

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
<b>Pearson Edexcel International GCSE</b>									
Centre Number					Candidate Number				
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Time 2 hours					Paper reference		<b>4MA1/2H</b>		
<b>Mathematics A</b> <b>PAPER 2H</b> <b>Higher Tier</b>									
<b>You must have:</b> 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.

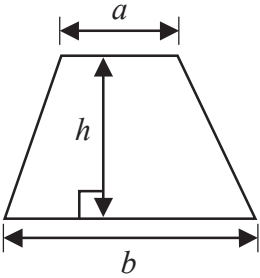
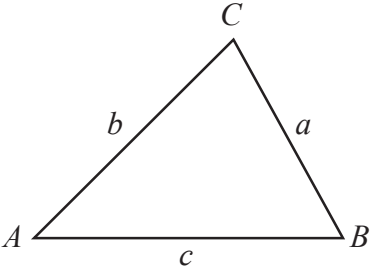
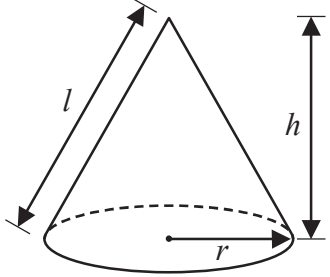
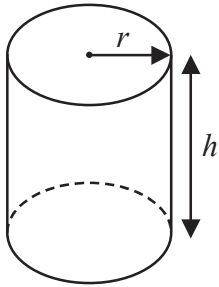
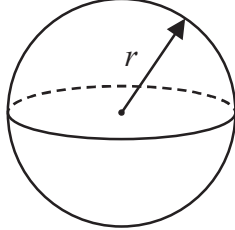
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**Pearson**

**International GCSE Mathematics**  
**Formulae sheet – Higher Tier**

<p><b>Arithmetic series</b></p> <p>Sum to <math>n</math> terms, <math>S_n = \frac{n}{2} [2a + (n - 1)d]</math></p>	<p><b>Area of trapezium</b> = <math>\frac{1}{2}(a + b)h</math></p> 
<p><b>The quadratic equation</b></p> <p>The solutions of <math>ax^2 + bx + c = 0</math> where <math>a \neq 0</math> are given by:</p> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	<p><b>In any triangle <math>ABC</math></b></p> <p><b>Sine Rule</b> <math>\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}</math></p> <p><b>Cosine Rule</b> <math>a^2 = b^2 + c^2 - 2bc \cos A</math></p> <p><b>Area of triangle</b> = <math>\frac{1}{2}ab \sin C</math></p>
<p><b>Trigonometry</b></p> 	<p><b>Volume of cone</b> = <math>\frac{1}{3}\pi r^2 h</math></p> <p><b>Curved surface area of cone</b> = <math>\pi r l</math></p> 
<p><b>Volume of cylinder</b> = <math>\pi r^2 h</math></p> <p><b>Curved surface area of cylinder</b> = <math>2\pi r h</math></p> 	<p><b>Volume of sphere</b> = <math>\frac{4}{3}\pi r^3</math></p> <p><b>Surface area of sphere</b> = <math>4\pi r^2</math></p> 

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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)

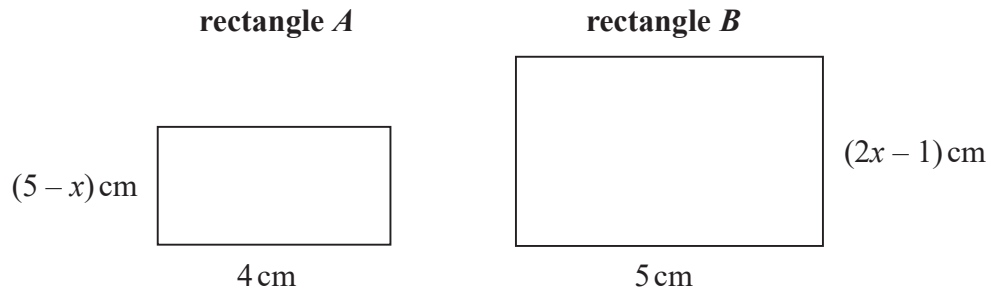
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- 2 Here are two rectangles, rectangle  $A$  and rectangle  $B$ .



