

- 1 (a) The price of a newspaper increased from \$0.97 to \$1.13 .

Calculate the percentage increase.

..... % [3]

- (b) One day, the newspaper had 60 pages of news and advertisements.

The ratio number of pages of news : number of pages of advertisements = 5 : 7.

- (i) Calculate the number of pages of advertisements.

..... [2]

- (ii) Write the number of pages of advertisements as a percentage of the number of pages of news.

..... % [1]

- (c) On holiday Maria paid 2.25 euros for the newspaper when the exchange rate was \$1 = 0.9416 euros.
At home Maria paid \$1.13 for the newspaper.

Calculate the difference in price.

Give your answer in dollars, correct to the nearest cent.

\$ [3]

- (d) The number of newspapers sold decreases exponentially by $x\%$ each year.
Over a period of 21 years the number of newspapers sold decreases from 1 763 000 to 58 000.

Calculate the value of x .

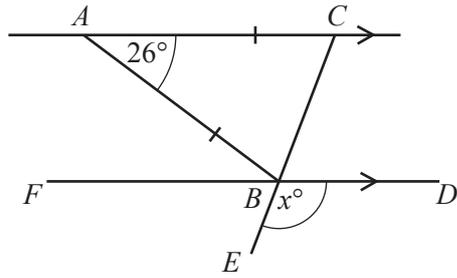
$$x = \dots\dots\dots [3]$$

- (e) Every page of the newspaper is a rectangle measuring 43 cm by 28 cm, both correct to the nearest centimetre.

Calculate the upper bound of the area of a page.

$$\dots\dots\dots \text{ cm}^2 [2]$$

2 (a)



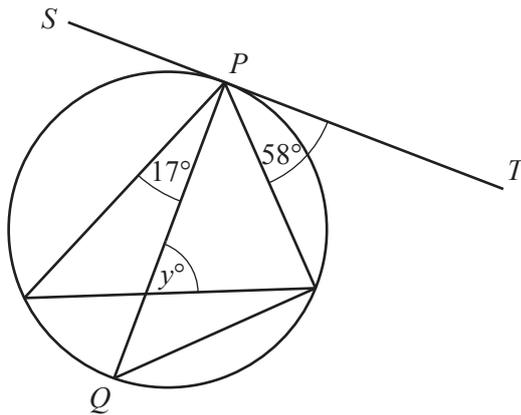
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AC is parallel to *FBD*, *ABC* is an isosceles triangle and *CBE* is a straight line.

Find the value of *x*.

x = [3]

(b)



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The diagram shows a circle with diameter *PQ*.
SPT is a tangent to the circle at *P*.

Find the value of *y*.

y = [5]

3 The probability that Andrei cycles to school is r .

(a) Write down, in terms of r , the probability that Andrei **does not** cycle to school.

..... [1]

(b) The probability that Benoit **does not** cycle to school is $1.3 - r$.
The probability that both Andrei and Benoit **do not** cycle to school is 0.4 .

(i) Complete the equation in terms of r .

(.....) \times (.....) = 0.4 [1]

(ii) Show that this equation simplifies to $10r^2 - 23r + 9 = 0$.

[3]

(iii) Solve by factorisation $10r^2 - 23r + 9 = 0$.

$r = \dots\dots\dots$ or $r = \dots\dots\dots$ [3]

(iv) Find the probability that Benoit **does not** cycle to school.

..... [1]

4 (a) The equation of a straight line is $2y = 3x + 4$.

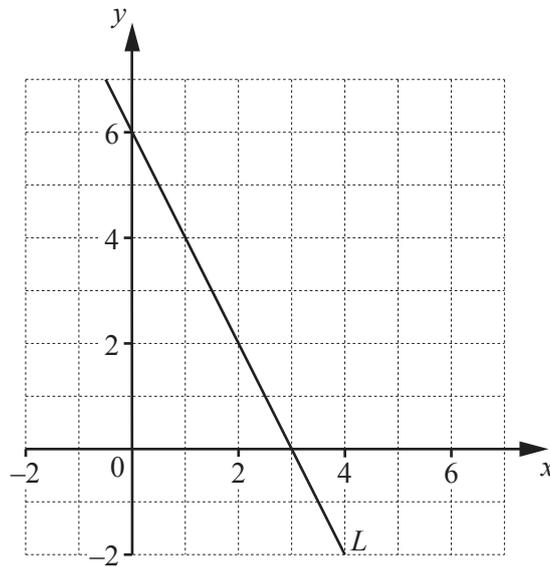
(i) Find the gradient of this line.

..... [1]

(ii) Find the co-ordinates of the point where the line crosses the y -axis.

