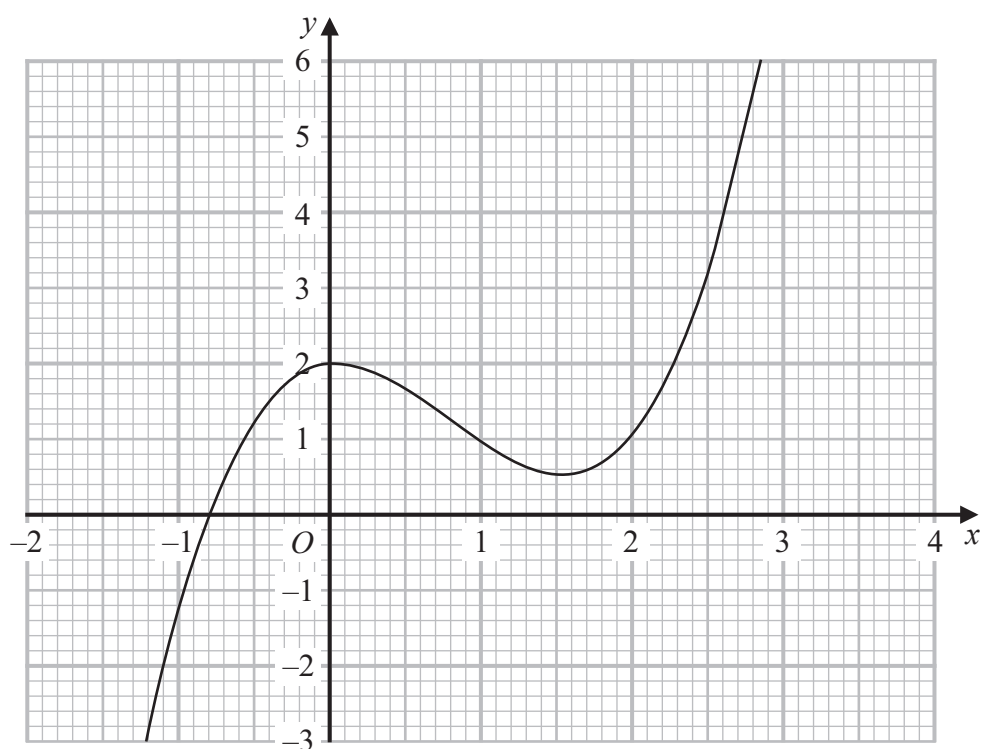
work out the size of angle ABD

Give your answer correct to one decimal place.

o

(Total for Question 16 is 5 marks)

17 Part of the curve with equation $y = f(x)$ is shown on the grid.



Find an estimate for the gradient of the curve at the point where $x = 2$.
Show your working clearly.

(Total for Question 17 is 3 marks)

- 18** The line with equation $2y = x + 1$ intersects the curve with equation $3y^2 + 7y + 16 = x^2 - x$ at the points A and B

Find the coordinates of A and the coordinates of B
Show clear algebraic working.

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

(Total for Question 18 is 5 marks)

19 $ABCD$ is a horizontal rectangular field.

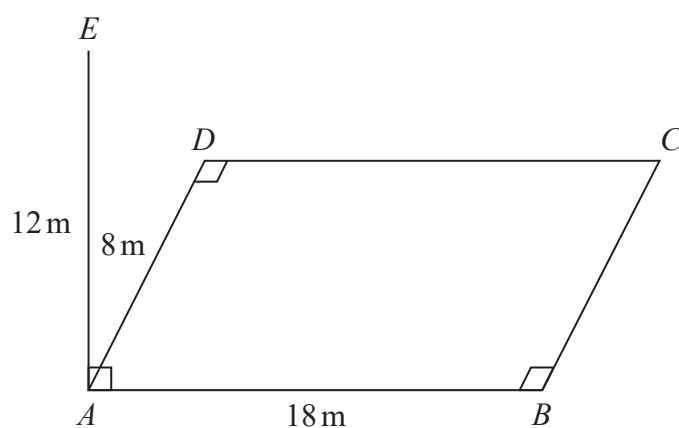


Diagram **NOT**
accurately drawn

A vertical pole, AE , is placed at the corner A of the field.

$$AE = 12\text{ m} \quad AB = 18\text{ m} \quad AD = 8\text{ m}$$

Calculate the size of the angle between EC and the plane $ABCD$
Give your answer correct to one decimal place.

(Total for Question 19 is 3 marks)

- 20** y is inversely proportional to \sqrt{x}
 x is directly proportional to T^3

Given that $y = 8$ when $T = 25$

find the exact value of T when $y = 27$

$T = \dots\dots\dots$

(Total for Question 20 is 4 marks)

- 21 The diagram shows a solid made from a cylinder and a hemisphere.
The cylinder and the hemisphere are both made from the same metal.

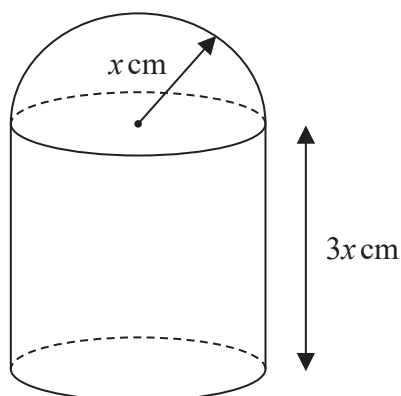


Diagram **NOT**
accurately drawn

The plane face of the hemisphere coincides with the upper plane face of the cylinder.

The radius of the cylinder and the radius of the hemisphere are both x cm.

The height of the cylinder is $3x$ cm.

The total surface area of the solid is $81\pi \text{ cm}^2$

The mass of the solid is 840 grams.

The following table gives the density of each of four metals.

Metal	Density (g/cm^3)
Aluminium	2.7
Nickel	8.9
Gold	19.3
Silver	10.5

The metal used to make the solid is one of the metals in the table.

Determine the metal used to make the solid.

Show your working clearly.

.....
(Total for Question 21 is 6 marks)

Turn over for Question 22

22 ABC is a triangle in which angle $ABC = 90^\circ$

p and q are integers such that

the coordinates of A are $(p, 10)$

the coordinates of B are $(-1, -5)$

the coordinates of C are $(8, q)$

Given that the gradient of AC is $-\frac{6}{7}$

work out the value of p and the value of q

$$p = \dots\dots\dots$$

$$q = \dots\dots\dots$$

(Total for Question 22 is 5 marks)

Turn over for Question 23

23 The functions f and g are such that

$$f(x) = x + 25 \qquad g(x) = x^2 - 12x$$

The function h is such that $h(x) = fg(x)$

The domain of h is $\{x : x \leq 6\}$

Express the inverse function h^{-1} in the form $h^{-1}(x) = \dots$

$$h^{-1}(x) = \dots\dots\dots$$

(Total for Question 23 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

BLANK PAGE

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

Pearson Edexcel International GCSE


Time 2 hours

Paper reference **4MA1/2H**

Mathematics A

PAPER: 2H

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

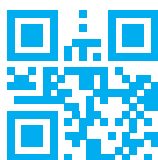
- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more 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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

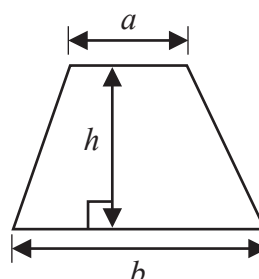
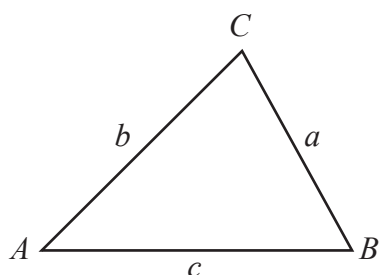
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

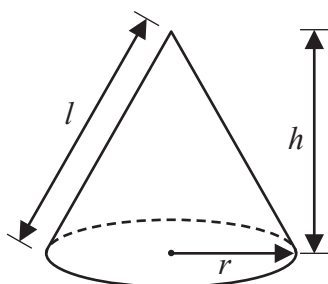
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

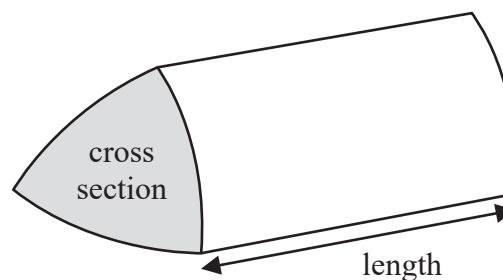
Area of triangle $= \frac{1}{2}ab \sin C$

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

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

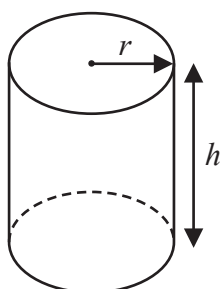
**Volume of prism**

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



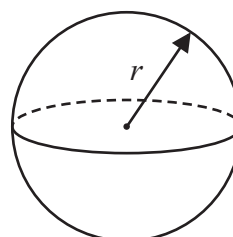
Volume of cylinder $= \pi r^2 h$

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



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

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



Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Here are some integers where $a < b < c < d$

$a \qquad b \qquad c \qquad d \qquad d \qquad d$

The mode of the integers is 9
The median of the integers is 8
The range of the integers is 4

Work out the value of a , the value of b , the value of c and the value of d

$a = \dots\dots\dots$
 $b = \dots\dots\dots$
 $c = \dots\dots\dots$
 $d = \dots\dots\dots$

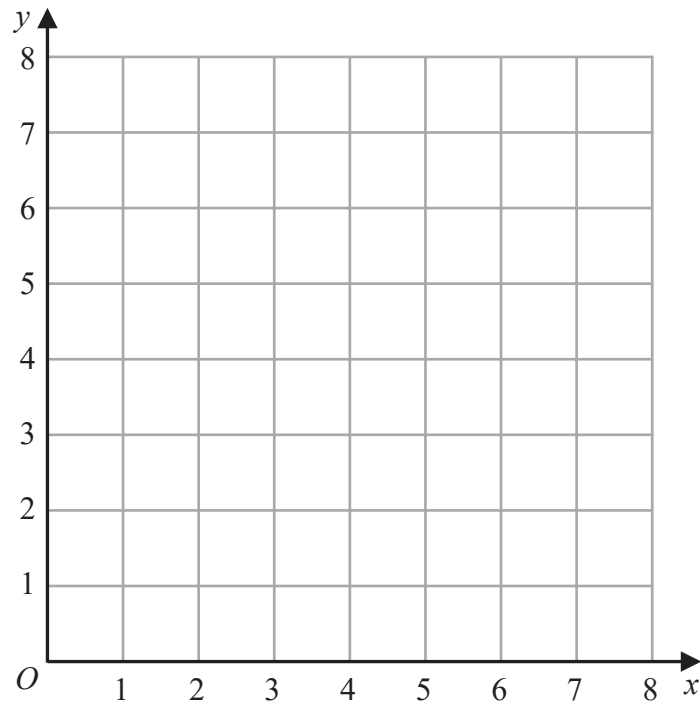
(Total for Question 1 is 3 marks)

2 (a) On the grid, draw and label with its equation the straight line with equation

(i) $y = 1$

(ii) $x = 2$

(iii) $x + y = 7$



(3)

(b) Show, by shading on the grid, the region that satisfies **all three** of the inequalities

$y \geq 1$

$x \geq 2$

$x + y \leq 7$

Label the region **R**.

(1)

(Total for Question 2 is 4 marks)

- 3 An aeroplane travelled from New York City to Los Angeles.

The aeroplane travelled a distance of 3980 kilometres in 5 hours 24 minutes.

Work out the average speed of the aeroplane.

Give your answer in kilometres per hour correct to the nearest whole number.

..... kilometres per hour

(Total for Question 3 is 3 marks)

- 4 Show that $5\frac{1}{3} - 2\frac{6}{7} = 2\frac{10}{21}$

(Total for Question 4 is 3 marks)

5 The diagram shows an 8-sided shape $ABCDEFGH$.

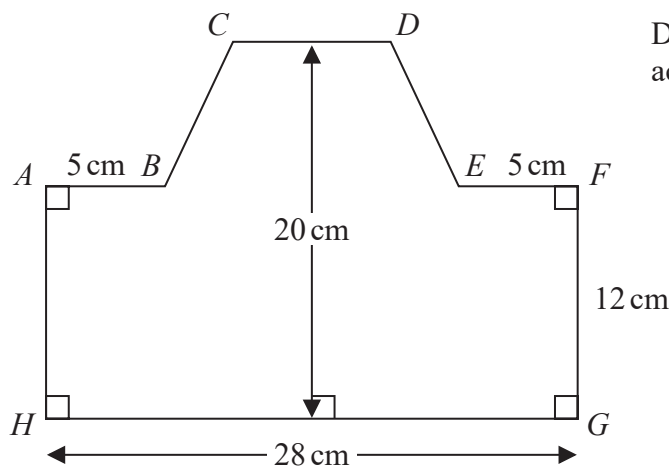


Diagram **NOT** accurately drawn

$HG = 28\text{ cm}$ $FG = 12\text{ cm}$ $AB = EF = 5\text{ cm}$
The height of the shape is 20 cm
 CD is parallel to HG

The area of shape $ABCDEFGH$ is 434 cm^2

Find the length of CD .

..... cm

(Total for Question 5 is 4 marks)

- 6 The diagram shows triangle PQR .

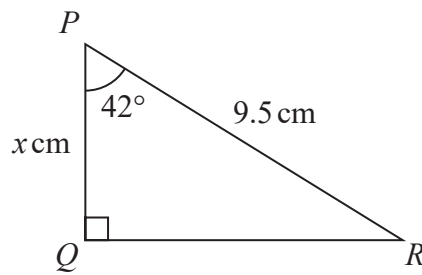


Diagram **NOT**
accurately drawn

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

$x =$

(Total for Question 6 is 3 marks)

- 7 Change a speed of 81 kilometres per hour to a speed in metres per second.

..... metres per second

(Total for Question 7 is 3 marks)

8 Behnaz makes 300 celebration cards so that

number of birthday cards : number of anniversary cards : number of congratulations cards = 7:5:3

$\frac{2}{5}$ of the birthday cards have numbers on them.

36% of the anniversary cards have numbers on them.

None of the congratulations cards have numbers on them.

Work out what fraction of the 300 cards have numbers on them.

Give your answer in its simplest form.

.....
(Total for Question 8 is 5 marks)

- 9 Pasha invests 50 000 dollars in a savings account for 4 years.
He gets 1.3% per year compound interest.

Work out how much money Pasha will have in his savings account at the end of 4 years.
Give your answer correct to the nearest dollar.

..... dollars

(Total for Question 9 is 3 marks)

10 Solve the simultaneous equations

$$7x + 3y = 3$$

$$3x - y = 7$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question 10 is 3 marks)

11 (i) Factorise $x^2 + 5x - 24$

.....
(2)

(ii) Hence, solve $x^2 + 5x - 24 = 0$

.....
(1)

(Total for Question 11 is 3 marks)

12 Larry is a delivery man.

He has 7 parcels to deliver.

The mean weight of the 7 parcels is 2.7 kg

Larry delivers 3 of the parcels.

Each of these 3 parcels has a weight of W kg

The mean weight of the other 4 parcels is 3.3 kg

Work out the value of W

$W = \dots\dots\dots$

(Total for Question 12 is 3 marks)

13 The table gives information about the ages, in years, of 80 people in a train carriage.

Age (a years)	Frequency
$0 < a \leq 20$	7
$20 < a \leq 30$	25
$30 < a \leq 40$	20
$40 < a \leq 50$	14
$50 < a \leq 60$	8
$60 < a \leq 70$	6

(a) Complete the cumulative frequency table.

Age (a years)	Cumulative frequency
$0 < a \leq 20$	
$0 < a \leq 30$	
$0 < a \leq 40$	
$0 < a \leq 50$	
$0 < a \leq 60$	
$0 < a \leq 70$	

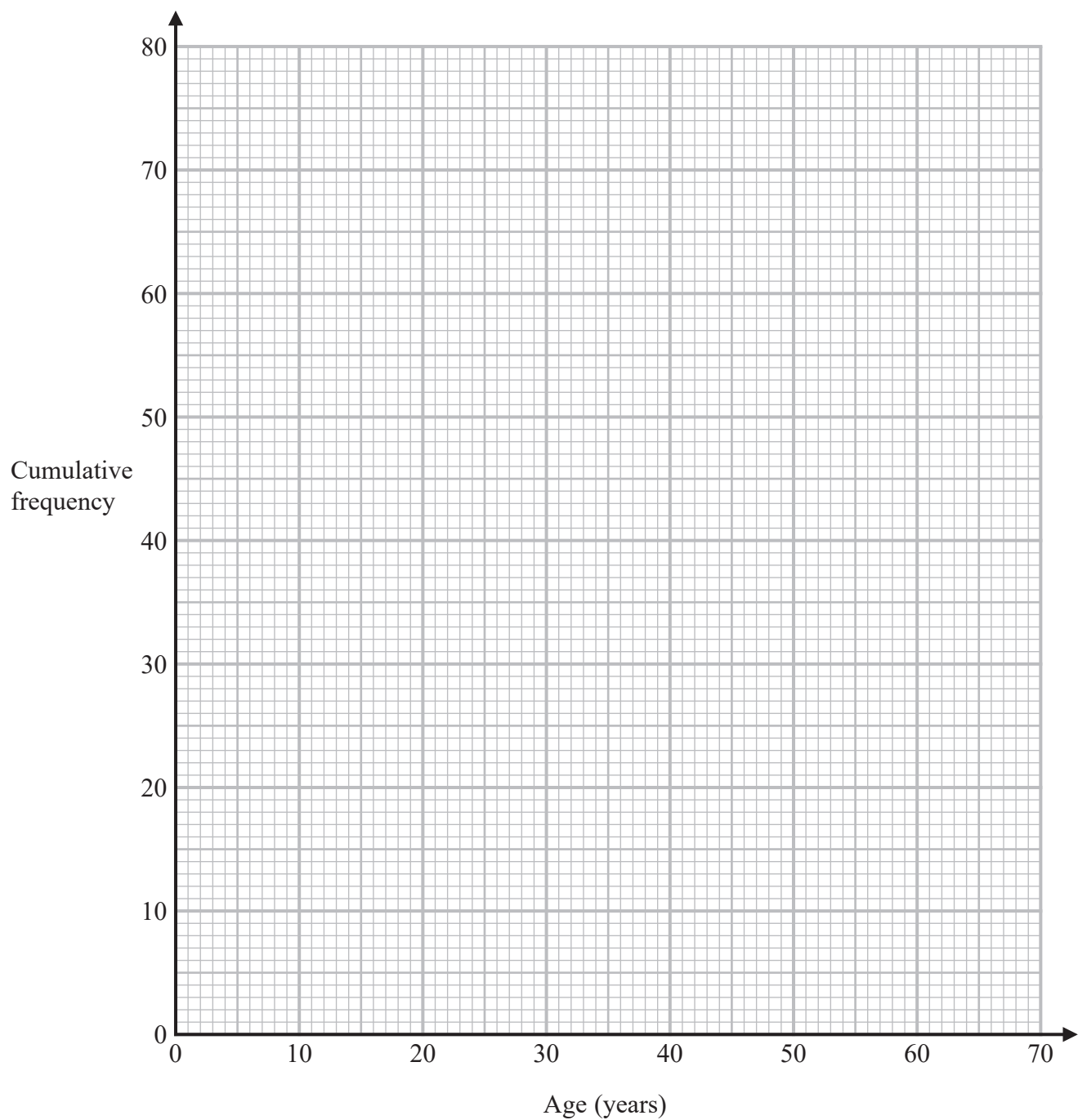
(1)

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

(2)

(c) Use your graph to find an estimate for the median age of the 80 people.

..... years
(1)



Of the people in the train carriage, 60% of those who are aged between 18 and 65 are going to work. None of the other people in the train carriage are going to work.

- (d) Use your graph to find an estimate for the number of people in the train carriage who are going to work.

(3)

(Total for Question 13 is 7 marks)

- 14** (a) Expand and simplify $(5 - x)(2x + 3)(x + 4)$
Show your working clearly.

.....
(3)

- (b) Make c the subject of $g = \frac{c + 3}{4 + c} - 7$

.....
(4)

(Total for Question 14 is 7 marks)

15 (a) Solve $\frac{4x+5}{3} - \frac{3-2x}{2} = 13$

Show clear algebraic working.

$x = \dots\dots\dots$
(4)

(b) Solve the inequality $2y^2 - 7y - 30 \leq 0$
Show your working clearly.

$\dots\dots\dots$
(3)

(Total for Question 15 is 7 marks)

16 100 farmers are asked if they have goats (G), sheep (S) or chickens (C) on their farms.

Of these farmers

31 have sheep

53 have chickens

6 have goats, sheep and chickens

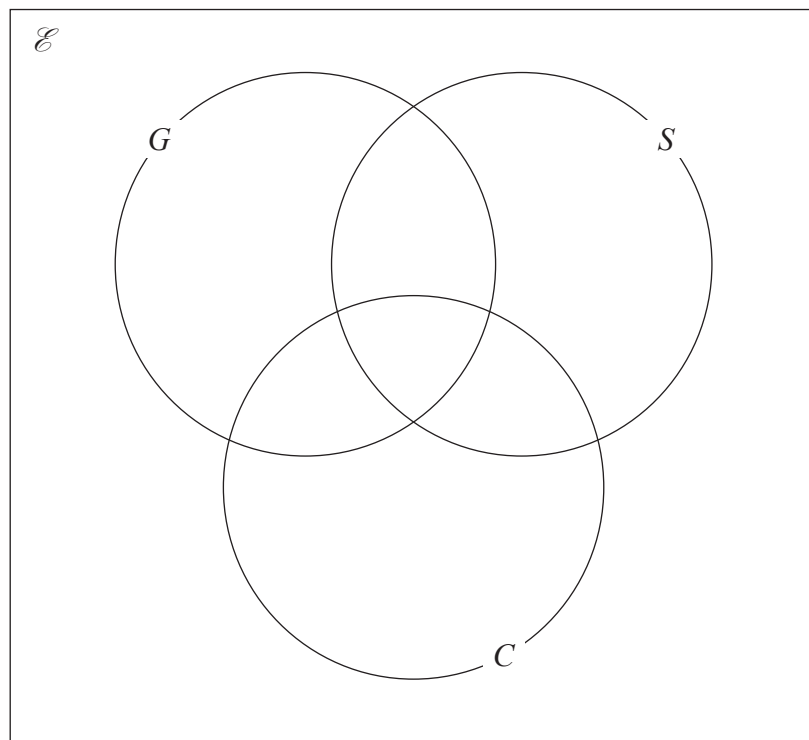
11 have sheep and goats

17 have sheep and chickens

18 have goats and chickens

20 do not have any goats, sheep or chickens

- (a) Using this information, complete the Venn diagram to show the number of farmers in each appropriate subset.



(3)

(b) Find

(i) $n(G)$

(1)

(ii) $n([G \cup S]')$

(1)

(iii) $n(G' \cap C)$

(1)

One of the farmers who has chickens is chosen at random.

(c) Find the probability that this farmer also has goats.

(2)

(Total for Question 16 is 8 marks)

17 M varies directly as the cube of h
 $M = 4$ when $h = 0.5$

Find the value of h when $M = 500$

(Total for Question 17 is 4 marks)

18 $X = \frac{2a - b}{f}$

$a = 7.5$ correct to 1 decimal place.

$b = 3.42$ correct to 2 decimal places.

$f = 2$ correct to the nearest whole number.

Work out the upper bound of the value of X
Show your working clearly.

.....
(Total for Question 18 is 3 marks)

19 $a = \frac{14}{3x-7}$ $x = \frac{7}{4y-3}$

Express a in the form $\frac{py+q}{ry+s}$ where p , q , r and s are integers.

Give your answer in its simplest form.

$$a = \dots\dots\dots$$

(Total for Question 19 is 3 marks)

20 The diagram shows four identical circles drawn inside a square.

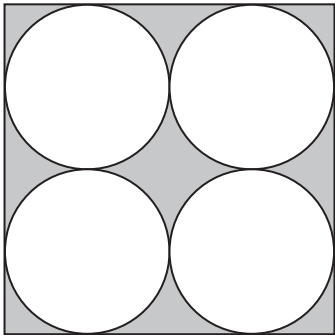


Diagram **NOT**
accurately drawn

Each circle touches two other circles and two sides of the square.

The region inside the square that is outside the circles, shown shaded in the diagram, has a total area of 40 cm^2

Work out the perimeter of the square.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 20 is 4 marks)

21

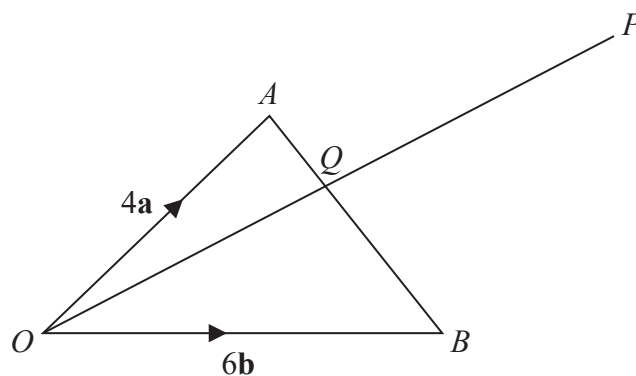


Diagram **NOT**
accurately drawn

OAB is a triangle.

Q is the point on AB such that OQP is a straight line.

$$\vec{OA} = 4\mathbf{a} \quad \vec{OB} = 6\mathbf{b} \quad \vec{AP} = 2\mathbf{a} + 8\mathbf{b}$$

Using a vector method, find the ratio $AQ:QB$

$$AQ:QB = \dots\dots\dots$$

(Total for Question 21 is 5 marks)

22 $ABCD$ is a kite, with diagonals AC and BD , drawn on a centimetre square grid, with a scale of 1 cm for 1 unit on each axis.

A is the point with coordinates $(-3, 4)$

The diagonals of the kite intersect at the point M with coordinates $(0, 2)$

Given that $AB = AD = 6.5$ cm and the x coordinate of B is positive,

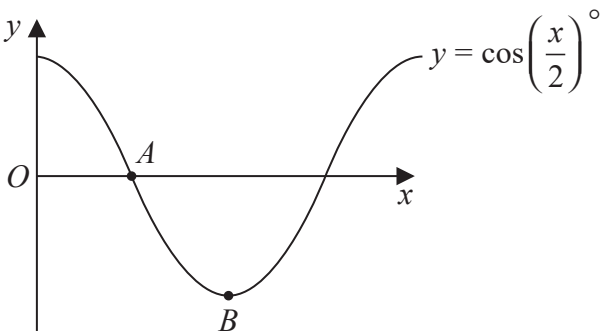
find the coordinates of the points B and D .

(..... ,)

(..... ,)

(Total for Question 22 is 7 marks)

23 The diagram shows a sketch of the graph of $y = \cos\left(\frac{x}{2}\right)^\circ$



(i) Find the coordinates of the point A

(..... ,)

(1)

(ii) Find the coordinates of the point B

(..... ,)

(1)

(Total for Question 23 is 2 marks)

24

$$\frac{18 \times (\sqrt{27})^{4n+6}}{6 \times 9^{2n+8}} = 3^x$$

Express x in terms of n

Show your working clearly and simplify your expression.