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)**

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- 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.

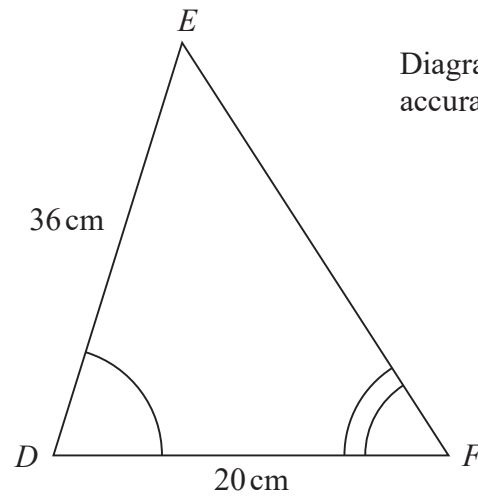
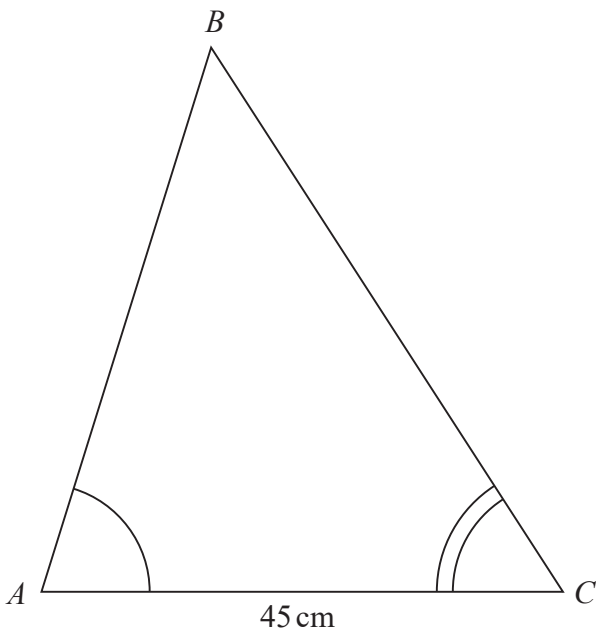


Diagram **NOT** accurately drawn

(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)

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

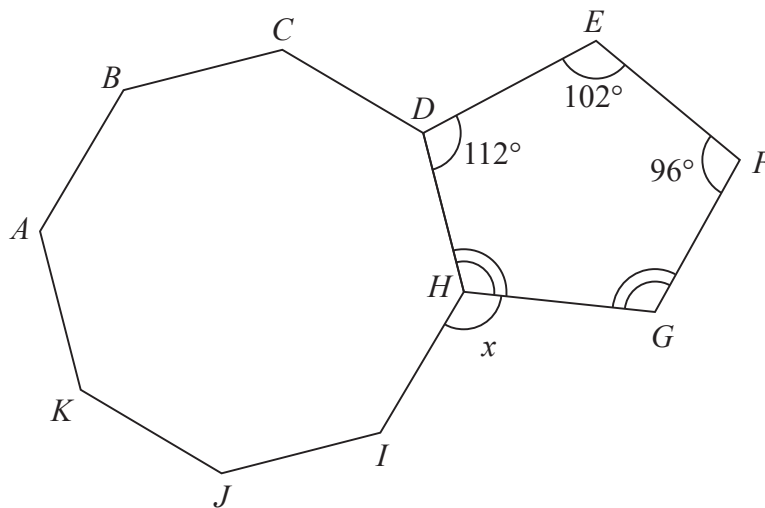


Diagram **NOT**  
accurately drawn

Angle  $GHD =$  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)**

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

<b>Cyclone Bank</b>	<b>Tornado Bank</b>
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)**

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9 A rainwater tank contains  $2.4 \times 10^7$  raindrops.  
The rainwater tank also contains  $1.75 \times 10^6$  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  $5.01 \times 10^{21}$  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  $BA = BC$ .

