

1 A tennis club has 560 members.

(a) The ratio men : women : children = 5 : 6 : 3.

(i) Show that the club has 240 women members.

Answer(a)(i)

[2]

(ii) How many members are children?

Answer(a)(ii) [1]

(b) $\frac{5}{8}$ of the 240 women members play in a tournament.

How many women members do **not** play in the tournament?

Answer(b) [2]

(c) The annual membership fee in 2013 is \$198 for each adult and \$75 for each child.

(i) Calculate the total amount the 560 members pay in 2013.

Answer(c)(i) \$ [2]

(ii) The adult fee of \$198 in 2013 is 5.6% more than the fee in 2012.

Calculate the adult fee in 2012.

Answer(c)(ii) \$ [3]

3

(d) The club buys 36 tennis balls for \$9.50 and sells them to members for \$0.75 each.

Calculate the percentage profit the club makes.

Answer(d) % [3]

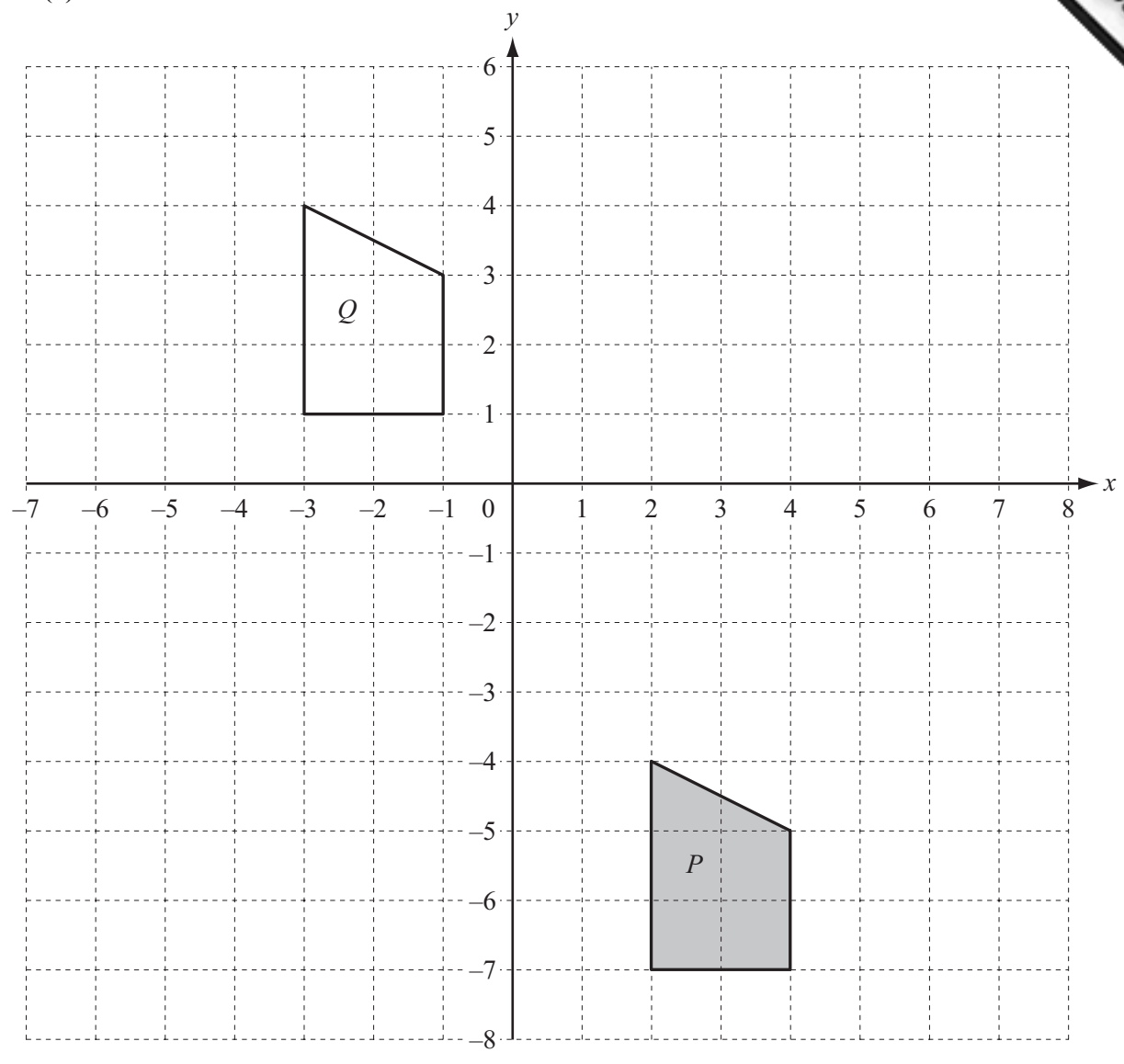
(e) A tennis court is a rectangle with length 23.7 m and width 10.9 m, each correct to 1 decimal place.