$x = \dots\dots\dots$

(Total for Question 24 is 3 marks)

TOTAL FOR PAPER IS 100 MARKS

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

Pearson Edexcel International GCSE


Time 2 hours

Paper reference **4MA1/2HR**

Mathematics A

PAPER: 2HR

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

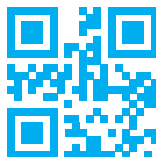
- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more 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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

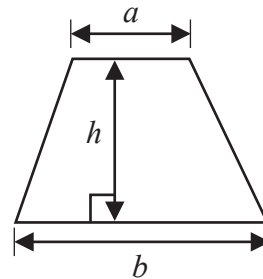
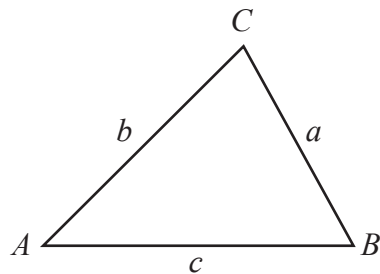
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

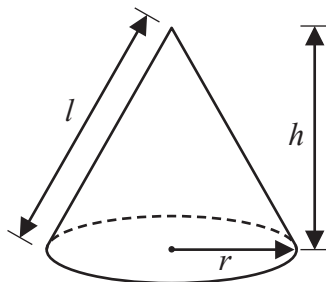
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

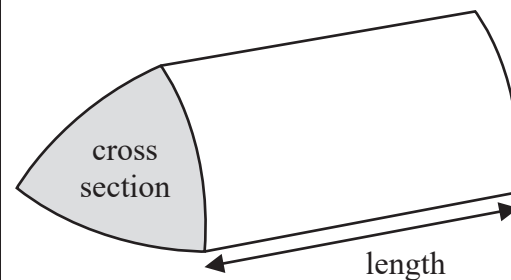
Area of triangle $= \frac{1}{2}ab \sin C$

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

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

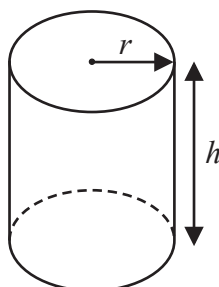
**Volume of prism**

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



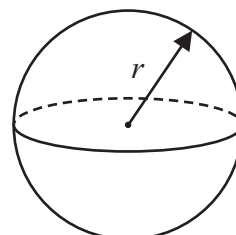
Volume of cylinder $= \pi r^2 h$

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



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

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

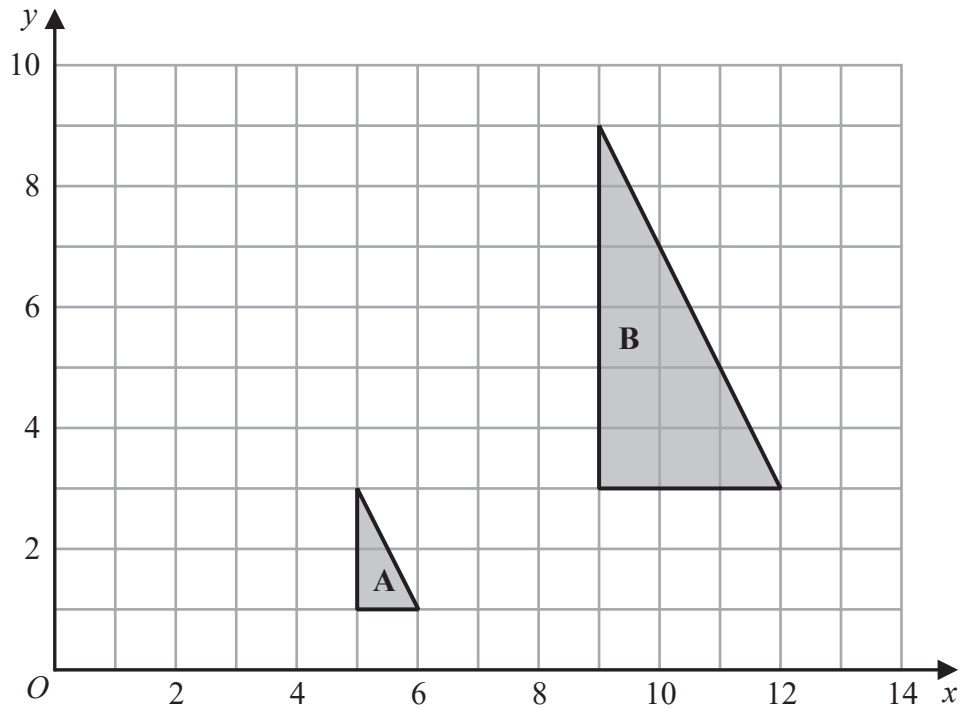


Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1



- (a) Describe fully the single transformation that maps triangle A onto triangle B

(3)

- (b) On the grid above, translate triangle A by the vector $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$

Label your triangle C

(1)

(Total for Question 1 is 4 marks)

- 2 Write 1200 as a product of powers of its prime factors.
Show your working clearly.

(Total for Question 2 is 3 marks)

3 Alberto, Bill, Candela and Diana are four friends.

Here is some information about the height of each of these friends.

Alberto's height is 158 cm.

Bill's height is 175 cm.

Candela's height is greater than Diana's height.

The median height of these four friends is 160 cm.

The range of the heights of these four friends is 21 cm.

Work out Candela's height and Diana's height.

Candela cm

Diana cm

(Total for Question 3 is 3 marks)

- 4 $\mathcal{E} = \{9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20\}$
 $A = \{\text{multiples of } 3\}$
 $B = \{\text{odd numbers}\}$

(a) List the members of the set

(i) $A \cap B$

.....
 (1)

(ii) $A \cup B$

.....
 (1)

(b) Is it true that $24 \in A$?

Tick one of the boxes below.

Yes

No

☐
☐

Give a reason for your answer.

.....
 (1)

Set C has 4 members such that $C \cap B' = \{10, 18\}$

(c) List the members of one possible set C

.....
 (2)

.....
 (Total for Question 4 is 5 marks)

- 5 The diagram shows a shape made from a square $ABCD$ and 4 identical semicircles.

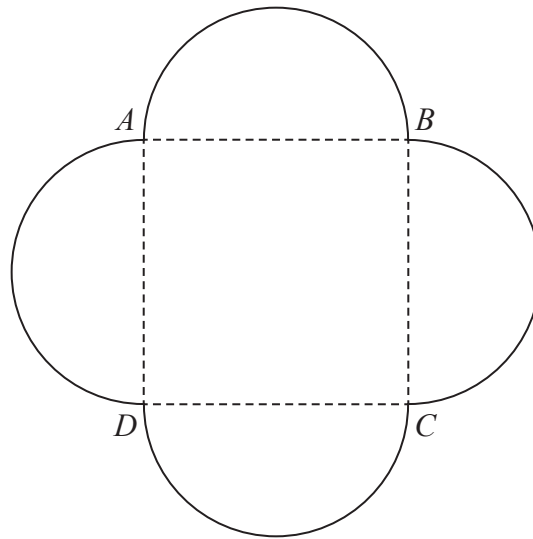


Diagram **NOT**
accurately drawn

As shown in the diagram, the semicircles have AB , BC , CD and DA as diameters.

The area of the square is 36 cm^2

Calculate the total area of the shape.

Give your answer correct to one decimal place.

..... cm^2

(Total for Question 5 is 4 marks)

6 (a) Solve $p = \frac{3p - 5}{10}$

Show clear algebraic working.

$$p = \dots\dots\dots$$

(3)

(b) Simplify a^0 where $a > 0$

$$\dots\dots\dots$$

(1)

(c) Simplify fully $\frac{3xy^3}{6x^2y}$

$$\dots\dots\dots$$

(2)

(d) Factorise fully $10c^3d^2 + 15cd^4$

$$\dots\dots\dots$$

(2)

(Total for Question 6 is 8 marks)

7 $\frac{2^k}{4^n} = 2^x$

Find an expression for x in terms of k and n

$x = \dots\dots\dots$

(Total for Question 7 is 2 marks)

- 8 A cinema increased the cost of an adult ticket by 12%
After the increase, the cost of an adult ticket was £18.20
Work out the cost of an adult ticket before the increase.

£.....

(Total for Question 8 is 3 marks)

- 9 The table gives information about the population, correct to 2 significant figures, of each of five cities in 2018

City	Population (2018)
Ahmedabad	7.7×10^6
Barcelona	5.5×10^6
Chicago	8.8×10^6
Lagos	1.3×10^7
Tokyo	3.7×10^7

- (a) Write 8.8×10^6 as an ordinary number.

.....
(1)

- (b) Which of these cities had the least population in 2018?

.....
(1)

- (c) Work out the difference between the population of Tokyo and the population of Ahmedabad in 2018

Give your answer in standard form correct to 2 significant figures.

.....
(2)

(Total for Question 9 is 4 marks)

10 The diagram shows triangle ABP inside the regular hexagon $ABCDEF$

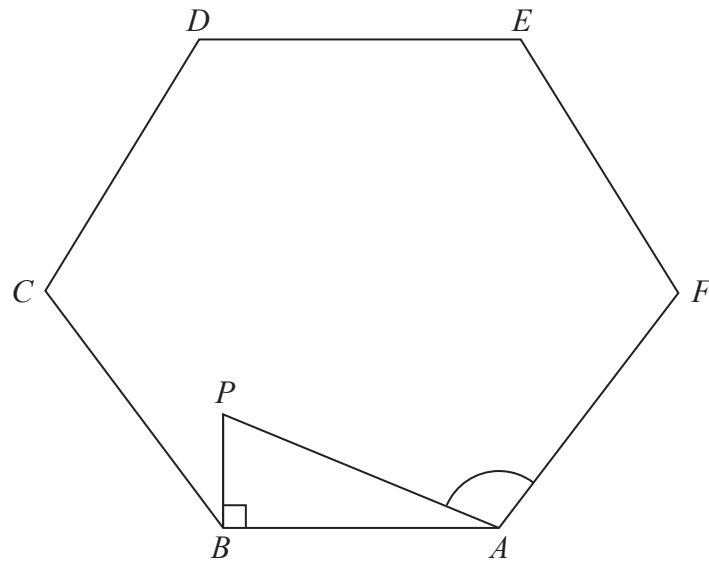


Diagram **NOT**
accurately drawn

$$AB = 5 \text{ cm}$$

$$BP = 2 \text{ cm}$$

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

Work out the size of angle PAF

Give your answer correct to 3 significant figures.

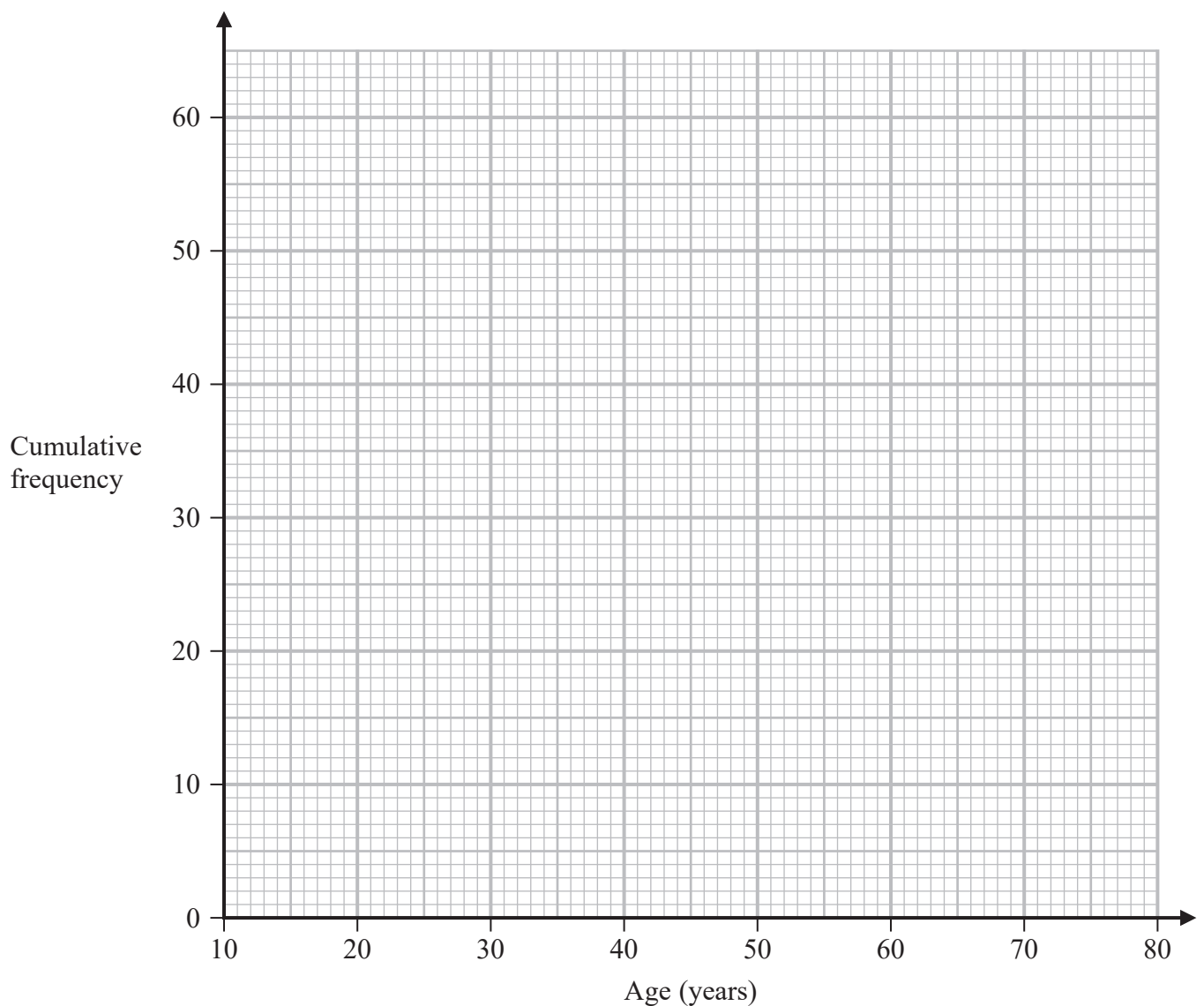
o

(Total for Question 10 is 5 marks)

- 11 The cumulative frequency table shows information about the ages of 60 people who went to a gym on Saturday.

Age (a years)	Cumulative frequency
$10 < a \leq 20$	13
$10 < a \leq 30$	36
$10 < a \leq 40$	42
$10 < a \leq 50$	47
$10 < a \leq 60$	52
$10 < a \leq 70$	56
$10 < a \leq 80$	60

- (a) On the grid, draw a cumulative frequency graph for the information in the table.



(2)

Question 11 continued

(b) Use your graph to find an estimate for the median of the ages of these people.

..... years
(1)

(c) Use your graph to find an estimate for the interquartile range of the ages of these people.

..... years
(2)

(d) Use your graph to find an estimate for the number of these people who are older than 55 years.

.....
(2)

(Total for Question 11 is 7 marks)

12

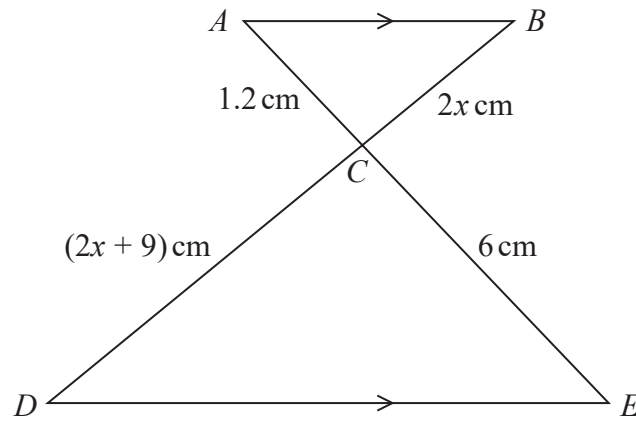


Diagram **NOT**
accurately drawn

ACE and BCD are straight lines.
 AB is parallel to DE

Work out the value of x

$x = \dots\dots\dots$

(Total for Question 12 is 3 marks)

13 The diagram shows a sector AOB of a circle with centre O

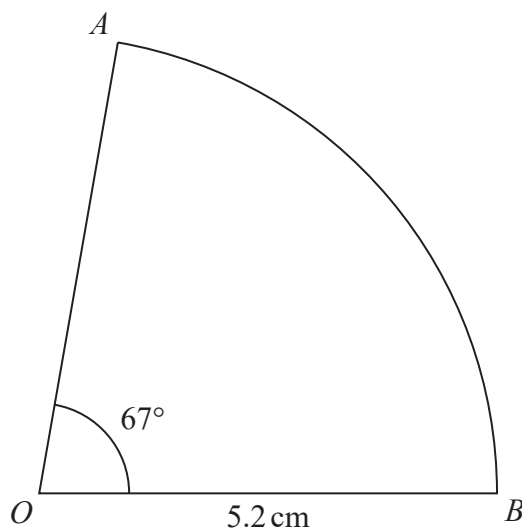


Diagram **NOT**
accurately drawn

Angle $AOB = 67^\circ$

$OA = OB = 5.2 \text{ cm}$

Calculate the perimeter of the sector.

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 13 is 3 marks)

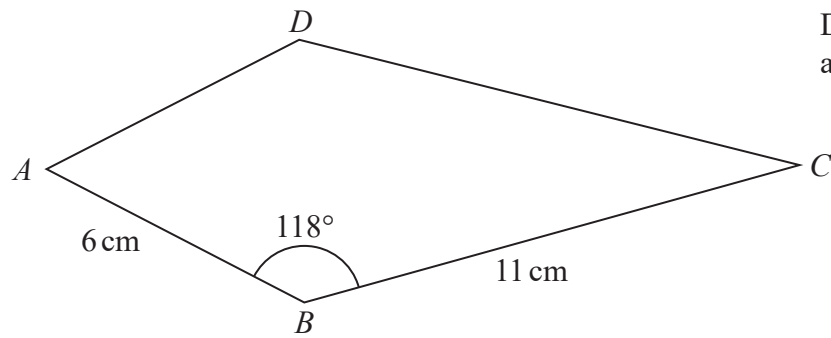
14 Ciara throws **four** fair six-sided dice.

The faces of each dice are labelled with the numbers 1, 2, 3, 4, 5, 6

Work out the probability that at least one of the dice lands on an even number.

.....
(Total for Question 14 is 3 marks)

15 The diagram shows a kite $ABCD$



$$AB = 6 \text{ cm}$$

$$BC = 11 \text{ cm}$$

$$\text{Angle } ABC = 118^\circ$$

Calculate the area of the kite.

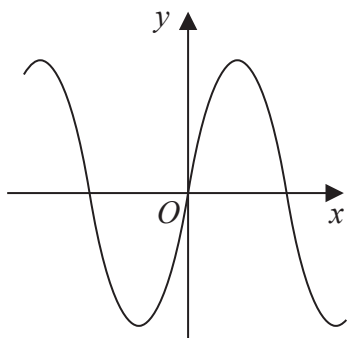
Give your answer correct to 3 significant figures.

..... cm^2

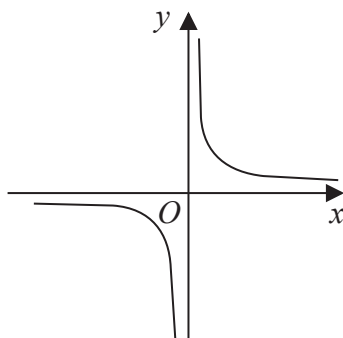
(Total for Question 15 is 3 marks)

16 Here are nine graphs.

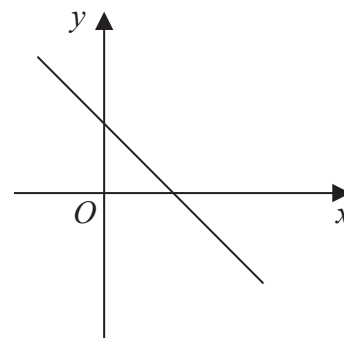
Graph A



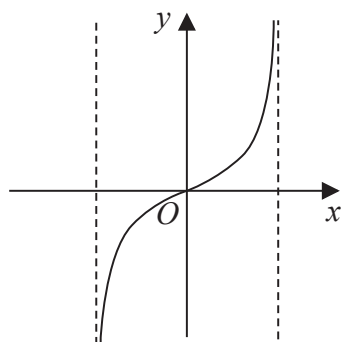
Graph B



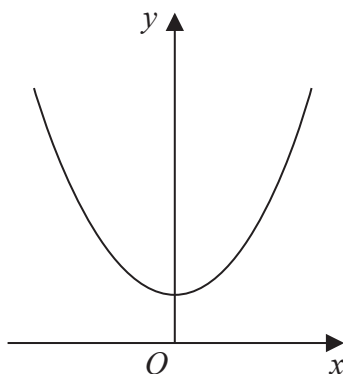
Graph C



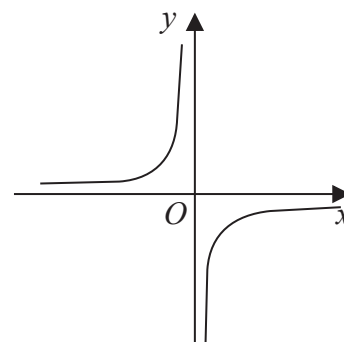
Graph D



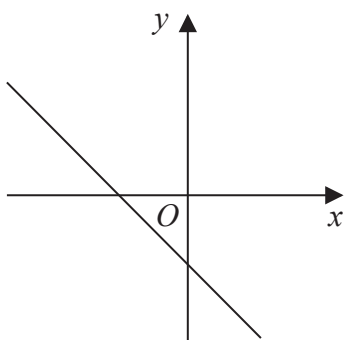
Graph E



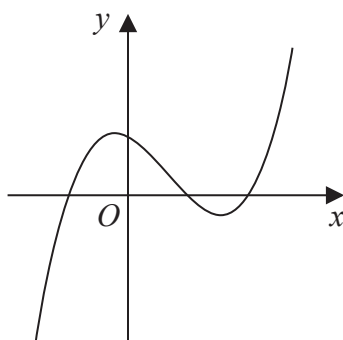
Graph F



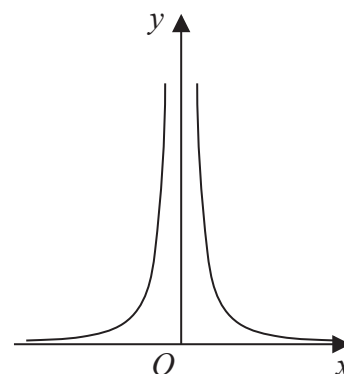
Graph G



Graph H



Graph I



Complete the table below with the letter of the graph that could represent each given equation.
Write each answer on the dotted line.

Equation	Graph
$y = -2x + 3$
$y = -\frac{1}{x}$
$y = \tan x^\circ$
$y = (x + 1)(x - 1)(x - 2)$

(Total for Question 16 is 3 marks)

17 Use algebra to show that $0.3\dot{4}\dot{5} = \frac{19}{55}$

(Total for Question 17 is 2 marks)

18 Kaidan and Sonja went on two different car journeys.

For Kaidan's journey

distance = 80 km correct to the nearest 5 km

time = 2.7 hours correct to 1 decimal place

For Sonja's journey

distance = 33 km correct to 2 significant figures

time = 1 hour correct to the nearest 0.1 hour

Kaidan says,

“My average speed could have been greater than Sonja's average speed.”

By considering bounds, show that Kaidan is correct.

Show your working clearly.

(Total for Question 18 is 4 marks)

19 $f(x) = x^2 - 4$

$$g(x) = 2x + 1$$

Solve $fg(x) > 0$

Show clear algebraic working.

.....
(Total for Question 19 is 4 marks)

20 The centre O of a circle has coordinates $(4, 7)$

The point A , on the circle, has coordinates $(6, 11)$ and AOP is a diameter of the circle.

Find an equation of the tangent to the circle at the point P

.....
(Total for Question 20 is 4 marks)

21 Solve the simultaneous equations

$$\begin{aligned}x - 2y &= 3 \\ x^2 - y^2 + 2x &= 10\end{aligned}$$

Show clear algebraic working.

.....
(Total for Question 21 is 5 marks)

22 The point A with coordinates $(-3, 2)$ lies on the straight line with equation $y = f(x)$

(a) Find the coordinates of the image of the point A on the straight line with equation

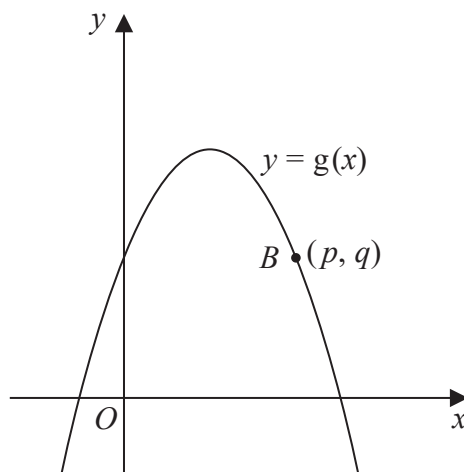
(i) $y = f(x) - 3$

(.....,)
(1)

(ii) $y = f\left(\frac{x}{2}\right)$

(.....,)
(1)

Here is a sketch of part of the curve with equation $y = g(x)$



The point B with coordinates (p, q) lies on the curve.

(b) Find the coordinates of the image of the point B on the curve with equation

$$y = -g(x - c)$$

where c is a constant.

(.....,)
(2)

(Total for Question 22 is 4 marks)

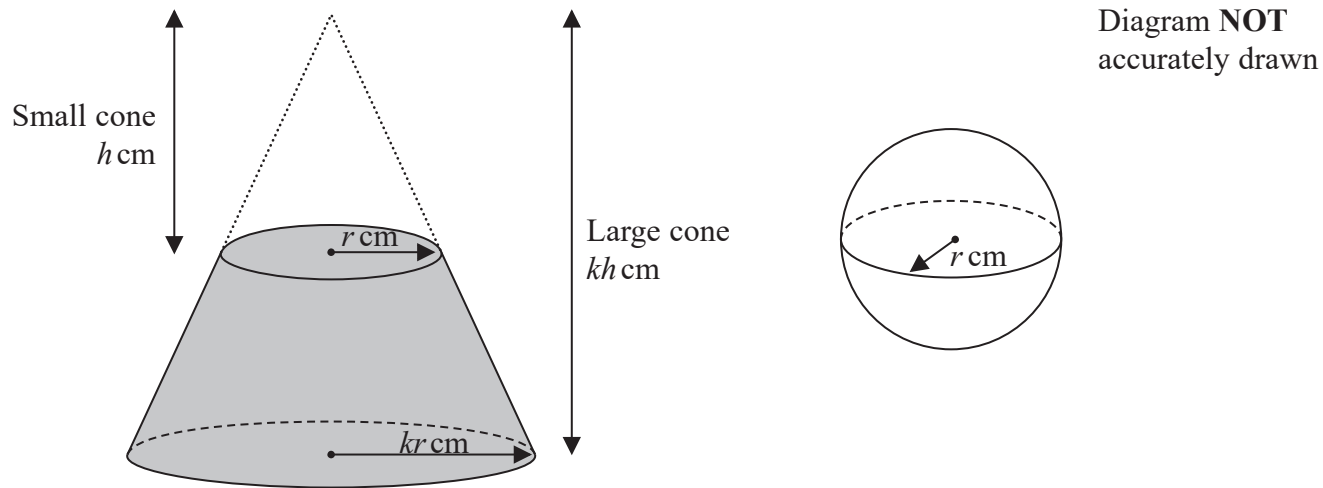
23 Express $\left(\frac{20}{x^2 - 36} - \frac{2}{x - 6}\right) \times \frac{1}{4 - x}$ as a single fraction in its simplest form.