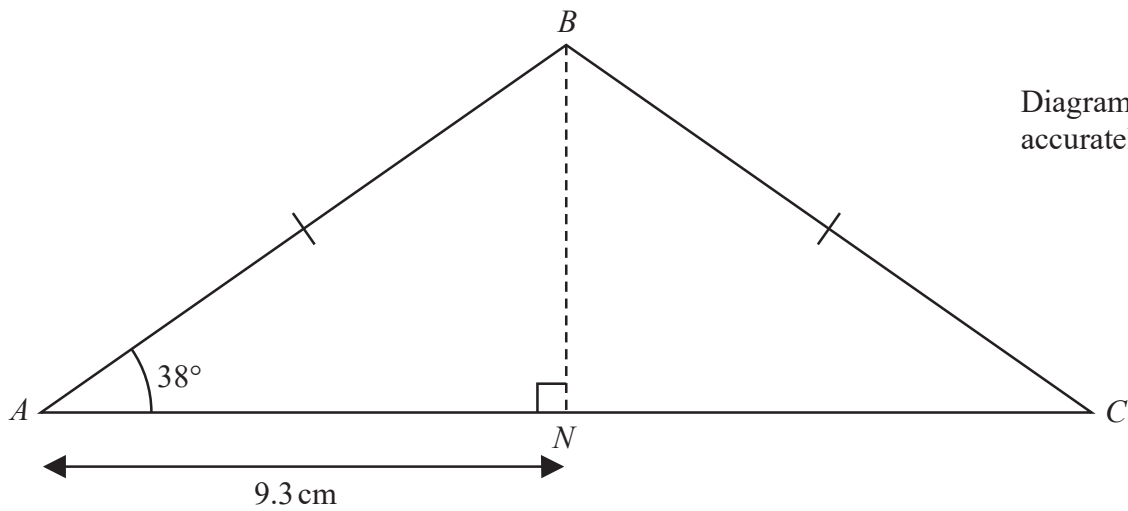


Diagram NOT accurately drawn

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$N$  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

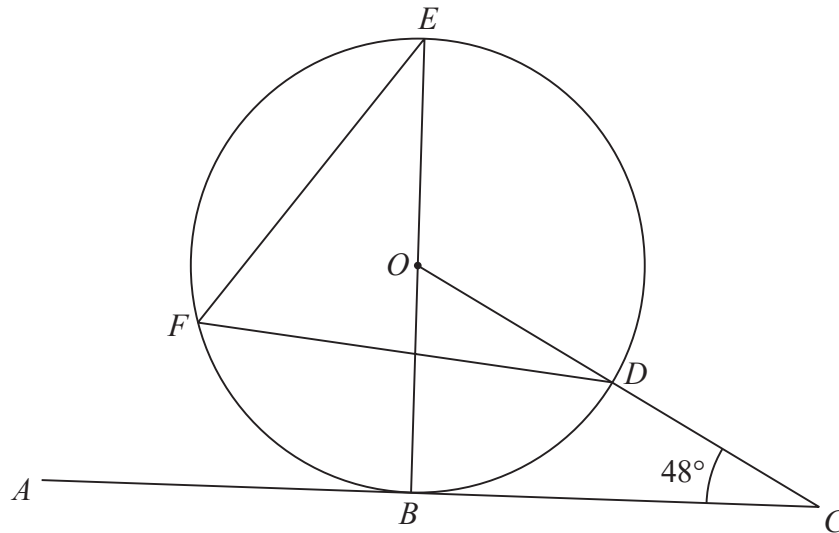


Diagram NOT  
accurately drawn

$B$ ,  $D$ ,  $E$  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)

