

Paper 2 Practice Paper

Model
Answers

Question	Marks	TOPIC
1	5	Stem & Leaf
2	4	Sequences
3	3	Angles
4	3	Use a calculator
5	2	Elevations & Plans
6	7	Frequency Polygon
7	3	Ration
8	3	Compound Interest
9	4	Bearings/Scale Drawings
10	4	Trial & Improvement
11	2	Fractional Enlargement
12	6	Change the Subject
13	3	Histograms
14	2	Index notation
15	3	Reverse Percentages
16	2	Sectors
17	3	Recurring Decimals
18	4	Simultaneous Equations
19	2	Stratified samples
20	5	Trigonometry
21	4	Bounds
22	3	Proofs
23	4	Volume Frustrum
24	3	Quadratic equation
25	4	Cubic Graph
26	4	Volume of Similar Shapes
27	4	Parallel & perpendicular Lines
28	5	Trigonometric Graphs

HIGHER

Q1.

Here are the heights in centimetres of 20 men.

~~165~~ ~~164~~ ~~176~~ ~~179~~ ~~188~~ ~~178~~ ~~183~~ ~~172~~ ~~190~~ ~~190~~
~~167~~ ~~159~~ ~~156~~ ~~176~~ ~~173~~ ~~168~~ ~~169~~ ~~182~~ ~~187~~ ~~192~~

(a) Show this information in an ordered stem and leaf diagram.

156, 159, 164, 165, 167, 167, 168, 169, 172, 173, 176, 176, 178, 179,
180, 182, 183, 188, 190, 192

15	6	9
16	4	5 7 7 8 9
17	2	3 6 6 8 9
18	0	2 3 8
19	0	2

Key
14/7 means 147

(3)

(b) Work out the percentage of these men with a height greater than 184cm.

$$\frac{3}{20} \times 100 = 15\%$$

15

.....%

(2)

(Total for question = 5 marks)

Q2.

Here are the first five terms of an arithmetic sequence.

4 11 18 25 32
+7 +7 +7 +7

(a) Write down, in terms of n , an expression for the n th term of this sequence.

$$7n - 3$$

(2)

An expression for the n th term of another sequence is $3n^2 - 1$

(b) Find the fourth term of this sequence.

$$3 \times (4)^2 - 1 = 47$$

(2)

(Total for Question is 4 marks)

Q3.

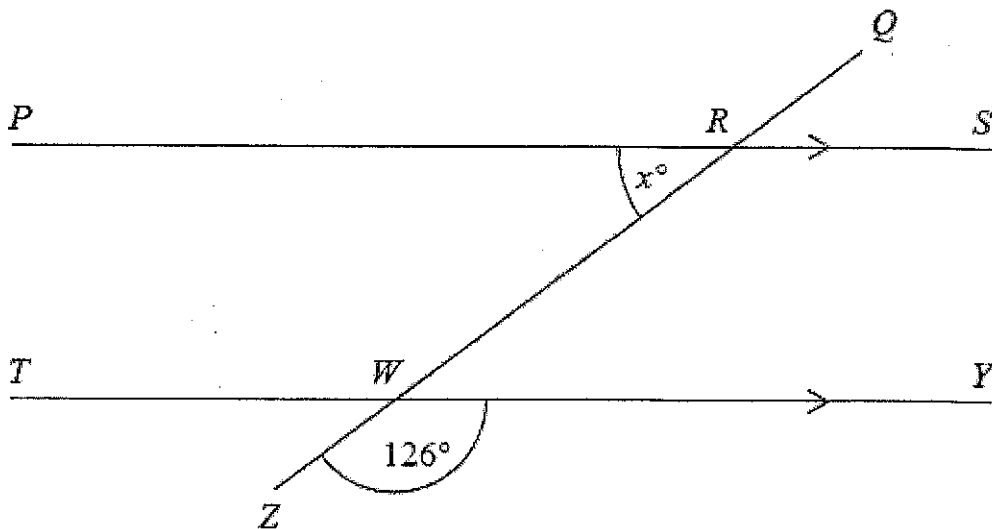


Diagram NOT accurately drawn

PRS and TWY are parallel straight lines.
QRWZ is a straight line.

Work out the value of x .
Give reasons for your answer.

~~WRWZ~~ $YWR = 180 - 126$
 $= 54$ angles in a straight line
add up to 180°

$X = 54$ alternate angles

(Total for Question is 3 marks)

Q4.

(a) (i) Use your calculator to work out $\frac{\sqrt{46.2 - 17.5}}{2.39 \times 0.7}$

Write down all the figures on your calculator display.

3.202174593

(ii) Give your answer to (i) correct to 3 significant figures.

3.20

(3)

(Total for Question is 3 marks)

Q5.

The diagram shows a solid prism.