.....
(Total for Question 23 is 3 marks)

24 The diagram shows a frustum of a cone, and a sphere.

The frustum, shown shaded in the diagram, is made by removing the small cone from the large cone.

The small cone and the large cone are similar.



The height of the small cone is h cm and the radius of the base of the small cone is r cm.
The height of the large cone is kh cm and the radius of the base of the large cone is kr cm.
The radius of the sphere is r cm.

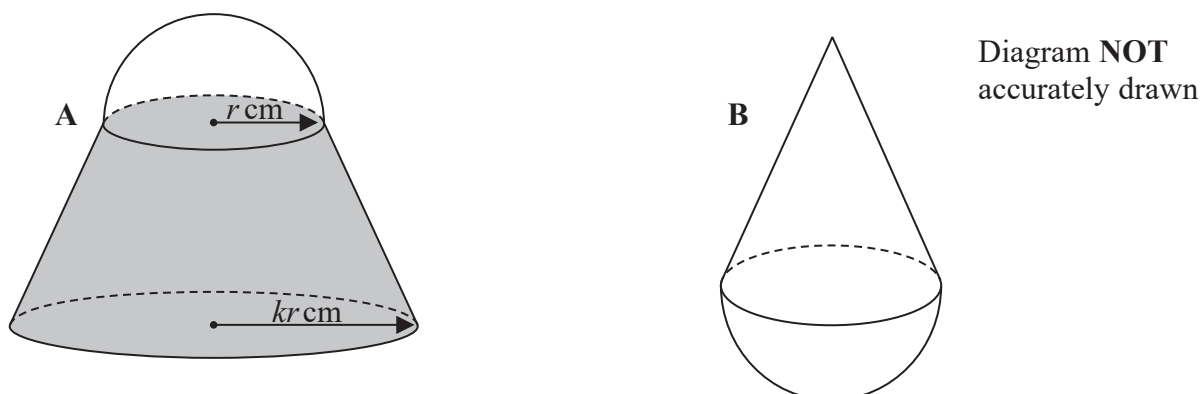
The sphere is divided into two hemispheres, each of radius r cm.

Solid **A** is formed by joining one of the hemispheres to the frustum.

The plane face of the hemisphere coincides with the upper plane face of the frustum, as shown in the diagram below.

Solid **B** is formed by joining the other hemisphere to the small cone that was removed from the large cone.

The plane face of the hemisphere coincides with the plane face of the base of the small cone, as shown in the diagram below.



The volume of solid **A** is 6 times the volume of solid **B**.

Given that $k > \sqrt[3]{7}$

find an expression for h in terms of k and r

$h = \dots\dots\dots$

(Total for Question 24 is 6 marks)

25 $ABCD$ is a parallelogram and ADM is a straight line.

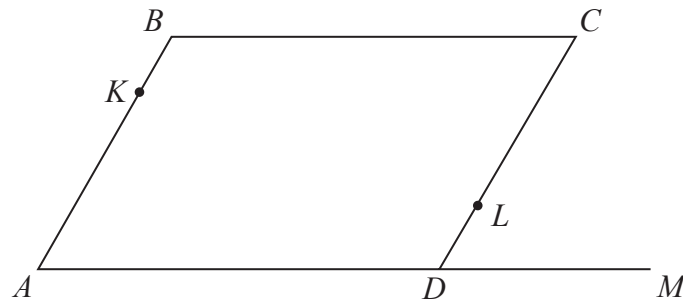


Diagram **NOT**
accurately drawn

$$\vec{AB} = \mathbf{a} \quad \vec{BC} = \mathbf{b} \quad \vec{DM} = \frac{1}{2} \mathbf{b}$$

K is the point on AB such that $AK:AB = \lambda:1$

L is the point on CD such that $CL:CD = \mu:1$

KLM is a straight line.

Given that $\lambda:\mu = 1:2$

use a vector method to find the value of λ and the value of μ

$$\lambda = \dots\dots\dots$$

$$\mu = \dots\dots\dots$$

(Total for Question 25 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

Pearson Edexcel International GCSE


Time 2 hours

Paper reference **4MA1/2H**

Mathematics A

PAPER 2H

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

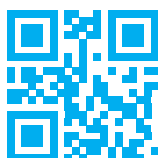
- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more 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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

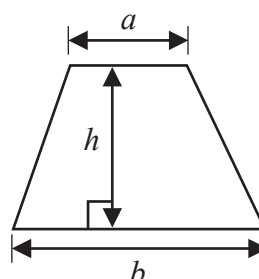
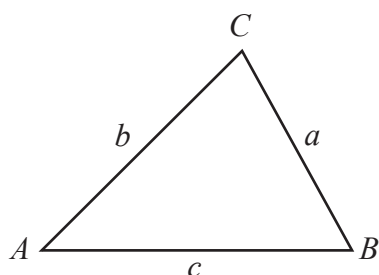
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry**

In any triangle ABC

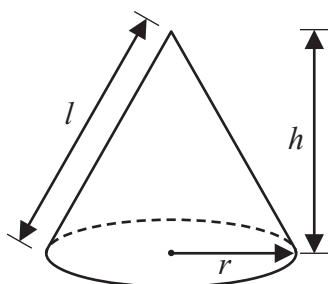
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

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

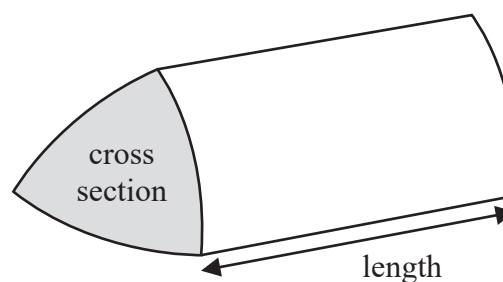
Volume of cone $= \frac{1}{3}\pi r^2 h$

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



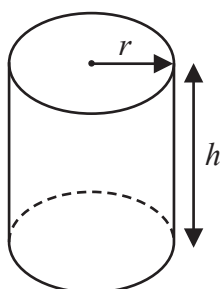
Volume of prism

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



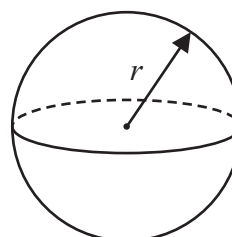
Volume of cylinder $= \pi r^2 h$

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



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

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



Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Show that $3\frac{5}{7} \div 1\frac{5}{8} = 2\frac{2}{7}$

(Total for Question 1 is 3 marks)

- 2 Change a speed of 90 kilometres per hour to a speed in metres per second.
Show your working clearly.

..... m/s

(Total for Question 2 is 3 marks)

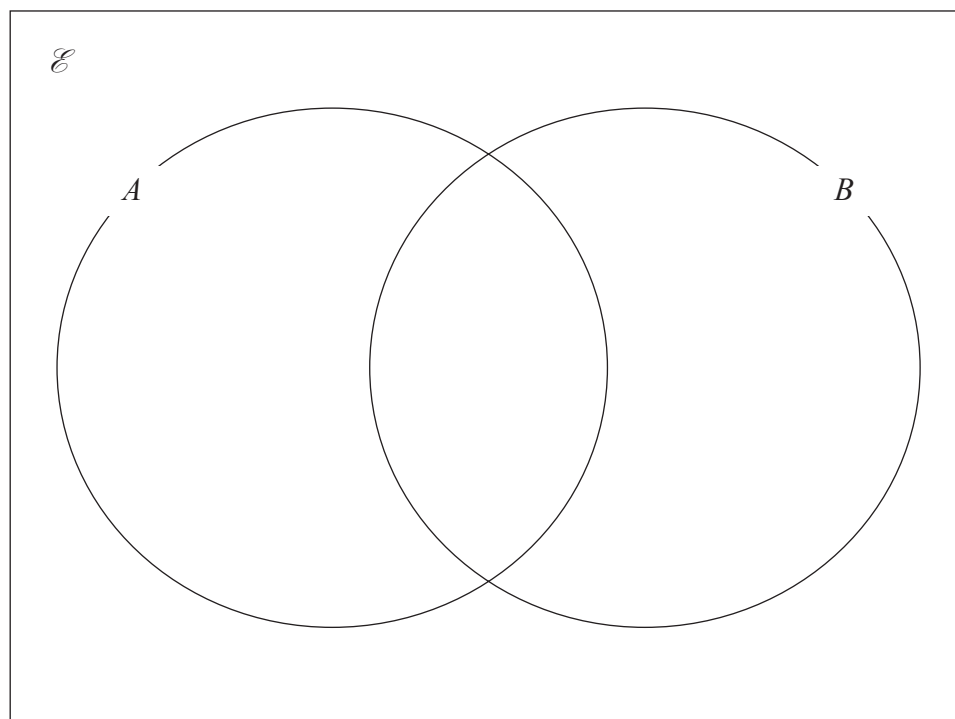
3 $\mathcal{E} = \{11, 12, 13, 14, 15, 16, 17, 18, 19, 20\}$

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

$$A \cap B = \{12, 16, 20\}$$

$$(A \cup B)' = \{17, 19\}$$

Complete the Venn diagram for the sets \mathcal{E} , A and B



(Total for Question 3 is 3 marks)

4 The diagram shows rectangle $ABCD$

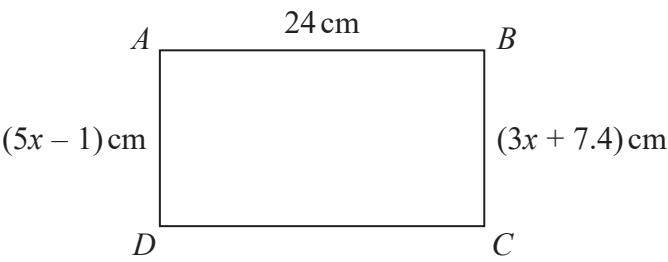


Diagram **NOT** accurately drawn

Work out the perimeter of the rectangle.
Show your working clearly.

..... cm

(Total for Question 4 is 4 marks)

5 The weight of a cake is 2.75 kg, correct to 2 decimal places.

(a) Write down the lower bound of the weight of the cake.

..... kg
(1)

(b) Write down the upper bound of the weight of the cake.

..... kg
(1)

Penny has worked out $\frac{81.3 \times 59.2}{1.9^2}$ on her calculator.

Her answer is 13 332.299 17

Penny's answer is not sensible.

(c) By rounding each number to one significant figure, work out a suitable estimate to show that her answer is not sensible.
Show your working clearly.

(2)

(Total for Question 5 is 4 marks)

- 6 The points A and B are on a coordinate grid.

The coordinates of A are $(6, 4)$

The coordinates of B are $(17, j)$ where j is a constant.

The midpoint of AB has coordinates $(k, 15)$ where k is a constant.

Find the value of j and the value of k

$$j = \dots\dots\dots$$

$$k = \dots\dots\dots$$

(Total for Question 6 is 3 marks)

- 7 Solve the simultaneous equations

$$5x + 4y = -2$$

$$2x - y = 4.4$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question 7 is 3 marks)

8 Matteo is going to invest 5000 Swiss francs for two years.

He can invest his money in Bank **G** or in Bank **H**.

Bank **G**

1.6% per year
compound interest

Bank **H**

2.9% interest added after
two years

The total amount of interest Matteo would receive at the end of two years from Bank **G** is more than the amount of interest Matteo would receive at the end of two years from Bank **H**.

How much more?

..... Swiss francs

(Total for Question 8 is 4 marks)

9 (a) Write down the value of $(m + 2)^0$ where m is a positive integer.

.....
(1)

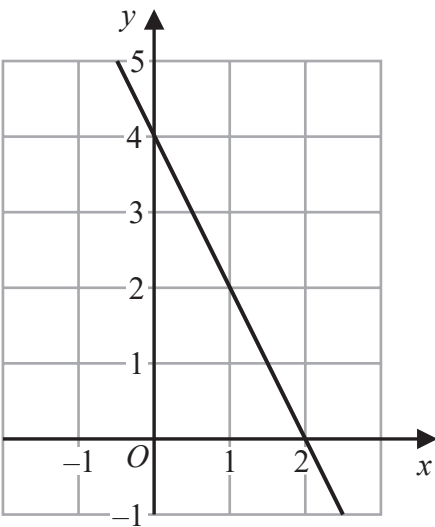
(b) Simplify $(3a^2b^4)^3$

.....
(2)

(c) Factorise fully $14x^2y^4 + 21x^3y^2$

.....
(2)

The diagram shows a straight line drawn on a grid.



(d) Write down an equation of the line.

.....
(2)

(Total for Question 9 is 7 marks)

10 The diagram shows an isosceles triangle, with base length 24 cm.

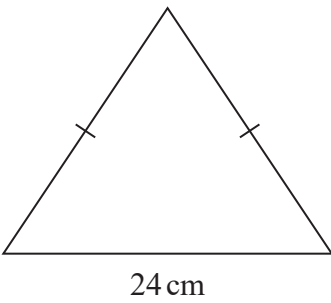


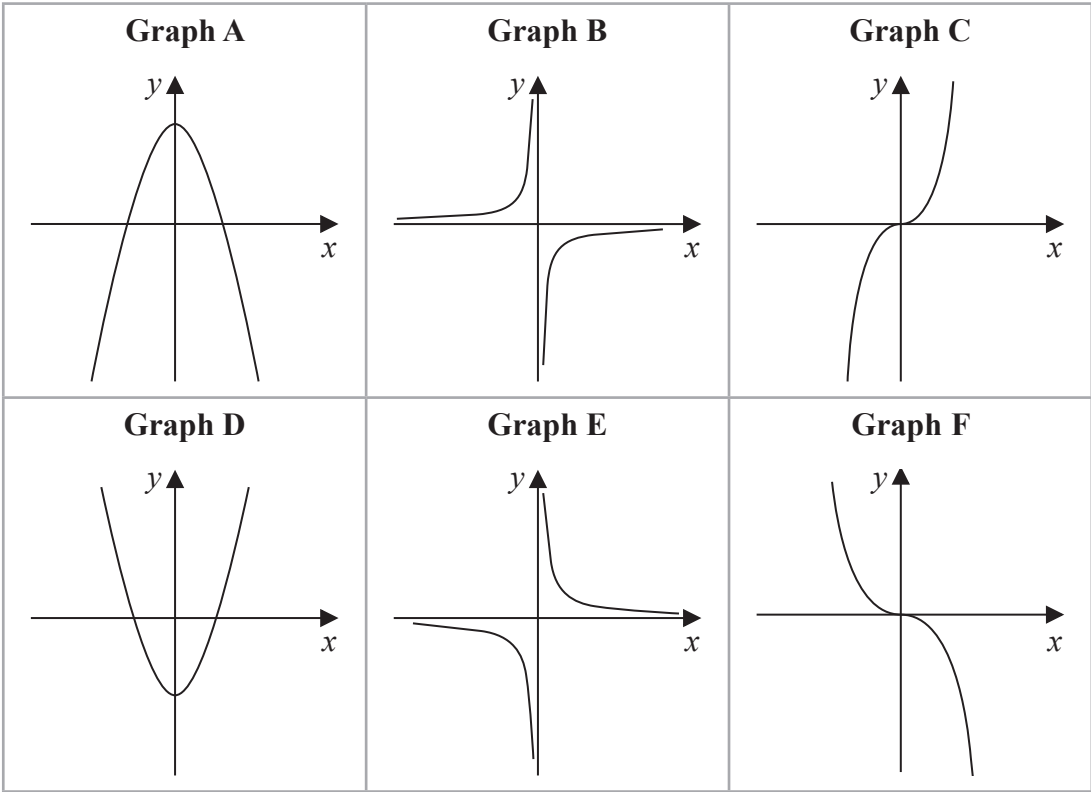
Diagram **NOT** accurately drawn

The perimeter of the triangle is 54 cm.
Work out the area of the triangle.

..... cm²

(Total for Question 10 is 5 marks)

11 Here are six graphs.

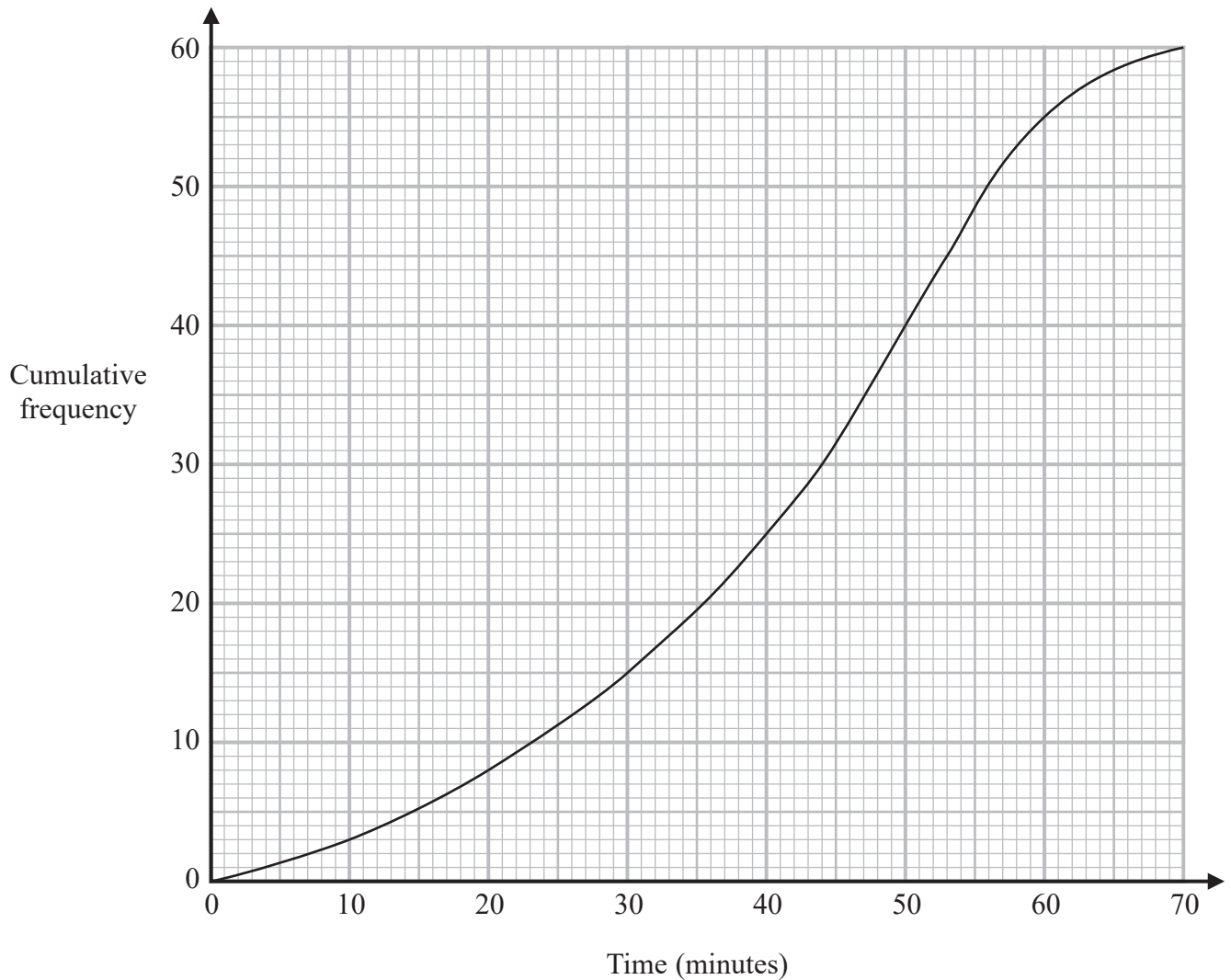


Complete the table below with the letter of the graph that could represent each given equation.
Write your answers on the dotted lines.

Equation	Graph
$y = -\frac{2}{x}$
$y = 5 - x^2$
$y = -2x^3$

(Total for Question 11 is 3 marks)

- 12 The cumulative frequency graph gives information about the time, in minutes, each of 60 people took to shop in a market.



- (a) Use the graph to find an estimate for the median time people took to shop in the market.

..... minutes
(1)

- (b) Use the graph to find an estimate for the number of people who took longer than 55 minutes to shop in the market.

.....
(2)

(c) Use the graph to complete the frequency table to give information about the time, in minutes, each of the 60 people took to shop in the market.

Time taken to shop in the market (<i>m</i> minutes)	Frequency
$0 < m \leq 10$	3
$10 < m \leq 20$	5
$20 < m \leq 30$	
$30 < m \leq 40$	
$40 < m \leq 50$	
$50 < m \leq 60$	
$60 < m \leq 70$	

(2)

(Total for Question 12 is 5 marks)

13 Solve $\frac{x + 3}{4} - \frac{7 - x}{5} = 4.3$

Show clear algebraic working.

$x =$

(Total for Question 13 is 3 marks)

14 A , B , C and D are points on a circle, centre O

EBF is the tangent to the circle at B

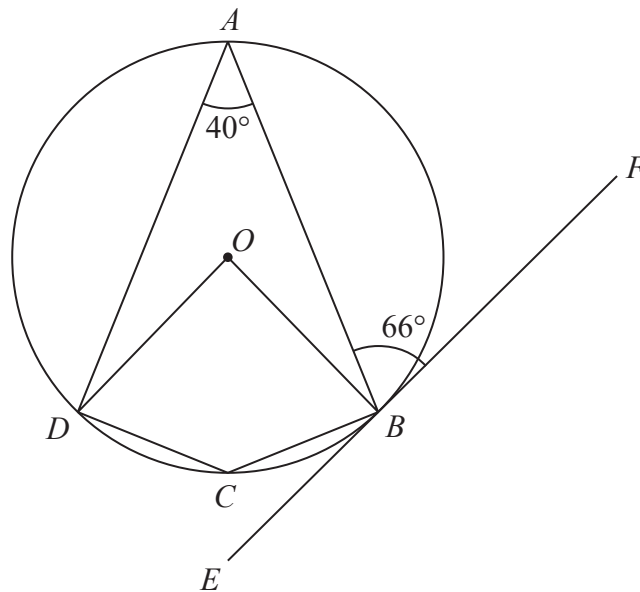


Diagram **NOT**
accurately drawn

(a) (i) Work out the size of angle DCB

(1)

(ii) Give a reason for your answer to (a)(i)

(1)

(b) Work out the size of angle ADO

(3)

(Total for Question 14 is 5 marks)

- 15** Here is a list giving the numbers of runs scored last week by the eleven members of cricket team **A**.

2 3 4 6 21 26 27 32 34 61 72

The interquartile range of the numbers of runs scored last week by the eleven members of cricket team **B** was 42

Using a suitable calculation, write down one comparison between the numbers of runs scored by the members of cricket team **A** and the members of cricket team **B**.
Show your working clearly.

(Total for Question 15 is 3 marks)

- 16** Use algebra to show that $0.4\dot{3}\dot{8} = \frac{217}{495}$

(Total for Question 16 is 2 marks)

- 17 Given that $8\sqrt{m} + \sqrt{49m} - \sqrt{9m} = k\sqrt{m}$
 where k is an integer and m is a prime number,

(a) work out the value of k

$$k = \dots\dots\dots (1)$$

- (b) Show that $\frac{5 - \sqrt{18}}{1 - \sqrt{2}}$ can be written in the form $a + b\sqrt{2}$

where a and b are integers.

Show each stage of your working clearly.

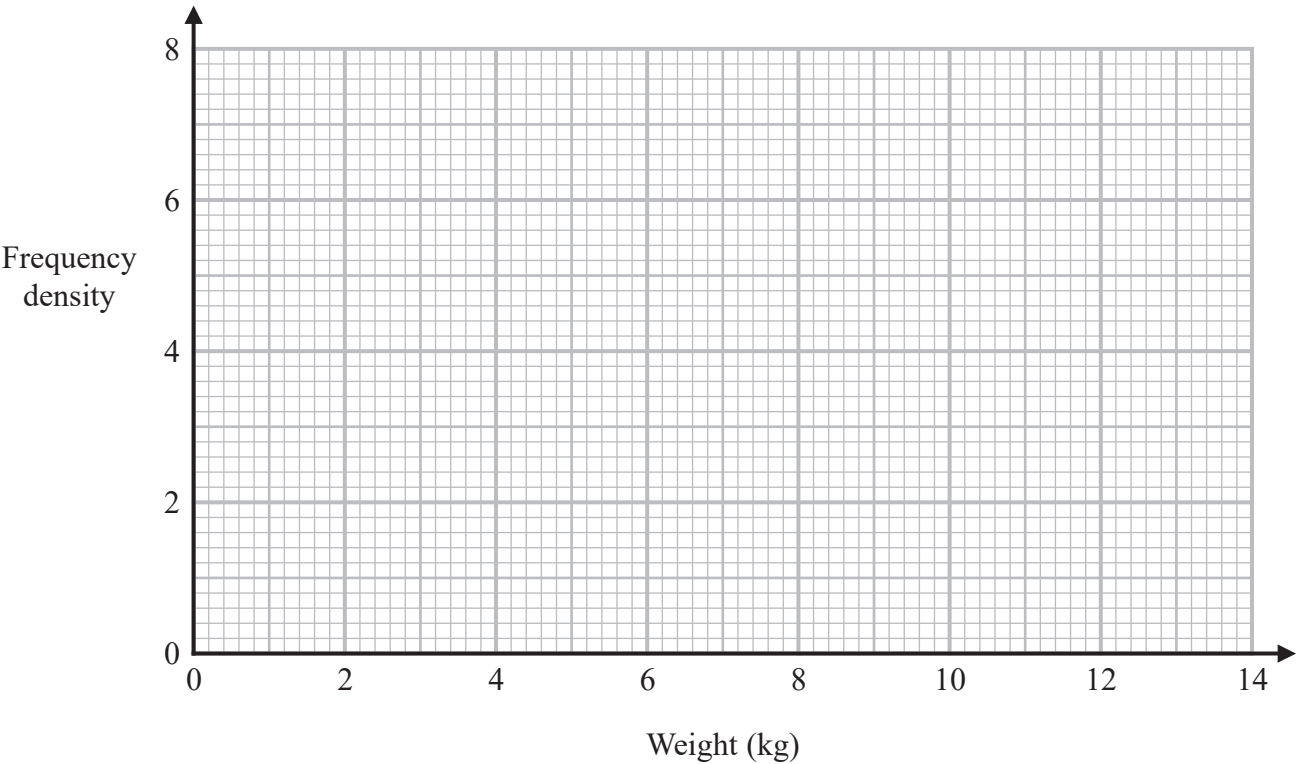
(3)

(Total for Question 17 is 4 marks)

18 The table gives information about the weights, in kg, of the parcels that Pedro delivers on Monday.

Weight (w kg)	Frequency
$0 < w \leq 2$	12
$2 < w \leq 3$	7
$3 < w \leq 6$	15
$6 < w \leq 9$	12
$9 < w \leq 14$	9

(a) On the grid, draw a histogram for this information.



