

Surname	Centre Number	Candidate Number
Other Names		0



GCSE LINKED PAIR PILOT

4364/02

METHODS IN MATHEMATICS UNIT 2: Methods (Calculator) HIGHER TIER

A.M. MONDAY, 17 June 2013

2 hours

ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3.14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

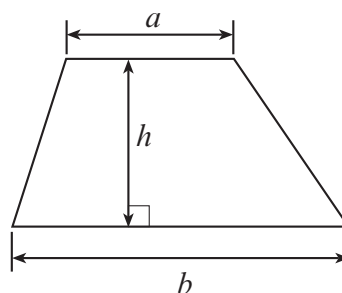
The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 3.

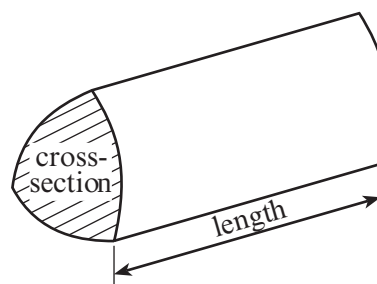
For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	5	
2	8	
3	8	
4	10	
5	8	
6	5	
7	6	
8	9	
9	4	
10	4	
11	4	
12	4	
13	3	
14	6	
15	5	
16	8	
17	3	
TOTAL MARK		

Formula List

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

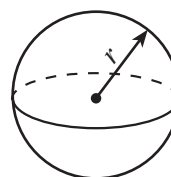


Volume of prism $= \text{area of cross-section} \times \text{length}$



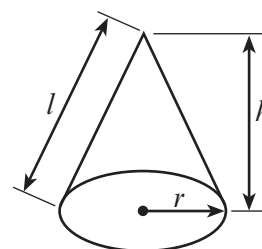
Volume of sphere $= \frac{4}{3} \pi r^3$

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



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

Curved surface area of cone $= \pi r l$

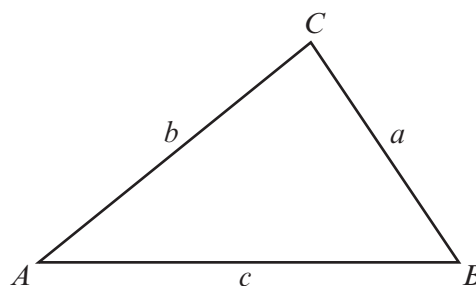


In any triangle ABC

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

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

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

1. (a) In an election, Stella gained 28 416 votes out of a total of 38 400 votes.
Write 28 416 as a percentage of 38 400.

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[2]

- (b) Jake needs to find a selling price which is 12% more than £766.
Find the selling price.

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[2]