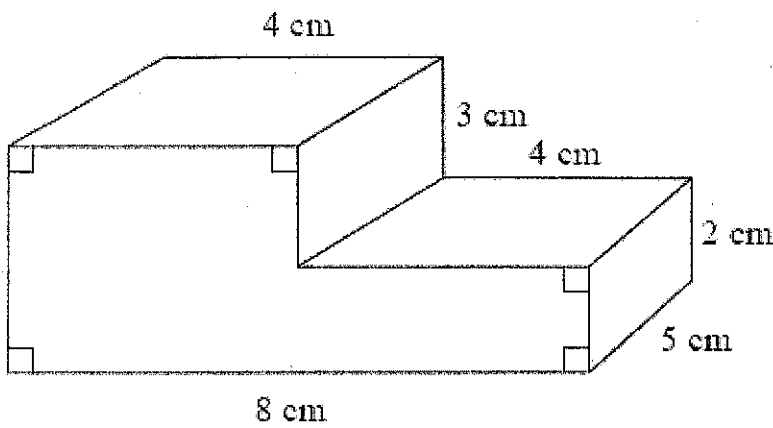
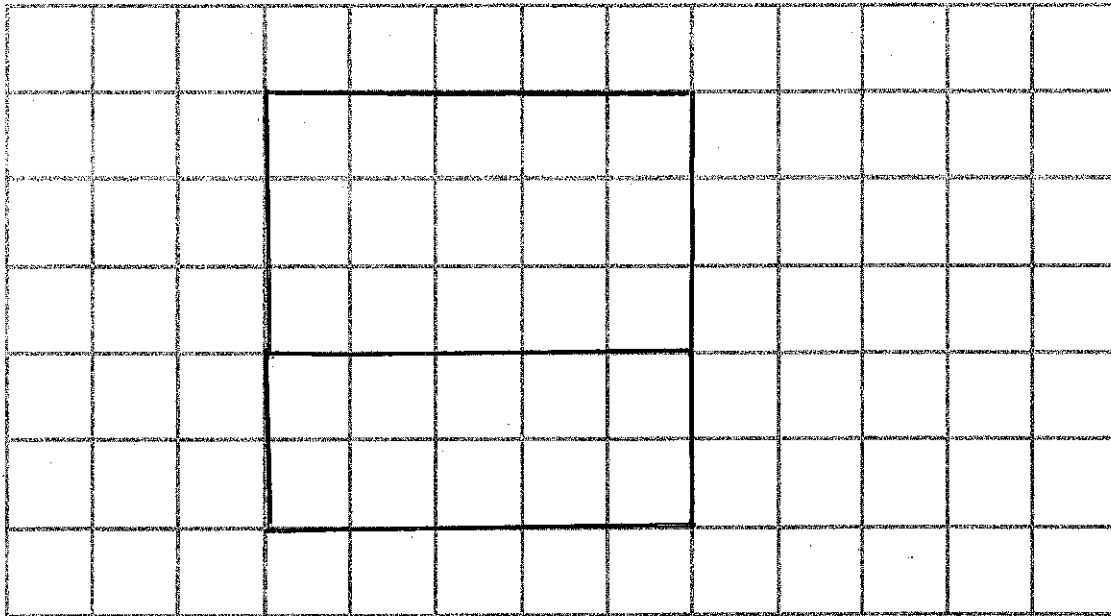


Diagram NOT
accurately drawn

On the centimetre square grid, draw the side elevation of the solid prism from the direction shown by the arrow.



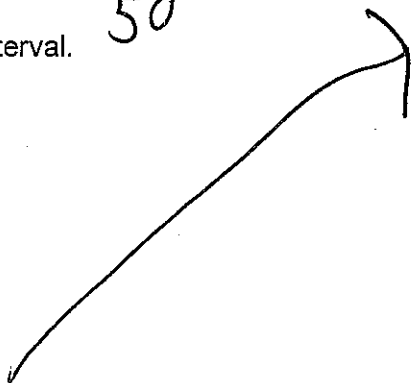
(Total for Question is 2 marks)

Q6.

The table gives information about the temperature, T °C, at noon in a town for 50 days.

Temperature (T °C)	Frequency	mid-point	mid-point \times frequency
$8 < T \leq 12$	6	10	60
$12 < T \leq 16$	8	14	112
$16 < T \leq 20$	13	18	234
$20 < T \leq 24$	21	22	462
$24 < T \leq 28$	2	26	52
	50		920

(a) Write down the modal class interval.



$20 < T \leq 24$

(1)

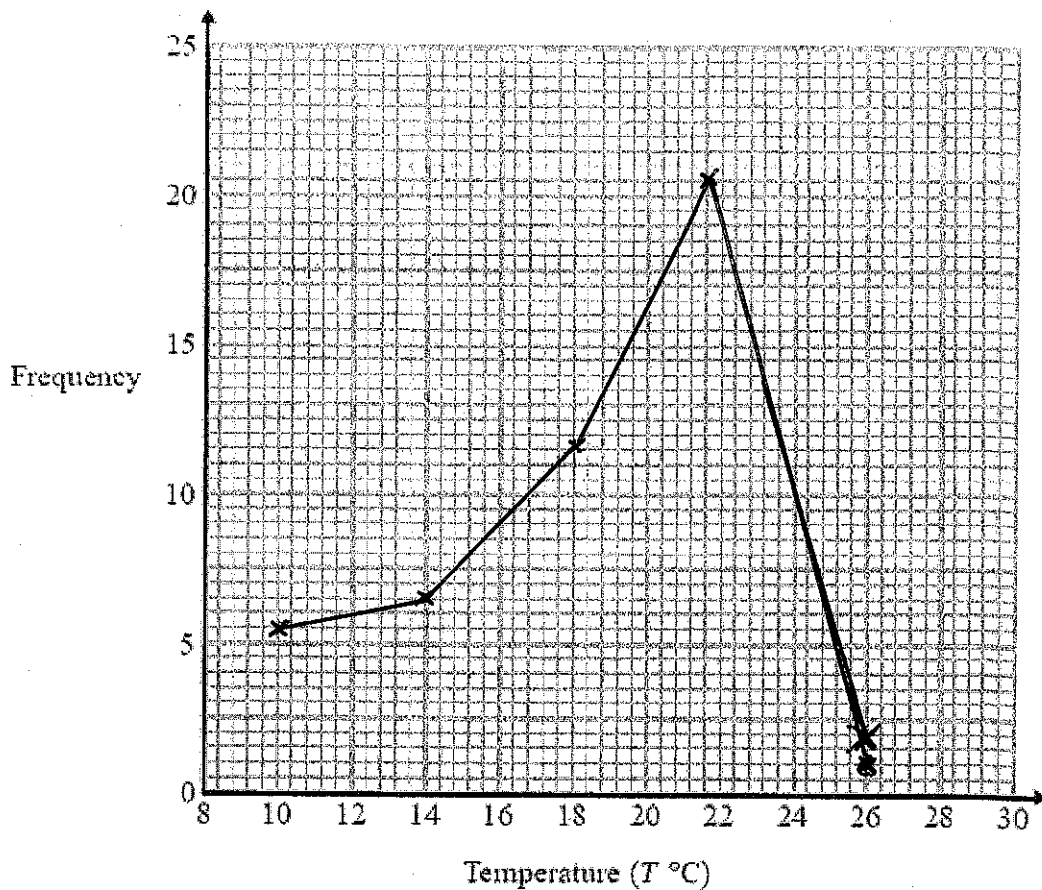
(b) Calculate an estimate for the mean temperature.