(..... ,) [1]

(b) The diagram shows a straight line L .



(i) Find the equation of line L .

..... [3]

(ii) Find the equation of the line perpendicular to line L that passes through $(9, 3)$.

..... [3]

(c) A is the point $(8, 5)$ and B is the point $(-4, 1)$.

(i) Calculate the length of AB .

..... [3]

(ii) Find the co-ordinates of the midpoint of AB .

(..... ,) [2]

- 5 The table shows some values of $y = \frac{1}{2x} - \frac{x}{4}$ for $0.15 \leq x \leq 3.5$.

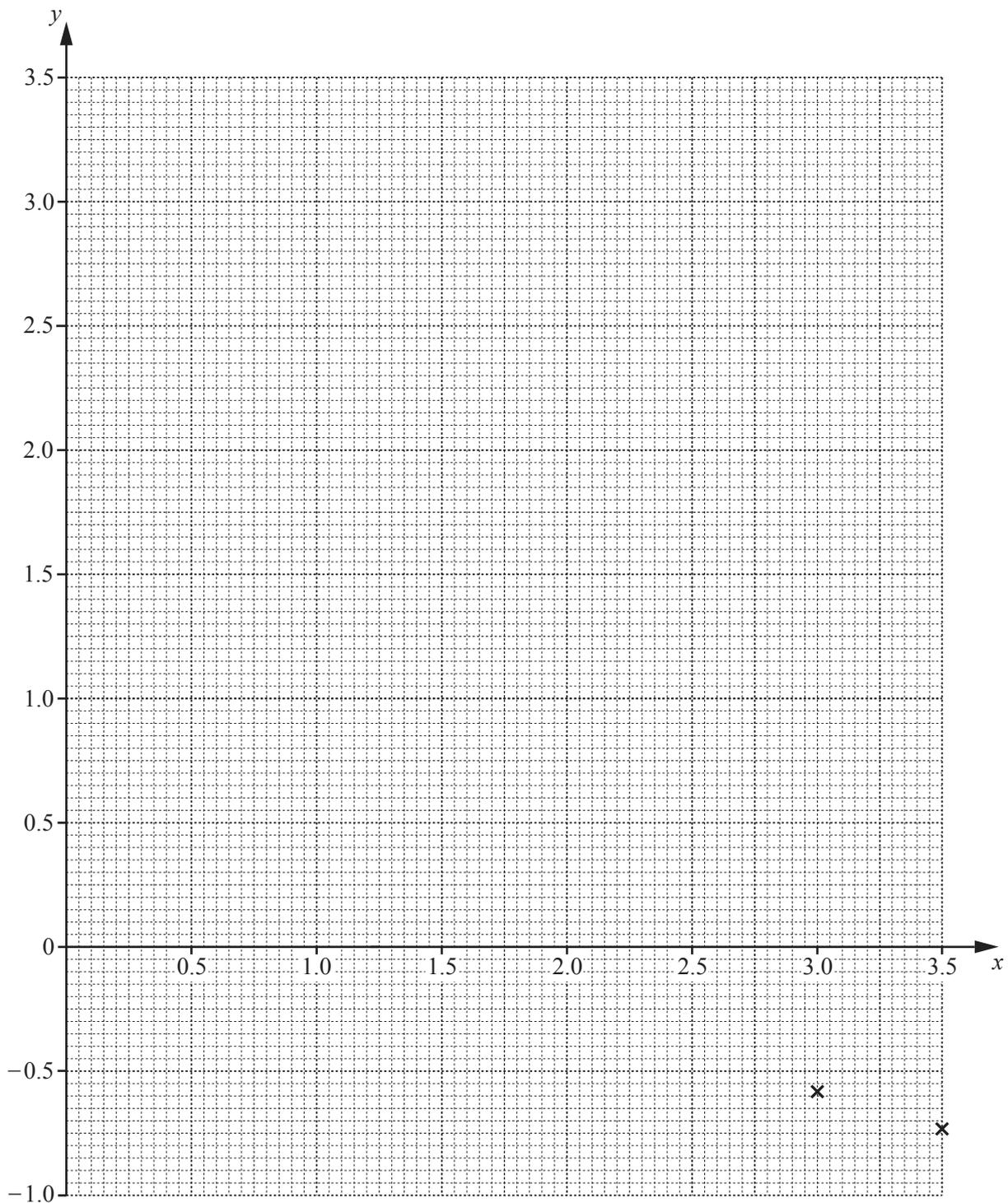
x	0.15	0.2	0.5	1	1.5	2	2.5	3	3.5
y	3.30		0.88		-0.04		-0.43	-0.58	-0.73

(a) Complete the table.

[3]

(b) On the grid, draw the graph of $y = \frac{1}{2x} - \frac{x}{4}$ for $0.15 \leq x \leq 3.5$.

The last two points have been plotted for you.



[4]

(c) Use your graph to solve the equation $\frac{1}{2x} - \frac{x}{4} = \frac{1}{2}$ for $0.15 \leq x \leq 3.5$.

$x = \dots\dots\dots$ [1]

(d) (i) On the grid, draw the line $y = 2 - x$. [2]

(ii) Write down the x co-ordinates of the points where the line $y = 2 - x$ crosses the graph of $y = \frac{1}{2x} - \frac{x}{4}$ for $0.15 \leq x \leq 3.5$.

$x = \dots\dots\dots$ and $x = \dots\dots\dots$ [2]

(e) Show that the graph of $y = \frac{1}{2x} - \frac{x}{4}$ can be used to find the value of $\sqrt{2}$ for $0.15 \leq x \leq 3.5$.

[2]

6 (a) Expand and simplify.

$$(x+7)(x-3)$$

..... [2]

(b) Factorise completely.

(i) $15p^2q^2 - 25q^3$

..... [2]

(ii) $4fg + 6gh + 10fk + 15hk$

..... [2]

(iii) $81k^2 - m^2$

..... [2]

(c) Solve the equation.

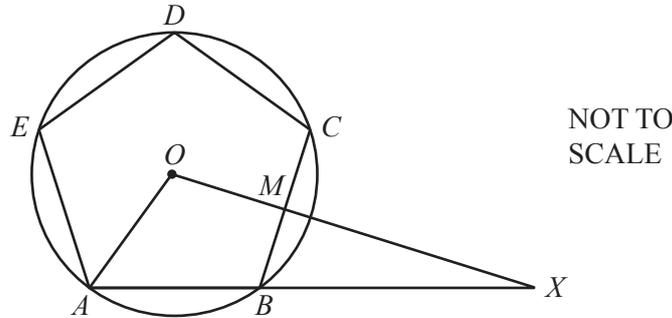
$$3(x-4) + \frac{x+2}{5} = 6$$

$x =$ [4]

7 (a) Show that each interior angle of a regular pentagon is 108° .

[2]

(b)



The diagram shows a regular pentagon $ABCDE$.
 The vertices of the pentagon lie on a circle, centre O , radius 12 cm.
 M is the midpoint of BC .

(i) Find BM .

$BM = \dots\dots\dots$ cm [3]

(ii) OMX and ABX are straight lines.

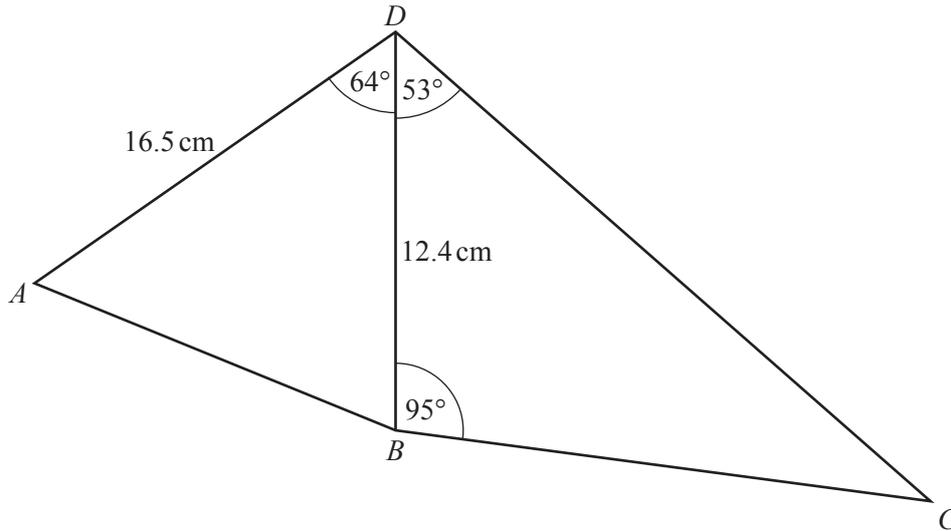
(a) Find BX .

$BX = \dots\dots\dots$ cm [3]

(b) Calculate the area of triangle AOX .

$\dots\dots\dots$ cm^2 [3]

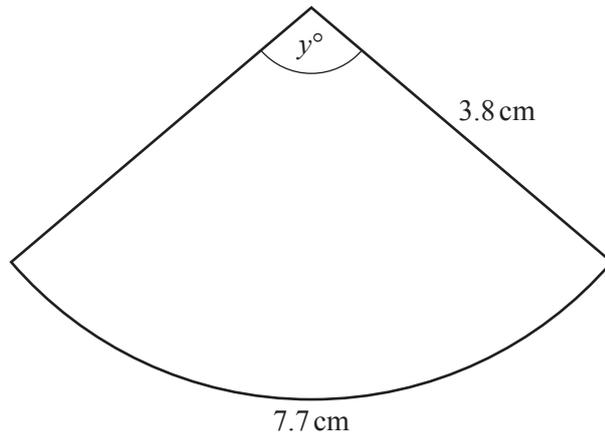
8 (a)

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The diagram shows two triangles ABD and BCD .
 $AD = 16.5$ cm and $BD = 12.4$ cm.
 Angle $ADB = 64^\circ$, angle $BDC = 53^\circ$ and angle $DBC = 95^\circ$.

(i) Find AB . $AB = \dots\dots\dots$ cm [4](ii) Find BC . $BC = \dots\dots\dots$ cm [4]

(b)

NOT TO
SCALE

The diagram shows a sector of a circle of radius 3.8 cm.
The arc length is 7.7 cm.

(i) Calculate the value of y .

$y = \dots\dots\dots$ [2]

(ii) Calculate the area of the sector.

$\dots\dots\dots \text{ cm}^2$ [2]

- 9 100 students were each asked how much money, $\$m$, they spent in one week. The frequency table shows the results.

Amount ($\$m$)	$0 < m \leq 5$	$5 < m \leq 10$	$10 < m \leq 20$	$20 < m \leq 30$	$30 < m \leq 50$
Frequency	16	38	30	9	7

- (a) Calculate an estimate of the mean.

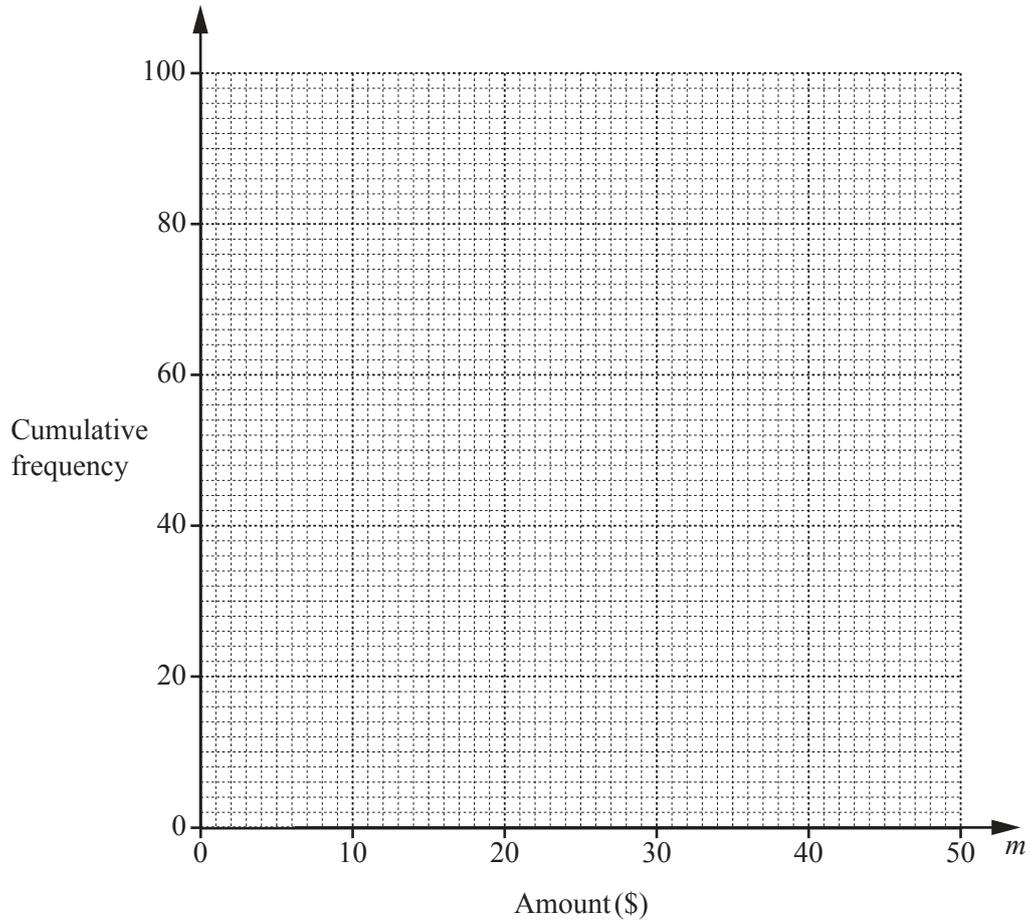
$\$$ [4]

- (b) Complete the cumulative frequency table below.

Amount ($\$m$)	$m \leq 5$	$m \leq 10$	$m \leq 20$	$m \leq 30$	$m \leq 50$
Cumulative frequency	16				100

[2]

(c) On the grid, draw the cumulative frequency diagram.



[3]

(d) Use your cumulative frequency diagram to find an estimate for

(i) the median,

\$ [1]

(ii) the interquartile range,

\$ [2]

(iii) the number of students who spent more than \$25.

..... [2]

10 (a) The volume of a solid metal sphere is 24430 cm^3 .

(i) Calculate the radius of the sphere.

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

..... cm [3]

(ii) The metal sphere is placed in an empty tank.
The tank is a cylinder with radius 50 cm, standing on its circular base.
Water is poured into the tank to a depth of 60 cm.

Calculate the number of litres of water needed.

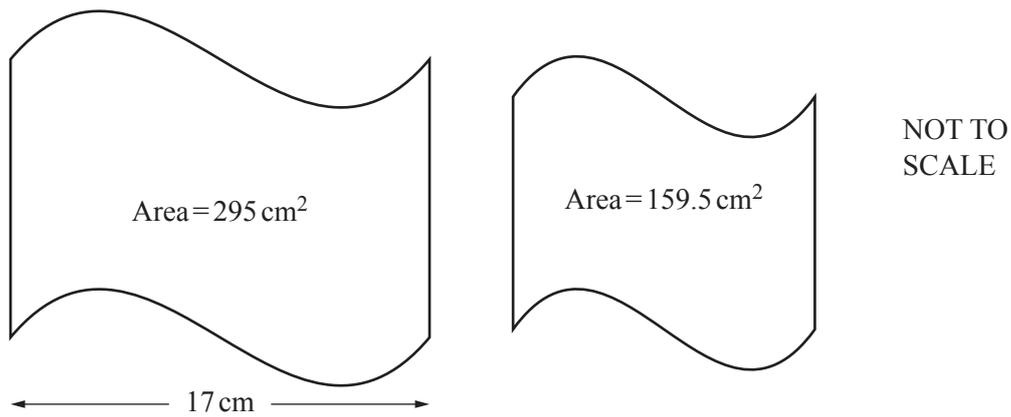
..... litres [3]

(b) A different tank is a cuboid measuring 1.8 m by 1.5 m by 1.2 m.
Water flows from a pipe into this empty tank at a rate of 200 cm^3 per second.

Find the time it takes to fill the tank.
Give your answer in hours and minutes.

..... hours minutes [4]

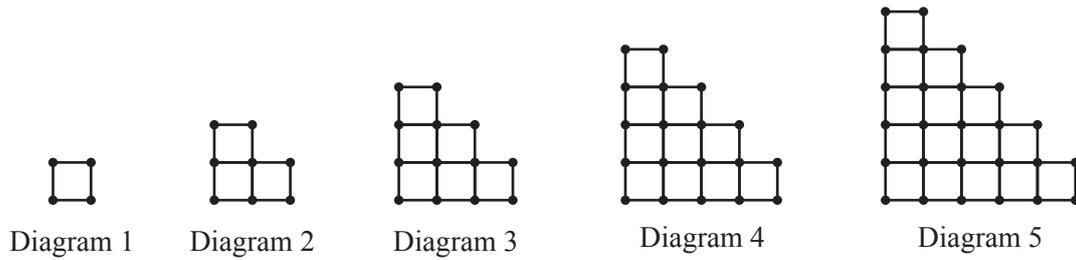
(c)



The diagram shows two mathematically similar shapes with areas 295 cm^2 and 159.5 cm^2 . The width of the larger shape is 17 cm.

Calculate the width of the smaller shape.

..... cm [3]



The sequence of diagrams above is made up of small lines and dots.

(a) Complete the table.

	Diagram 1	Diagram 2	Diagram 3	Diagram 4	Diagram 5	Diagram 6
Number of small lines	4	10	18	28		
Number of dots	4	8	13	19		

[4]

(b) For Diagram n find an expression, in terms of n , for the number of small lines.

..... [2]

(c) Diagram r has 10 300 small lines.

Find the value of r .

$r =$ [2]

(d) The number of dots in Diagram n is $an^2 + bn + 1$.

Find the value of a and the value of b .

$a = \dots\dots\dots$

$b = \dots\dots\dots$ [2]

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