

Write your name here			
Surname		Other names	
Pearson Edexcel Certificate Pearson Edexcel International GCSE		Centre Number 	Candidate Number
Mathematics A Paper 4H  Higher Tier			
Monday 12 January 2015 – Afternoon Time: 2 hours		Paper Reference 4MA0/4H KMA0/4H	
You must have: Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.			Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

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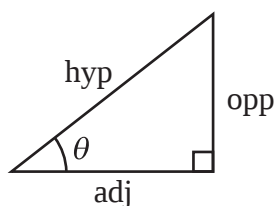
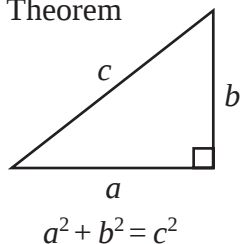


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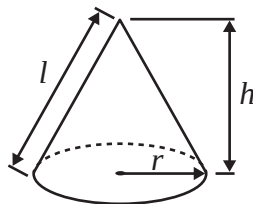
FORMULAE SHEET – HIGHER TIER

Pythagoras' Theorem



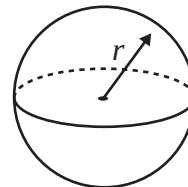
$$\text{Volume of cone} = \frac{1}{3} \pi r^2 h$$

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



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

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



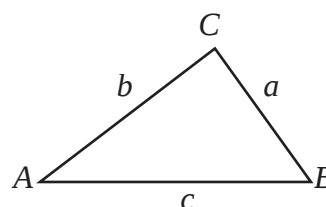
$$\begin{aligned} \text{adj} &= \text{hyp} \times \cos \theta \\ \text{opp} &= \text{hyp} \times \sin \theta \\ \text{opp} &= \text{adj} \times \tan \theta \end{aligned}$$

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

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

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

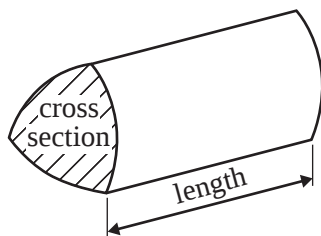
In any triangle ABC



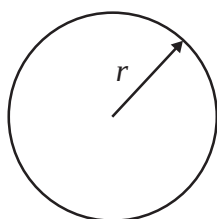
$$\text{Sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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



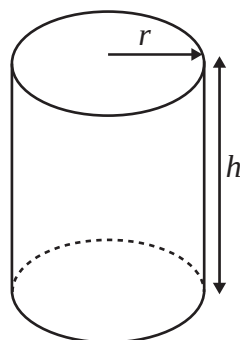
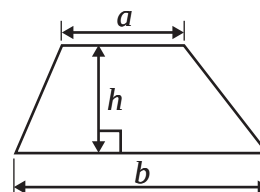
$$\text{Volume of prism} = \text{area of cross section} \times \text{length}$$



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

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

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



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

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

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

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



Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** Becky counted the number of matches in each of 50 boxes.
The table shows information about her results.

Number of matches	Frequency
45	3
46	7
47	12
48	23
49	4
50	1

Work out the mean number of matches.

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

Do NOT write in this space.



2

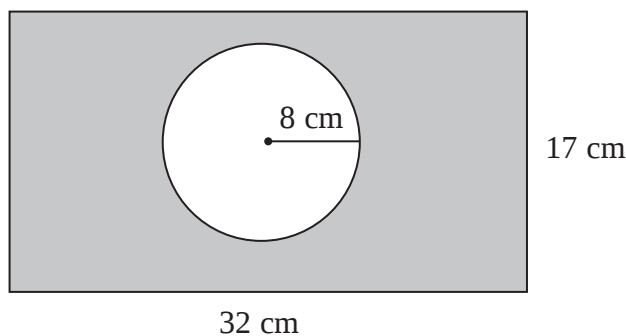


Diagram **NOT**
accurately drawn

The diagram shows a circle inside a rectangle.

Work out the area of the shaded region.

Give your answer correct to 3 significant figures.

.....cm²

(Total for Question 2 is 3 marks)

- 3 A bag contains only red counters, blue counters and yellow counters.
The number of red counters in the bag is the same as the number of blue counters.

Mikhail takes at random a counter from the bag.