(3)

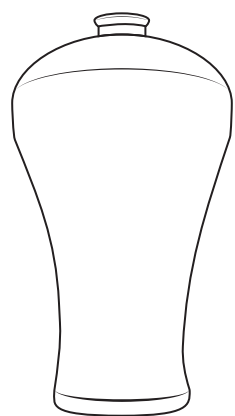
One of the parcels that Pedro delivered on Monday is chosen at random.

(b) Using the information in the table, find an estimate for the probability that this parcel weighs more than 7 kg.

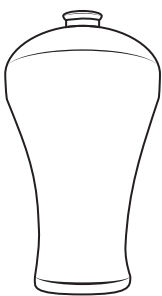
(2)

(Total for Question 18 is 5 marks)

19 **A** and **B** are two similar vases.



A



B

Diagram **NOT**
accurately drawn

The vases are such that

$$\text{surface area of vase } \mathbf{B} = \frac{25}{64} \times \text{surface area of vase } \mathbf{A}$$

and that

$$\text{volume of vase } \mathbf{A} - \text{volume of vase } \mathbf{B} = 541.8 \text{ cm}^3$$

Calculate the volume of vase **B**

..... cm³

(Total for Question 19 is 4 marks)

20 Solve the simultaneous equations

$$\begin{aligned}y &= 7 - 2x \\ x^2 + y^2 &= 34\end{aligned}$$

Show clear algebraic working.

.....
(Total for Question 20 is 5 marks)

21 Given that the surface area of a sphere is $49\pi\text{cm}^2$

find the volume of the sphere.

Give your answer correct to the nearest integer.

..... cm^3

(Total for Question 21 is 3 marks)

- 22** Solve the inequality $6x^2 + 37x \leq 35$
Show clear algebraic working.

(Total for Question 22 is 3 marks)

Turn over for Question 23

23 The diagram shows a solid prism $ABCDEFGHIJ$

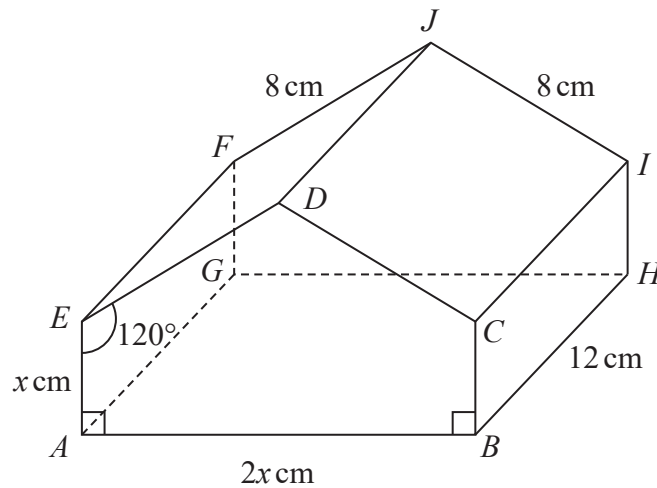


Diagram **NOT**
accurately drawn

The prism is such that each cross section is a pentagon where

$$AE = BC = x \text{ cm}$$

$$AB = 2x \text{ cm}$$

$$ED = CD = 8 \text{ cm}$$

$$\text{angle } EAB = \text{angle } CBA = 90^\circ$$

$$\text{angle } AED = \text{angle } BCD = 120^\circ$$

Given that $AG = BH = EF = DJ = CI = 12 \text{ cm}$

calculate the angle that AJ makes with the base $ABHG$ of the prism.

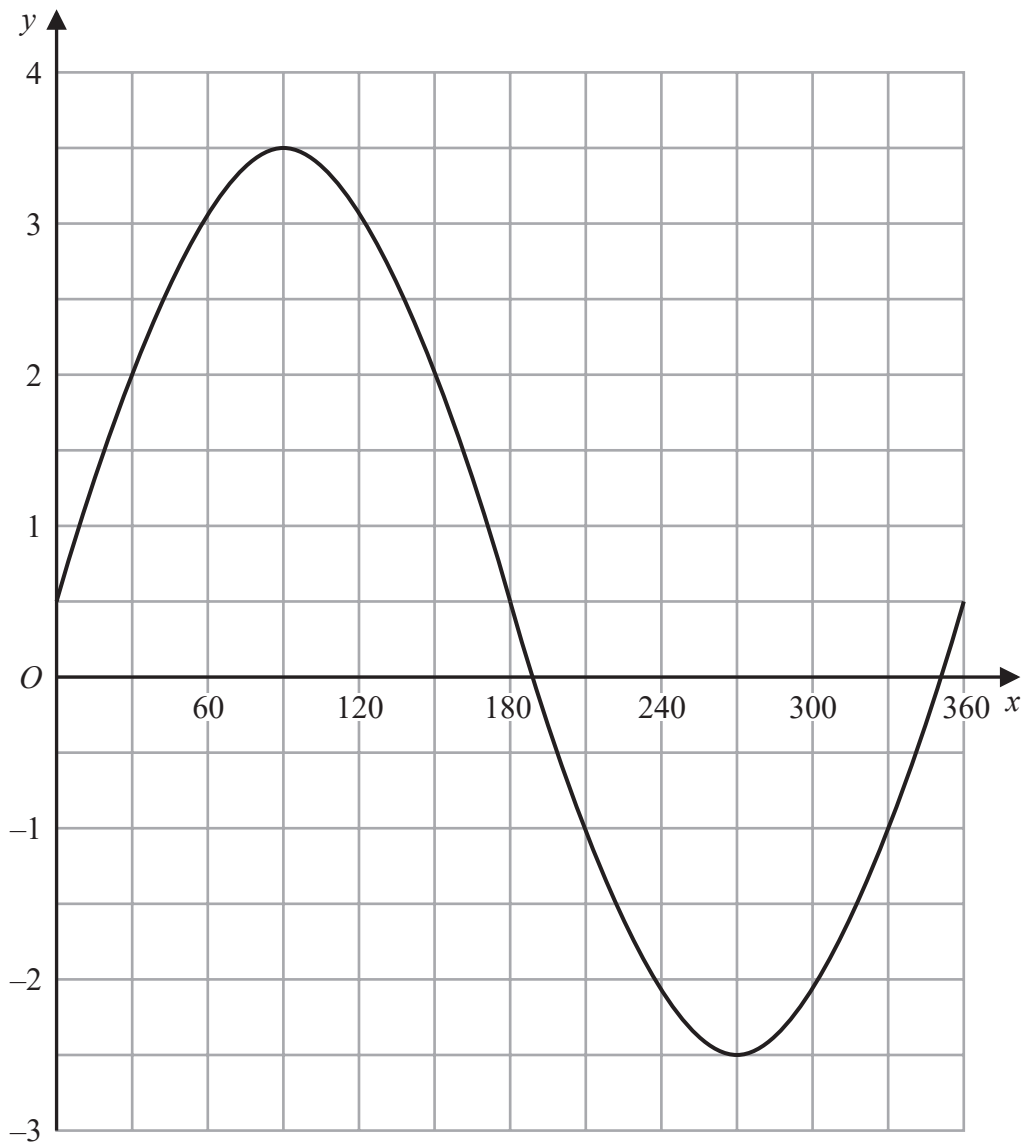
Give your answer correct to 3 significant figures.

o

(Total for Question 23 is 5 marks)

Turn over for Question 24

24 The graph of $y = a \sin x^\circ + b$ is drawn on the grid.



Find the value of a and the value of b

$a =$

$b =$

(Total for Question 24 is 2 marks)

25 The function f is such that $f(x) = 3x^2 - 12x + 7$ where $x \leq 2$

Express the inverse function f^{-1} in the form $f^{-1}(x) = \dots$

$f^{-1}(x) = \dots\dots\dots$

(Total for Question 25 is 4 marks)

26 Find the values of n such that

$$\frac{10^{4n} \times 2^{3(n^2-5n)} \times 5^{2(1-2n)}}{20^2} = 1$$

Show clear algebraic working.

(Total for Question 26 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

BLANK PAGE

Please check the examination details below before entering your candidate information


Candidate surname					Other names				
Centre Number					Candidate Number				

Pearson Edexcel International GCSE

Time 2 hours

Paper reference **4MA1/2HR**

Mathematics A
PAPER 2HR
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.
- 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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

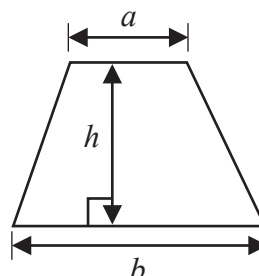
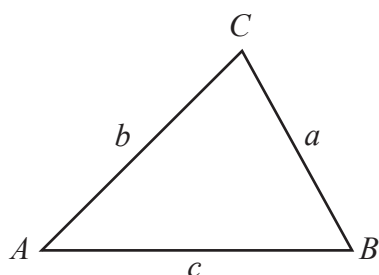
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

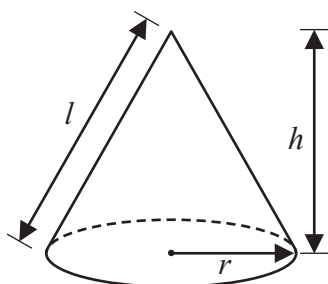
$$\text{Sine Rule } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

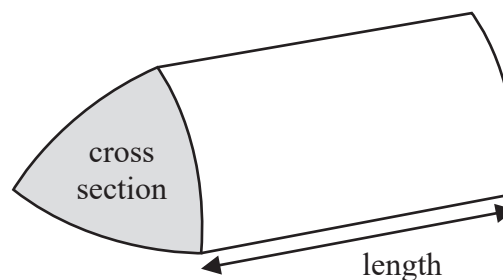
$$\text{Area of triangle} = \frac{1}{2}ab \sin C$$

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

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

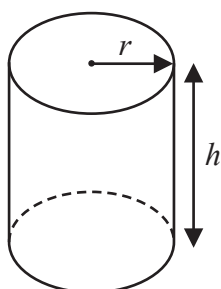
**Volume of prism**

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



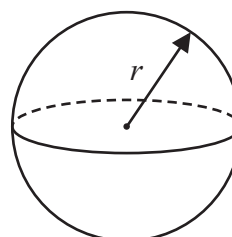
$$\text{Volume of cylinder} = \pi r^2 h$$

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



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

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



Answer ALL TWENTY SIX questions.

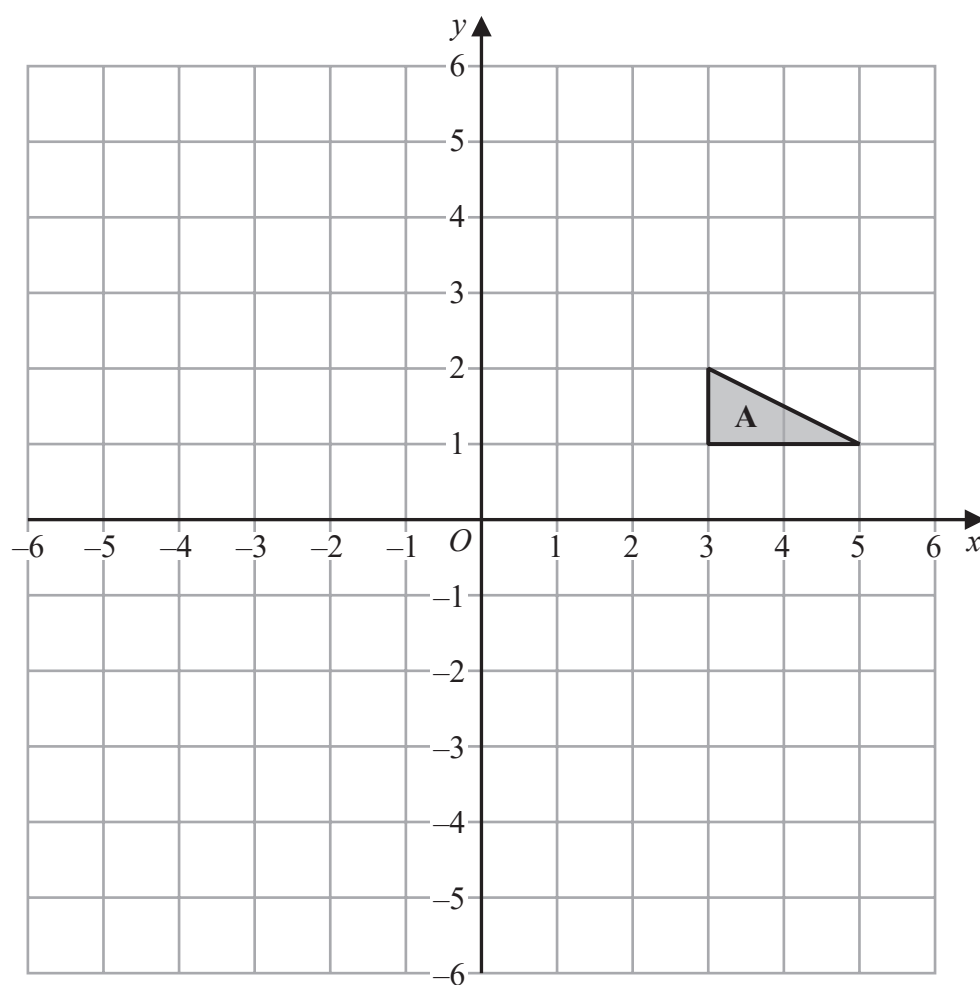
Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Show that $4\frac{2}{3} \div 1\frac{5}{6} = 2\frac{6}{11}$

(Total for Question 1 is 3 marks)

2



- (a) On the grid, rotate triangle **A** 180° about $(1, -1)$
Label the new triangle **B**

(2)

- (b) On the grid, translate triangle **A** by the vector $\begin{pmatrix} -7 \\ 3 \end{pmatrix}$

Label the new triangle **C**

(1)

(Total for Question 2 is 3 marks)

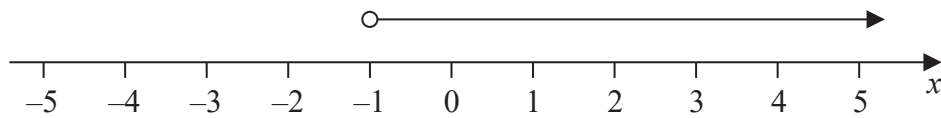
3 $-8 < 2y \leq 2$

y is an integer.

(a) Find all the possible values of y

(2)

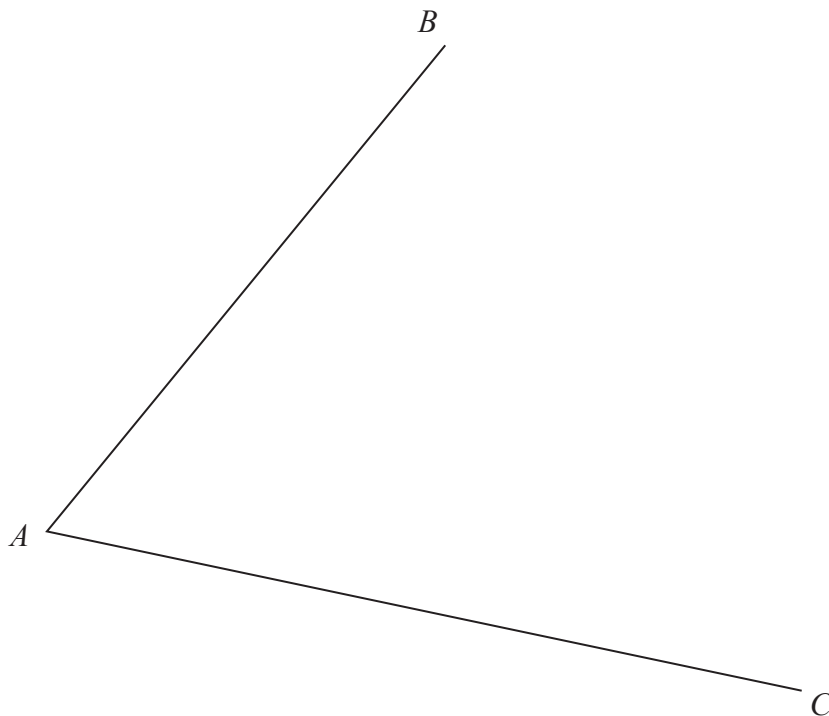
(b) Write down the inequality shown on the number line.



(1)

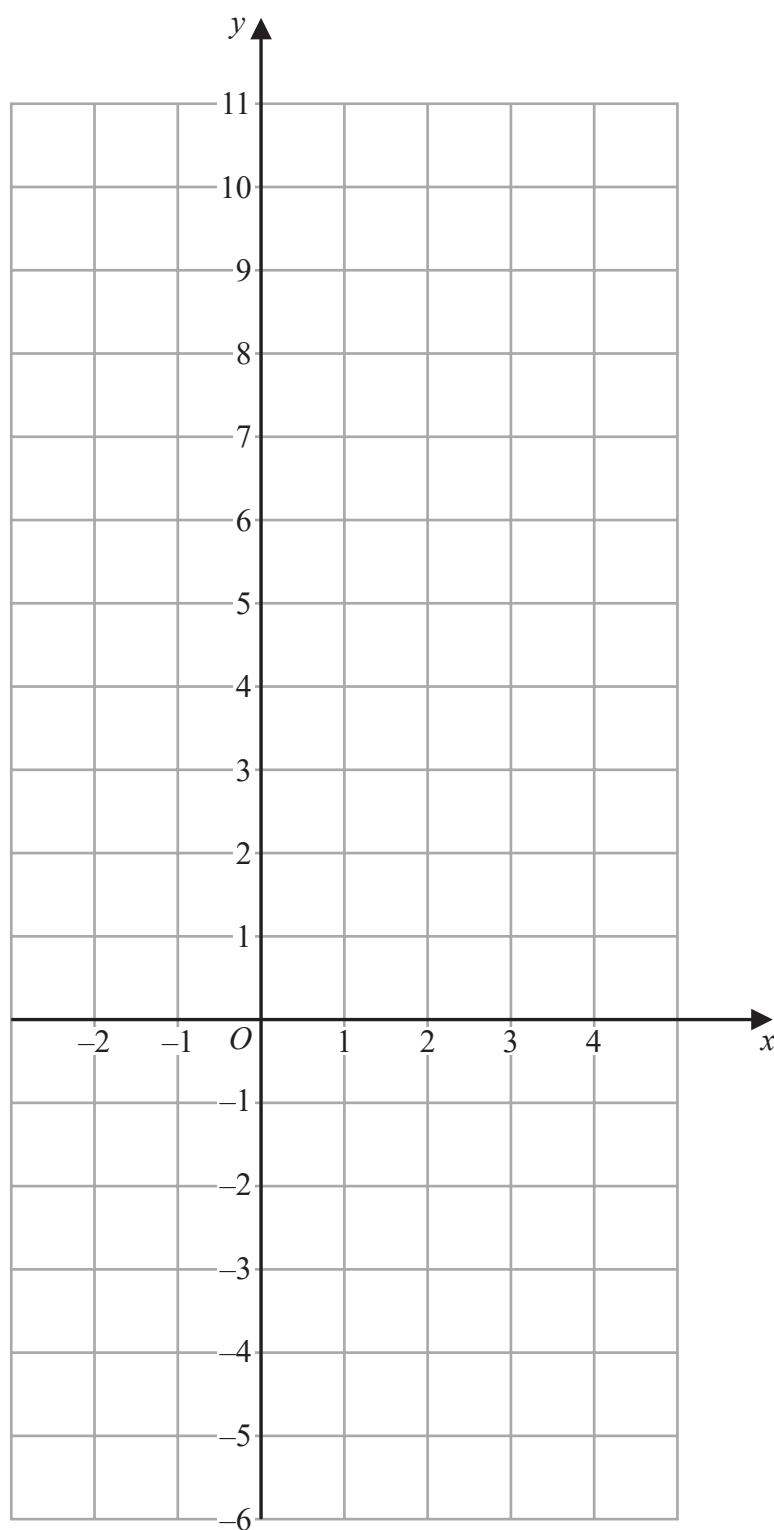
(Total for Question 3 is 3 marks)

4 Using ruler and compasses only, construct the bisector of angle BAC
You must show all your construction lines.



(Total for Question 4 is 2 marks)

- 5 On the grid, draw the graph of $5x + 2y = 10$ for values of x from -2 to 4



(Total for Question 5 is 3 marks)

- 6 In a bag, there are only red counters, blue counters, green counters and yellow counters.

The total number of counters in the bag is 80

In the bag

the number of red counters is $x + 7$

the number of blue counters is $x - 11$

the number of green counters is $3x$

Jude takes at random a counter from the bag.

The probability that he takes a red counter is $\frac{1}{4}$

Work out the probability that Jude takes a yellow counter.

.....
(Total for Question 6 is 4 marks)

7 (a) Find the highest common factor (HCF) of 200 and 420

.....
(2)

$$A = 2^3 \times 3 \times 5 \times 7^2$$

$$B = 2 \times 3^2 \times 7$$

$$C = 3 \times 5^2 \times 11$$

(b) Find the lowest common multiple (LCM) of A , B and C
Write your answer as a product of powers of prime factors.

.....
(2)

(Total for Question 7 is 4 marks)

8 60 students sat a Mathematics exam.

The mean mark for the 32 students in Class A was 55

The mean mark for the 28 students in Class B was 52

Find the mean mark for all 60 students.

.....
(Total for Question 8 is 3 marks)

- 9 Teresa invests \$2000 for 3 years in a savings account.
She gets 4% each year compound interest.

(a) How much money will Teresa have in her savings account at the end of 3 years?
Give your answer correct to the nearest dollar.

\$.....
(3)

Sam invested \$ T
The value of his investment decreased by 9% each year.

At the end of the first year, the value of Sam's investment was \$1365

(b) Work out the value of T

.....
(3)

(Total for Question 9 is 6 marks)

10 The diagram shows two solids, **A** and **B**, made from two different metals.

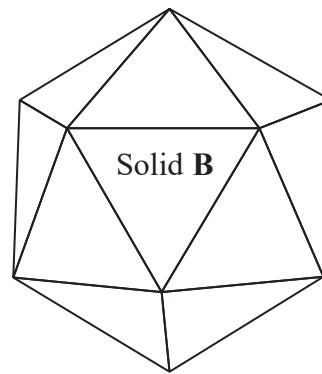
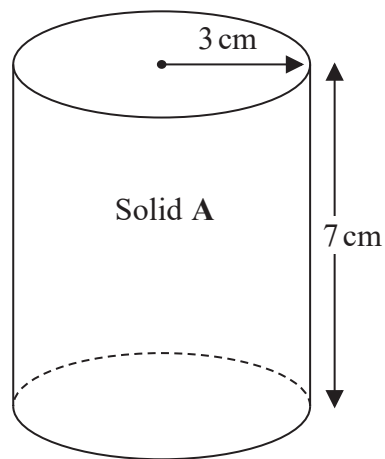


Diagram **NOT**
accurately drawn

Solid **A** is in the shape of a cylinder with radius 3 cm and height 7 cm

Solid **A** has a mass of 2000 g

Solid **B** has a mass of 3375 g

Solid **B** has a volume of 450 cm^3

All of the metal from Solid **A** and Solid **B** is melted down to make a uniform Solid **C**

Given that there is no change to mass or volume during this process

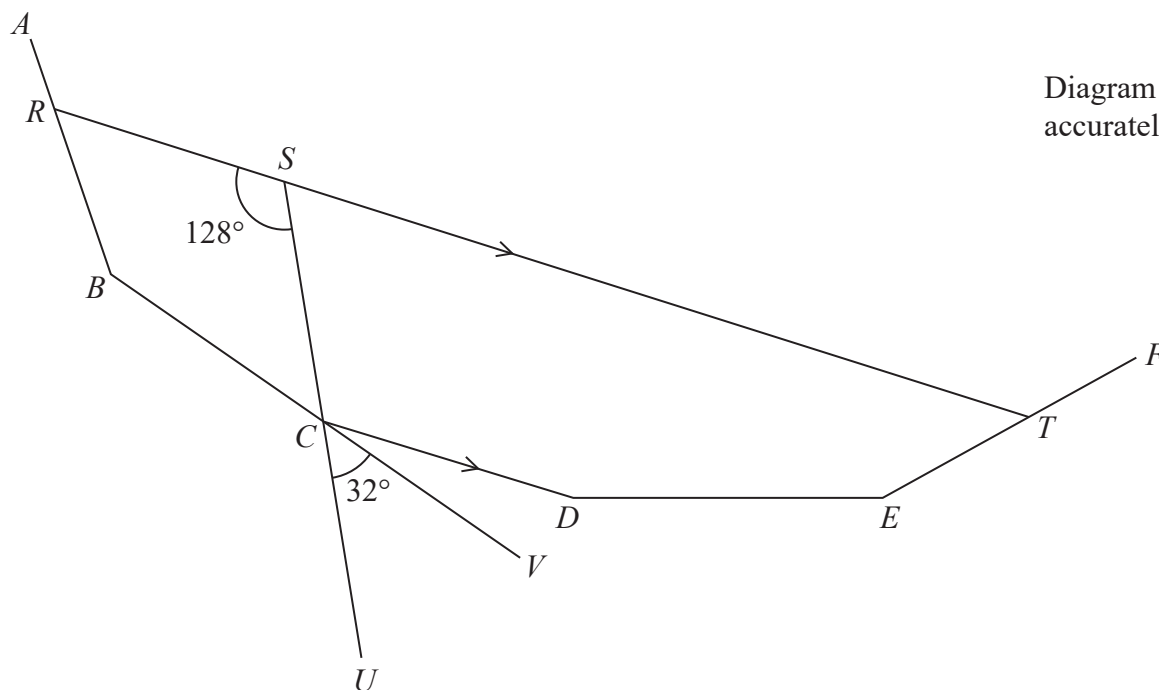
work out the density of Solid **C**

Give your answer correct to one decimal place.

..... g/cm^3

(Total for Question 10 is 3 marks)

11



AB , BC , CD , DE and EF are five sides of a regular polygon.

RST , SCU and BCV are straight lines.

RST is parallel to CD

Angle $RSC = 128^\circ$

Angle $UCV = 32^\circ$

Work out how many sides the polygon has.

Show your working clearly.

(Total for Question 11 is 4 marks)

12 (a) Simplify $\frac{2}{y^0}$

.....
(1)

(b) Simplify fully $(16a^4)^{\frac{3}{4}}$

.....
(2)

(c) Expand and simplify $5x(3x + 4)(2x - 1)$

.....
(3)

(Total for Question 12 is 6 marks)

13 A rectangle has length L and width W

L is increased by 20%

W is decreased by 35%

Calculate the percentage reduction in the area of the rectangle.

