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Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

1094618911

MATHEMATICS (SYLLABUS D) **4024/22**

Paper 2 **May/June 2024**

2 hours 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 100.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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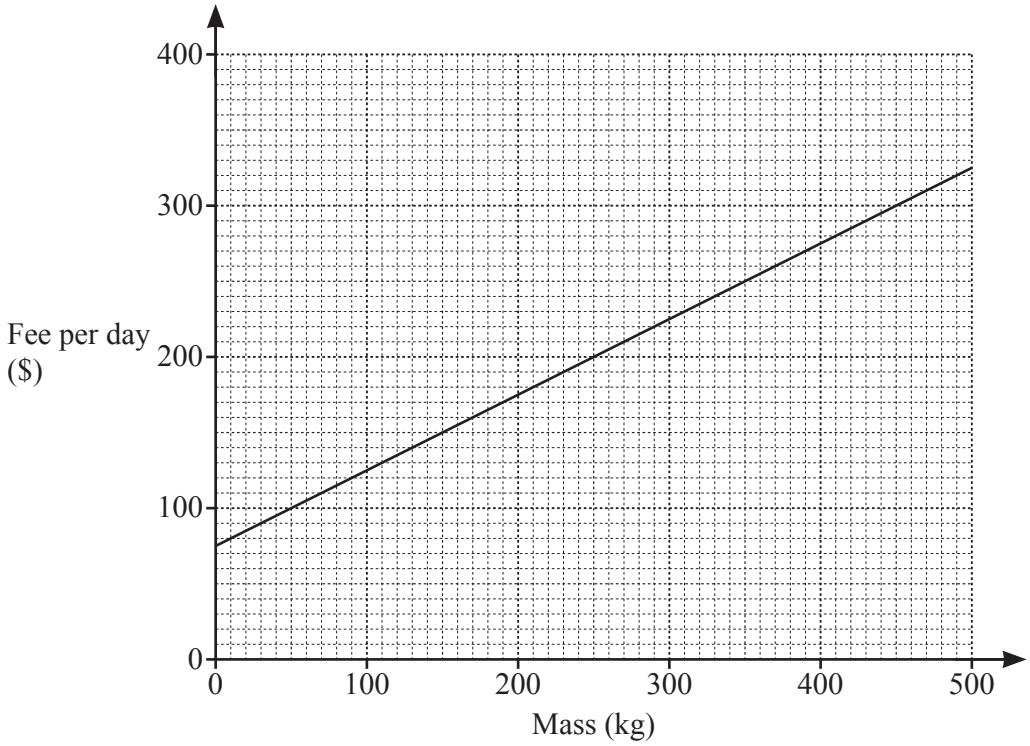
1 **(a)** Oranges cost \$1.45 per kilogram.
Asher buys 1.2 kg of oranges.

Find the change he receives from \$10.

\$ ..... [1]

(b) Maria pays a fee to sell strawberries at a market.
Each day she pays \$75 plus a payment for the mass of strawberries she sells.
The fee Maria pays per day is shown on the graph.



(i) One day Maria's fee is \$240.

Use the graph to find the mass of strawberries she sells that day.

..... kg [1]

(ii) On Saturday Maria sells 270 kg of strawberries.
On Sunday she sells 220 kg of strawberries.

Find the **total** fee she pays for these two days.

\$ ..... [2]

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(iii) The fee per day for Maria now increases.
Each day she now pays \$90 plus a payment of \$60 for every 100 kg of strawberries she sells.

On the grid, draw a line to represent this new fee when she sells 0 kg to 500 kg of strawberries in a day.

[2]

(c) Write the ratio 1.6 kg : 600 g : 2.4 kg in its simplest form.

..... : ..... : ..... [2]

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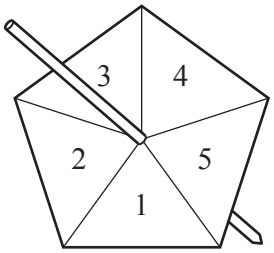
2



The diagram shows a fair spinner numbered from 1 to 5.
The score is the number the spinner lands on.

(a) The spinner is spun once.

Find the probability that the score is

(i) 3

..... [1]

(ii) even.

..... [1]

(b) The spinner is spun twice.
The two scores are added together.

(i) Complete the possibility diagram to show all the outcomes.

First spin

Second spin

+	1	2	3	4	5
1	2	3	4	5	6
2	3	4	5	6	7
3	4	5	6		
4					
5					

[2]

(ii) Find the probability that the outcome is 4.

..... [1]

(iii) Find the probability that the outcome is greater than 6.

..... [2]

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3 **(a)** The exchange rate between dollars ($) and Malaysian Ringgits (MYR) is $1 = 4.19 MYR.
The exchange rate between dollars ($) and Pakistani Rupees (PKR) is $1 = 179.12 PKR.

Find the exchange rate between Malaysian Ringgits and Pakistani Rupees.

1 MYR = ... PKR [2]

(b) Farhad invests $1500 in an account paying compound interest at a rate of 4% per year.
Gulsan invests $1500 in an account paying simple interest at a rate of x% per year.

Farhad and Gulsan have the same amount of money in their accounts at the end of 2 years.

Calculate the value of x.

x = ... [4]

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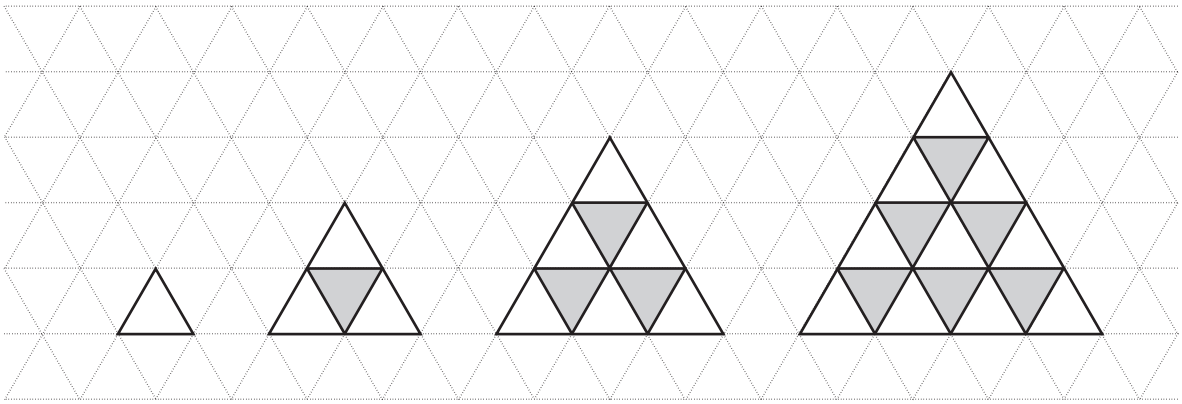
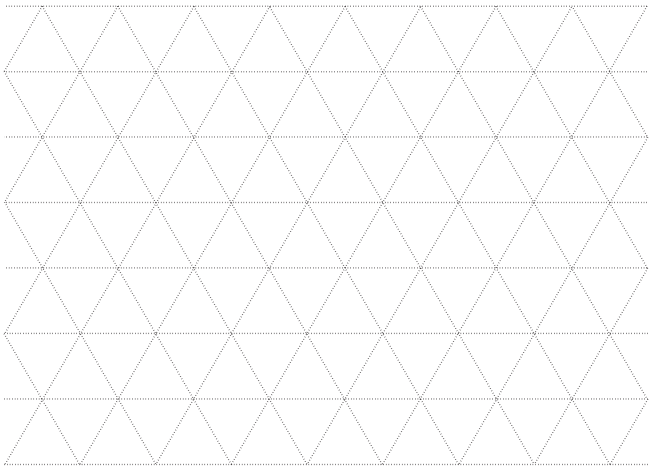
4 **(a)** The diagrams show the first four patterns in a sequence.



Pattern 1 Pattern 2 Pattern 3 Pattern 4

(i) Draw Pattern 5 on the grid below.



[1]

(ii) Complete the table.

Pattern (n)	1	2	3	4	5	6
Total number of triangles	1	4	9	16		
Number of grey triangles	0	1	3			
Number of white triangles	1	3	6			

[2]

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(iii) Write an expression, in terms of n, for the total number of triangles in Pattern n.

..... [1]

(iv) Write an expression, in terms of n, for the number of white triangles in Pattern n.

..... [2]

(b) The 3rd term of a linear sequence is 34.
The 8th term of the same linear sequence is 14.

(i) Find the value of the first term of this sequence.

..... [2]

(ii) Find the value of the first negative term of this sequence.

..... [1]

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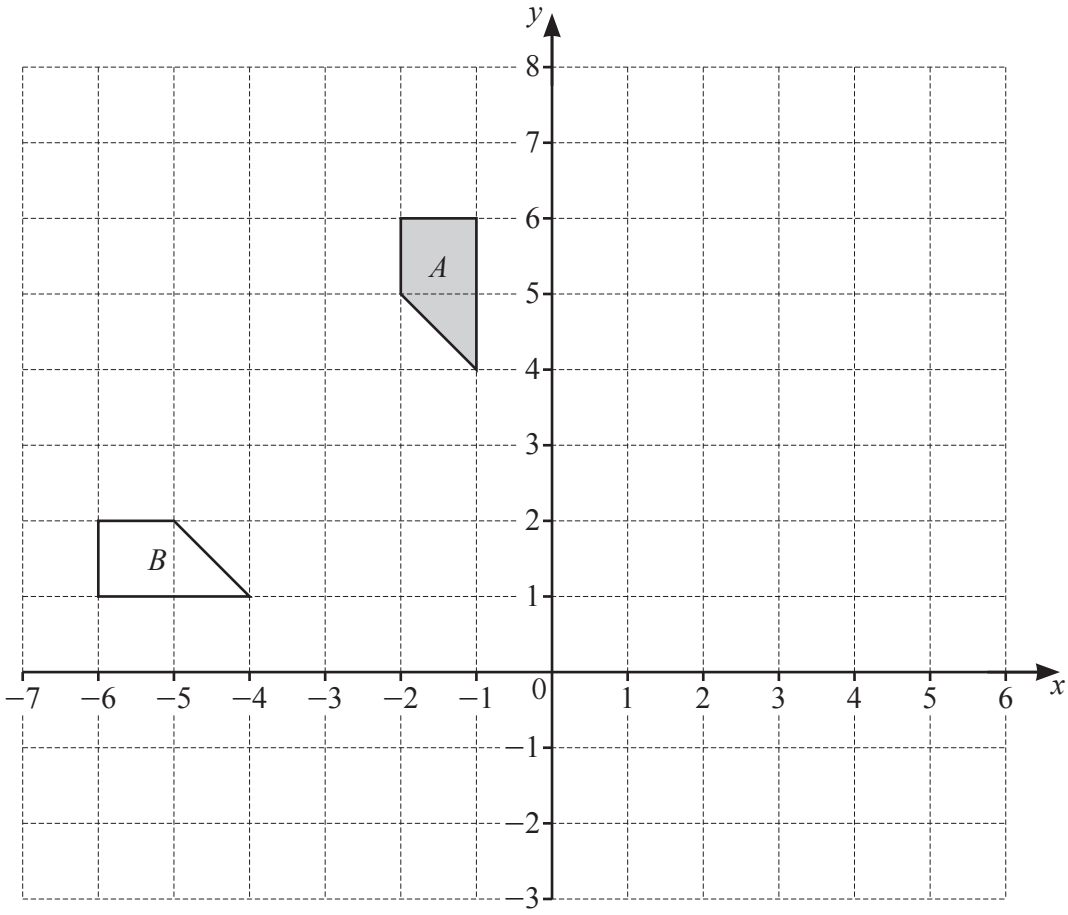
5



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

.....

..... [2]

(b) Shape *A* is mapped onto shape *C* by an enlargement of scale factor 3.
Two of the vertices of shape *C* are (2, 5) and (5, 2).

(i) Find the coordinates of the centre of the enlargement.

(..... , ...) [2]

(ii) Find the area of shape *C*.

..... units^2 [2]

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(c) Transformation T is represented by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$.

Transformation T maps shape *A* onto shape *D*.

(i) On the grid, draw shape *D*.

[2]

(ii) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$.

.....

..... [3]

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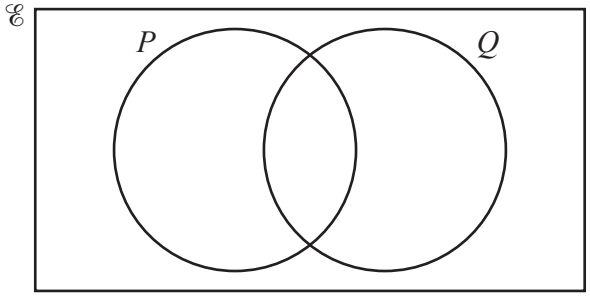
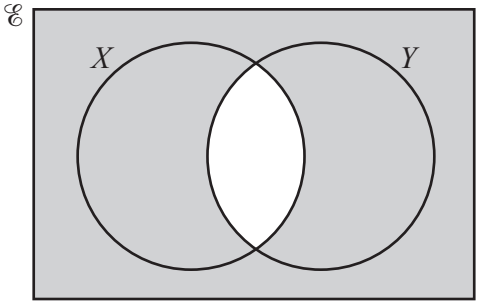
6 **(a)** In the Venn diagram, shade the region represented by $P \cup Q$.



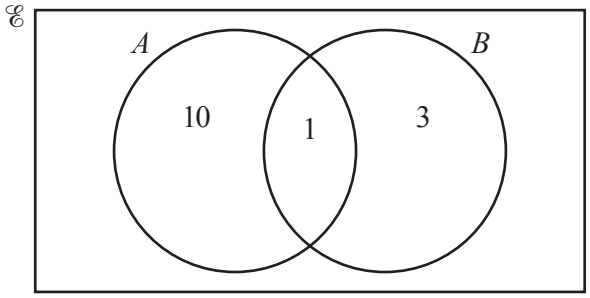
[1]

(b) Use set notation to describe the shaded region in the Venn diagram.



..... [1]

(c) $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
$A = \{x : x \text{ is a factor of } 40\}$
$B = \{x : x \text{ is an odd number}\}$



(i) Complete the Venn diagram. [2]

(ii) List the elements of $A' \cap B$.

..... [1]

(iii) One element of $\mathscr{E}$ is chosen at random.

Find the probability that this element is in $A \cap B$.

..... [1]

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7 **(a)** Solve $\frac{x}{3} = 7$.

$x =$ ..... [1]

(b) Solve $6x - 5 = 2(x + 3)$.

$x =$ ..... [2]

(c) Factorise $3x^2 - 2x - 8$.

..... [2]

(d) $(ax + b)^2 = 4x^2 - 12x + c$

Given that $a > 0$, find the value of each of a, b and c.

$a =$ .....

$b =$ .....

$c =$ ..... [3]

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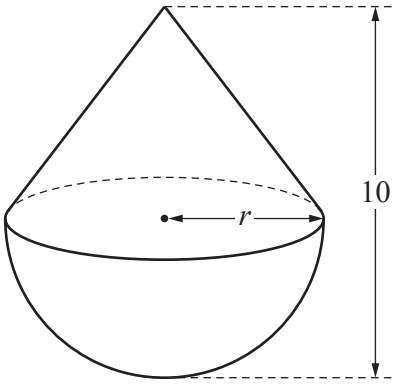
8 **(a)** **[Volume of a cone = $\frac{1}{3}\pi r^2 h$]**

[Volume of a sphere = $\frac{4}{3}\pi r^3$]

[Curved surface area of cone = $\pi r l$]
[Surface area of a sphere = $4\pi r^2$]



A solid is formed by placing a cone on top of a hemisphere.
The cone and the hemisphere each have radius r cm.
The height of the solid is 10 cm.
The curved surface area of the hemisphere is 145 cm^2.

(i) Show that $r = 4.80$, correct to 2 decimal places.

[3]

(ii) Calculate the volume of the solid.

..... cm^3 [4]

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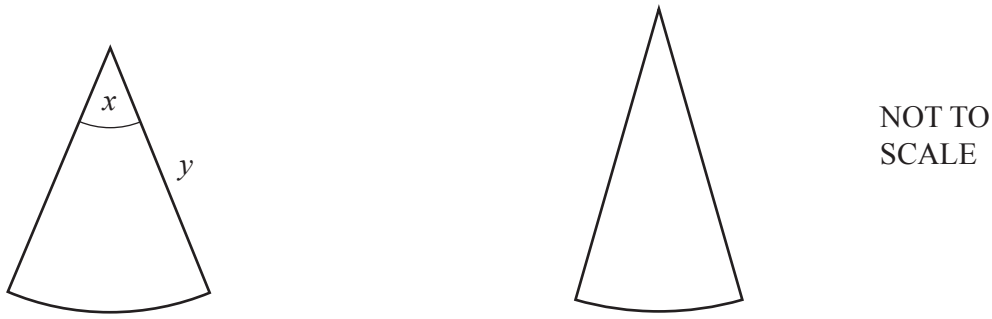
(iii) Calculate the curved surface area of the cone.

..... cm^2 [4]

(b)



Sector *A* Sector *B*

The diagram shows two sectors of circles.
Sector *A* has angle x and radius y.

The angle of sector *B* is 20% smaller than the angle of sector *A*.
The radius of sector *B* is 20% longer than the radius of sector *A*.

Calculate the area of sector *B* as a percentage of the area of sector *A*.

..... % [4]

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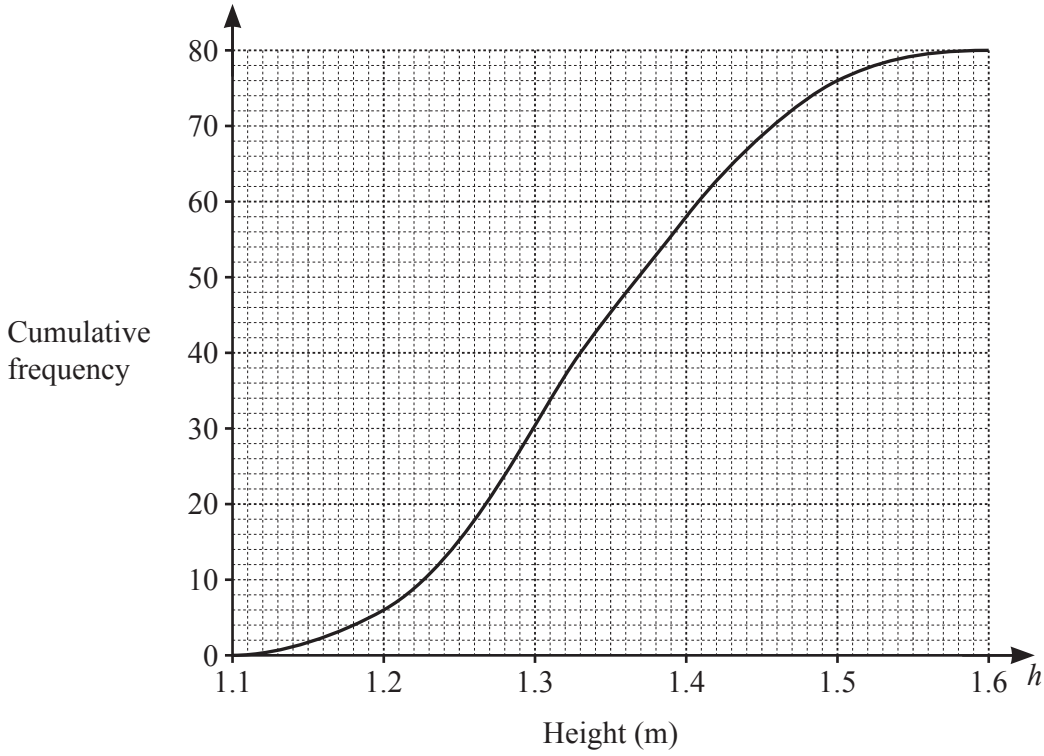
9 A shop sells two varieties of apple tree.

(a) The cumulative frequency diagram shows the heights, in metres, of 80 Variety A trees.



(i) Use the diagram to estimate

(a) the median

..... m [1]

(b) the 30th percentile.

..... m [2]

(ii) Trees with a height greater than y m are graded Class I.
$\frac{2}{5}$ of the 80 trees are graded Class I.

Find the value of y.

$y =$ ..... [2]

(iii) Complete the frequency table for the heights of the Variety A trees.

Height (h m)	$1.1 < h \leqslant 1.2$	$1.2 < h \leqslant 1.3$	$1.3 < h \leqslant 1.4$	$1.4 < h \leqslant 1.5$	$1.5 < h \leqslant 1.6$
Frequency	6	24			

[2]

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(b) The frequency table shows the heights of 50 Variety B trees.

Height (h m)	$1.5 < h \leqslant 1.7$	$1.7 < h \leqslant 1.8$	$1.8 < h \leqslant 1.9$	$1.9 < h \leqslant 2.3$
Frequency	p	15	17	q

Using the midpoints of the intervals, the estimated mean height of these Variety B trees is 1.81 m.

Calculate the value of p and the value of q.

$p =$ .....

$q =$ ..... [6]

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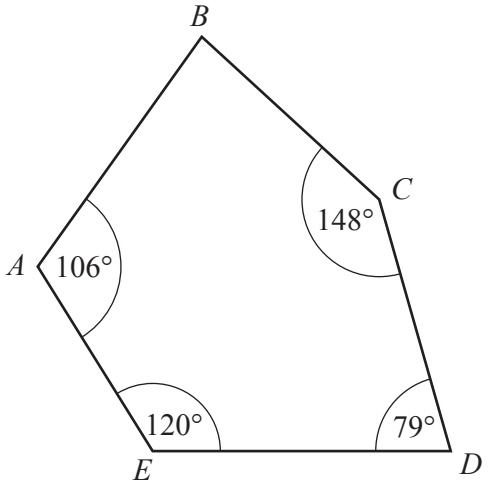
10



NOT TO SCALE

The diagram shows a pentagon.

(a) Calculate the interior angle B.

..... [2]

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(b) In the pentagon, $AE = 8\,\text{cm}$ and $AD = 15\,\text{cm}$.

Calculate the length ED.
Show your working and give your answer correct to 1 decimal place.

$ED =$ ..... cm [5]

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11 Q is the point $(n, -4)$, R is the point $(-1, 8)$ and S is the point $(3, 2)$.

(a) The length QR is 13 units.

Find the two possible values of n.

$n =$ ..... or $n =$ ..... [3]

(b) RST is a straight line and $RS : RT = 2 : 5$.

Find the coordinates of T.

(..... , ...) [2]

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(c) Find the equation of the perpendicular bisector of *RS*.

..... [5]

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