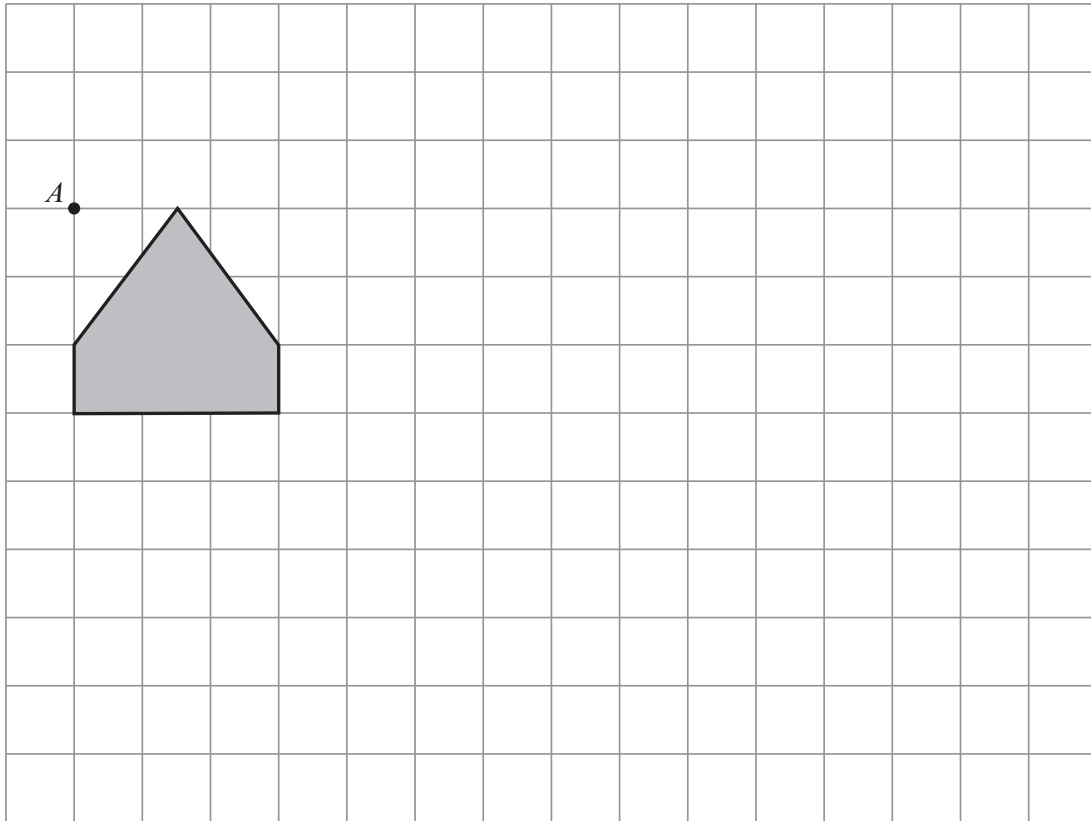
- (c) Cheryl and her sister share an amount of money in the ratio 2 : 3 respectively.
What fraction of the money will Cheryl receive?

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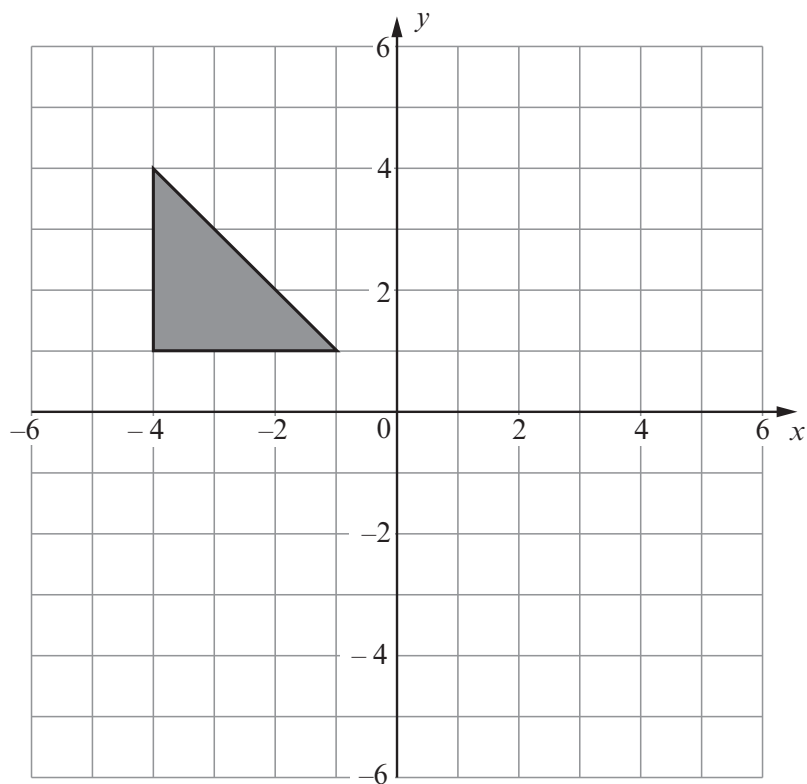
[1]

2. (a) Enlarge the shape shown on the grid by a scale factor of 2 using A as the centre of the enlargement.