.....%

(Total for Question 13 is 3 marks)

14 A , B and C are points on a circle, centre O

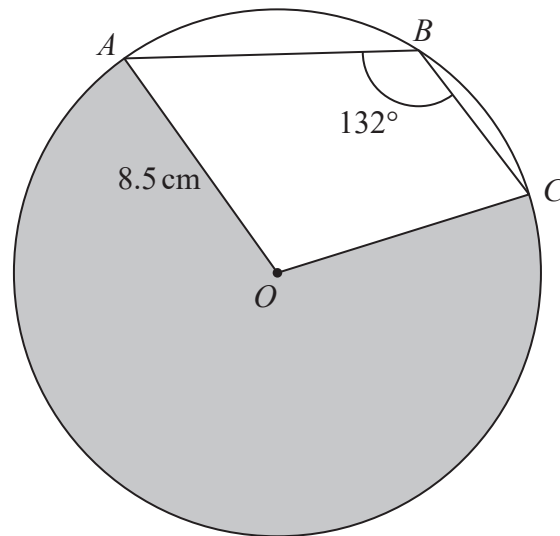


Diagram **NOT**
accurately drawn

The radius of the circle is 8.5 cm

Angle $ABC = 132^\circ$

Work out the perimeter of the shaded sector AOC

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 14 is 3 marks)

15 Here are the numbers of aces that Rutger served in each of 11 tennis matches.

1 1 2 4 6 8 8 9 11 12 15

- (a) Find the interquartile range of the numbers of aces.
Show your working clearly.

.....
(2)

Kim also plays in 11 tennis matches.

For Kim

the median number of aces is 11

the interquartile range of the numbers of aces is 5

- (b) State, giving a reason, whether Rutger or Kim

- (i) served more aces on average,

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

- (ii) was more consistent with the number of aces served.

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

(Total for Question 15 is 4 marks)

16 Here are two vectors.

$$\overrightarrow{BA} = \begin{pmatrix} -5 \\ 4 \end{pmatrix} \quad \overrightarrow{BC} = \begin{pmatrix} 9 \\ 1 \end{pmatrix}$$

Find \overrightarrow{AC} as a column vector.

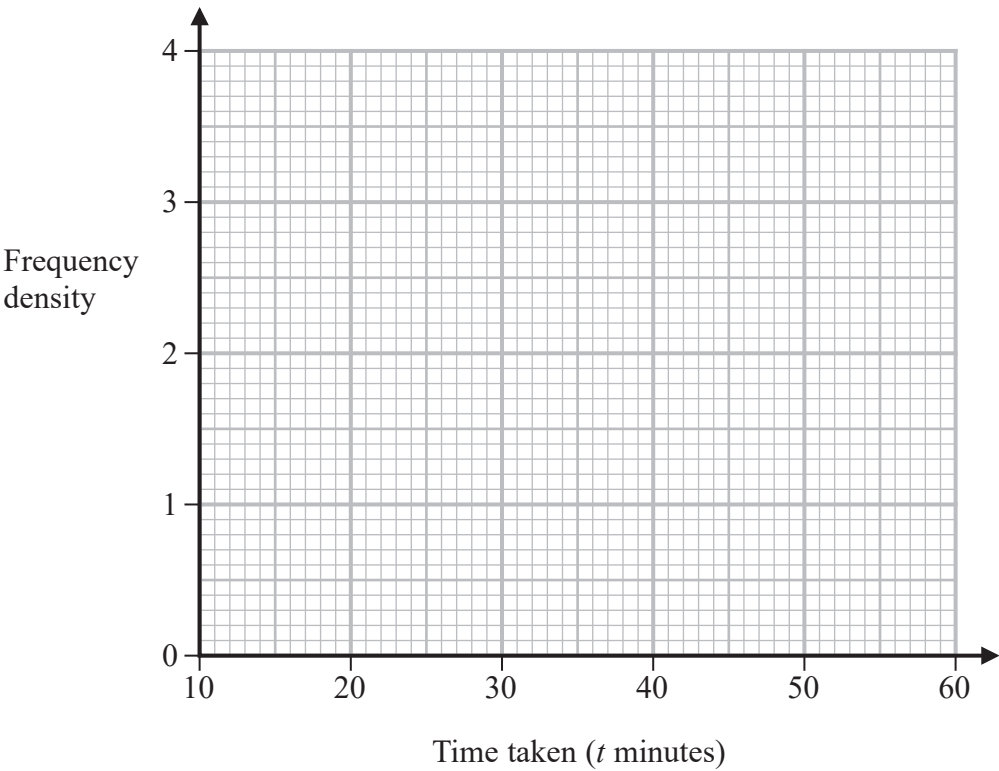
$$\overrightarrow{AC} = \begin{pmatrix} \\ \dots\dots\dots \\ \dots\dots\dots \end{pmatrix}$$

(Total for Question 16 is 2 marks)

17 The table gives information about the time taken by each student in Year 11 to complete a homework task.

Time taken (t minutes)	Frequency
$10 < t \leq 25$	15
$25 < t \leq 30$	18
$30 < t \leq 50$	32
$50 < t \leq 60$	4

(a) On the grid, draw a histogram for this information.



(3)

One of these students who took 50 minutes or less and more than 25 minutes to complete this homework task is chosen at random.

(b) Find an estimate for the probability that this student took 45 minutes or less to complete this homework task.

(2)

(Total for Question 17 is 5 marks)

18 A statue and a model of the statue are mathematically similar.

The statue has a total surface area of 3600 cm^2

The model has a total surface area of 625 cm^2

The volume of the model is 750 cm^3

Work out the volume of the statue.

..... cm^3

(Total for Question 18 is 3 marks)

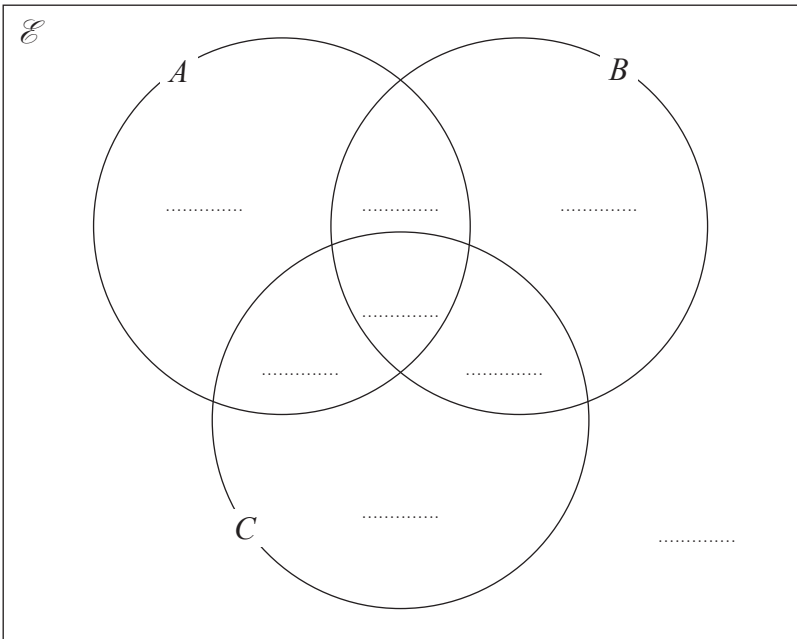
- 19** Prove algebraically that, for any three consecutive even numbers,
- the sum of the squares of the smallest even number and the largest even number is 8 more than twice the square of the middle even number.

(Total for Question 19 is 3 marks)

20 A , B and C are three sets.

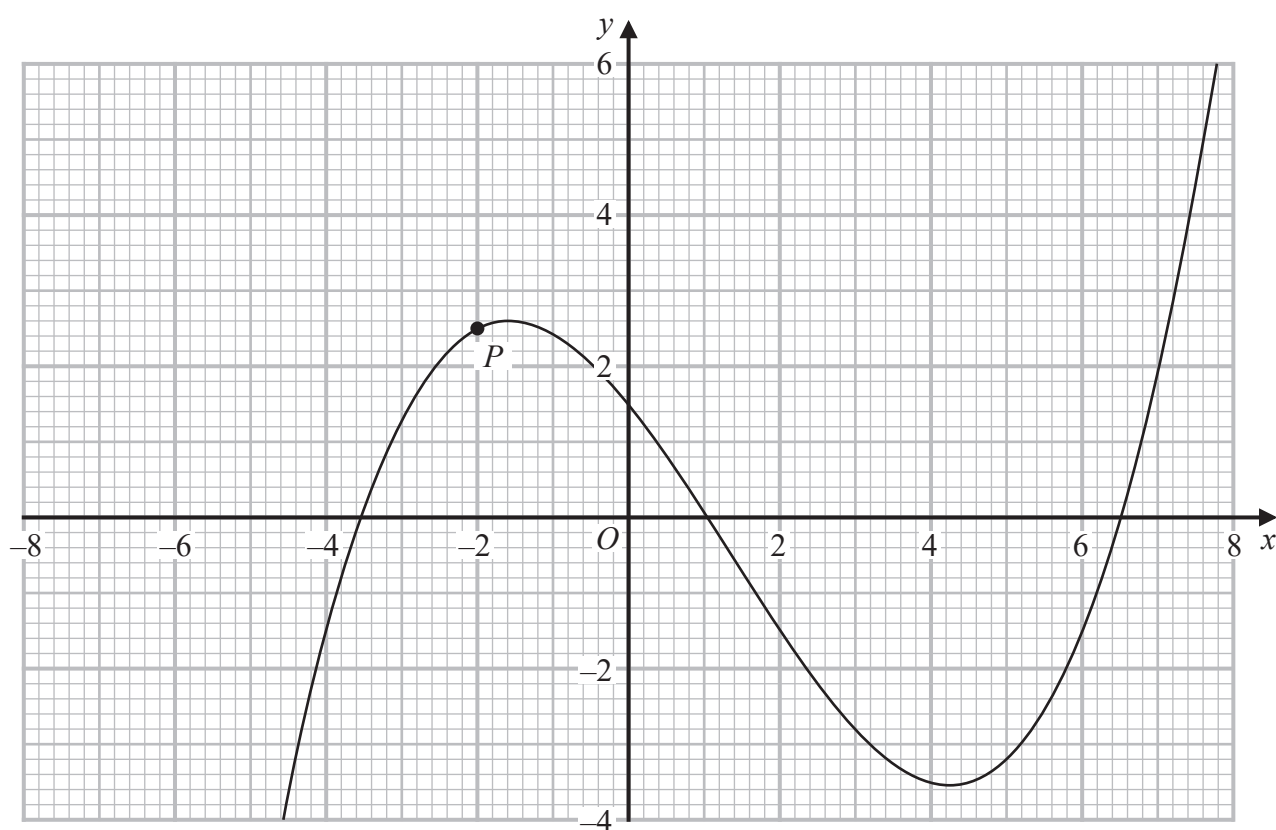
$n(A \cap B \cap C) = 5$
 $n(A \cap B \cap C') = 2$
 $n(A \cap C) = 5$
 $n(A) = 17$
 $n([A \cup B \cup C]') = 3$
 $n(A' \cap B \cap C') = 6$
 $n(B \cap C) = 7$
 $n(C) = 14$

Complete the Venn diagram to show the number of elements in each region.



(Total for Question 20 is 4 marks)

21 The diagram shows the graph of $y = f(x)$



The point P has x coordinate -2

Use the graph to find an estimate for the gradient of the curve at P

.....
(Total for Question 21 is 3 marks)

22 Solve the simultaneous equations

$$\begin{aligned}2y^2 + x^2 &= -6x + 42 \\ 2x + y &= -3\end{aligned}$$

Show clear algebraic working.

.....
(Total for Question 22 is 5 marks)

23 AEC and BED are chords of a circle.

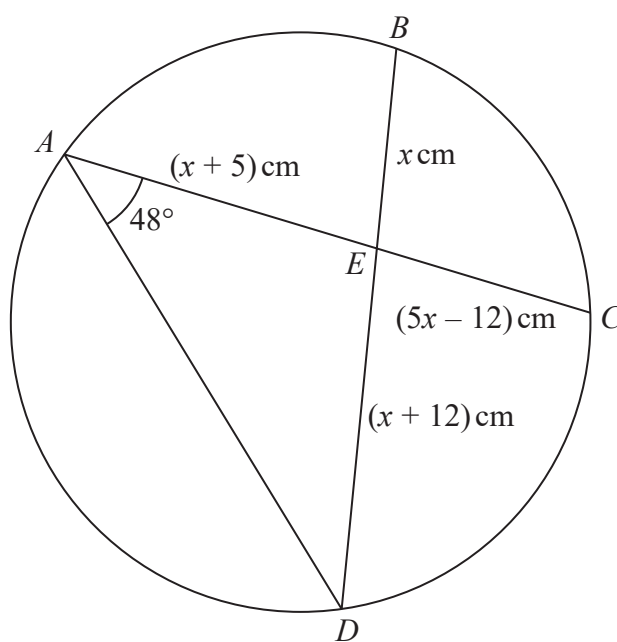


Diagram **NOT**
accurately drawn

$$AE = (x + 5) \text{ cm} \quad BE = x \text{ cm} \quad CE = (5x - 12) \text{ cm} \quad DE = (x + 12) \text{ cm}$$

$$\text{Angle } DAE = 48^\circ$$

Work out the size of angle ADE

Give your answer correct to one decimal place.

o

(Total for Question 23 is 5 marks)

Turn over for Question 24

24 The diagram shows a solid cone and a solid sphere.

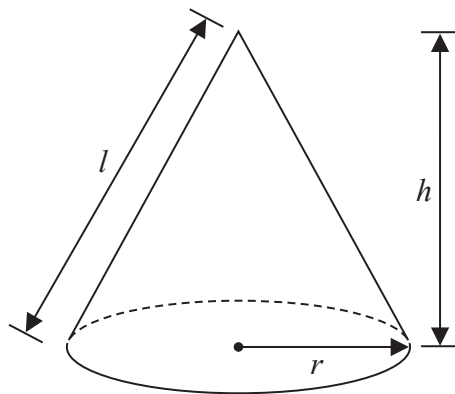
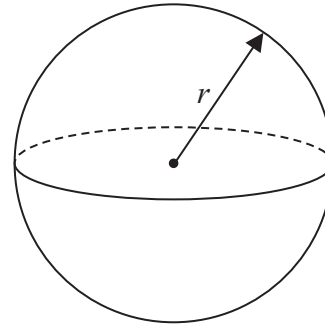


Diagram **NOT**
accurately drawn



The cone has base radius r , slant height l and perpendicular height h
The sphere has radius r

The base radius of the cone is equal to the radius of the sphere.

Given that

$$k \times \text{volume of the cone} = \text{volume of the sphere}$$

show that the **total** surface area of the cone can be written in the form

$$\pi r^2 \left(\frac{k + \sqrt{k^2 + a}}{k} \right)$$

where a is a constant to be found.

(Total for Question 24 is 6 marks)

Turn over for Question 25

25 $ABCD$ is a trapezium with AB parallel to DC

A is the point with coordinates $(-4, 6)$

B is the point with coordinates $(2, 3)$

D is the point with coordinates $(-1, 8)$

The trapezium has one line of symmetry.

The line of symmetry intersects CD at the point E

Work out the coordinates of the point E

(..... ,)

(Total for Question 25 is 6 marks)

Turn over for Question 26

26 Write

$$\frac{4x^2 - 17x - 15}{2x - 1} \times \frac{2x^2 - 7x + 3}{x^2 - 25} + (29 - 4x)$$

as a single fraction in its simplest form.

.....
(Total for Question 26 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

Pearson Edexcel International GCSE

Wednesday 7 June 2023


Morning (Time: 2 hours)

Paper reference **4MA1/2HR**

Mathematics A

PAPER 2HR

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.
- 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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

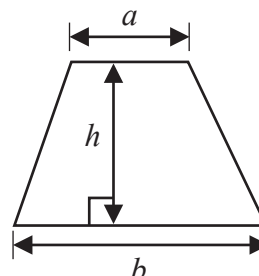
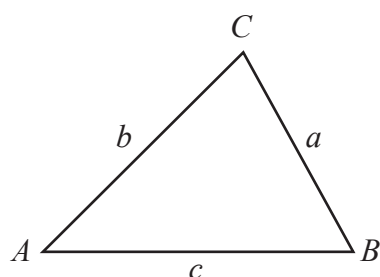
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

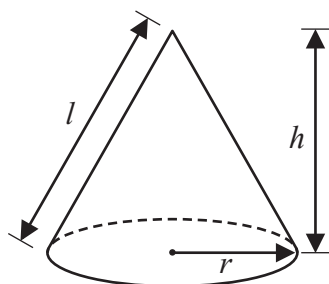
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

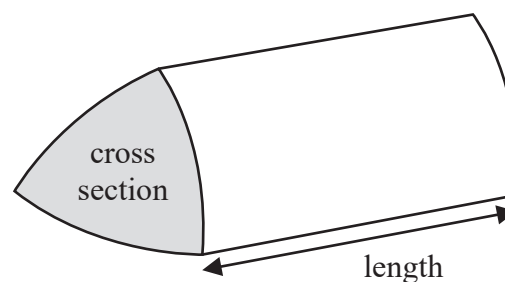
Area of triangle $= \frac{1}{2}ab \sin C$

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

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

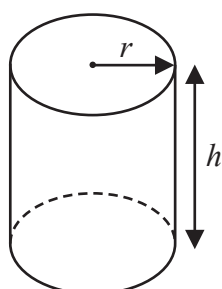
**Volume of prism**

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



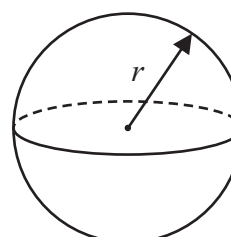
Volume of cylinder $= \pi r^2 h$

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



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

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



Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 $P = m^2 - 4c$

(a) Work out the value of P when $m = -5$ and $c = 3$

$$P = \dots\dots\dots$$

(2)

(b) Expand and simplify $(x + 5)(x - 7)$

$$\dots\dots\dots$$

(2)

(Total for Question 1 is 4 marks)

- 2 Sandeep wants to buy some packets of pens and some boxes of pencils for his stationery shop.

Each packet of pens contains 9 pens.

Each box of pencils contains 12 pencils.

Each packet of pens costs £7.60

Each box of pencils costs £4.80

Sandeep can only buy full packets of pens and full boxes of pencils.

He wants to buy exactly the same number of pens as pencils.

Work out the minimum amount Sandeep needs to pay.

£.....

(Total for Question 2 is 4 marks)

- 3 Anjali travels on the Eurostar train from Paris to Amsterdam.

The distance the train travels between Paris and Amsterdam is 515 km.
The time taken by the train to travel between Paris and Amsterdam is 3 hours 18 minutes.

Work out the average speed of the train.

Give your answer in km/h correct to the nearest whole number.

..... km/h

(Total for Question 3 is 3 marks)

- 4 Here are the first four terms of an arithmetic sequence.

38 31 24 17

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

.....

(Total for Question 4 is 2 marks)

- 5 A field is in the shape of a trapezium.

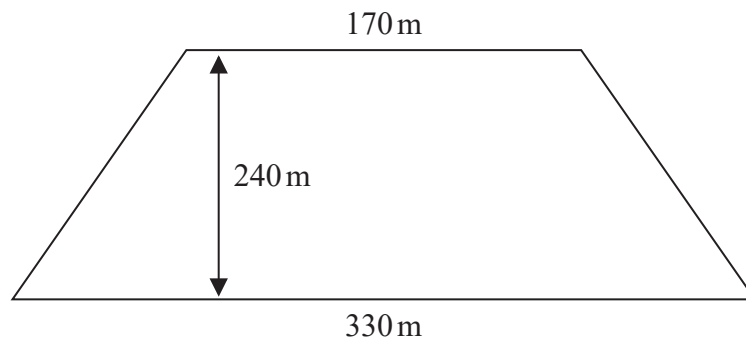


Diagram **NOT**
accurately drawn

The field is sold for a price of \$49 650

Given that 1 hectare = 10 000 m²

work out the average price of the field per hectare.

\$.....

(Total for Question 5 is 4 marks)

6 In his previous job, Pierre was paid 400 euros in total for working a 5-day week.

In his new job, Pierre is paid 14 euros per hour.

In his new job, Pierre works for 7 hours each day for a 5-day week.

(a) Work out the percentage increase in the amount that Pierre is paid for a 5-day week.

..... %
(4)

Marie changes her job.

Her salary decreases by 6%

Her new salary is 23 030 euros.

(b) Work out Marie's salary before she changes her job.

..... euros
(3)

(Total for Question 6 is 7 marks)

7 (a) Simplify $(4^{-2})^0$

.....
(1)

$$3^{-14} \times 3^8 = 3^m$$

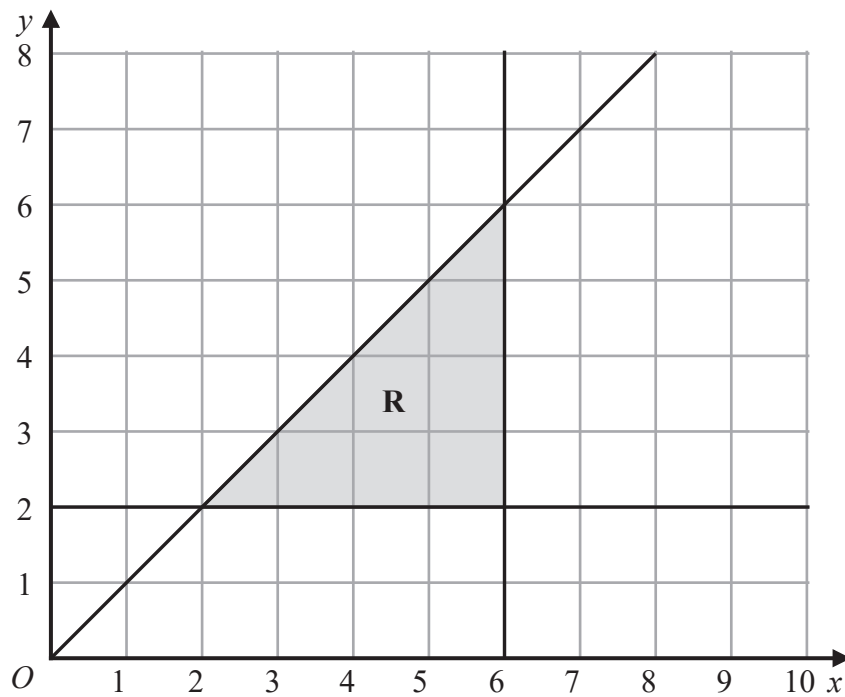
(b) Find the value of m

$m =$
(1)

(Total for Question 7 is 2 marks)

8 (a) Solve $9 - 4x > 17$

.....
(2)



(b) Write down the three inequalities that represent the shaded region **R**

.....
.....
.....
(3)

(Total for Question 8 is 5 marks)

- 9 The diagram shows a rectangular sheet of metal $ABCD$

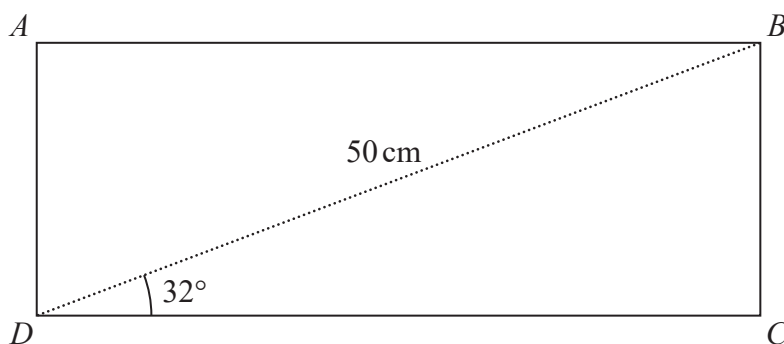


Diagram **NOT**
accurately drawn

$BD = 50$ cm and angle $BDC = 32^\circ$

Nasser joins side AD to side BC to form a cylinder.

BC is the height of the cylinder.

DC is the circumference of the cross section of the cylinder.

Work out the volume, in cm^3 , of the cylinder.

Give your answer correct to 3 significant figures.

..... cm³

(Total for Question 9 is 6 marks)

10 Gemara works as a taxi driver.

Last week, he recorded the following information about the distances he drove.

For the 5 days from Monday to Friday, the mean number of kilometres he drove was 104

For the 7 days from Monday to Sunday, the mean number of kilometres he drove was 127

On Saturday, Gemara drove 132 kilometres.

Work out the number of kilometres he drove on Sunday.

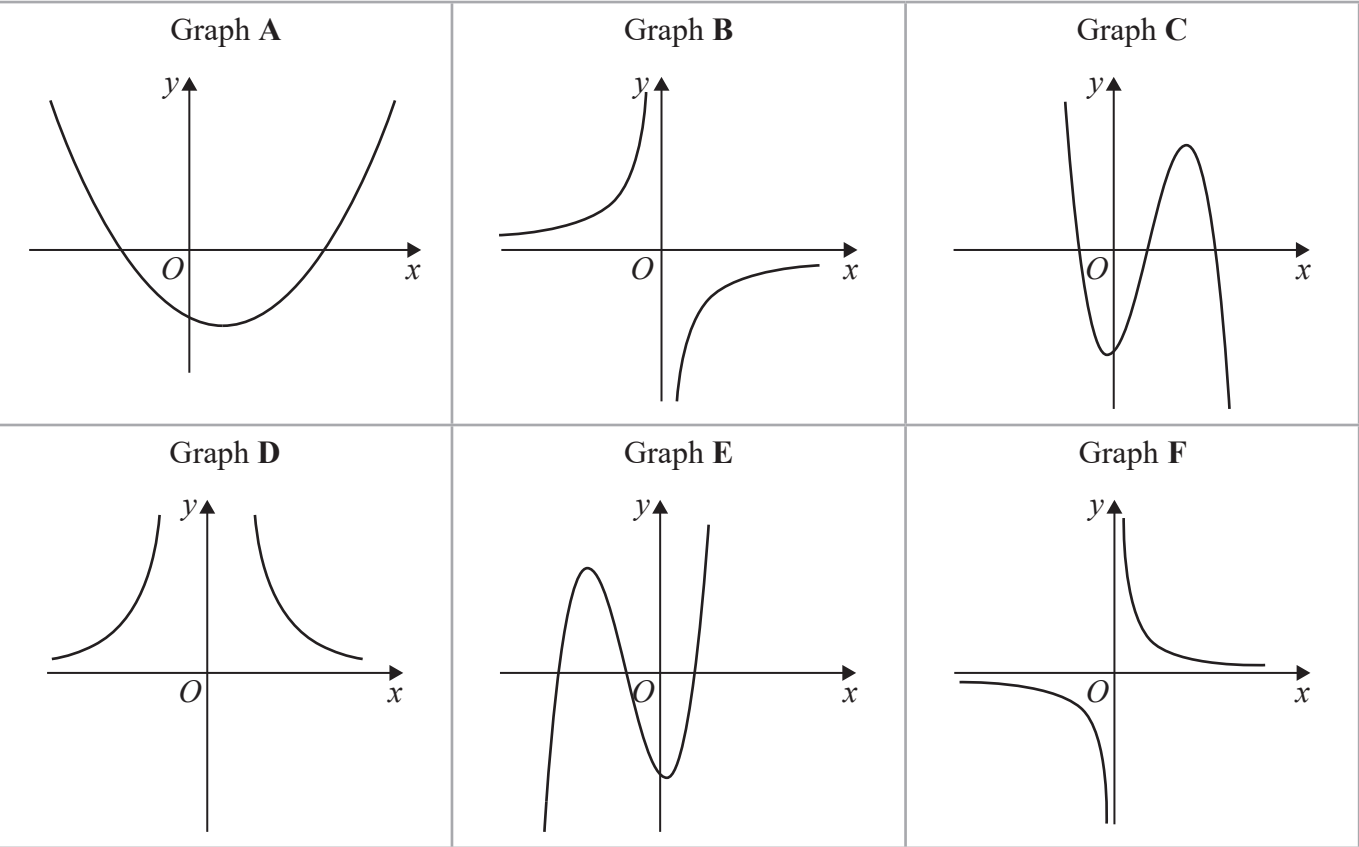
..... kilometres

(Total for Question 10 is 3 marks)

11 Express $\left(\frac{m^6 k^{10}}{25}\right)^{\frac{3}{2}}$ in the form $\frac{m^a k^b}{c}$ where a , b and c are integers to be found.