$$\frac{920}{50} = 18.4$$

18.4

°C
(4)

(c) Draw a frequency polygon for the information in the table.



(2)
(Total for Question is 7 marks)

Q7.

Sandra has a piece of string 153 cm long.
She cuts the string into three lengths in the ratio 4 : 2 : 3

Work out the length, in centimetres, of each piece of string.

$$\text{no of parts} = 4 + 2 + 3 = 9$$

$$1 \text{ part} = 153 \div 9 = 17$$

$$4 \times 17 : 2 \times 17 : 3 \times 17$$

$$68 : 34 : 51$$

$$4 \text{ parts} = 68 \text{ cm}$$

$$2 \text{ parts} = 34 \text{ cm}$$

$$3 \text{ parts} = 51 \text{ cm}$$

(Total for question = 3 marks)

Q8.

Mason invests £1500 at 2.5% per year compound interest.
Work out the value of Mason's investment at the end of 3 years.

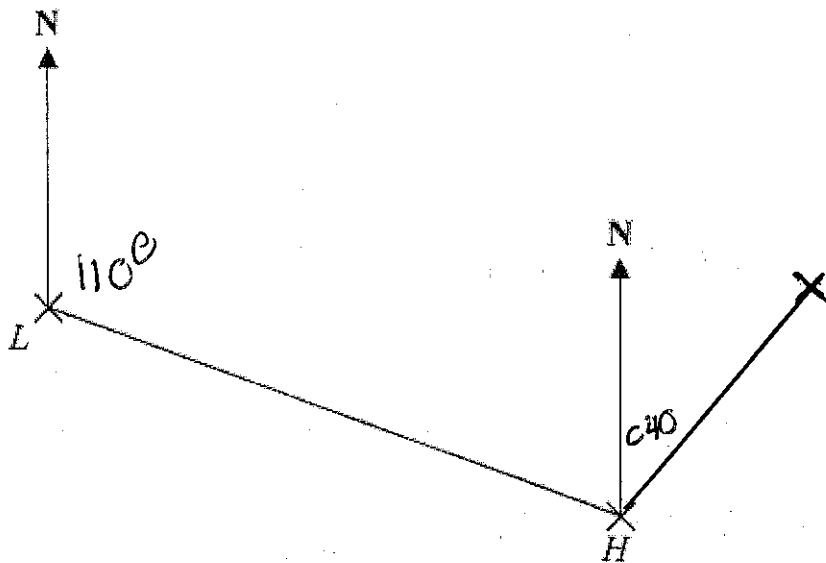
$$1500 \times 1.025^3 = \text{£}1615.335938$$

£1615.34

(Total for question = 3 marks)

Q9.

The diagram shows the position of a lighthouse L and a harbour H .



The scale of the diagram is 1 cm represents 5 km.

(a) Work out the real distance between L and H .

$$8\text{cm} = 8 \times 5\text{km}$$

40

km

(b) Measure the bearing of H from L .

110

(1)

(1)

A boat B is 20 km from H on a bearing of 040° .

(c) On the diagram, mark the position of boat B with a cross (\times).
Label it B .

(2)

(Total for Question is 4 marks)

Q10.

The equation

$$x^3 - 2x = 125$$

has a solution between 5 and 6

Use a trial and improvement method to find this solution.

Give your answer correct to 1 decimal place.

You must show all your working.