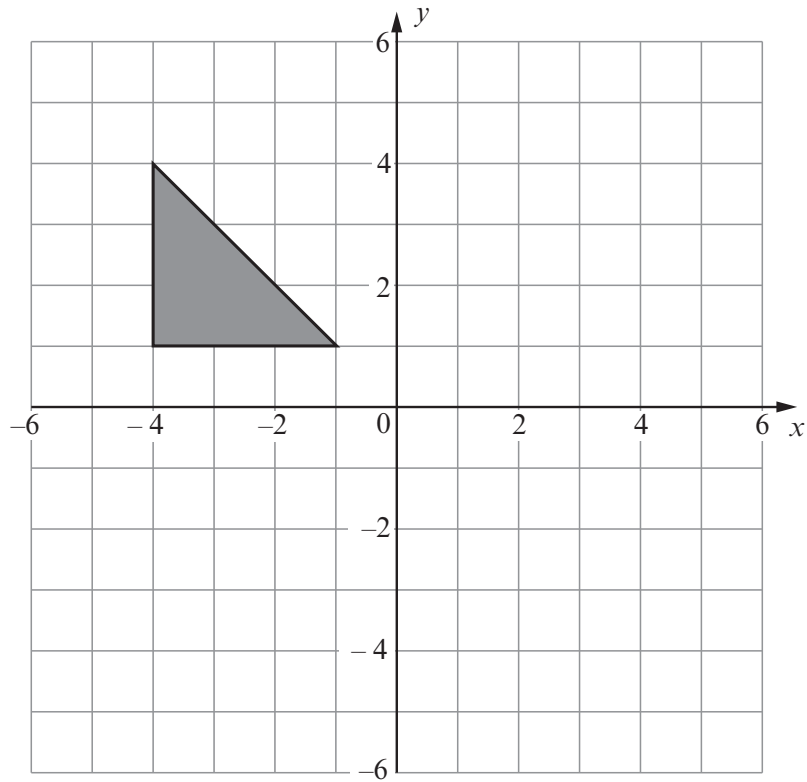
[3]

- (b) Reflect the triangle in the line $y = x$.



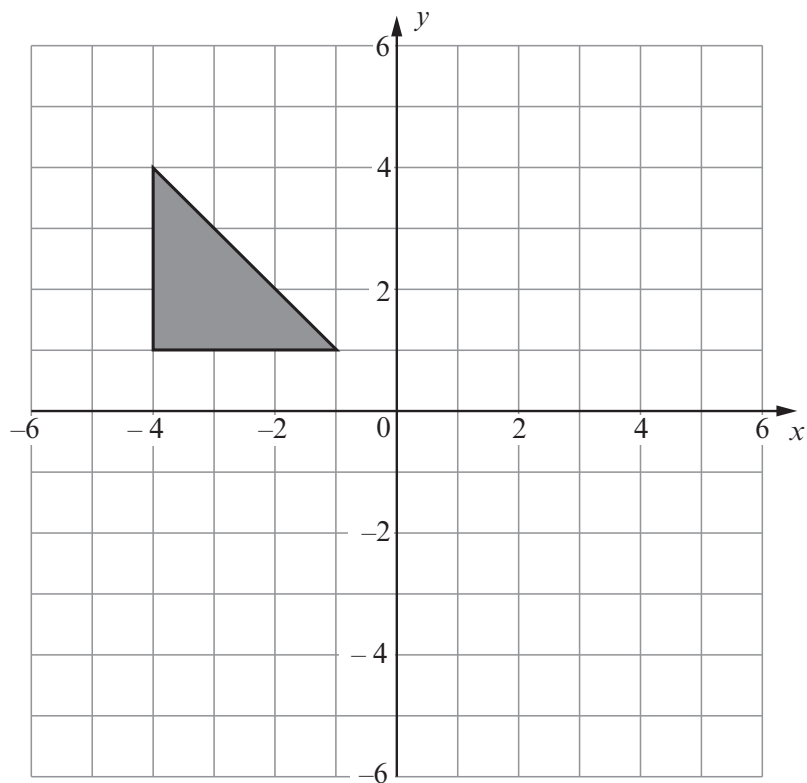
[2]

- (c) Translate the triangle shown below by $\begin{pmatrix} 5 \\ -3 \end{pmatrix}$.