The probability that the counter is yellow is 0.3

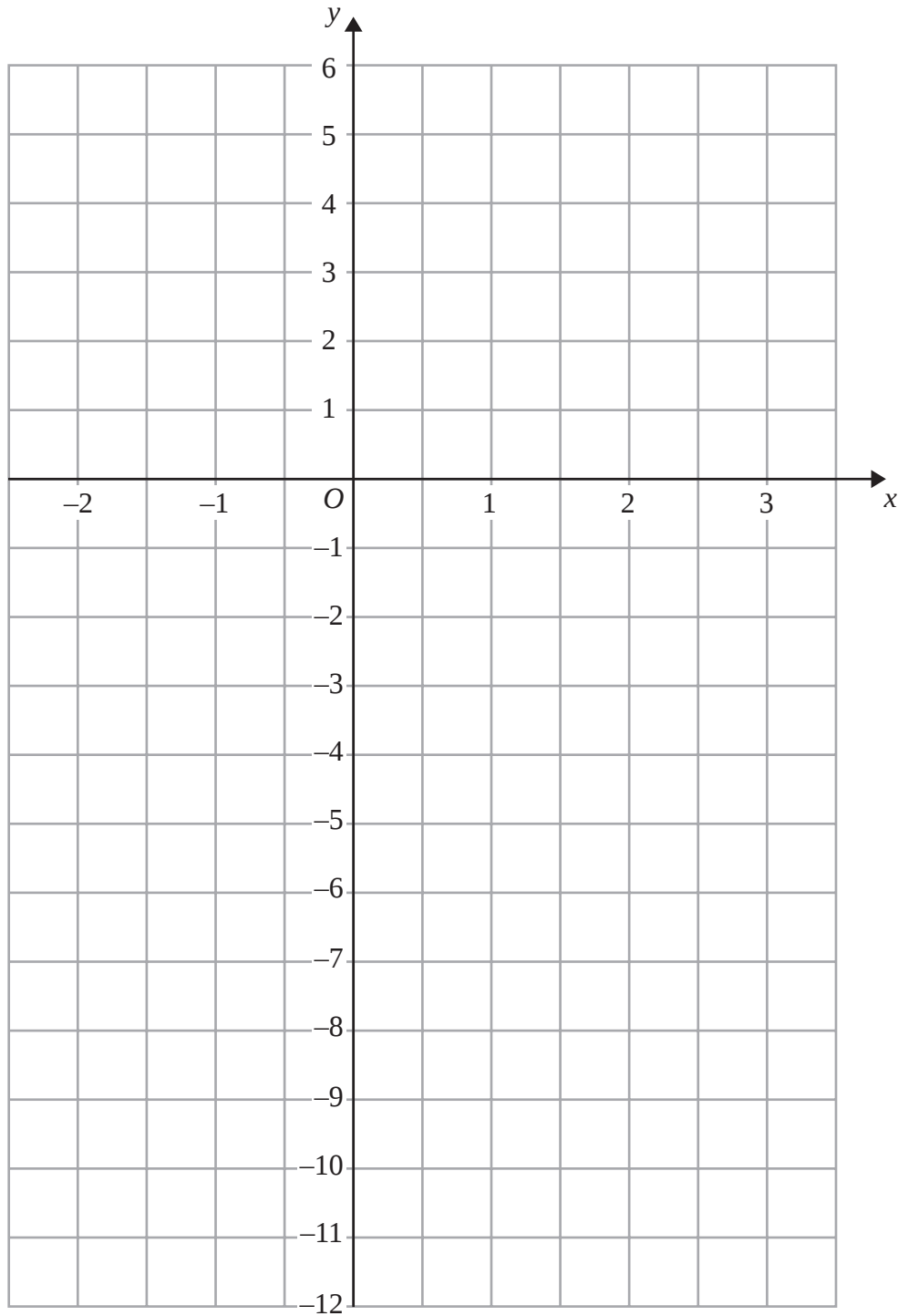
Work out the probability that the counter Mikhail takes is red.

.....