Calculate the upper and lower bounds of the perimeter of the court.

Answer(e) Upper bound m

Lower bound m [3]

2 (a)



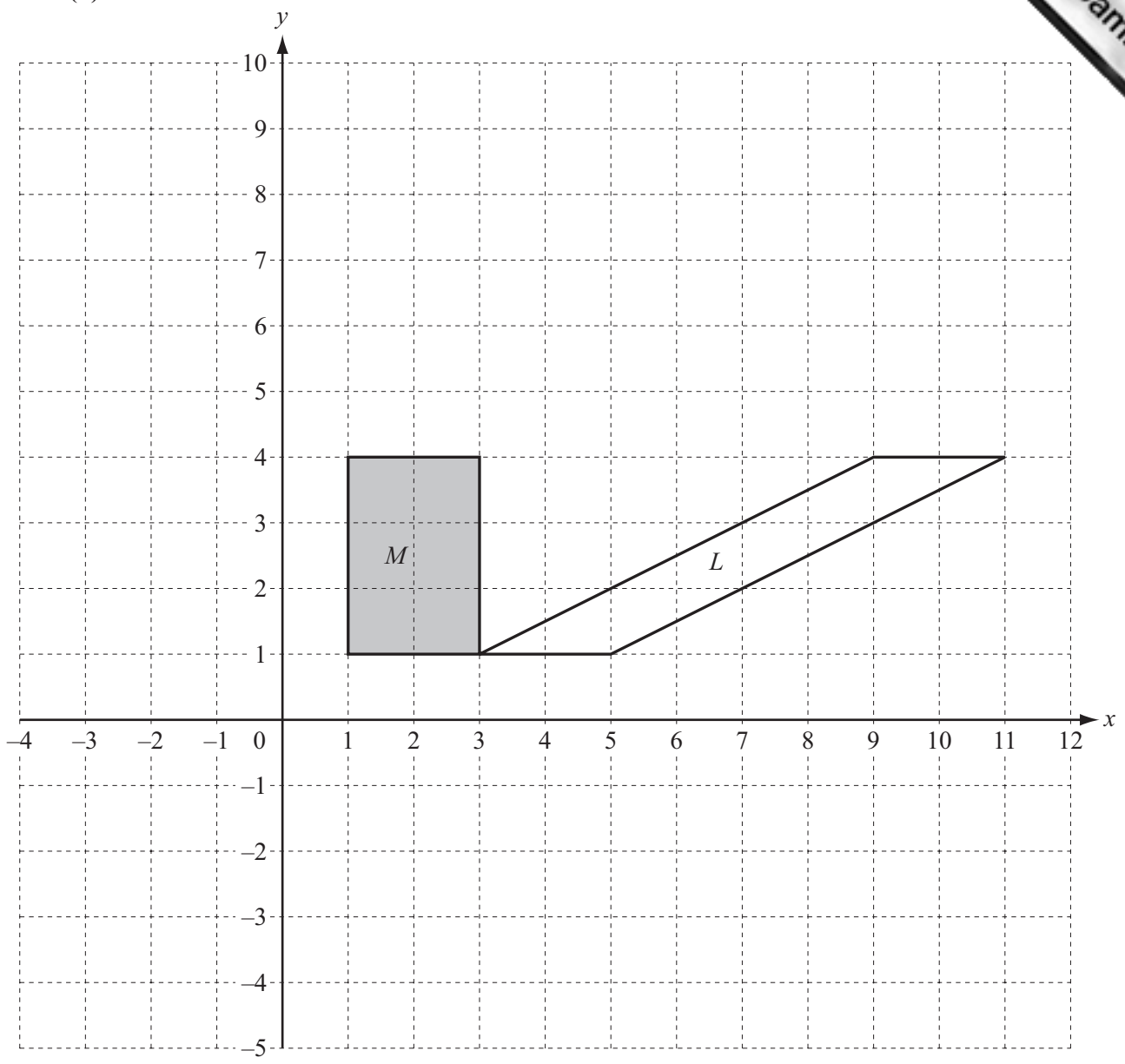
(i) Describe fully the **single** transformation which maps shape *P* onto shape *Q*.