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

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.....  
(3)

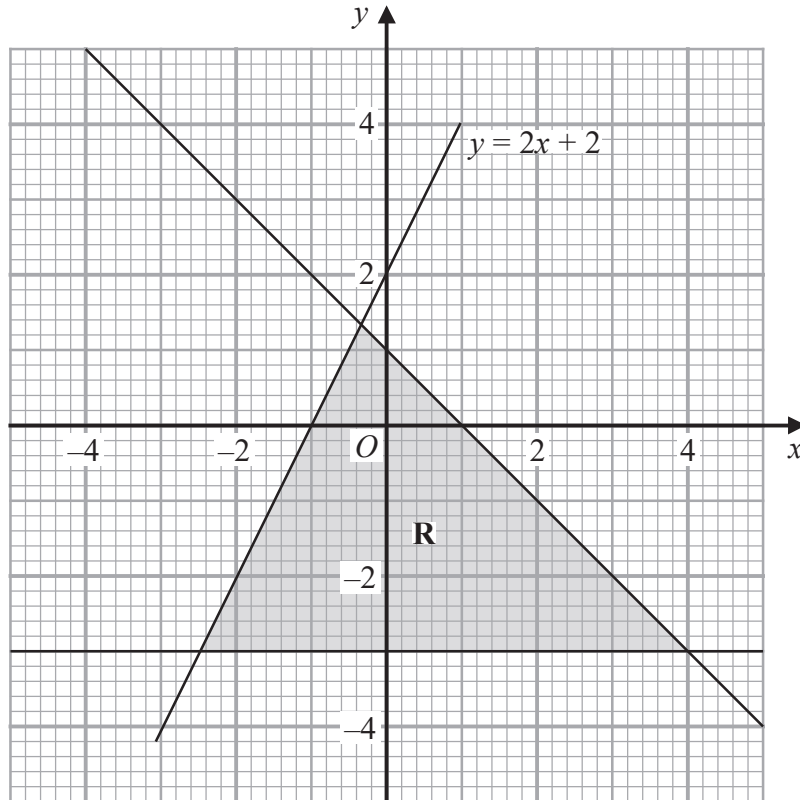
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(Total for Question 12 is 7 marks)

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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)



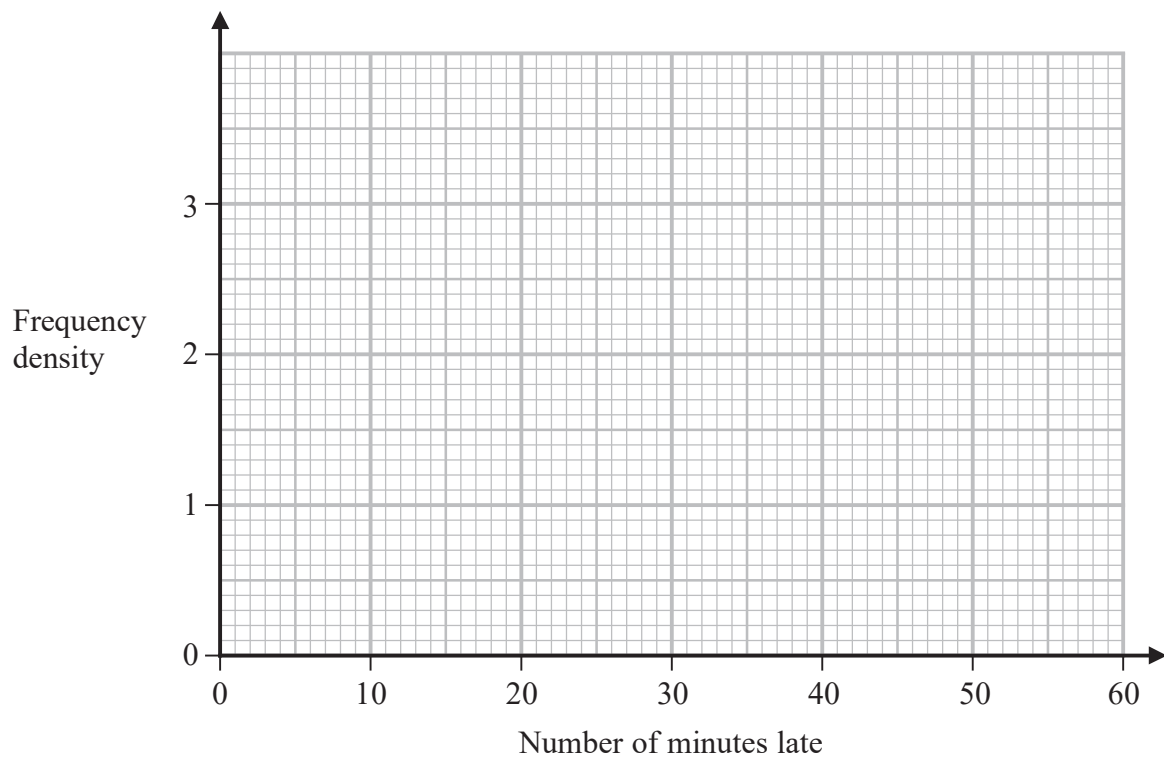


14 Manuel collected information about the flights that arrived late at an airport last month.

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)

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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.

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.....  
**(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.

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



18 Here is a quadrilateral  $ABCD$ .

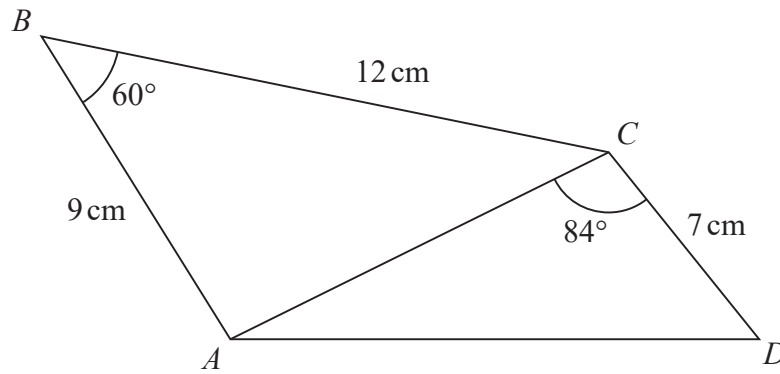


Diagram **NOT** accurately drawn

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

.....  $\text{cm}^2$

(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.

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

(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.

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.....  
(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)