(Total for Question 3 is 3 marks)



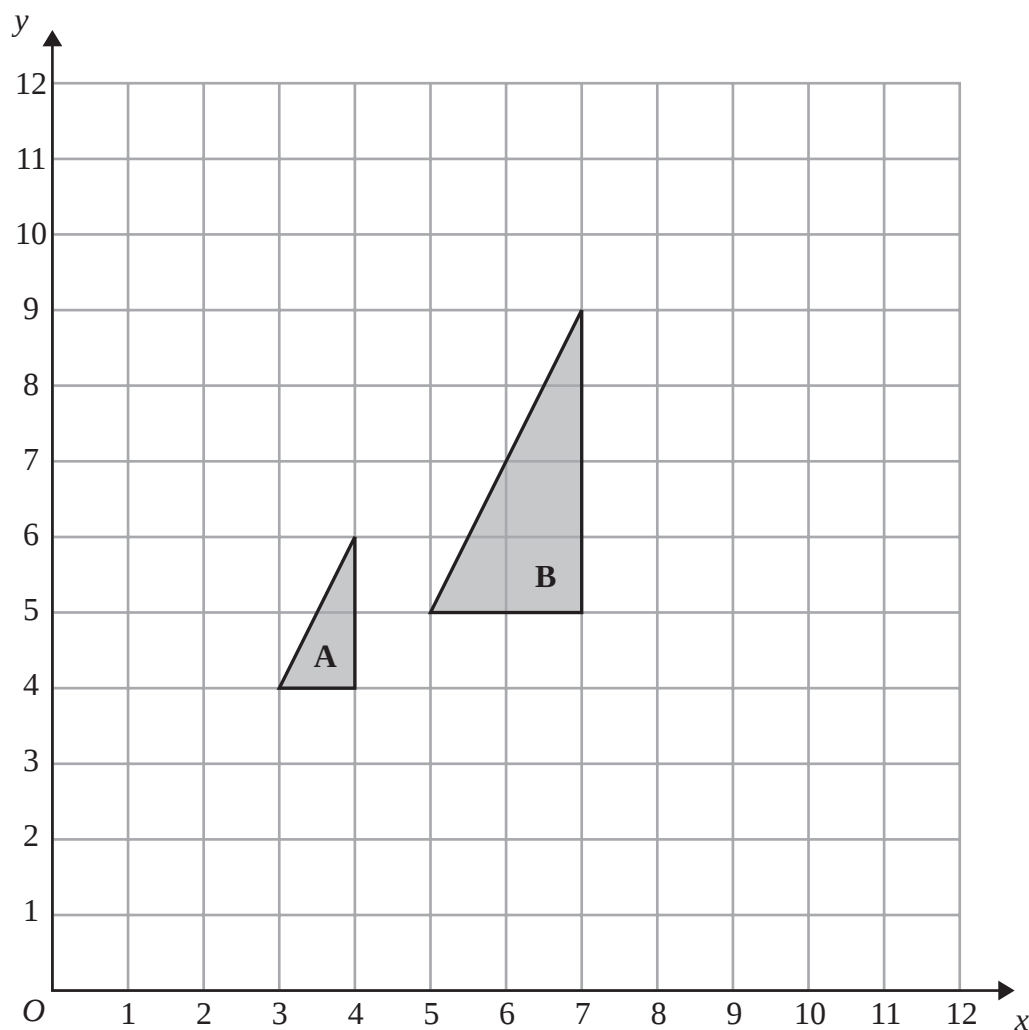
- 4 On the grid, draw the graph of $y = 3x - 4$ for values of x from -2 to 3



(Total for Question 4 is 4 marks)



5



(a) Describe fully the single transformation that maps triangle **A** onto triangle **B**.

(3)

(b) On the grid, translate triangle **A** by the vector $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$

(1)

(Total for Question 5 is 4 marks)

Do NOT write in this space.



- 6 $\mathcal{E} = \{\text{positive whole numbers less than 19}\}$
 $A = \{\text{odd numbers}\}$
 $B = \{\text{multiples of 5}\}$
 $C = \{\text{multiples of 4}\}$

(a) List the members of the set

(i) $A \cap B$

.....

(ii) $B \cup C$

.....

(2)

$D = \{\text{prime numbers}\}$

(b) Is it true that $B \cap D = \emptyset$?

Tick (✓) the appropriate box.

Yes

No

☐☐

Explain your answer.

.....

(1)

(Total for Question 6 is 3 marks)

- 7 Lisa, Max and Punita share £240 in the ratio 3 : 4 : 8

How much more money than Lisa does Punita get?