Answer(a)(i) [2]

(ii) On the grid above, draw the image of shape *P* after reflection in the line $y = -1$. [2]

(iii) On the grid above, draw the image of shape *P* under the transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$. [3]

(b)



(i) Describe fully the **single** transformation which maps shape *M* onto shape *L*.

Answer(b)(i) [3]

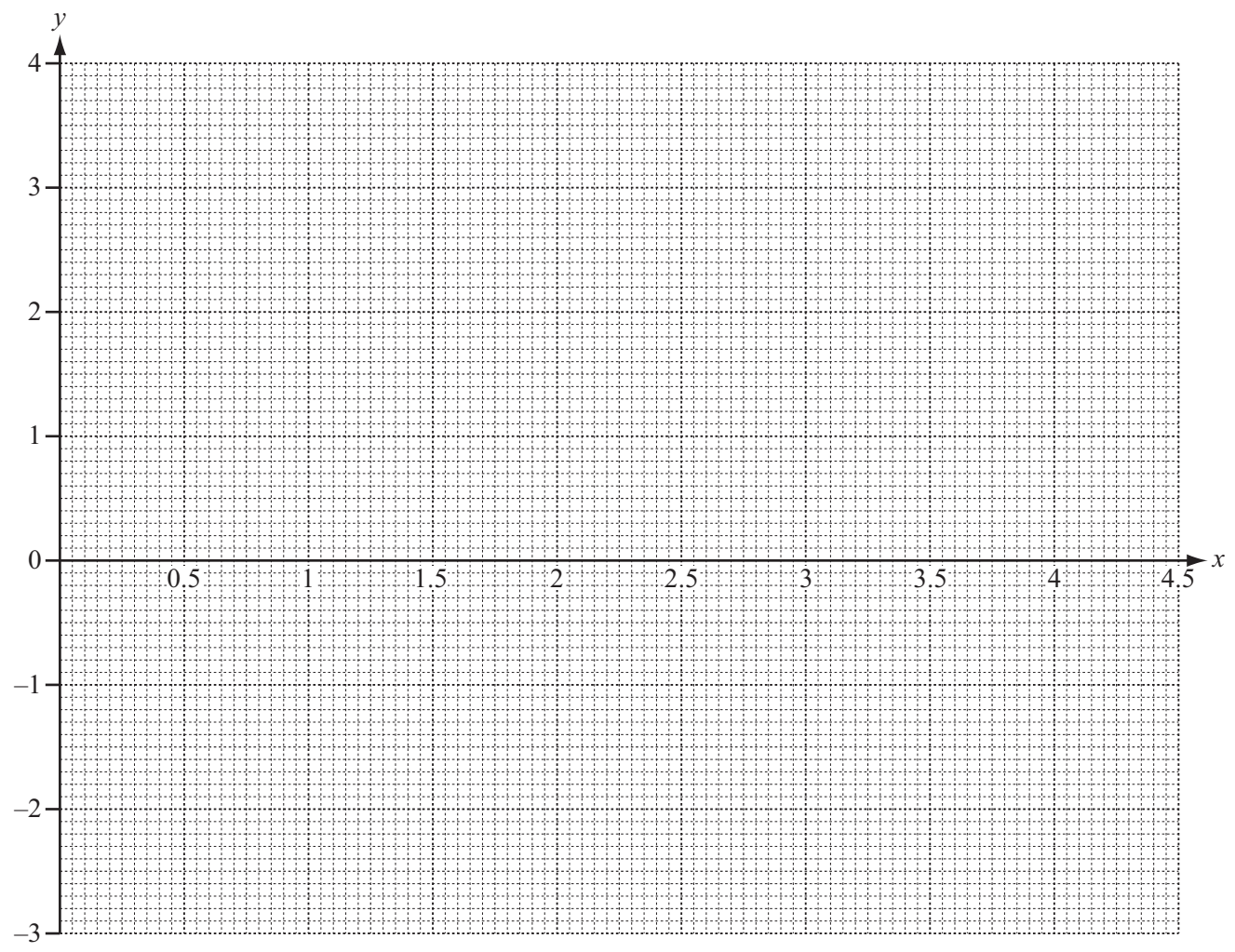
(ii) On the grid above, draw the image of shape *M* after enlargement by scale factor 2, centre (5, 0). [2]

3 The table shows some values for the function $y = 11x - 2x^2 - 12$ for $1 \leq x \leq 4.5$.

x	1	1.5	2	2.5	3	3.5	4	4.5
y	-3		2	3	3			

(a) Complete the table of values. [3]

(b) On the grid below, draw the graph of $y = 11x - 2x^2 - 12$ for $1 \leq x \leq 4.5$.



[4]

(c) By drawing a suitable line, use your graph to solve the equation $11x - 2x^2 = 11$.

Answer(c) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

(d) The line $y = mx + 2$ is a tangent to the curve $y = 11x - 2x^2 - 12$ at the point P .

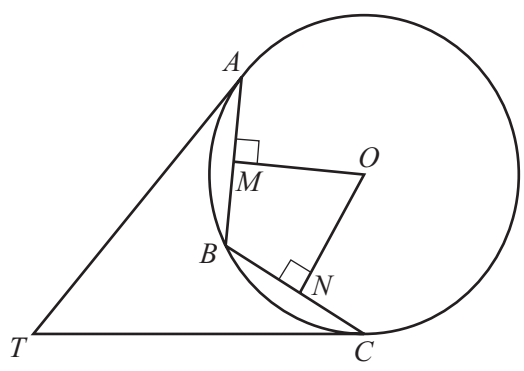
By drawing this tangent,

(i) find the co-ordinates of the point P ,

Answer(d)(i) ($\dots\dots\dots$, $\dots\dots\dots$) [2]

(ii) work out the value of m .

Answer(d)(ii) $m = \dots\dots\dots$ [2]



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A, B and C lie on the circle centre O , radius 8.5 cm.
 $AB = BC = 10.7$ cm.
 OM is perpendicular to AB and ON is perpendicular to BC .

(a) Calculate the area of the circle.

Answer(a) cm² [2]

(b) Write down the length of MB .

Answer(b) cm [1]

(c) Calculate angle MOB and show that it rounds to 39° correct to the nearest degree.

Answer(c)

[2]

(d) Using angle $MOB = 39^\circ$, calculate the length of the **major** arc AC .

Answer(d) cm [3]

(e) The tangents to the circle at A and at C meet at T .

Explain clearly why triangle ATB is congruent to triangle CTB .

Answer(e)

[3]



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5 Paul buys a number of large sacks of fertiliser costing \$ x each.
He spends \$27.

(a) Write down, in terms of x , an expression for the number of large sacks which Paul buys.

Answer(a) [1]

(b) Rula buys a number of small sacks of fertiliser.
Each small sack costs \$2 less than a large sack.
Rula spends \$25.

Write down, in terms of x , an expression for the number of small sacks which Rula buys.

Answer(b) [1]

(c) Rula buys 4 more sacks than Paul.
Write down an equation in x and show that it simplifies to $2x^2 - 3x - 27 = 0$.

Answer(c)

[4]

(d) Solve $2x^2 - 3x - 27 = 0$.

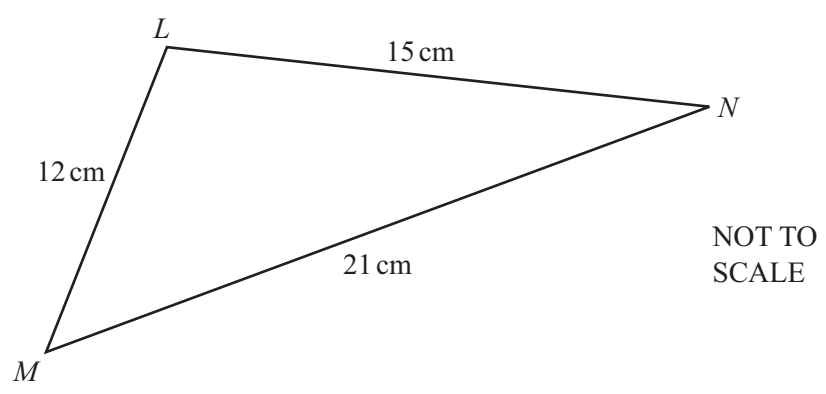
Answer(d) $x =$ or $x =$ [3]

(e) Calculate the number of sacks which Paul buys.

Answer(e) [1]

10

6 (a)



The diagram shows triangle LMN with $LM = 12\text{ cm}$, $LN = 15\text{ cm}$ and $MN = 21\text{ cm}$.

- (i) Calculate angle LMN .
Show that this rounds to 44.4° , correct to 1 decimal place.

Answer(a)(i)

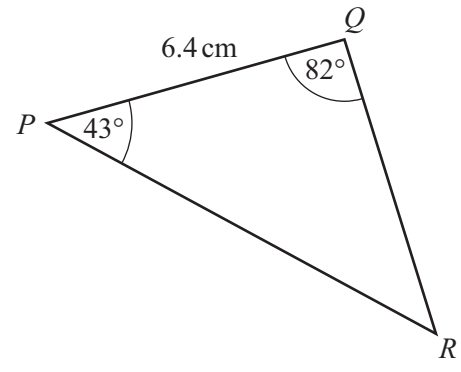
[4]

- (ii) Calculate the area of triangle LMN .

Answer(a)(ii) cm^2 [2]

11

(b)



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The diagram shows triangle PQR with $PQ = 6.4$ cm, angle $PQR = 82^\circ$ and angle $QPR = 43^\circ$.

Calculate the length of PR .

Answer(b) $PR = \dots\dots\dots$ cm [4]

$$7 \quad \mathbf{A} = \begin{pmatrix} 5 \\ 7 \end{pmatrix} \quad \mathbf{B} = \begin{pmatrix} 6 & -4 \end{pmatrix} \quad \mathbf{C} = \begin{pmatrix} 2 & 4 \\ 1 & 3 \end{pmatrix} \quad \mathbf{D} = \begin{pmatrix} 2 & 9 \\ -1 & -3 \end{pmatrix}$$

(a) Calculate the result of each of the following, if possible.

If a calculation is not possible, write "not possible" in the answer space.

(i) $3\mathbf{A}$

Answer(a)(i) [1]

(ii) \mathbf{AC}

Answer(a)(ii) [1]

(iii) \mathbf{BA}

Answer(a)(iii) [2]

(iv) $\mathbf{C} + \mathbf{D}$

Answer(a)(iv) [1]

(v) \mathbf{D}^2

Answer(a)(v) [2]

(b) Calculate \mathbf{C}^{-1} , the inverse of \mathbf{C} .

Answer(b) [2]

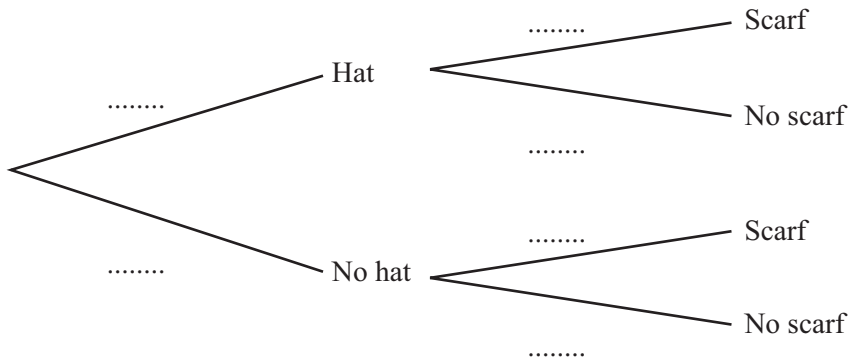
8 In this question, give all your answers as fractions.

When Ivan goes to school in winter, the probability that he wears a hat is $\frac{5}{8}$.

If he wears a hat, the probability that he wears a scarf is $\frac{2}{3}$.

If he does not wear a hat, the probability that he wears a scarf is $\frac{1}{6}$.

(a) Complete the tree diagram.



[3]

(b) Find the probability that Ivan

(i) does not wear a hat and does not wear a scarf,

Answer(b)(i) [2]

(ii) wears a hat but does not wear a scarf,

Answer(b)(ii) [2]

(iii) wears a hat or a scarf but not both.

Answer(b)(iii) [2]

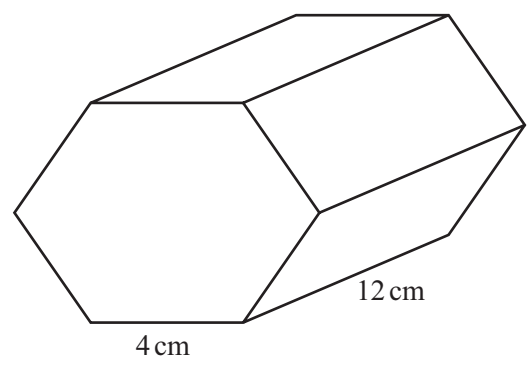
(c) If Ivan wears a hat and a scarf, the probability that he wears gloves is $\frac{7}{10}$.

Calculate the probability that Ivan does **not** wear all three of hat, scarf and gloves.

Answer(c) [3]

14

9 (a)



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The diagram shows a prism of length 12 cm.
 The cross section is a regular hexagon of side 4 cm.

Calculate the total surface area of the prism.

Answer(a) cm² [4]

(b) Water flows through a cylindrical pipe of radius 0.74 cm.
 It fills a 12 litre bucket in 4 minutes.

(i) Calculate the speed of the water through the pipe in centimetres per minute.

Answer(b)(i) cm/min [4]

(ii) When the 12 litre bucket is emptied into a circular pool, the water level rises by 5 millimetres.
Calculate the radius of the pool correct to the nearest centimetre.

Answer(b)(ii) cm [5]

10 (a) Write as a single fraction

(i) $\frac{5}{4} - \frac{2x}{5}$,

Answer(a)(i) [2]

(ii) $\frac{4}{x+3} + \frac{2x-1}{3}$.

Answer(a)(ii) [3]

(b) Solve the simultaneous equations.

$$\begin{aligned} 9x - 2y &= 12 \\ 3x + 4y &= -10 \end{aligned}$$

Answer(b) $x =$

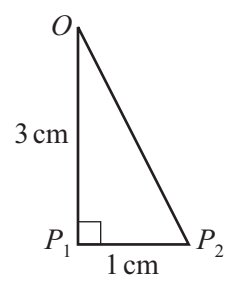
$y =$ [3]

(c) Simplify $\frac{7x + 21}{2x^2 + 9x + 9}$.

Answer(c) [4]

18

- 11 Sidney draws the triangle OP_1P_2 .
 $OP_1 = 3$ cm and $P_1P_2 = 1$ cm.
 Angle $OP_1P_2 = 90^\circ$.



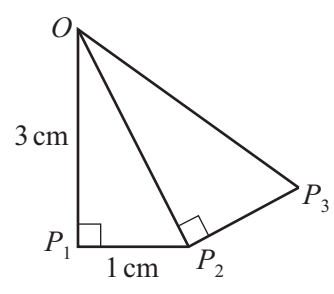
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- (a) Show that $OP_2 = \sqrt{10}$ cm.

Answer(a)

[1]

- (b) Sidney now draws the lines P_2P_3 and OP_3 .
 Triangle OP_2P_3 is mathematically similar to triangle OP_1P_2 .



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- (i) Write down the length of P_2P_3 in the form $\frac{\sqrt{a}}{b}$ where a and b are integers.

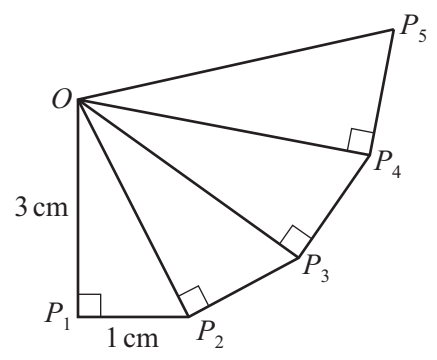
Answer(b)(i) $P_2P_3 = \dots\dots\dots$ cm [1]

- (ii) Calculate the length of OP_3 giving your answer in the form $\frac{c}{d}$ where c and d are integers.

Answer(b)(ii) $OP_3 = \dots\dots\dots$ cm [2]

- (c) Sidney continues to add mathematically similar triangles to his drawing.

Find the length of OP_5 .



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Answer(c) $OP_5 = \dots\dots\dots$ cm [2]

(d) (i) Show that angle $P_1OP_2 = 18.4^\circ$, correct to 1 decimal place.

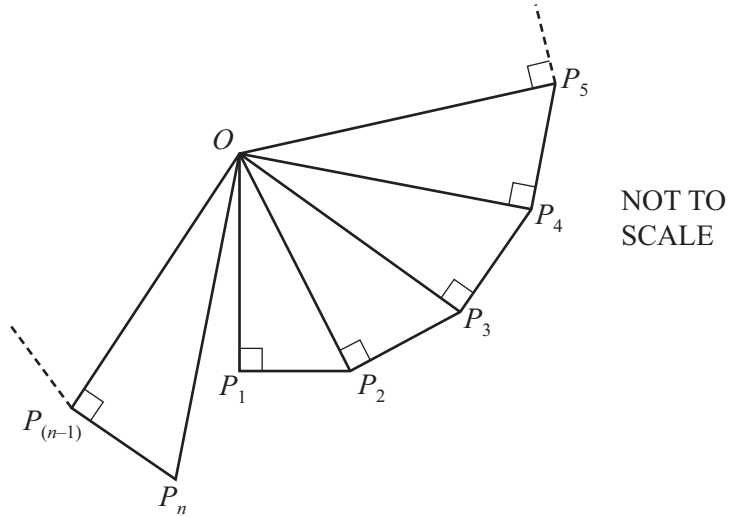
Answer(d)(i)

[2]

(ii) Write down the size of angle P_2OP_3 .

Answer(d)(ii) Angle $P_2OP_3 = \dots\dots\dots$ [1]

(iii) The last triangle Sidney can draw without covering his first triangle is triangle $OP_{(n-1)}P_n$.



Calculate the value of n .

Answer(d)(iii) $n = \dots\dots\dots$ [3]

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