(Total for Question 11 is 2 marks)

12 Here are six graphs.



Write down the letter of the graph of

(a) $y = \frac{10}{x^2}$

.....
(1)

(b) $y = x - 3 + 3x^2 - x^3$

.....
(1)

(c) $y = -\frac{3}{x}$

.....
(1)

(Total for Question 12 is 3 marks)

13 Feruzi invests 80 000 Kenyan shillings (KES)

He invests the money for 3 years at $x\%$ compound interest each year.

At the end of 3 years, the total interest he receives is 6151.25 KES

Work out the value of x

$x = \dots\dots\dots$

(Total for Question 13 is 3 marks)

14 Akari played a computer game eleven times.
Here are her scores.

25 20 28 27 26 22 23 29 20 29 26

(a) Find the interquartile range of her scores.

(3)

Machi played the same computer game eleven times.
The interquartile range for Machi’s scores was 9

(b) Who had the more consistent scores, Akari or Machi?
Give a reason for your answer.

(1)

(Total for Question 14 is 4 marks)

- 15** Osvaldo has a biased coin.
He spins the coin three times.

The probability that the coin lands on a head three times is $\frac{27}{64}$

Work out the probability that the coin will land on a tail three times.

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

- 16 Show that $\frac{2\sqrt{3}}{\sqrt{3}-1}$ can be written in the form $a + \sqrt{a}$ where a is an integer.

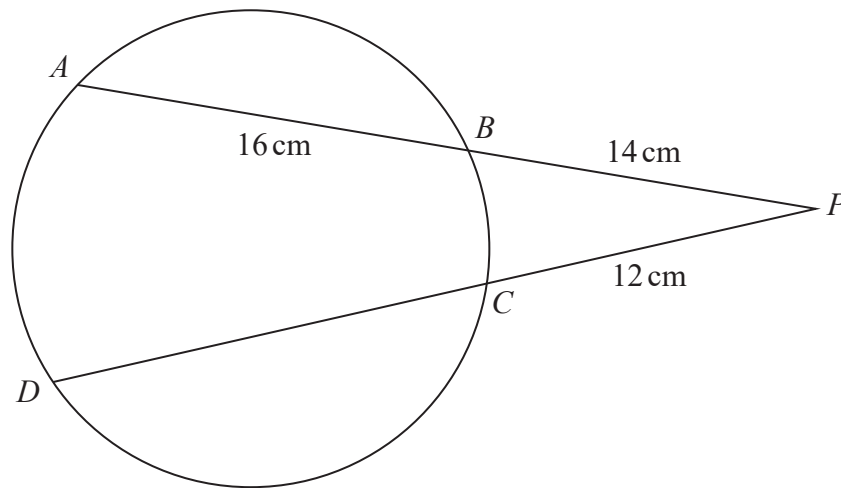
Show your working clearly.

(Total for Question 16 is 3 marks)

- 17 Make x the subject of $y = \sqrt[3]{\frac{6+5x}{x+4}}$

(Total for Question 17 is 4 marks)

18

Diagram **NOT**
accurately drawn

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

ABP and DCP are straight lines.

$$AB = 16 \text{ cm}$$

$$BP = 14 \text{ cm}$$

$$CP = 12 \text{ cm}$$

Work out the length of DC

..... cm

(Total for Question 18 is 3 marks)

19 30 adults booked to stay in a hotel.

19 adults booked breakfast

15 adults booked dinner

4 adults did not book breakfast or dinner

Some adults booked breakfast **and** dinner.

Meihui chooses at random two of the 30 adults.

Work out the probability that these two adults each booked breakfast **and** dinner.

.....
(Total for Question 19 is 4 marks)

20 A , B and C are points on a circle.

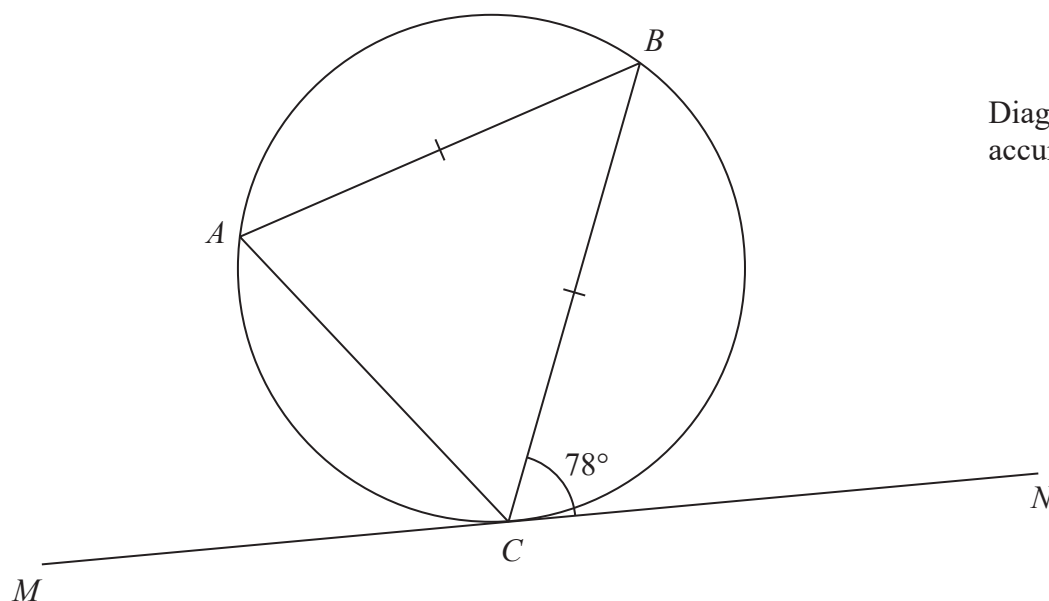


Diagram **NOT**
accurately drawn

MN is the tangent to the circle at C

$AB = CB$

Angle $BCN = 78^\circ$

Find the size of angle ABC

(Total for Question 20 is 2 marks)

21 Work out the coordinates of the points of intersection of

$$y - 2x = 1 \quad \text{and} \quad y^2 + xy = 7$$

Show clear algebraic working.

(..... ,)

(..... ,)

(Total for Question 21 is 5 marks)

22 Here is a cuboid $ABCDEFGH$

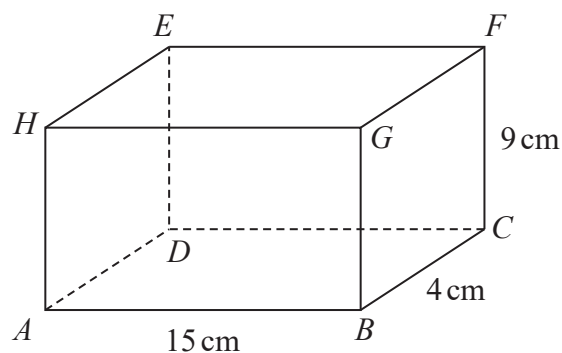


Diagram **NOT**
accurately drawn

$$AB = 15 \text{ cm} \quad BC = 4 \text{ cm} \quad CF = 9 \text{ cm}$$

- (a) Work out the length of BE
Give your answer correct to 3 significant figures.

..... cm
(2)

Here is a cuboid $PQRSTUVW$

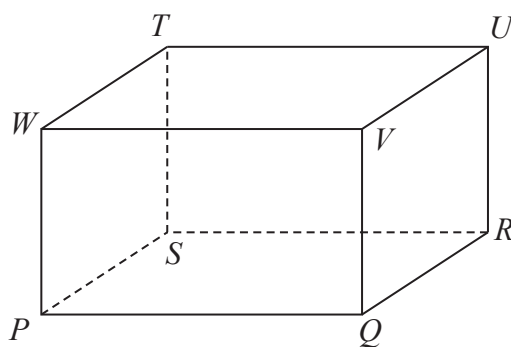


Diagram **NOT**
accurately drawn

$$PR = 42 \text{ cm}$$

The size of the angle between PU and the plane $PQRS$ is 30°

M is the midpoint of PR

- (b) Work out the size of angle UMR
Give your answer correct to 3 significant figures.

(3)

(Total for Question 22 is 5 marks)

23 Here are the first three terms of an arithmetic sequence.

$$8p \qquad 7p - 3 \qquad 4p + 2$$

The sum of the first n terms of the sequence is -1914

Work out the value of n
Show your working clearly.

$$n = \dots\dots\dots$$

(Total for Question 23 is 5 marks)

- 24** The surface area of sphere **A** is nine times the surface area of sphere **B**
The difference between the volume of sphere **A** and the volume of sphere **B** is $117\pi \text{ cm}^3$

Find the radius of the smaller sphere.
Show your working clearly.

..... cm

(Total for Question 24 is 5 marks)

- 25** The straight line with equation $y - 2x = 7$ is the perpendicular bisector of the line AB where A is the point with coordinates $(j, 7)$ and B is the point with coordinates $(6, k)$

Find the coordinates of the midpoint of the line AB

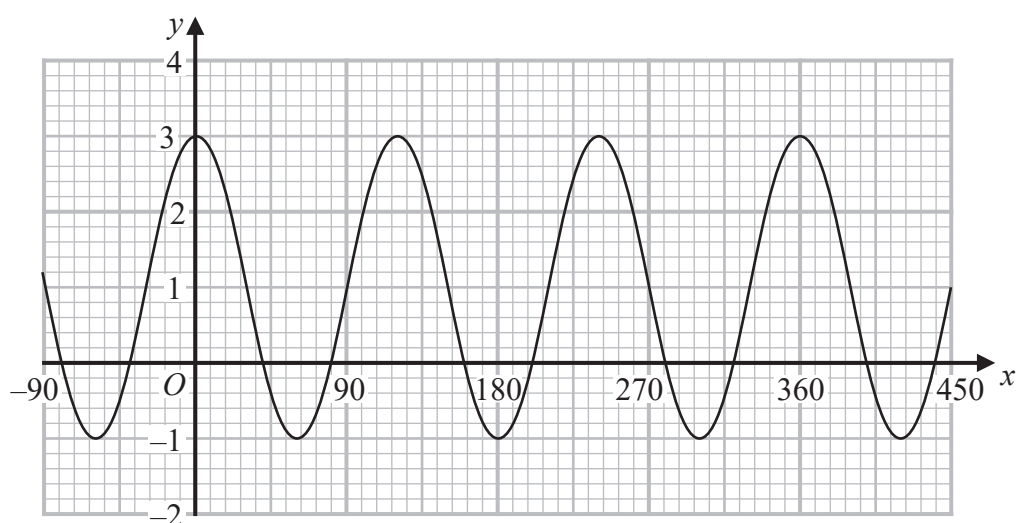
Show clear algebraic working.

(..... ,)

(Total for Question 25 is 6 marks)

Turn over for Question 26

26 Here is a sketch of the curve with equation $y = a \cos bx^\circ + c$ where $-90 \leq x \leq 450$



Find the value of a , the value of b and the value of c

$a = \dots\dots\dots$

$b = \dots\dots\dots$

$c = \dots\dots\dots$

(Total for Question 26 is 3 marks)

TOTAL FOR PAPER IS 100 MARKS

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

Pearson Edexcel International GCSE

Friday 10 November 2023


Morning (Time: 2 hours)

Paper reference **4MA1/2H**

Mathematics A

PAPER 2H

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

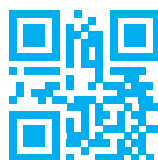
- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more 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.



International GCSE Mathematics
Formulae sheet – Higher Tier

Arithmetic series

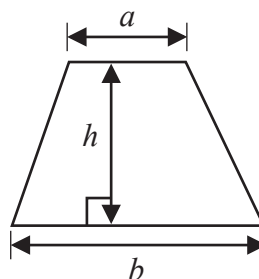
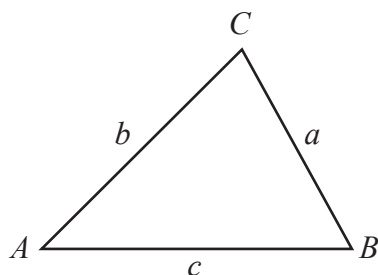
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

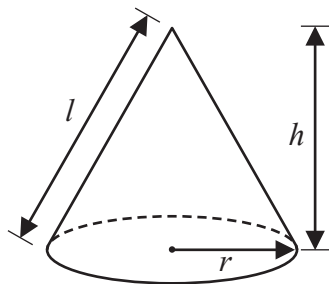
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

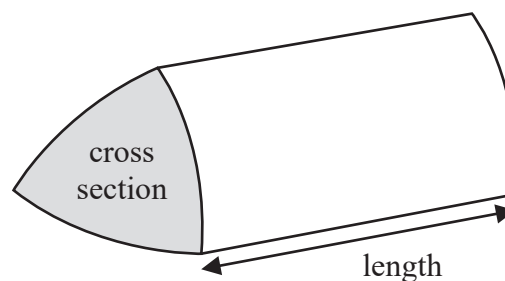
Area of triangle $= \frac{1}{2}ab \sin C$

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

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

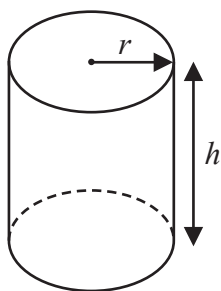
**Volume of prism**

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



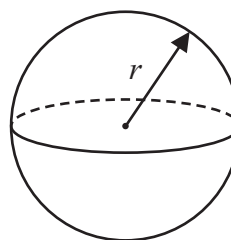
Volume of cylinder $= \pi r^2 h$

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



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

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



Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The table shows information about the lengths, in minutes, of 50 telephone calls.

Length of telephone call (<i>m</i> minutes)	Frequency
$0 < m \leq 5$	8
$5 < m \leq 10$	2
$10 < m \leq 15$	6
$15 < m \leq 20$	4
$20 < m \leq 25$	12
$25 < m \leq 30$	18

(a) Write down the modal class.

.....
(1)

(b) Work out an estimate for the total length, in minutes, of these telephone calls.

..... minutes
(3)

(Total for Question 1 is 4 marks)

- 2 The diagram shows triangle ABC and triangle ECD

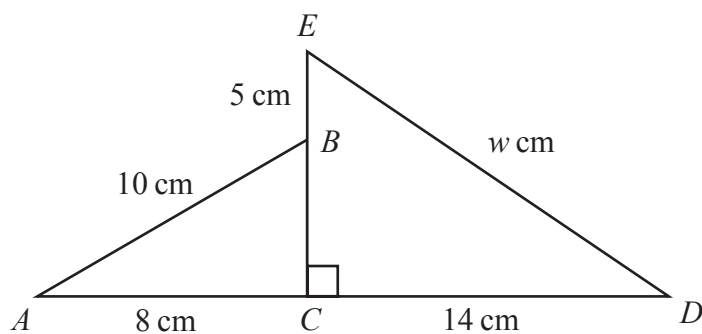


Diagram **NOT**
accurately drawn

ACD and EBC are straight lines.

$$AB = 10 \text{ cm} \quad AC = 8 \text{ cm} \quad EB = 5 \text{ cm} \quad CD = 14 \text{ cm} \quad ED = w \text{ cm}$$

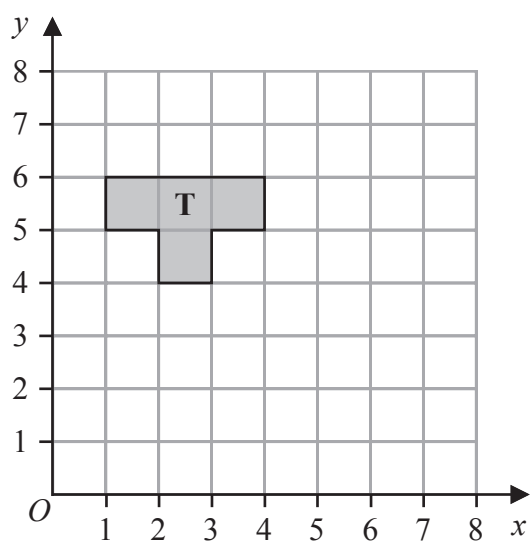
Work out the value of w

Give your answer correct to one decimal place.

$$w = \dots\dots\dots$$

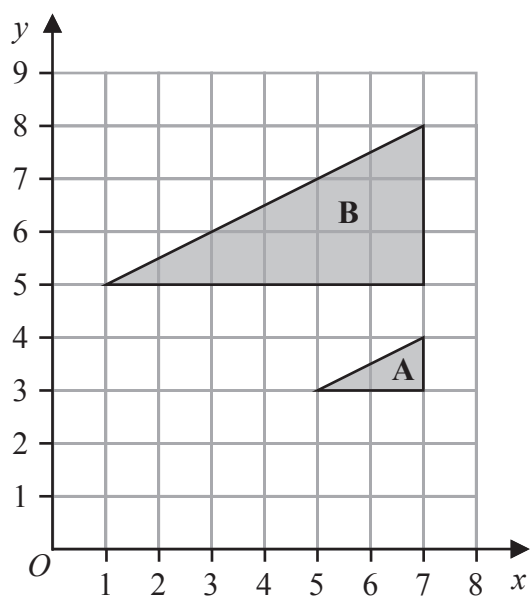
(Total for Question 2 is 4 marks)

3



(a) Reflect shape **T** in the line $y = x$

(2)



(b) Describe fully the single transformation that maps triangle **A** onto triangle **B**

(3)

(Total for Question 3 is 5 marks)

4 (a) Solve $\frac{2x+5}{6} = 2x-5$

Show clear algebraic working.

$$x = \dots\dots\dots$$

(3)

(b) Simplify $h^{15} \div h^3$

$$\dots\dots\dots$$

(1)

(c) Simplify fully $(2g^3k^5)^4$

$$\dots\dots\dots$$

(2)

(d) Given that $\frac{y^5 \times y^n}{y^7} = y^{12}$
work out the value of n

$$n = \dots\dots\dots$$

(2)

(Total for Question 4 is 8 marks)

5 Avril bakes a cake.

She uses flour, butter and sugar such that

$$\begin{aligned} \text{weight of flour : weight of butter} &= 6 : 5 \\ \text{weight of butter : weight of sugar} &= 3 : 2 \end{aligned}$$

Avril uses 120 grams of sugar.

Work out the weight of flour Avril uses.

..... grams

(Total for Question 5 is 3 marks)

6 Show that $3\frac{3}{7} \div 2\frac{2}{3} = 1\frac{2}{7}$

(Total for Question 6 is 3 marks)

- 7 Hermione buys a boat for \$26 800
The value of the boat depreciates by 8% each year.

Work out the value of the boat at the end of 3 years.
Give your answer correct to the nearest dollar.

\$.....

(Total for Question 7 is 3 marks)

- 8 The mean number of goals scored by a hockey team in 8 matches is 6
The team plays 2 more matches and scores k goals in each match.
The mean number of goals scored by the hockey team in the 10 matches is 7
Work out the value of k

$$k = \dots\dots\dots$$

(Total for Question 8 is 3 marks)

- 9 A straight line passes through the points with coordinates $(0, -3)$ and $(2, 0)$
Find an equation of the line.

.....

(Total for Question 9 is 2 marks)

10 The diagram shows a hexagon $ABCDEF$

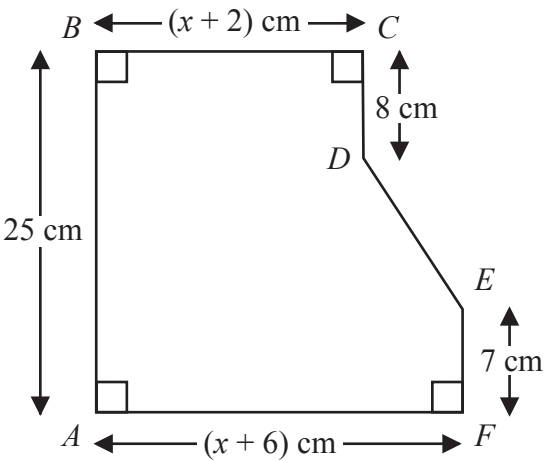


Diagram **NOT**
accurately drawn

$AB = 25 \text{ cm}$ $BC = (x + 2) \text{ cm}$ $CD = 8 \text{ cm}$ $EF = 7 \text{ cm}$ $AF = (x + 6) \text{ cm}$

The area of hexagon $ABCDEF$ is 258 cm^2

Work out the value of x

$x = \dots\dots\dots$

(Total for Question 10 is 5 marks)

12 $2^7 \times 4^5 = 4^x$

(a) Calculate the value of x

$$x = \dots\dots\dots (2)$$

(b) Simplify fully $(125p^6y^{24})^{\frac{2}{3}}$

$$\dots\dots\dots (2)$$

(Total for Question 12 is 4 marks)

13 Robert asked 11 people how many meetings they attended last week.

Here are the results in numerical order.

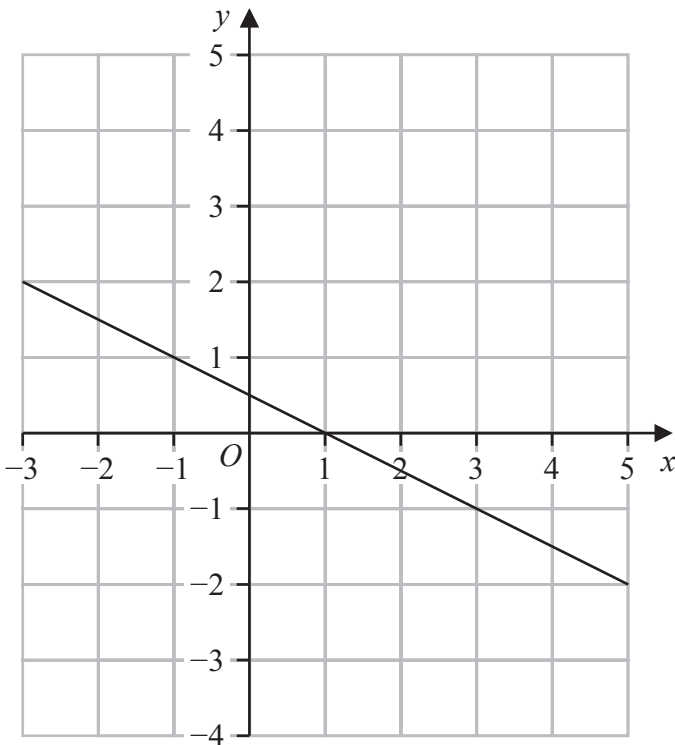
1 2 4 6 6 8 11 12 13 14 17

Find the interquartile range of the number of meetings.

$$\dots\dots\dots$$

(Total for Question 13 is 2 marks)

14 Here is the graph of the equation $2y + x = 1$ drawn on a grid.



By drawing another straight line on the grid, solve the simultaneous equations

$$\begin{aligned} y - x - 2 &= 0 \\ 2y + x &= 1 \end{aligned}$$

$x =$

$y =$

(Total for Question 14 is 3 marks)

15 (a) Use algebra to show that $0.3\dot{7}\dot{2} = \frac{41}{110}$

(2)

(b) Express $\frac{\sqrt{125} + \sqrt{80}}{\sqrt{3}}$ in the form \sqrt{n} where n is an integer.

Show your working clearly.

(3)

(Total for Question 15 is 5 marks)

16 Expand and simplify $(2x + 3)(x - 5)(x + 4)$

.....
(Total for Question 16 is 3 marks)

17 $P = a(c + y)$

$a = 8.3$ correct to 2 significant figures

$c = 2$ correct to 1 significant figure

$y = 15$ correct to the nearest 5

Work out the upper bound for the value of P
Show your working clearly.

.....
(Total for Question 17 is 3 marks)

- 18** A particle is moving along a straight line that passes through the fixed point O
The displacement, s metres, of the particle from O at time t seconds is given by

$$s = 2t^3 - 5t^2 + 6t - 5$$

Find the value of t when the acceleration of the particle is 5 m/s^2

$t = \dots\dots\dots$

(Total for Question 18 is 4 marks)

19 The functions f and g are such that

$$f:x \mapsto 5x + 7$$

$$g:x \mapsto \frac{5}{2x-9}$$

(a) State which value of x cannot be included in any domain of g

.....
(1)

(b) Find $fg(4)$

.....
(2)

The function h is such that

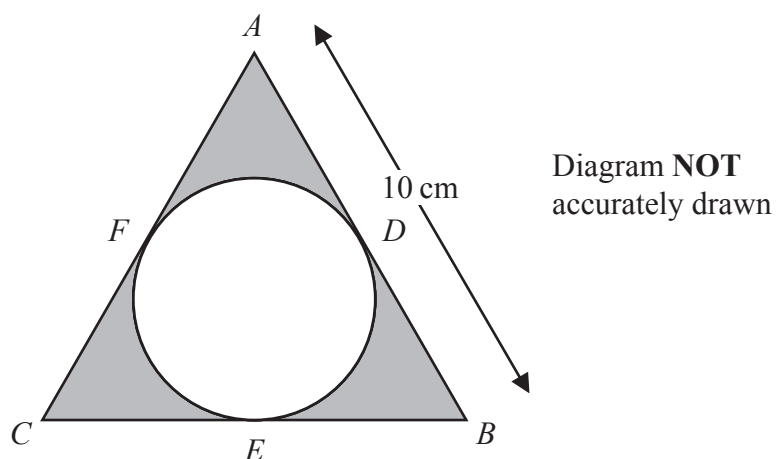
$$h:x \mapsto 3x^2 - 12x + 8 \quad \text{where } x > 2$$

(c) Express the inverse function h^{-1} in the form $h^{-1}:x \mapsto \dots$

$h^{-1}:x \mapsto$
(4)

(Total for Question 19 is 7 marks)

- 20** The diagram shows equilateral triangle ABC with sides of length 10 cm. A circle is drawn inside the triangle.



D , E and F are points on the circle.

ADB , BEC and CFA are tangents to the circle.

Calculate the total area of the regions shown shaded in the diagram.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 20 is 4 marks)

- 21** The line with equation $x + 2y = 5$ intersects the curve with equation $x^2 + 3y^2 = 13$ at the points A and B

Find the coordinates of A and the coordinates of B

Show clear algebraic working.

(..... ,)

(..... ,)

(Total for Question 21 is 5 marks)

22

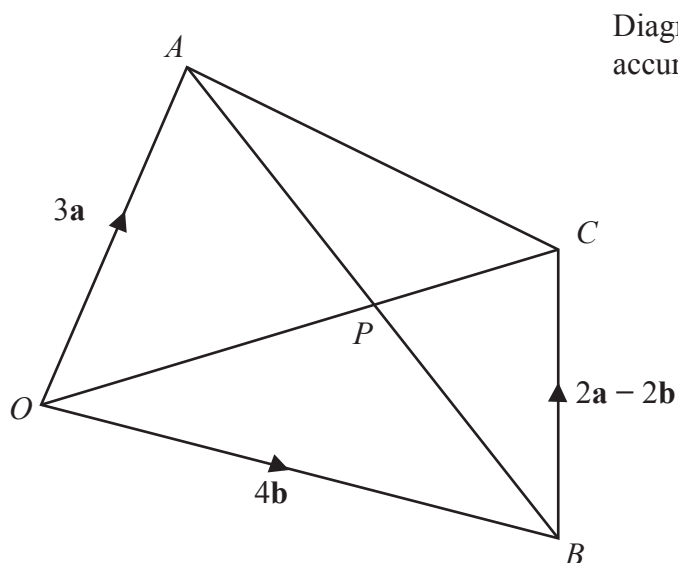


Diagram **NOT**
accurately drawn

$OACB$ is a quadrilateral.

$$\vec{OA} = 3\mathbf{a} \quad \vec{OB} = 4\mathbf{b} \quad \vec{BC} = 2\mathbf{a} - 2\mathbf{b}$$

- (a) (i) Find the vector \vec{OC} in terms of \mathbf{a} and \mathbf{b}
Simplify your answer.

$$\vec{OC} = \dots\dots\dots (1)$$

- (ii) Find the vector \vec{AB} in terms of \mathbf{a} and \mathbf{b}

$$\vec{AB} = \dots\dots\dots (1)$$

The point P lies on AB and on OC

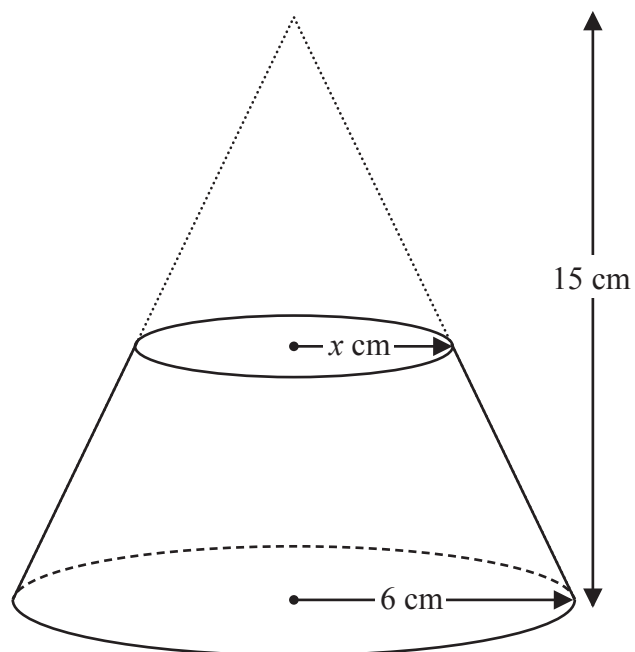
- (b) Using a vector method, find the ratio $AP : PB$
Show your working clearly.

.....
(3)

(Total for Question 22 is 5 marks)

23 Here is a frustum of a cone.

The frustum is made by removing a small cone from a similar large cone.



The height of the large cone is 15 cm.

The radius of the base of the large cone is 6 cm.

The radius of the base of the small cone is x cm.

Given that the volume of the frustum is $\frac{4212}{25}\pi \text{ cm}^3$

work out the value of x

Show clear algebraic working.

$x = \dots\dots\dots$

(Total for Question 23 is 5 marks)

Turn over for Question 24

24 Solve $\frac{45x^3 - 80x}{3x^2 + x - 4} \times \left(\frac{1}{3x - 4} + \frac{1}{x} \right) = \frac{4(x + 2)}{5x - 8}$

Show clear algebraic working.

$x =$

(Total for Question 24 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

Pearson Edexcel International GCSE

Monday 3 June 2024


Morning (Time: 2 hours)

Paper reference **4MA1/2H**

Mathematics A

PAPER 2H

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.
- 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.



International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

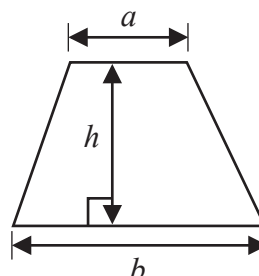
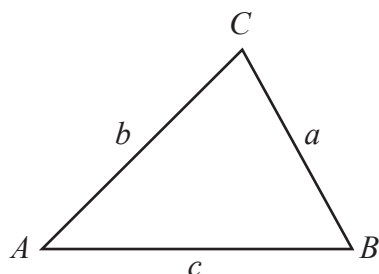
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

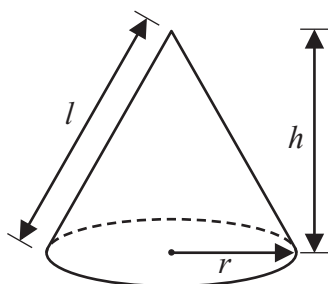
$$\text{Sine Rule} \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

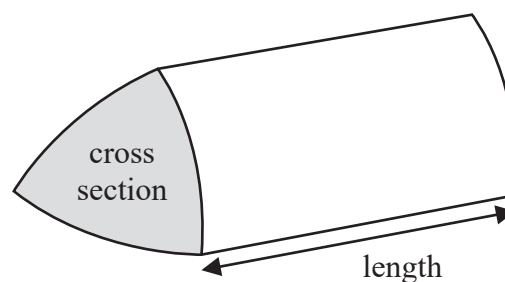
$$\text{Area of triangle} = \frac{1}{2}ab \sin C$$

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

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

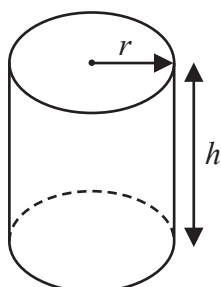
**Volume of prism**

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



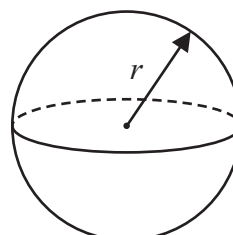
$$\text{Volume of cylinder} = \pi r^2 h$$

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



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

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



Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Here are eight numbers written in order of size

h 6 7 8 j 16 k k

where h, j and k are integers.

The median of the eight numbers is 10

The mode of the eight numbers is 18

The range of the eight numbers is 13

Work out the value of h , the value of j and the value of k

$h =$

$j =$

$k =$

(Total for Question 1 is 3 marks)

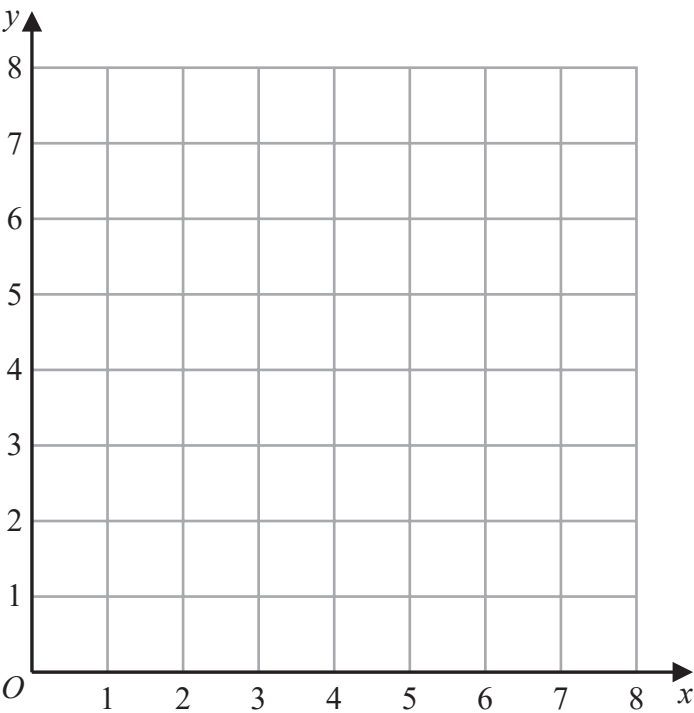
2 (a) On the grid, draw the straight line with equation

(i) $y = 2$

(ii) $x = 6$

(iii) $y = x + 1$

Label each line with its equation.



(3)

(b) Show, by shading on the grid, the region that satisfies all three of the inequalities

$y \geq 2$ $x \leq 6$ $y \leq x + 1$

Label the region **R**

(1)

(Total for Question 2 is 4 marks)

- 3** A plane takes 9 hours 36 minutes to fly from New Delhi to Perth.

The plane flies at an average speed of 820 km/h.

Work out the total distance the plane flies.

..... km

(Total for Question 3 is 3 marks)

- 4** Show that $2\frac{4}{7} \times 3\frac{1}{9} = 8$

(Total for Question 4 is 3 marks)

5 The diagram shows triangle ABC

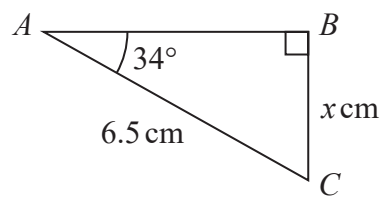


Diagram **NOT**
accurately drawn

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

$x =$

(Total for Question 5 is 3 marks)

6 Change a speed of w metres per second to a speed in kilometres per hour.
Give your answer in terms of w in its simplest form.

..... kilometres per hour

(Total for Question 6 is 3 marks)

- 7 The diagram shows a 6-sided shape $ABCDEF$

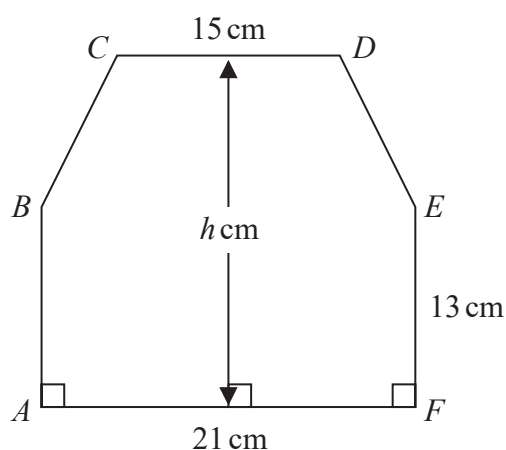


Diagram **NOT**
accurately drawn

$$AF = 21 \text{ cm} \quad CD = 15 \text{ cm} \quad AB = FE = 13 \text{ cm}$$

The perpendicular height of the shape is h cm
 CD is parallel to AF

The area of the shape is 390 cm^2

Work out the value of h

$$h = \dots\dots\dots$$

(Total for Question 7 is 4 marks)

- 8 Ishir plants 600 bulbs in a garden.
He plants tulip bulbs, crocus bulbs and daffodil bulbs so that

number of tulip bulbs : number of crocus bulbs : number of daffodil bulbs = 9 : 4 : 2

45% of the tulip bulbs are for yellow flowers.

$\frac{5}{8}$ of the crocus bulbs are for yellow flowers.

All of the daffodil bulbs are for yellow flowers.

Work out the number of bulbs that are for yellow flowers.

.....
(Total for Question 8 is 5 marks)

- 9 Giovanni invests 4500 koruna in a savings account for 4 years.
He gets 2.4% per year compound interest.

Work out how much money Giovanni will have in the savings account at the end of 4 years.
Give your answer correct to the nearest koruna.

..... koruna

(Total for Question 9 is 3 marks)

10 Solve the simultaneous equations

$$\begin{aligned} 6x + 4y &= 1 \\ 3x + 5y &= 8 \end{aligned}$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question 10 is 3 marks)

11 (i) Factorise $x^2 + 9x - 22$

.....
(2)

(ii) Hence, solve $x^2 + 9x - 22 = 0$

.....
(1)

(Total for Question 11 is 3 marks)

12 Ali uses a fitness tracker to count the number of steps he walks each day for 7 days.

For the first 4 days, his mean number of steps is 11 800

For the next 3 days, his mean number of steps is 13 207

Work out his mean number of steps for the 7 days.

(Total for Question 12 is 3 marks)

13 The table gives information about the distances, in km, that 70 teachers travel to school.

Distance (d km)	Frequency
$0 < d \leq 10$	7
$10 < d \leq 20$	17
$20 < d \leq 30$	18
$30 < d \leq 40$	14
$40 < d \leq 50$	10
$50 < d \leq 60$	4

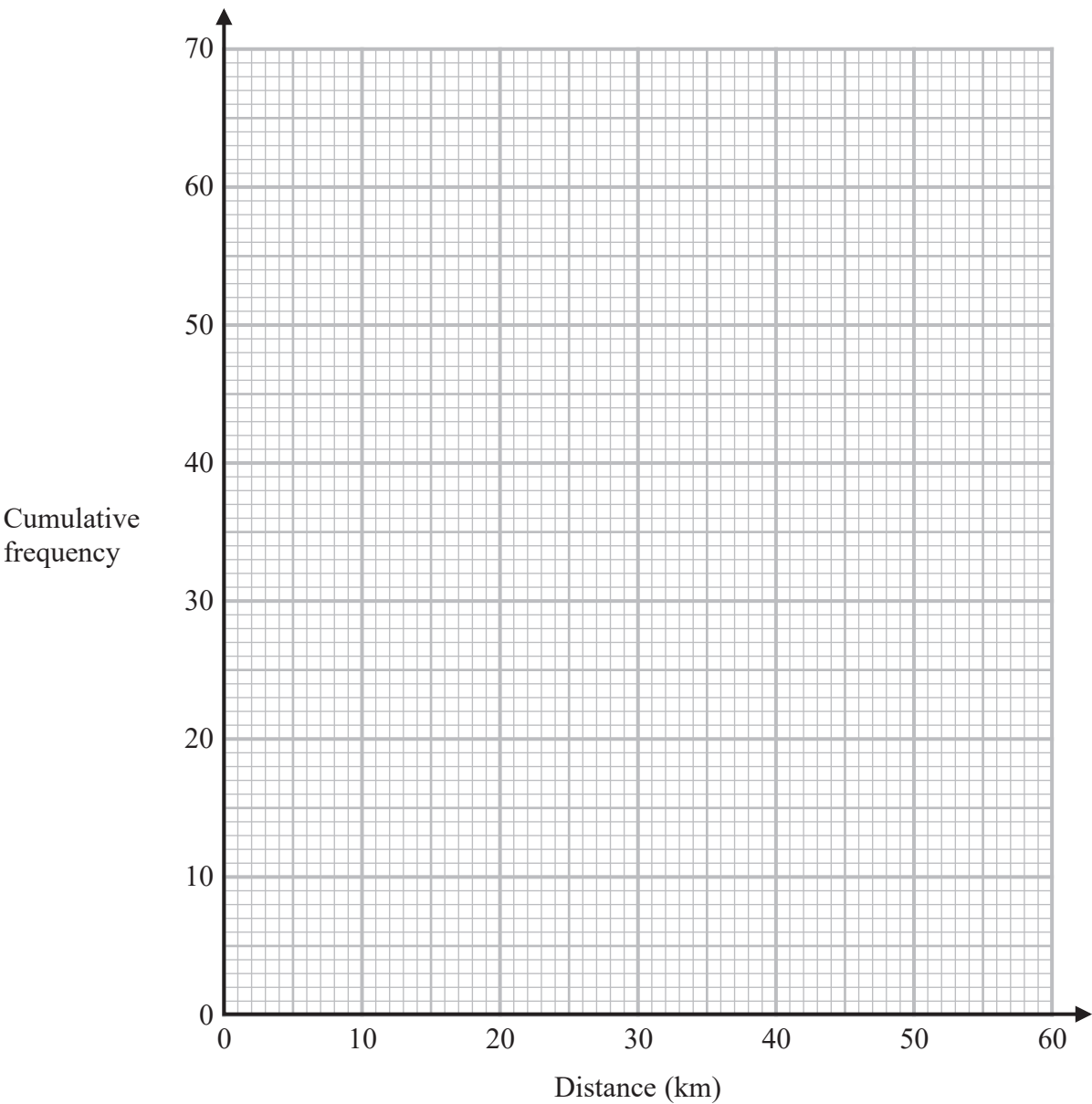
(a) Complete the cumulative frequency table.

Distance (d km)	Cumulative frequency
$0 < d \leq 10$	
$0 < d \leq 20$	
$0 < d \leq 30$	
$0 < d \leq 40$	
$0 < d \leq 50$	
$0 < d \leq 60$	

(1)

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

(2)



(c) Use your graph to find an estimate for the interquartile range of the distances.

..... km
(2)

(d) Use your graph to find an estimate for the number of teachers who travel more than 46 km.

.....
(2)

(Total for Question 13 is 7 marks)

- 14** (a) Show that $3y(2y + 5)(y + 7)$ can be written in the form $ay^3 + by^2 + cy$ where a, b and c are integers.

(3)

(b) Solve $\frac{2x + 3}{5} + \frac{6x - 5}{4} = \frac{163}{100}$

Show clear algebraic working.

$$x = \dots\dots\dots$$

(4)

(Total for Question 14 is 7 marks)

15 (a) Make g the subject of $e = \sqrt{\frac{7g+5}{11+2g}}$

.....
(4)

(b) Solve the inequality $3y^2 + 4y - 32 > 0$
Show your working clearly.

.....
(3)

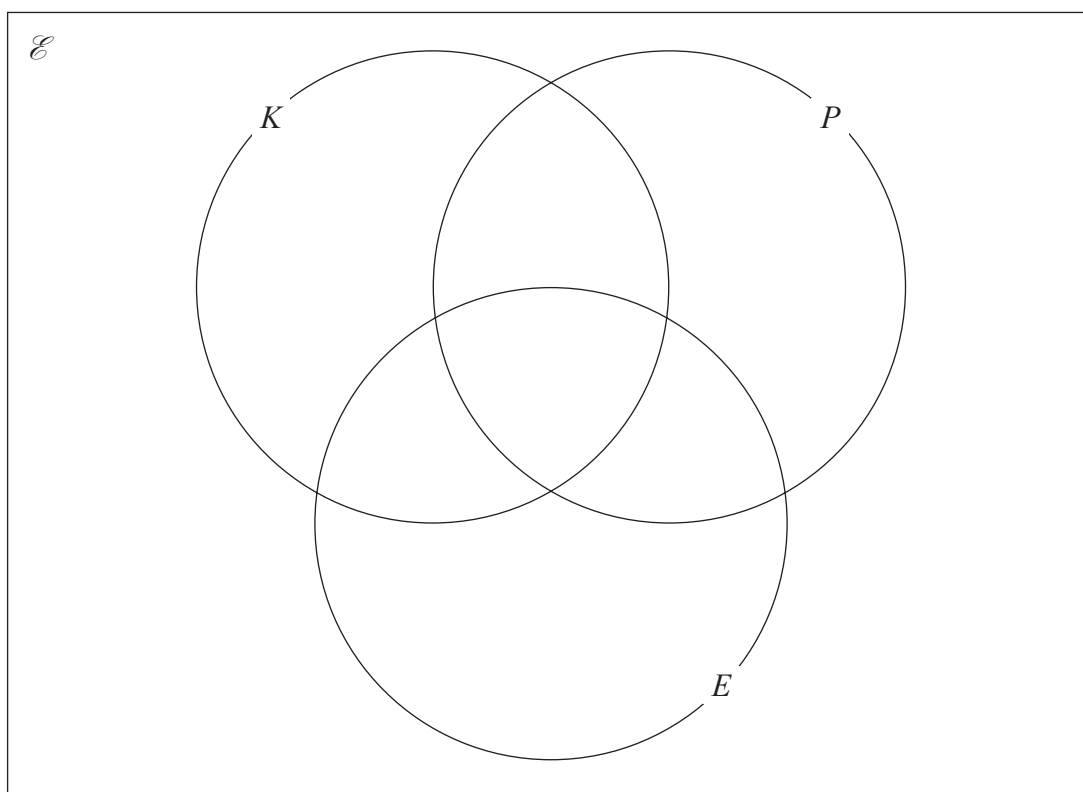
(Total for Question 15 is 7 marks)

- 16** 60 art students were asked if they would like to attend workshops for knitting (K), for photography (P) or for embroidery (E)

Of these students

- 9 chose knitting, photography and embroidery
- 17 chose knitting and photography
- 16 chose photography and embroidery
- 20 chose knitting and embroidery
- 28 chose photography
- 39 chose embroidery
- 2 chose none of the workshops

- (a) Using this information, complete the Venn diagram to show the numbers of students in each subset.



(3)

One of the students is chosen at random.

Given that this student chose photography,

(b) find the probability that this student also chose knitting.

(2)

(c) Find $n(P \cap K')$

(1)

(d) Find $n([P \cup E] \cap K)$

(1)

(Total for Question 16 is 7 marks)

17 Q is directly proportional to the square root of d

$Q = 4.5$ when $d = 324$

Find a formula for Q in terms of d

(Total for Question 17 is 3 marks)

18 The straight line **P** has equation $5y + 2x = 7$

Find the gradient of a straight line that is perpendicular to **P**

.....
(Total for Question 18 is 2 marks)

19 $G = \frac{c}{2f - 3h}$

$c = 8$ correct to the nearest whole number

$f = 6.62$ correct to 2 decimal places

$h = 1.2$ correct to 1 decimal place

Work out the lower bound for the value of G
Give your answer correct to 3 decimal places.
Show your working clearly.

.....
(Total for Question 19 is 3 marks)

20 Given that $k = x - y$ and $x = \frac{1}{4y}$

express $\frac{5k}{x+2}$ in the form $\frac{a-by^2}{c+dy}$ where a, b, c and d are integers.

.....
(Total for Question 20 is 3 marks)

21 The diagram shows a square $ABCD$ and a circle.

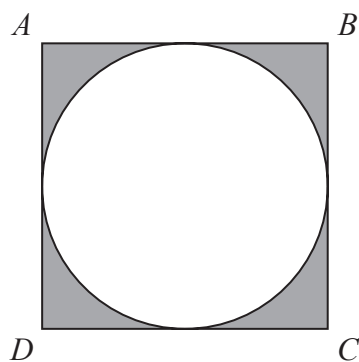


Diagram **NOT**
accurately drawn

The sides of the square are tangents to the circle.

The total area of the shaded regions is 80 cm^2

Work out the length of AC

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 21 is 5 marks)

Turn over for Question 22

22 The straight line **L** has equation $x + y = 5$

The curve **C** has equation $2x^2 + 3y^2 = 210$

Find the coordinates of the points where **L** and **C** intersect.
Show clear algebraic working.

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

(Total for Question 22 is 5 marks)

23 Simplify $\frac{30 \times 25^{2x+7}}{\sqrt{180} \times (\sqrt{5})^{4x+9}}$

Give your answer in the form 5^w where w is an expression in terms of x
Show each stage of your working clearly.

.....
(Total for Question 23 is 3 marks)

Turn over for Question 24

24

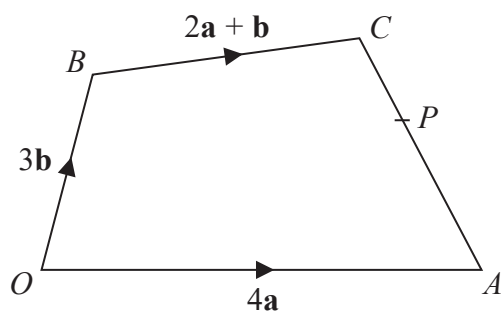


Diagram **NOT**
accurately drawn

The diagram shows a quadrilateral $OACB$ in which

$$\overrightarrow{OA} = 4\mathbf{a} \quad \overrightarrow{OB} = 3\mathbf{b} \quad \overrightarrow{BC} = 2\mathbf{a} + \mathbf{b}$$

- (a) Find \overrightarrow{AC} in terms of \mathbf{a} and \mathbf{b}
Give your answer in its simplest form.

$$\overrightarrow{AC} = \dots\dots\dots (2)$$

The point P lies on AC such that $AP:PC = 3:2$

The point Q is such that OPQ and BCQ are straight lines.

- (b) Using a vector method, find \overrightarrow{OQ} in terms of \mathbf{a} and \mathbf{b}
Give your answer in its simplest form.
Show your working clearly.

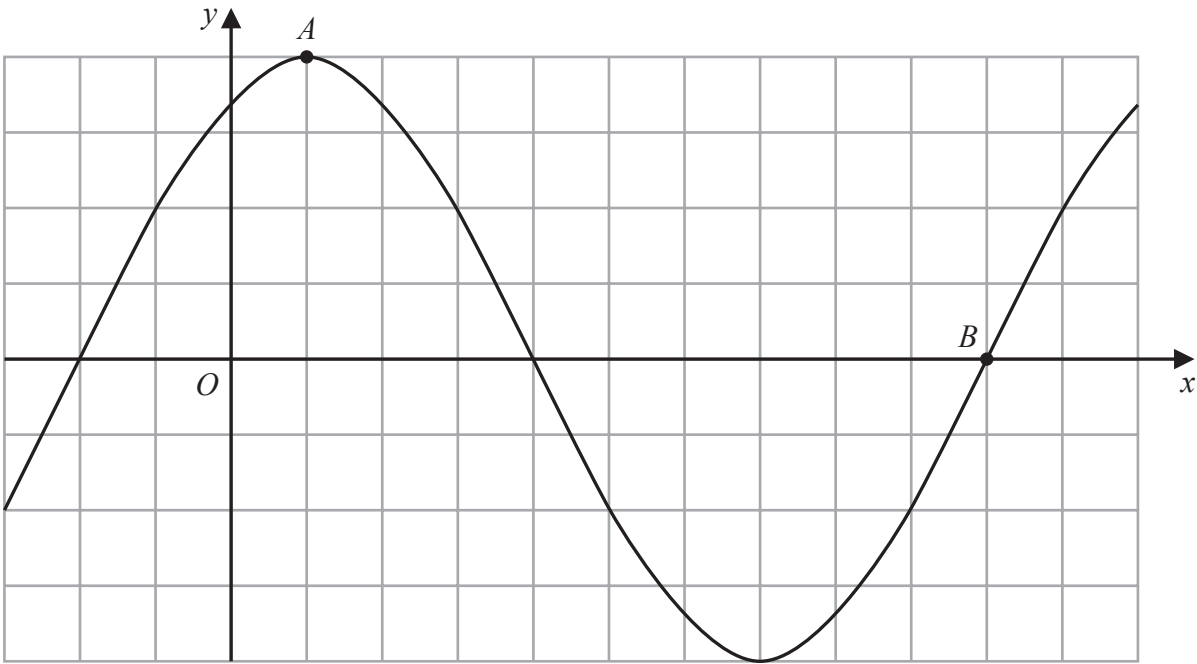
$$\overrightarrow{OQ} = \dots\dots\dots$$

(4)

(Total for Question 24 is 6 marks)

Turn over for Question 25

25 The diagram shows a sketch of the graph of $y = 2\sin(x + 60)^\circ$



(i) Find the coordinates of the point A

(..... ,)
(1)

(ii) Find the coordinates of the point B

(..... ,)
(1)

(Total for Question 25 is 2 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

BLANK PAGE

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

Pearson Edexcel International GCSE

Monday 3 June 2024


Morning (Time: 2 hours)

Paper reference **4MA1/2HR**

Mathematics A

PAPER 2HR

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.
- 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.



International GCSE Mathematics
Formulae sheet – Higher Tier

Arithmetic series

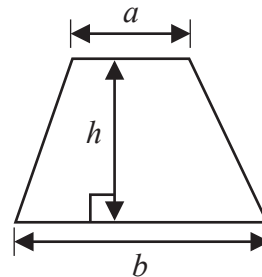
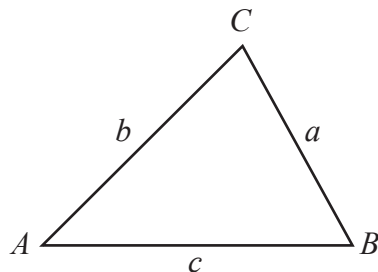
Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$

The quadratic equation

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

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

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

**Trigonometry****In any triangle ABC**

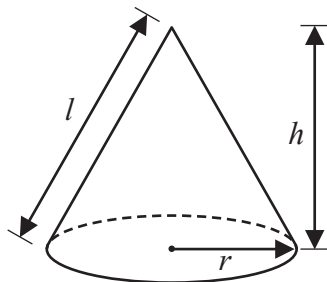
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

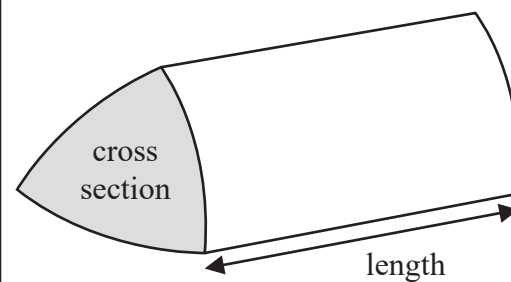
Area of triangle $= \frac{1}{2}ab \sin C$

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

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

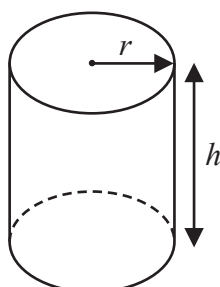
**Volume of prism**

$=$ area of cross section \times length



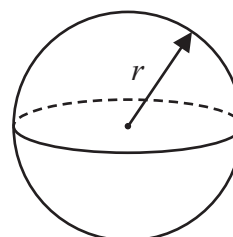
Volume of cylinder $= \pi r^2 h$

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



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

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



Answer ALL TWENTY SIX questions.

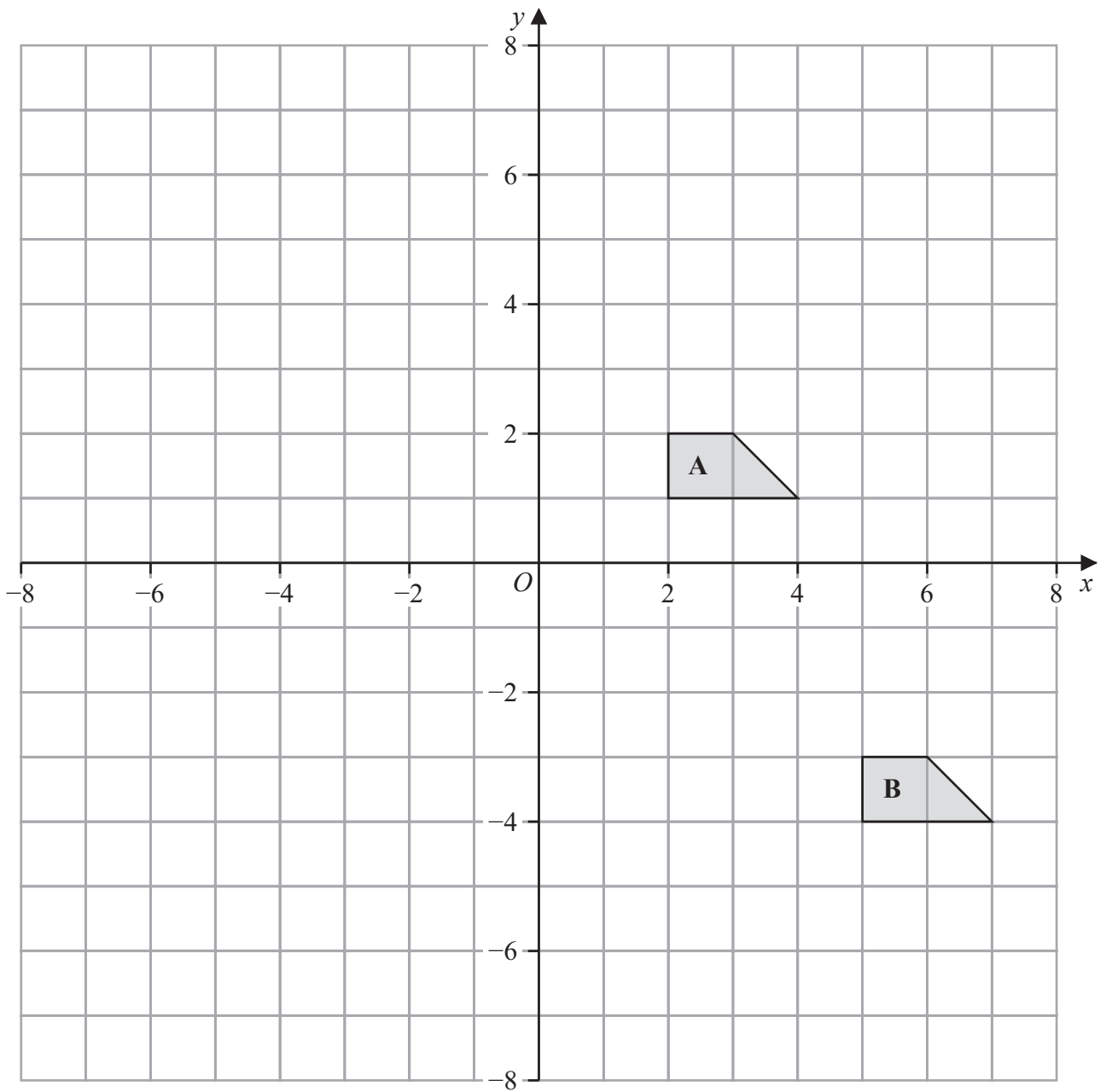
Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** Write 1400 as a product of powers of its prime factors.
Show your working clearly.

.....
(Total for Question 1 is 3 marks)

2



(a) Describe fully the single transformation that maps shape **A** onto shape **B**

(2)

(b) On the grid above, rotate shape **A** 180° about $(-1, 0)$
Label your shape **C**

(2)

(Total for Question 2 is 4 marks)

3 Here is a list of four numbers written in ascending order of size

x x y 15

where x and y are integers.

The numbers have

- a median of 12.5
- a range of 4

Find the value of x and the value of y

$x =$

$y =$

(Total for Question 3 is 2 marks)

4 $\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
 $A = \{\text{factors of } 6\}$
 $B = \{\text{prime numbers}\}$

(a) List the members of the set

(i) $A \cup B$

.....
(1)

(ii) A'

.....
(1)

Harpreet states that $A \cap B = \emptyset$

Harpreet is incorrect.

(b) Explain why.

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

C is a set with 4 members such that

 the set $A \cap C$ has 2 members
 the set $B \cap C$ has 2 members

Set $A \cap C$ and set $B \cap C$ have no members in common.

(c) List the 4 members of set C

.....
(2)

(Total for Question 4 is 5 marks)

- 5 The diagram shows the design for a badge, which will be made using wire.
The design is a circle inside a square $ABCD$

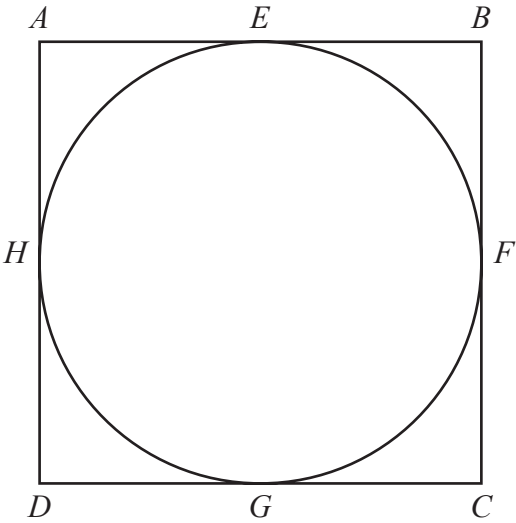


Diagram **NOT**
accurately drawn

The circle touches the square at the points E , F , G and H

The area of the square is 81 cm^2

Calculate the total length of wire that will be needed to make the square and the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 5 is 4 marks)

6 (a) Solve $\frac{2f}{3} = 4f - 17$

Show clear algebraic working.

$$f = \dots\dots\dots$$

(3)

(b) Simplify $(e + 12)^0$ where $e > 0$

$$\dots\dots\dots$$

(1)

(c) Simplify fully $\frac{12a^4h^6}{4ah^2}$

$$\dots\dots\dots$$

(2)

(d) Factorise fully $20x^5y + 12x^3y^4$

$$\dots\dots\dots$$

(2)

(Total for Question 6 is 8 marks)

7 $\frac{3^{-2} \times 3^5}{3^{10}} = 3^n$

Find the value of n

$n = \dots\dots\dots$

(Total for Question 7 is 2 marks)

8 In a sale, all normal prices are reduced by 17%

The sale price of a fridge is 6225 rupees.

Work out the normal price of the fridge.

$\dots\dots\dots$ rupees

(Total for Question 8 is 3 marks)

9 (a) Write 6.04×10^5 as an ordinary number.

.....
(1)

(b) Write 0.000 07 in standard form.

.....
(1)

(c) Work out $\frac{7.6 \times 10^{10}}{4 \times 10^5 - 2 \times 10^4}$

Give your answer in standard form.

.....
(2)

(Total for Question 9 is 4 marks)

10 The diagram shows a hexagon $ABCDEF$

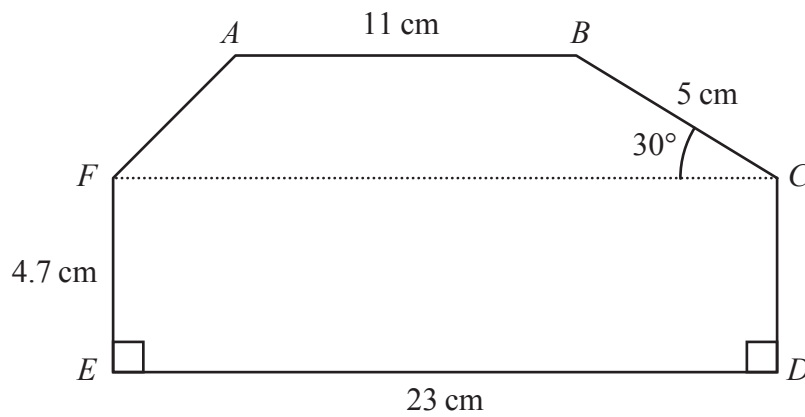


Diagram **NOT**
accurately drawn

Angle $BCF = 30^\circ$

AB , FC and ED are parallel.

Calculate the area of $ABCDEF$

Show your working clearly.

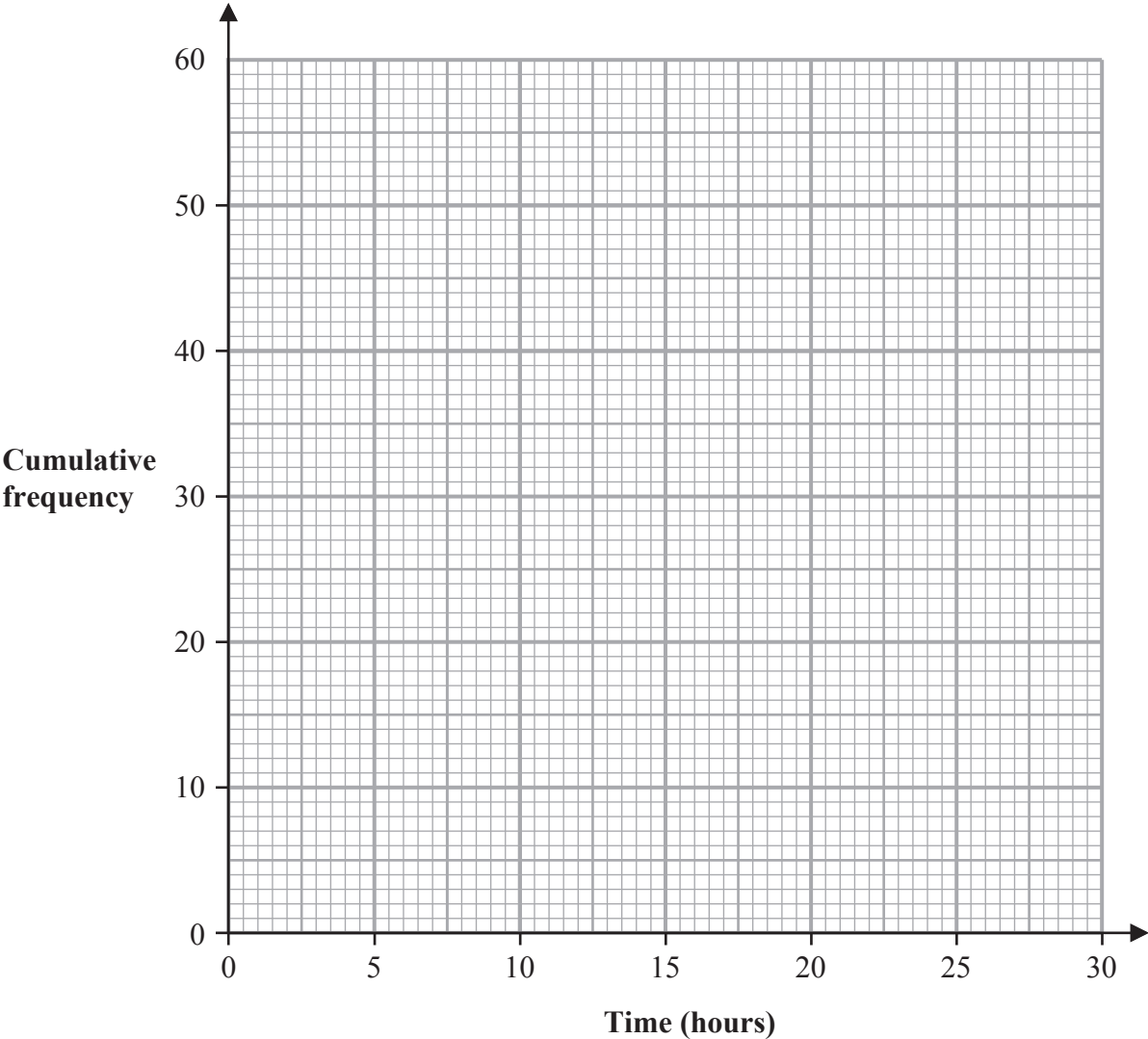
..... cm^2

(Total for Question 10 is 5 marks)

11 The cumulative frequency table gives information about the time, in hours, that each of 60 workers spent working from home in one week.

Time (t hours)	Cumulative frequency
$0 < t \leq 5$	6
$0 < t \leq 10$	17
$0 < t \leq 15$	27
$0 < t \leq 20$	42
$0 < t \leq 25$	53
$0 < t \leq 30$	60

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



(2)

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

..... hours
(2)

25 workers spent more than W hours working from home.

(c) Use your graph to find an estimate for the value of W

$W =$
(2)

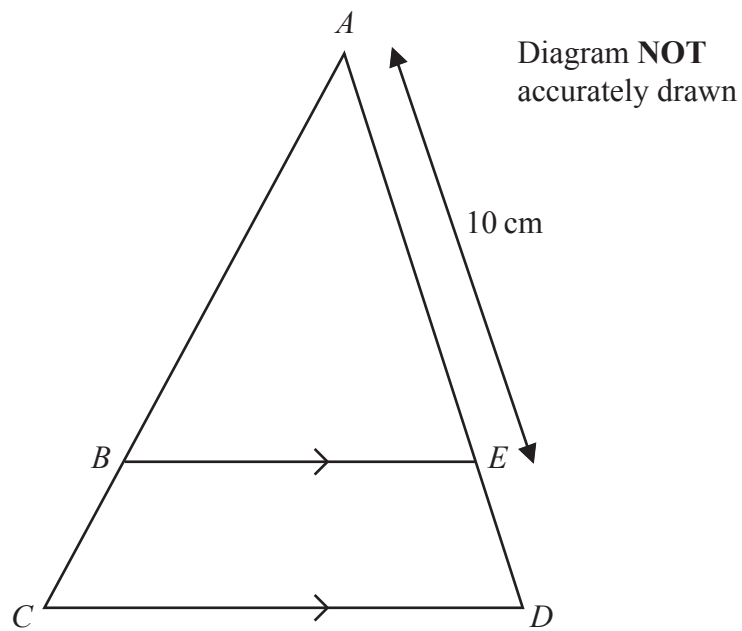
One of the 60 workers is chosen at random.
This worker spent H hours working from home.

(d) Find the probability that $5 < H \leq 10$

.....
(1)

(Total for Question 11 is 7 marks)

12



In the diagram, ABC and AED are straight lines.
 BE is parallel to CD

$$AE = 10 \text{ cm} \quad \text{and} \quad CD = 1.5 \times BE$$

(a) Work out the length of ED

..... cm
 (2)

$$AB = (2x + 5) \text{ cm and } BC = (3x - 5) \text{ cm}$$

(b) Work out the value of x

$x =$
 (2)

(Total for Question 12 is 4 marks)

13 OAB is a sector of a circle with centre O and radius r cm.

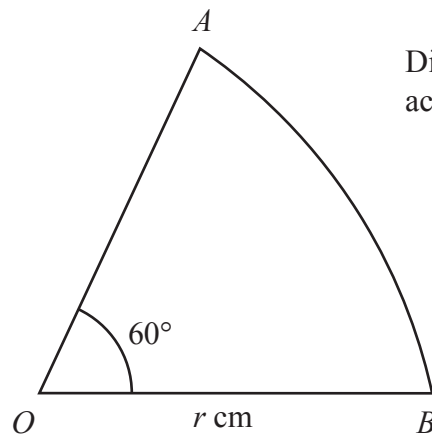


Diagram **NOT**
accurately drawn

Angle $AOB = 60^\circ$

The perimeter of the sector is P cm.

Find a formula for P in terms of r

Give your answer in the form $P = r(c\pi + k)$ where c and k are values to be found.

(Total for Question 13 is 3 marks)

14 Adriana is going to roll a biased dice and spin a biased coin.

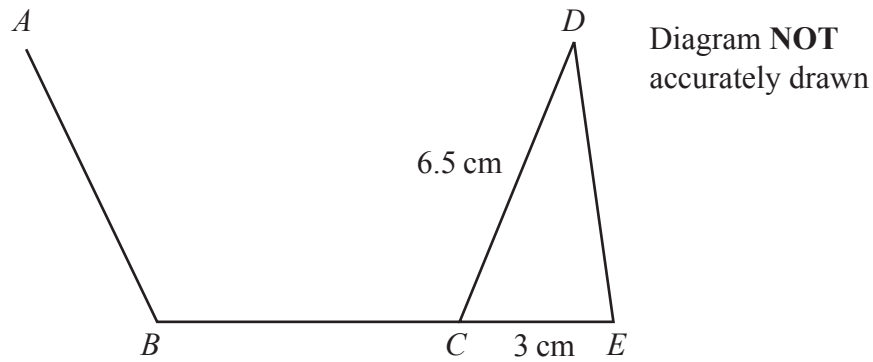
The probability that the coin will land on Heads is 0.8

The probability that the dice will land on 6 and the coin will land on Heads is 0.24

Work out the probability that the dice will land on 6 and the coin will land on Tails.

.....
(Total for Question 14 is 3 marks)

15



AB , BC and CD are three sides of a regular pentagon and CDE is a triangle.
 BCE is a straight line.

$$CD = 6.5 \text{ cm} \quad CE = 3 \text{ cm}$$

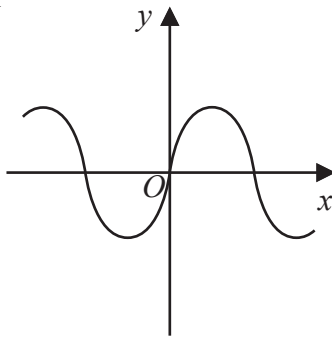
Work out the area of triangle CDE
 Give your answer correct to 3 significant figures.

..... cm^2

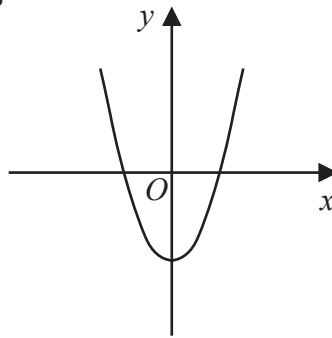
(Total for Question 15 is 3 marks)

16 Here are six graphs.

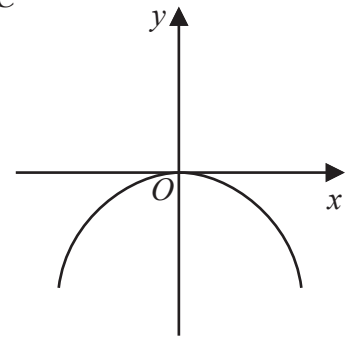
A



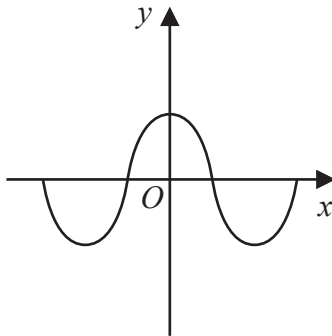
B



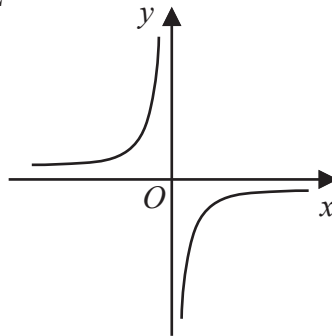
C



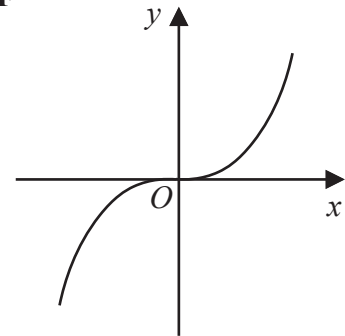
D



E



F



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

(i) $y = -\frac{1}{x}$

.....
(1)

(ii) $y = \sin x^\circ$

.....
(1)

(Total for Question 16 is 2 marks)

17 $f(x) = \frac{x}{2x-4}$ $g(x) = 3x + 1$

Given that $fg(k) = 2$

work out the value of k

$k = \dots\dots\dots$

(Total for Question 17 is 3 marks)

18 Use algebra to show that $0.\dot{3}0\dot{6} = \frac{34}{111}$

(Total for Question 18 is 2 marks)

19 Aviv goes on a cycle journey.

For the cycle journey

average speed = 19 km/h correct to the nearest whole number

time = 1.5 hours correct to one decimal place

Work out the upper bound for the distance Aviv travels.
Give your answer correct to 3 significant figures.

..... km

(Total for Question 19 is 3 marks)

- 20** Solve $6x^2 - 7x - 20 > 0$
Show clear algebraic working.

.....
(Total for Question 20 is 4 marks)

21 $ABCD$ is a square.

The point A has coordinates $(-5, 2)$

The point B has coordinates $(3, 5)$

Find an equation of the line that passes through B and C

Give your answer in the form $ax + by + c = 0$ where a , b and c are integers.

(Total for Question 21 is 4 marks)

22 Solve the simultaneous equations

$$x^2 + y^2 = y + 11$$

$$y = 3x - 1$$

Show clear algebraic working.

(Total for Question 22 is 5 marks)

23 A curve has equation $y = f(x)$

The coordinates of the minimum point on this curve are $(6, -3)$

Write down the coordinates of the minimum point on the curve with equation

(i) $y = f(x) + 10$

(..... ,)
(1)

(ii) $y = f(3x)$

(..... ,)
(1)

(Total for Question 23 is 2 marks)

24 The diagram shows a solid, **S**, made from a cone and a hemisphere.

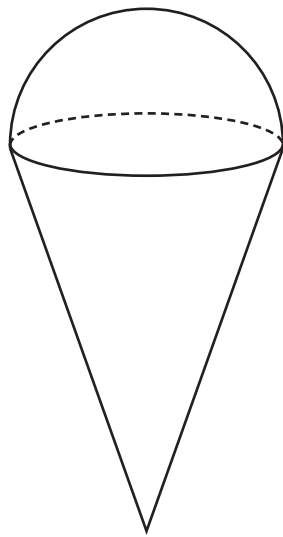


Diagram **NOT**
accurately drawn

The centre of the circular face of the cone coincides with the centre of the flat surface of the hemisphere.

The radius of the circular face of the cone, x cm, is equal to the radius of the hemisphere.

The total height of **S** is $4 \times$ the radius of the hemisphere.

A separate sphere has radius kx cm.

The volume of this sphere is $12.5 \times$ the volume of **S**

(a) Work out the value of k

$k = \dots\dots\dots$
(4)

A solid, **T**, is similar to solid **S**
The volume of **T** is $512 \times$ the volume of **S**
The total surface area of **T** is $d \times$ the total surface area of **S**
(b) Find the value of d

$d = \dots\dots\dots$
(1)

(Total for Question 24 is 5 marks)

Turn over for Question 25

25 $OPQR$ is a parallelogram.

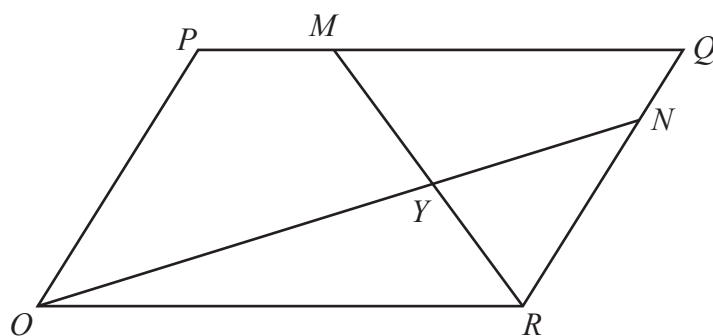


Diagram **NOT**
accurately drawn

$$\vec{OP} = 2\mathbf{a} \quad \text{and} \quad \vec{OR} = 3\mathbf{b}$$

The point M lies on PQ such that $PM = \frac{1}{4}PQ$

The point N lies on RQ such that $RN = \frac{4}{5}RQ$

(a) Find, in terms of \mathbf{a} and \mathbf{b} , giving your answers in simplest form

(i) \vec{ON}

.....
(1)

(ii) \vec{MR}

.....
(1)

MR and ON intersect at the point Y

Given that

$$OY = k \times ON$$

(b) use a vector method to find the value of k

$$k = \dots\dots\dots (4)$$

(Total for Question 25 is 6 marks)

Turn over for Question 26

26 Write $4 - \left[(3x - 5) \div \frac{3x^2 + x - 10}{4x - 1} \right]$ as a single fraction in its simplest form.

.....
(Total for Question 26 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

BLANK PAGE