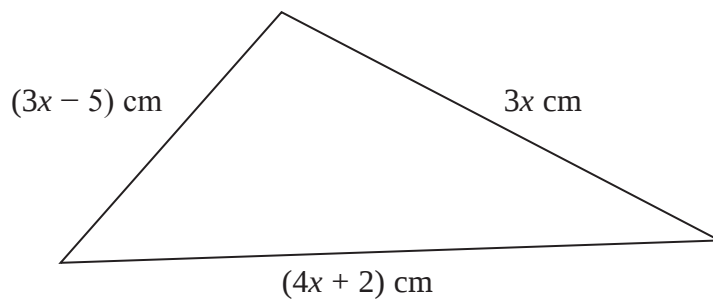
£.....

(Total for Question 7 is 3 marks)



8 The diagram shows a triangle.

Diagram **NOT**
accurately drawn



The lengths of the sides of the triangle are $3x \text{ cm}$, $(3x - 5) \text{ cm}$ and $(4x + 2) \text{ cm}$.

The perimeter of the triangle is 62 cm .

Work out the value of x .

Show clear algebraic working.

$x = \dots\dots\dots$

(Total for Question 8 is 4 marks)



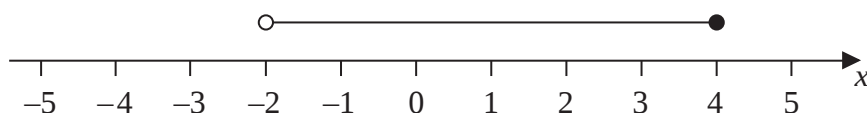
- 9 Three positive whole numbers are all different.
The numbers have a median of 8 and a mean of 6
Find the three numbers.

.....
(Total for Question 9 is 2 marks)

- 10 (a) Solve the inequality $3x + 8 < 35$

.....
(2)

- (b) Write down the inequality shown on the number line.



.....
(2)

(Total for Question 10 is 4 marks)



11

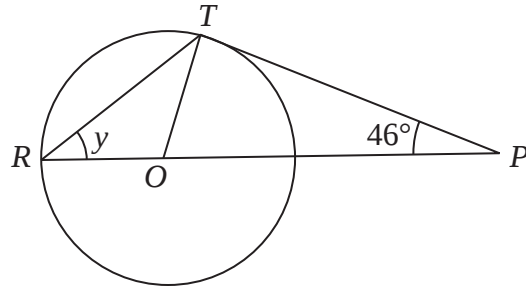


Diagram **NOT**
accurately drawn

R and T are points on a circle, centre O .

ROP is a straight line.

PT is a tangent to the circle.

Angle $TPO = 46^\circ$

(a) Explain why angle $OTP = 90^\circ$

(1)

(b) Work out the size of angle y .

(3)

(Total for Question 11 is 4 marks)

Do NOT write in this space.

12 (a) Factorise $c^2 - 5c$

.....
(2)

(b) Simplify $d^5 \times d^7$

.....
(1)

(c) Factorise $x^2 + x - 30$

.....
(2)

(d) Make b the subject of $P = \frac{1}{2}ab^2$

$b =$
(2)

(e) Solve $\frac{2x+1}{3} + \frac{x-5}{2} = 4$

Show clear algebraic working.

$x =$
(4)

(Total for Question 12 is 11 marks)



13 (a) Write 0.000076 in standard form.

.....
(1)

The area covered by the Pacific Ocean is $1.6 \times 10^8 \text{ km}^2$

The area covered by the Arctic Ocean is $1.4 \times 10^7 \text{ km}^2$

(b) Write 1.6×10^8 as an ordinary number.

.....
(1)

The area covered by the Pacific Ocean is k times the area covered by the Arctic Ocean.

(c) Find, correct to the nearest integer, the value of k .

$k =$
(2)

(Total for Question 13 is 4 marks)