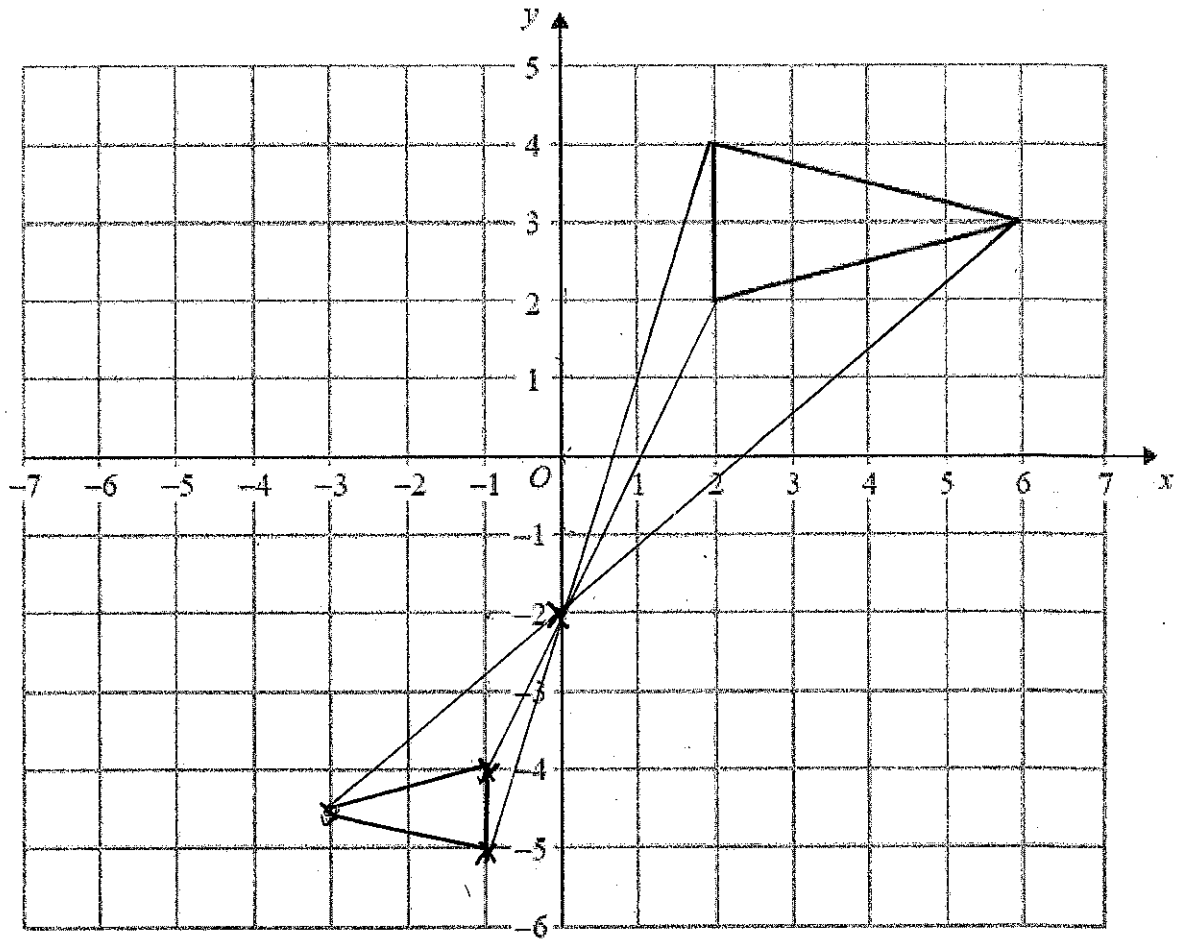
$x = 5.5$	$5.5^3 - 2 \times 5.5 = 155.375$	too big
$x = 5.3$	$5.3^3 - 2 \times 5.3 = 138.277$	too big
$x = 5.2$	$5.2^3 - 2 \times 5.2 = 130.208$	too big
$x = 5.1$	$5.1^3 - 2 \times 5.1 = 122.451$	too small
$x = 5.15$	$5.15^3 - 2 \times 5.15 = 126.290875$	too big

5.15 is too big, rounds to 5.1

$$x = 5.1$$

(Total for question = 4 marks)

Q11.



$\frac{1}{2}$

On the grid, enlarge the triangle by scale factor $-\frac{1}{2}$, centre $(0, -2)$.

(Total for Question is 2 marks)

Q12.

You can change temperatures from °F to °C by using the formula

$$C = \frac{5(F - 32)}{9}$$

F is the temperature in °F.

C is the temperature in °C.

The minimum temperature in an elderly person's home should be 20°C.

Mrs Smith is an elderly person.

The temperature in Mrs Smith's home is 77°F.

*(a) Decide whether or not the temperature in Mrs Smith's home is lower than the minimum temperature should be.

$$C = \frac{5(77-32)}{9} = \frac{5 \times 45}{9} = 25$$

No it is not lower than it should be

(3)