[1]

- (d) Rotate the triangle shown on the grid below through 90° anticlockwise about (2, 1).



[2]

3. *You will be assessed on the quality of your written communication in this question.*

A colour of paint called 'ochra' is made using a recipe with white, red, blue and yellow paint. The breakdown of the percentages of the different colours in the 'ochra' paint are shown in the table.

'Ochra' paint recipe	
White	90%
Red	5%
Blue	3%
Yellow	2%

Catrin has already bought 2.5 litres of blue paint.

She decides to buy white, red and yellow paint to use with **all** of her blue paint to make as much 'ochra' paint as she can.

The sizes of tins of paint available are:

- 1 litre,
- 2.5 litres and
- 10 litres.

Only full tins of paint are available to buy.

Catrin has only a small shed to store her paint, so wants as little white, red and yellow paint left over as possible.

Calculate the amount of each of the colours of paint Catrin needs to buy and complete the shopping list for her on the opposite page.

You **must** show all your working.

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Shopping list	
Colour	Number and sizes of tins to buy
White	
Red	
Yellow	

[8]

4. (a) Solve $\frac{8x}{5} = 60$.

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..... [2]

(b) Solve $\frac{3}{x} = 12$.

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..... [1]

(c) Solve $9x - 4 = 7(x + 2)$.

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..... [3]

(d) Solve the inequality $10x + 5 > 45$.

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(e) Write down the smallest whole number that satisfies the inequality $9x > 60$.

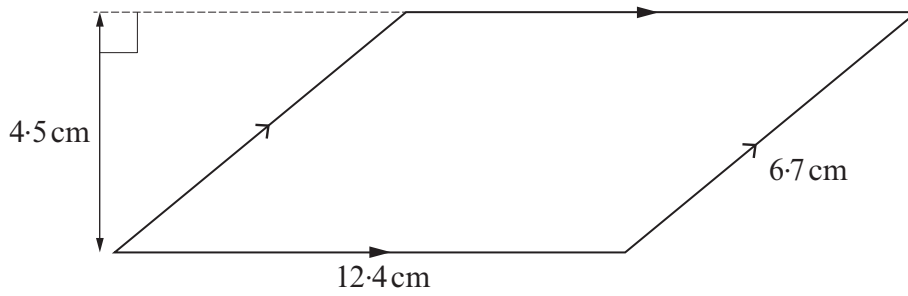
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5. (a)

*Diagram not drawn to scale*

Calculate the area of the parallelogram.

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[2]

(b) The area of a circle is 34.6 cm^2 .
Calculate the radius of the circle.

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[3]

(c) The lengths, in centimetres, of the five sides of a pentagon are:

$$x \qquad x + 2 \qquad 2x \qquad 3x + 5 \qquad 4x$$

The perimeter of the pentagon is 95 centimetres.

Set up an equation in terms of x and solve it to find the value of x .

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$$x = \dots\dots\dots$$

[3]

6. (a) Find the value of $\frac{7.77^2 - 6.22}{2.4^2 + 3 \times 2.2}$, giving your answer correct to one decimal place.

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[2]

- (b) Find the product of the values of $(2\frac{1}{3}$ of 273) and $(4\frac{1}{5}$ of 760).

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[3]

7. The diagram shows a square and a circle.
The diagonal of the square is equal to the diameter of the circle.

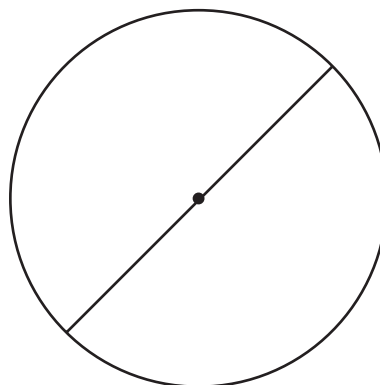
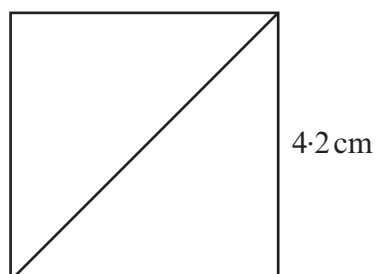


Diagram not drawn to scale

Calculate the circumference of the circle.

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[6]

8. (a) Solve the following equation.

$$\frac{3x-1}{4} - \frac{x+6}{3} = \frac{3}{2}$$

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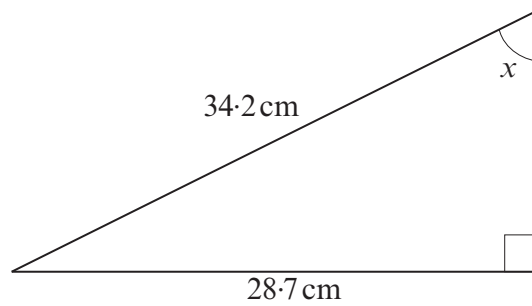
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[4]

(b)

*Diagram not drawn to scale*Calculate the size of the angle x .

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[3]

(c) Evaluate $\frac{(3.4 \times 10^5) + (1.5 \times 10^4)}{2.3 \times 10^{-6}}$.

Give your answer in standard form correct to 2 significant figures.

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[2]

9. The stars shown below are similar.

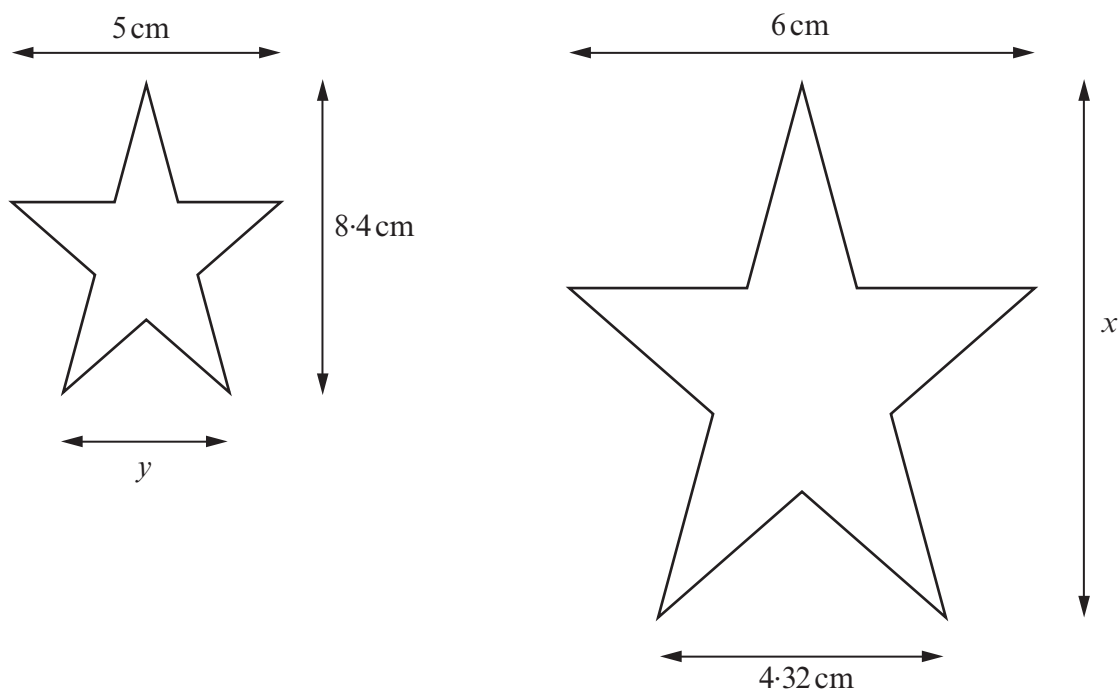


Diagram not drawn to scale

Showing all of your working, find the lengths x and y .

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$$x = \text{..... cm}$$

$$y = \text{..... cm}$$

[4]

10. The length of a rectangle is known to be 40 cm or less.
The width of the rectangle is known to be 10 cm shorter than the length of the rectangle.

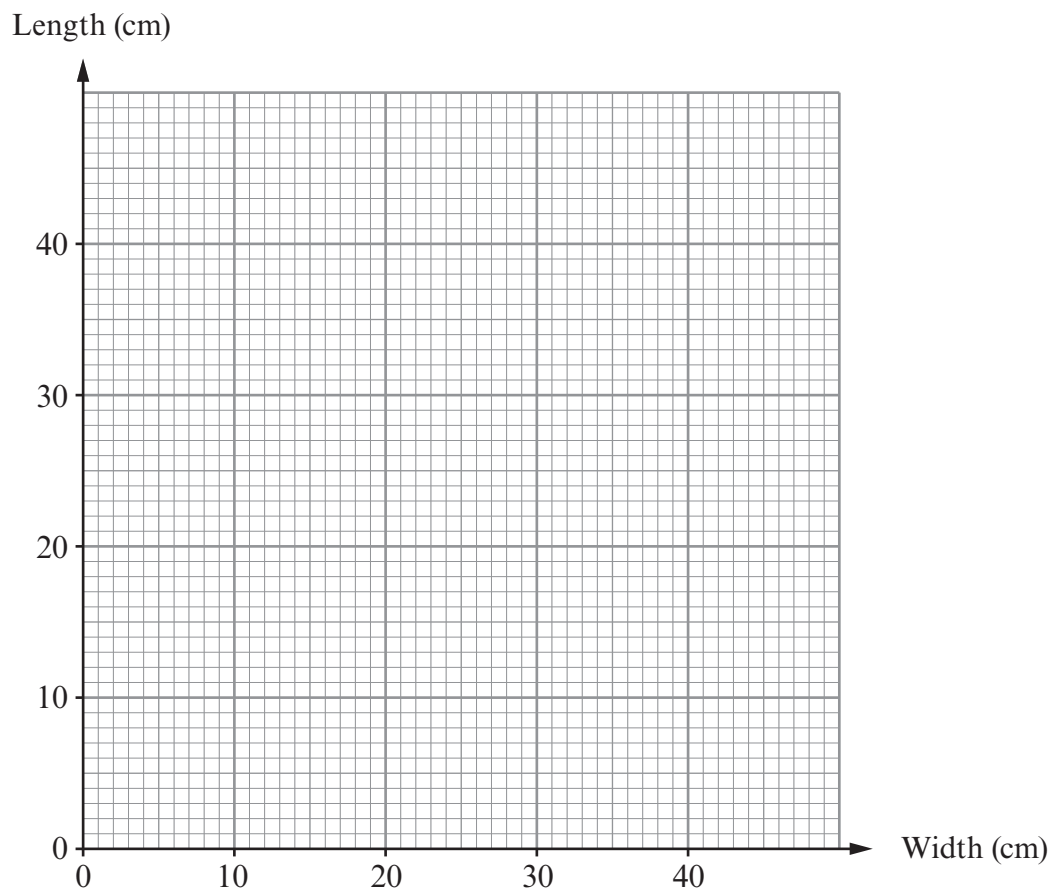
(a) Draw a graph to illustrate this information.

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[3]



- (b) Should your graph touch either of the axes?
Explain your answer.

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[1]

11. The diagrams below show pairs of congruent triangles.
The diagrams are drawn to scale.

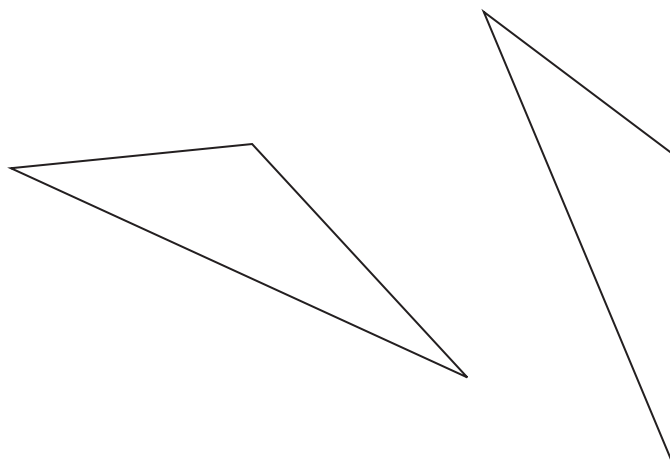
Anwen has made a statement about each of the pairs of triangles.

- (a) "Look, I have measured two of the sides and one of the angles in each triangle. I have enough information to say that the triangles are congruent."

For the statement to be correct, indicate on each triangle the two sides and one angle Anwen could have measured.

Indicate clearly the corresponding sides.

Do not mark any extra detail.

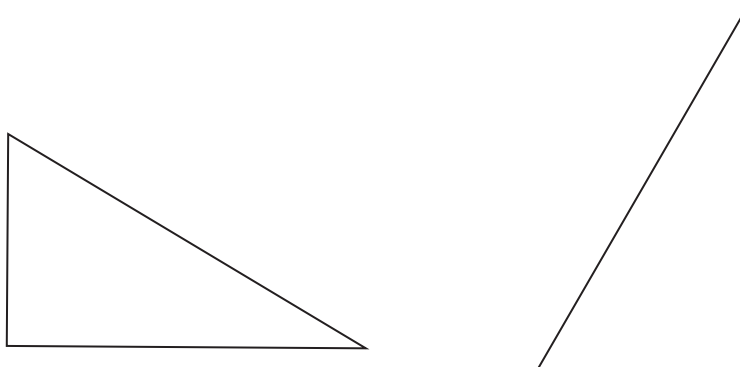


[2]

- (b) "Look, I have measured one angle in each triangle and found that they each measured 90° . Then, I measured the hypotenuse of each triangle and found that they were equal."

Indicate on each triangle

- the mathematical information given in Anwen's statement, and
- mark the **minimum** extra detail required to show that the triangles are congruent.



[2]

12. Complete the table below.

Original amount	After a decrease of	
	40%	2%
£	£492	£

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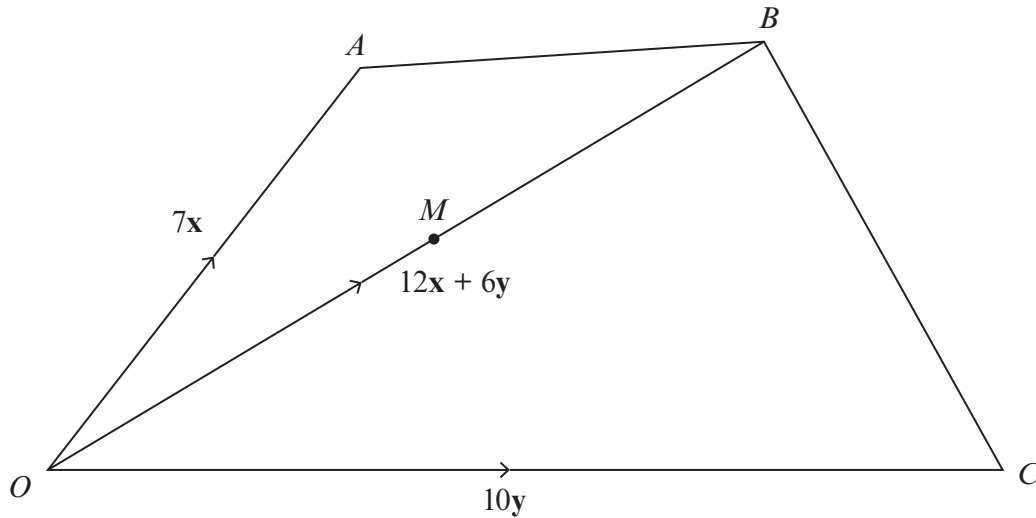
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[4]

13. The diagram shows a quadrilateral $OABC$.



In the quadrilateral $OABC$, the vectors $\mathbf{OA}$, $\mathbf{OB}$ and $\mathbf{OC}$ are given by $\mathbf{OA} = 7\mathbf{x}$, $\mathbf{OB} = 12\mathbf{x} + 6\mathbf{y}$ and $\mathbf{OC} = 10\mathbf{y}$.

(a) Express $\mathbf{AC}$ in terms of $\mathbf{x}$ and $\mathbf{y}$.

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[1]

(b) $\mathbf{M}$ is the mid-point of $\mathbf{OB}$.
Express each of the following in terms of $\mathbf{x}$ and $\mathbf{y}$ in their simplest form.

(i) $\mathbf{MO}$

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[1]

(ii) $\mathbf{MC}$

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[1]

A triangle with vertices labeled A , B , and C . The side AC is labeled 17.8 cm . The angle at vertex C is labeled 34° .

The area of triangle ABC is 42.8 cm^2 .
Calculate the length of AB .

Turn over.

- 



The radius of the sphere is 6.7 cm.
The height of the cone is 10.4 cm.

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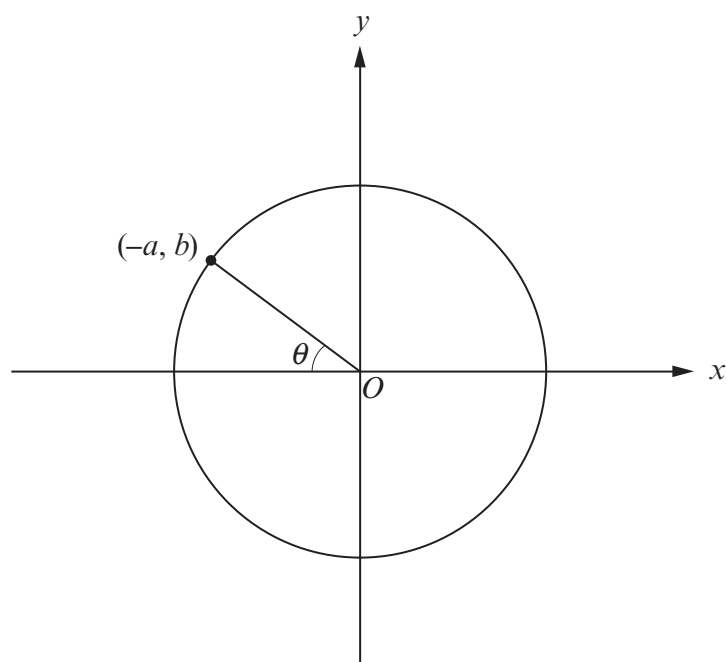
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Form and solve simultaneous equations to calculate the dimensions of the smaller rectangle. Give your answers correct to 1 decimal place.

Turn over.

17. The sketch below shows a circle with its centre at the origin and radius 1 unit. The point $(-a, b)$ is on the circumference of the circle.



The angle θ is shown on the diagram.

Complete the following statements, in terms of a and b .

$\sin \theta = \dots\dots\dots$

$\cos \theta = \dots\dots\dots$

[3]

END OF PAPER

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