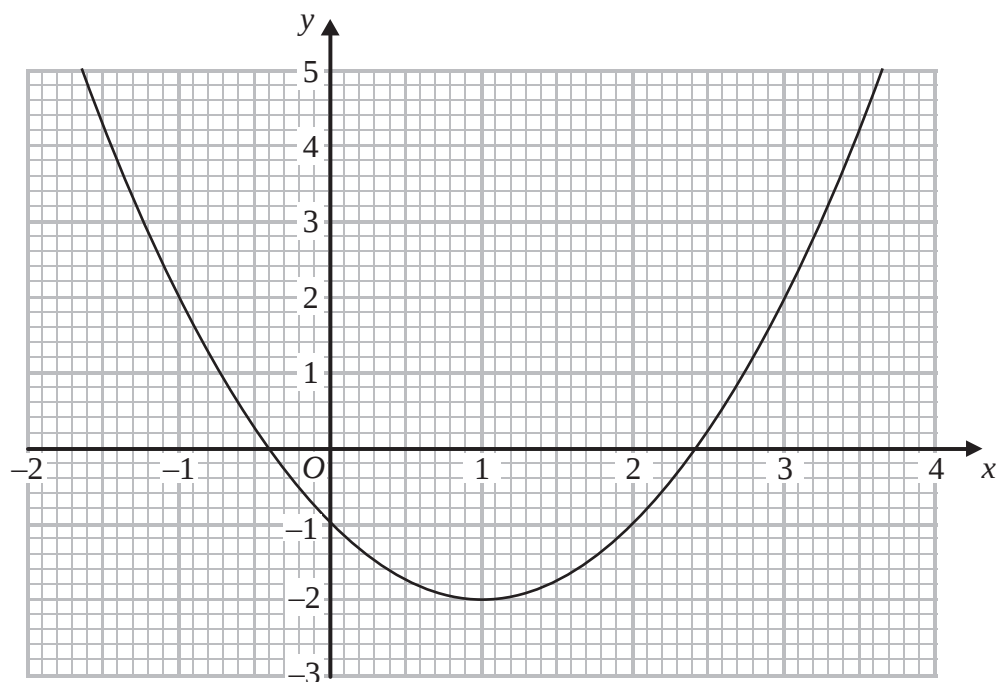
14 Kwo invests HK\$ 40 000 for 3 years at 2.5% per year compound interest.
Work out the value of the investment at the end of 3 years.

HK\$.....

(Total for Question 14 is 3 marks)



15 Here is the graph of $y = x^2 - 2x - 1$



(a) Use the graph to solve the equation $x^2 - 2x - 1 = 2$

.....
(2)

The equation $x^2 + 5x - 7 = 0$ can be solved by finding the points of intersection of the line $y = ax + b$ with the graph of $y = x^2 - 2x - 1$

(b) Find the value of a and the value of b .

$a =$

$b =$

(2)

(Total for Question 15 is 4 marks)



The probability that Chris passes the driving test is 0.9
The probability that Sunil passes the driving test is 0.65

Sunil



(3)

14



17

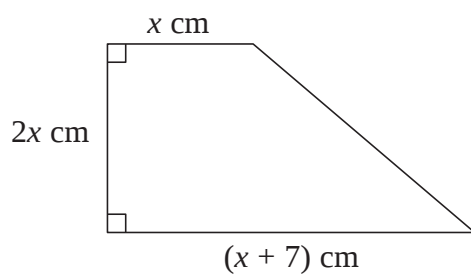


Diagram **NOT**
accurately drawn

The diagram shows a trapezium.
The trapezium has an area of 17 cm^2

(a) Show that $2x^2 + 7x - 17 = 0$

(3)

(b) Work out the value of x .
Give your answer correct to 3 significant figures.
Show your working clearly.

$x = \dots\dots\dots$

(3)

(Total for Question 17 is 6 marks)



- 18** An athlete runs 400 metres, correct to the nearest metre.
The athlete takes 50.2 seconds, correct to the nearest 0.1 of a second.

Work out the upper bound of the athlete's average speed.
Give your answer correct to 3 significant figures.

..... m/s

(Total for Question 18 is 3 marks)

19 $\mathbf{a} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 1 \\ 7 \end{pmatrix}$ $\mathbf{c} = \begin{pmatrix} -7 \\ 0 \end{pmatrix}$

- (a) Write, as a column vector, $2\mathbf{a}$

$\begin{pmatrix} \\ \end{pmatrix}$
.....
(1)

- (b) Write, as a column vector, $3\mathbf{b} - \mathbf{c}$

$\begin{pmatrix} \\ \end{pmatrix}$
.....
(2)