(b) Make F the subject of the formula $C = \frac{5(F - 32)}{9}$

$$9C = 5(F - 32)$$

$$9C = 5F - 160$$

$$9C + 160 = 5F$$

$$\frac{9C + 160}{5} = F$$

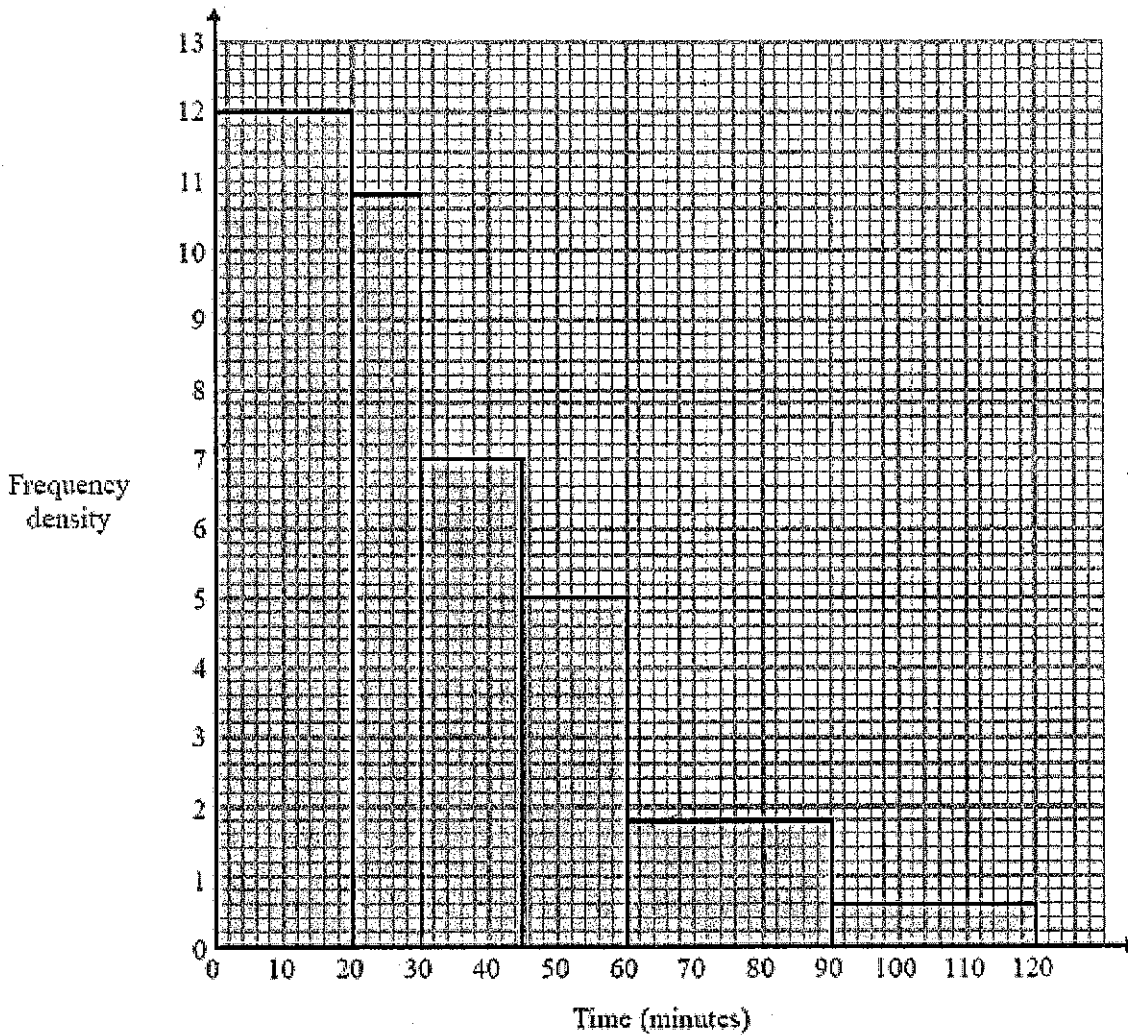
$$F = \frac{9C + 160}{5}$$

(3)

(Total for Question is 6 marks)

Q13.

The histogram shows information about the times, in minutes, that some passengers had to wait at an airport.



Work out the percentage of the passengers who had to wait for more than one hour.

$$\begin{aligned} \text{No of passengers} &= (12 \times 20) + (11 \times 10) + (7 \times 15) + (5 \times 15) \\ &\quad + (1.8 \times 30) + (0.6 \times 30) \\ &= 240 + 110 + 105 + 75 + 54 + 18 = 592 \end{aligned}$$

$$\text{No of passengers waiting more than 1 hour} = 72 \quad 602$$

$$\text{percentage} = \frac{72}{592} \times 100$$

$$\frac{10.2\%}{10.1\%}$$

(Total for Question is 3 marks)

$$\frac{60}{602}$$

$$\frac{72}{602} \times 100 = 11.96\%$$

Q14.

Write these numbers in order of size.
Start with the smallest number.

$$\begin{array}{cccc} 5^{-1} & 0.5 & -5 & 5^0 \\ 0.2 & 0.5 & -5 & 1 \end{array}$$

~~0.2, 0.5, -5, 1~~ $-5, 5^{-1}, 0.5, 5^0$

(Total for Question is 2 marks)

Q15.

In a sale normal prices are reduced by 20%.

A washing machine has a sale price of £464

By how much money is the normal price of the washing machine reduced?

$$80\% = £464$$

$$100\% = x$$

$$x = \frac{100}{80} \times £464 = £580 \text{ price before sale}$$

$$580$$

$$-464$$

$$\hline 116$$

- price reduction

$$£ \quad 116$$

(Total for Question is 3 marks)

Q16.

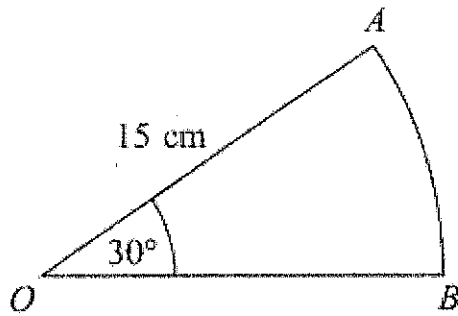


Diagram NOT
accurately drawn

OAB is a sector of a circle, centre O.
The radius of the circle is 15 cm.
The angle of the sector is 30°.

Calculate the area of sector OAB.
Give your answer correct to 3 significant figures.

$$\frac{30}{360} \times \pi \times 15^2 = 58.9 \text{ cm}^2$$

..... 58.9 cm²
(Total for Question is 2 marks)

Q17.

Express the recurring decimal $0.1\dot{5}$ as a fraction.
Give your answer in its simplest form.

$$\begin{aligned} r &= 0.1\dot{5} \\ 100r &= 15.\dot{5} \\ 10r &= 1.\dot{5} \\ 90r &= 14 \\ r &= \frac{14}{90} = \frac{7}{45} \end{aligned}$$

..... $\frac{7}{45}$
(Total for Question is 3 marks)

Q18.

Solve the simultaneous equations

$$\begin{array}{l} 5x + 2y = 11 \text{ --- (A)} \\ 4x - 3y = 18 \text{ --- (B)} \end{array}$$

$$\text{(A)} \times 3$$

$$\text{(B)} \times 2$$

$$\text{(C)} + \text{(D)}$$

$$15x + 6y = 33 \text{ --- (C)}$$

$$\frac{8x - 6y = 36 \text{ --- (D)}}{\hline}$$

$$23x = 69$$

$$x = 3$$

substitute x for 3 in (A)

$$15 + 2y = 11$$

$$2y = -4$$

$$y = -2$$

$$\begin{array}{l} x = \dots \frac{3}{\dots} \dots \\ y = \dots \frac{-2}{\dots} \dots \end{array}$$

(Total for Question is 4 marks)

Q19.

156 students went to London.

Each student visited one of the British Museum or the National Gallery or the Stock Exchange.

The table gives information about these students.

	Place visited		
	British Museum	National Gallery	Stock Exchange
Male	25	18	35
Female	27	32	19

Kate takes a sample of 30 of these students.

The sample is stratified by place visited and by gender.

Work out the number of male students who visited the Stock Exchange in the sample.

$$\frac{35}{156} \times 30 = 6.73 \dots$$

~~7~~ 7

(Total for Question is 2 marks)

Q20.

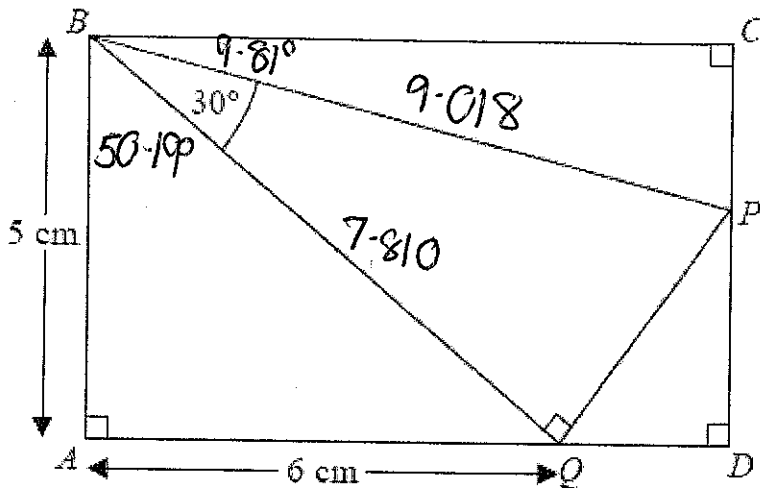


Diagram NOT accurately drawn

In the diagram,

- ABCD is a rectangle
- P lies on the line CD
- Q lies on the line AD
- PQB is a right-angled triangle

Work out the length of BC.
Give your answer correct to 3 significant figures.
You must show your working.

will be other ways of getting to this answer.

$$BQ = \sqrt{5^2 + 6^2} = 7.810$$

$$\cos 30 = \frac{7.810}{BP}$$

$$BP = \frac{7.810}{\cos 30} = 9.018$$

$$\tan \angle BQD = \frac{6}{5}$$

$$\angle BQD = 50.19^\circ$$

$$\therefore \angle CBP = 180 - (30 + 50.19) = 9.81$$

$$\cos 9.81^\circ = \frac{BC}{9.018}$$

$$BC = 9.018 \times \cos 9.81$$

$$= 8.89$$

8.89

.....cm

(Total for question = 5 marks)

Q21.

The value of p is 4.3

The value of q is 0.4

Both p and q are given correct to the nearest 0.1

(a) Write down the lower bound for p .

4.25

(1)

$$r = p + \frac{1}{q}$$

(b) Work out the upper bound for r .
You must show all your working.

$$r = 4.35 + \frac{1}{0.35} = 7.20714285$$

7.20714285

(3)

(Total for question = 4 marks)

Q22.

Prove that

$(2n + 3)^2 - (2n - 3)^2$ is a multiple of 8

for all positive integer values of n .

$$(2n+3)(2n+3) = 4n^2 + 12n + 9$$

$$(2n-3)(2n-3) = 4n^2 - 12n + 9$$

$$(4n^2 + 12n + 9) - (4n^2 - 12n + 9) = 24n$$

24 is in the 8 times table.

(Total for Question is 3 marks)

Q23.

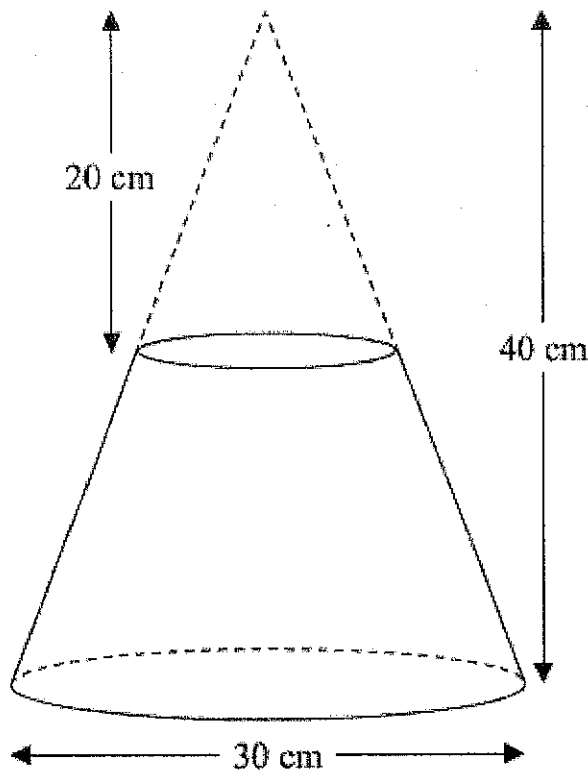


Diagram NOT
accurately drawn

A frustum is made by removing a small cone from a similar large cone.

The height of the small cone is 20 cm.

The height of the large cone is 40 cm.

The diameter of the base of the large cone is 30 cm.

Work out the volume of the frustum.

Give your answer correct to 3 significant figures.

lengths of large cone are twice the small cone

$$\text{Volume of small cone} = \frac{1}{3} \times \pi \times 7.5^2 \times 20 = 1178 \text{ cm}^3$$

$$\text{Volume of large cone} = \frac{1}{3} \times \pi \times 15^2 \times 40 = 9425 \text{ cm}^3$$

$$\begin{array}{r} 9425 \\ -1178 \\ \hline 8247 \end{array}$$

$$\dots\dots\dots 8250 \dots\dots\dots \text{cm}^3$$

(Total for Question is 4 marks)

Q24.

Solve $2x^2 + 4x - 5 = 0$

Give your solutions correct to 2 decimal places.

$$a = 2, \quad b = 4, \quad c = -5$$

$$\frac{-4 \pm \sqrt{16 - 4 \times (2) \times (-5)}}{2 \times 2}$$

$$\frac{-4 \pm \sqrt{16 + 40}}{4}$$

$$\frac{-4 \pm \sqrt{56}}{4}$$

.....
 $0.87, -2.87$

(Total for question = 3 marks)

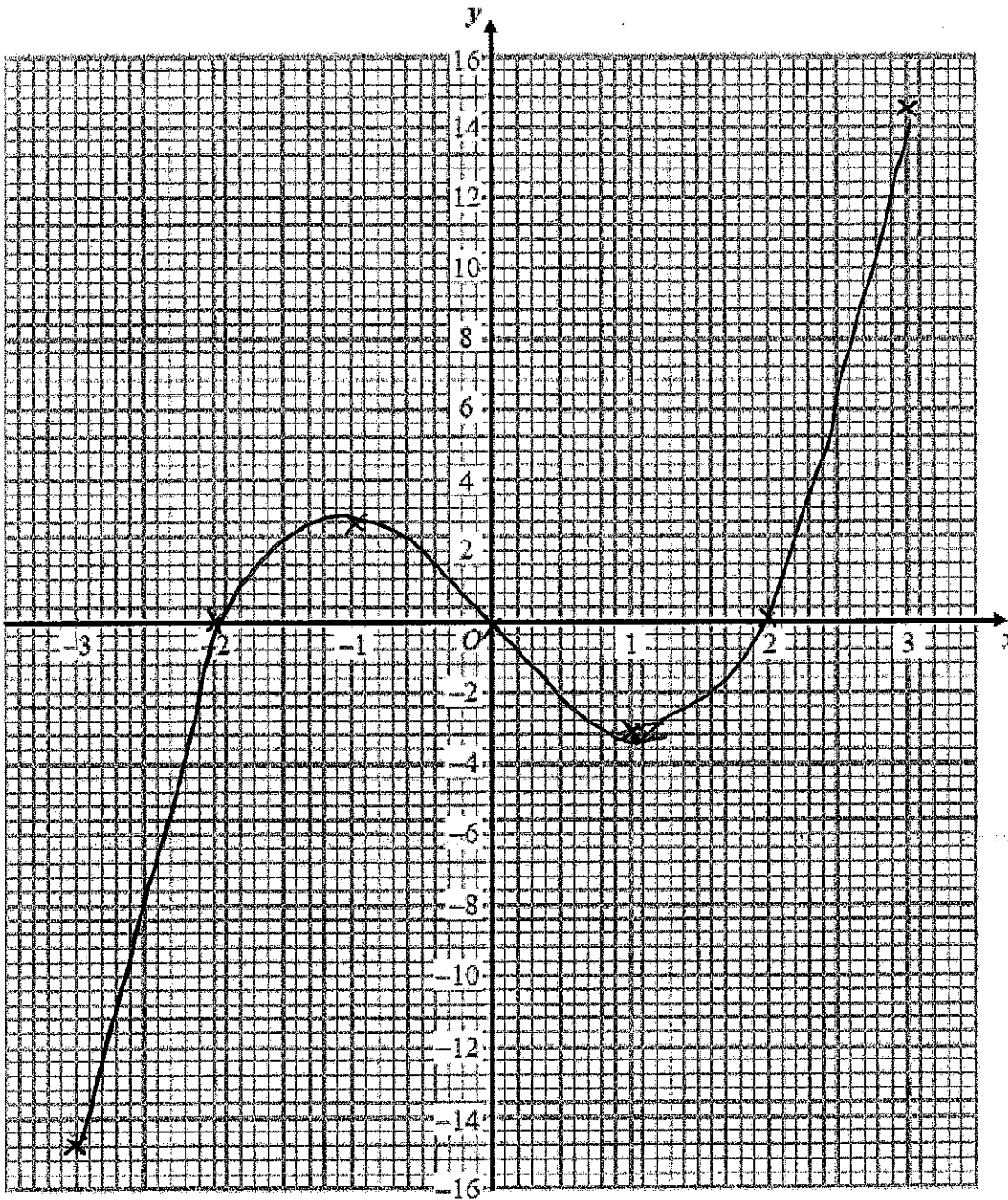
Q25.

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

x	-3	-2	-1	0	1	2	3
y	-15	0	3	0	-3	0	15

(2)

(b) On the grid, draw the graph of $y = x^3 - 4x$ from $x = -3$ to $x = 3$



(2)

(Total for Question is 4 marks)

Q26.

The diagram shows two similar solids, A and B.

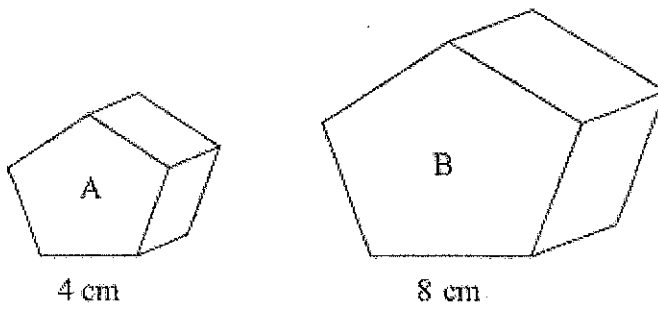


Diagram NOT
accurately drawn

Solid A has a volume of 80 cm^3 .

(a) Work out the volume of solid B.

$$\begin{array}{l} \text{lengths} \quad 4:8 \\ \quad \quad \quad 1:2 \\ \text{volumes} \quad 1^3:2^3 \\ \quad \quad \quad 1:8 \end{array}$$

$$\text{Volume of B} = \frac{8}{1} \times 80 \text{ cm}^3$$

640

..... cm^3
(2)

Solid B has a total surface area of 160 cm^2 .

(b) Work out the total surface area of solid A.

$$\begin{array}{l} \text{Areas} \quad 1^2:2^2 \\ \quad \quad \quad 1:4 \end{array}$$

$$\text{S. Area of A} = \frac{1}{4} \times 160 \text{ cm}^2$$

40

..... cm^2
(2)

(Total for Question is 4 marks)

Q27.

(a) Write down an equation of a straight line that is parallel to the straight line $y = 3x - 5$

e.g. $y = 3x + 1$ [anything that has $y = 3x \pm \text{a number}$]

(1)

A straight line, L, is perpendicular to the straight line $y = 3x - 5$ and passes through the point (6, 5)

(b) Find an equation of L.

gradient of $y = 3x - 5 = 3$
gradient of perpendicular line = $-\frac{1}{3}$

$$y = mx + c$$

$$5 = -\frac{1}{3} \times 6 + c$$

$$c = 7.$$

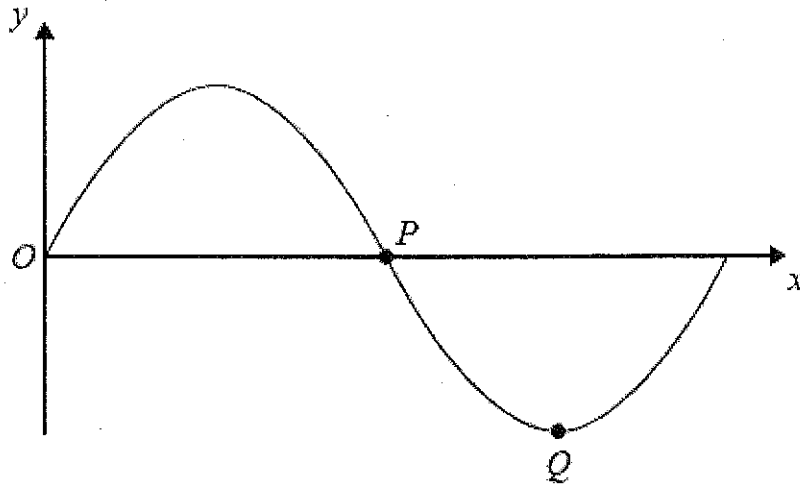
$$y = -\frac{1}{3}x + 7$$

(3)

(Total for Question is 4 marks)

Q28.

The diagram shows part of a sketch of the curve $y = \sin x^\circ$.



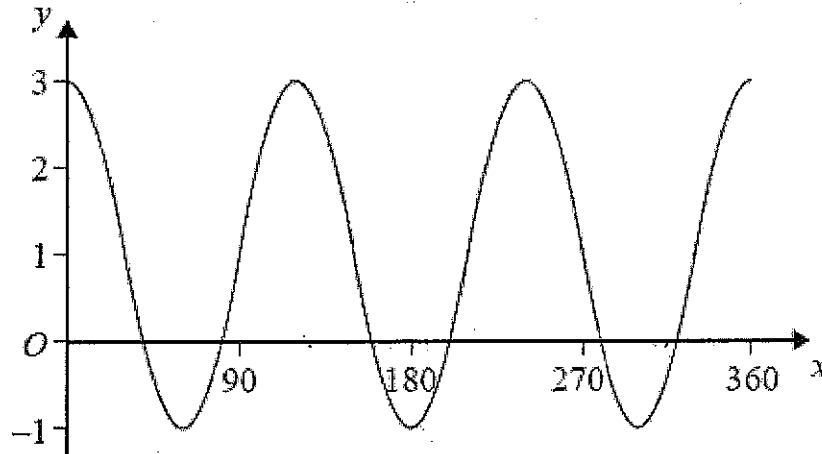
(a) Write down the coordinates of the point P.

(180° , 0)
(1)

(b) Write down the coordinates of the point Q.

(270° , -1)
(1)

Here is a sketch of the curve $y = a \cos bx^\circ + c$, $0 \leq x \leq 360$



(c) Find the values of a , b and c .

$a = 2$ (stretched s.f 2)
 $b = 3$ (stretched s.f $\frac{1}{3}$ Y-axis)
 $c = 1$ (translated (1) X-axis)
(3)

(Total for Question is 5 marks)