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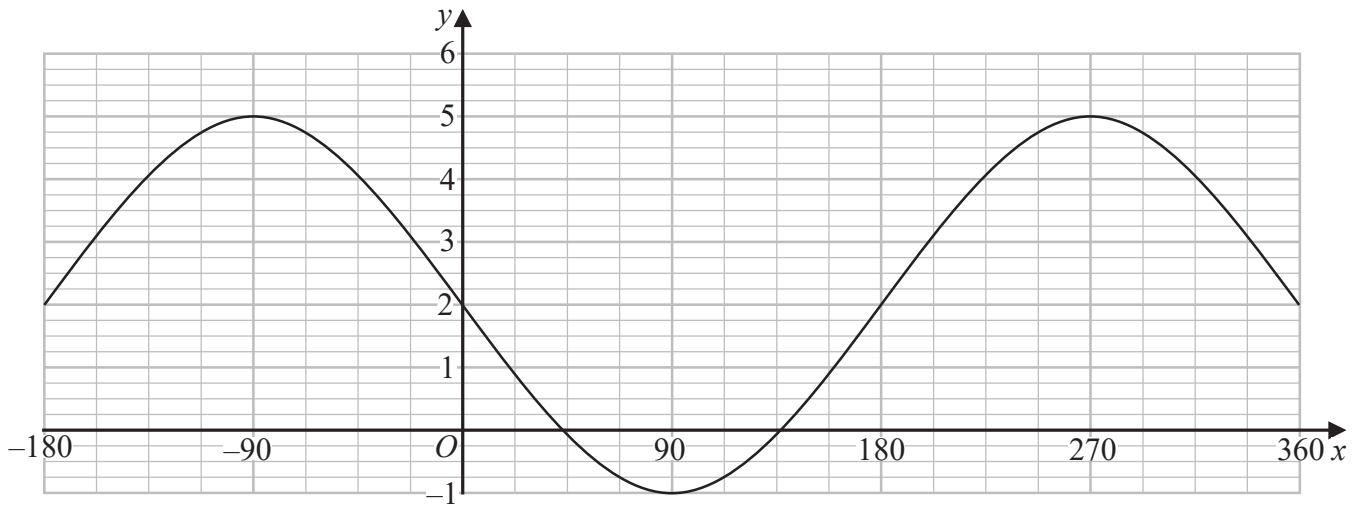
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The graph of  $y = a \cos(x - b)^\circ + c$  for  $-180 \leq x \leq 360$  is drawn on the grid below.



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

$a = \dots\dots\dots$

$b = \dots\dots\dots$

$c = \dots\dots\dots$

(3)

(Total for Question 21 is 6 marks)



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

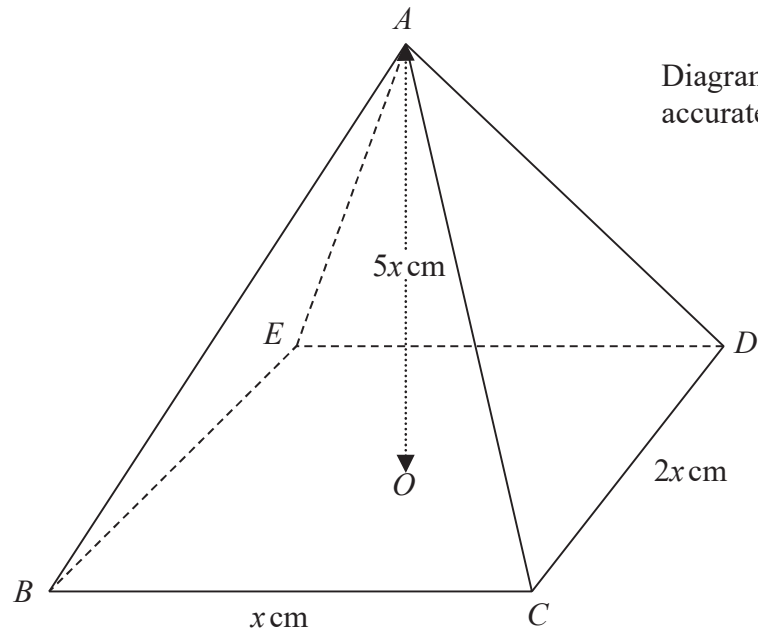
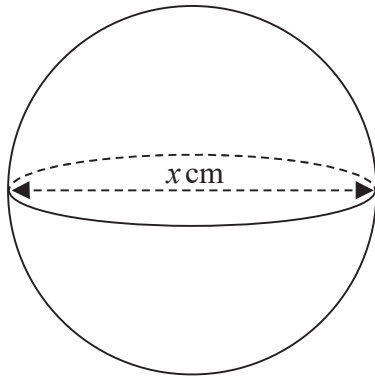


Diagram NOT accurately drawn

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  $288\pi$  cm<sup>3</sup>

Calculate the total surface area of the pyramid.  
Give your answer correct to the nearest cm<sup>2</sup>

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..... cm<sup>2</sup>

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

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**TOTAL FOR PAPER IS 100 MARKS**



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