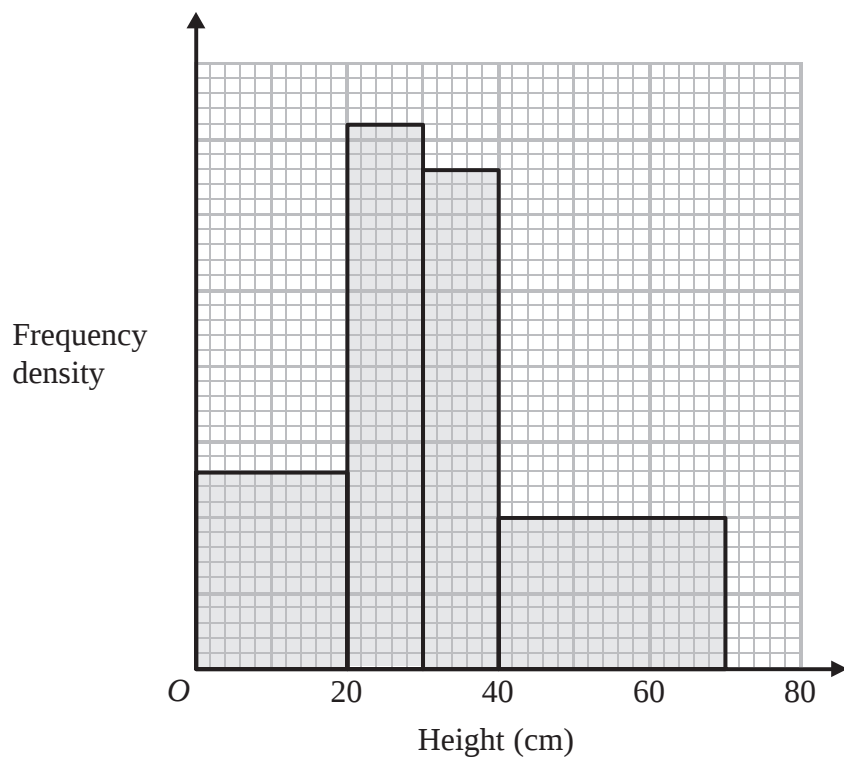
- (c) Work out the magnitude of $\mathbf{a}$
Give your answer as a surd.

.....
(2)

(Total for Question 19 is 5 marks)



20 The histogram shows information about the heights of some tomato plants.



26 plants have a height of less than 20 cm.

Work out the total number of tomato plants.

(Total for Question 20 is 3 marks)



21 The diagram shows a cylinder and a sphere.

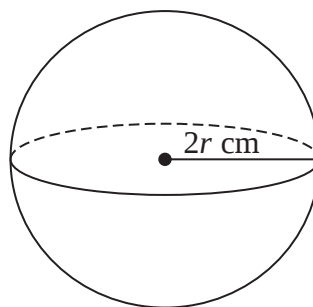
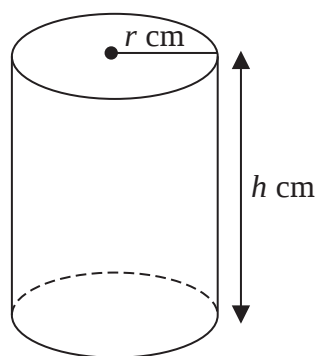


Diagram **NOT**
accurately drawn

The cylinder has radius $r \text{ cm}$ and height $h \text{ cm}$.
The sphere has radius $2r \text{ cm}$.

The volume of the cylinder is equal to the volume of the sphere.
Find an expression for h in terms of r .
Give your answer in its simplest form.

.....
(Total for Question 21 is 3 marks)

22 (a) Write $\frac{1}{32}$ as a power of 2

.....
(2)

(b) Show that $(4 + \sqrt{12})(5 - \sqrt{3}) = 14 + 6\sqrt{3}$
Show each stage of your working clearly.

(3)

(Total for Question 22 is 5 marks)

23 Write $5 - (x + 2) \div \left(\frac{x^2 - 4}{x - 3} \right)$ as a single fraction.

Simplify your answer fully.

.....
(Total for Question 23 is 4 marks)



24 The diagram shows a sector $OAPB$ of a circle, centre O .

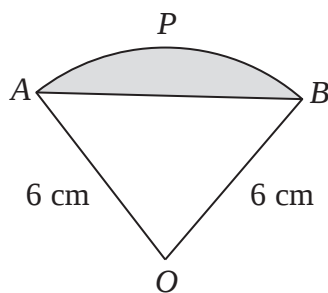


Diagram **NOT**
accurately drawn

AB is a chord of the circle.

$OA = OB = 6$ cm.

The area of sector $OAPB$ is 5π cm²

Calculate the perimeter of the shaded segment.

Give your answer correct to 3 significant figures.

.....cm

(Total for Question 24 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS