| Surname | | Centre Number | Candidate Number |
|---|---|---|---|
| Other Names | | | 0 |

**GCSE**

**WJEC CBAC**

4351/02

**MATHEMATICS (UNITISED SCHEME)**
**UNIT 1: Mathematics In Everyday Life**
**HIGHER TIER**

A.M. TUESDAY, 6 November 2012
$1\frac{1}{4}$ 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 **5**.

| For Examiner's use only | | |
|---|---|---|
| **Question** | **Maximum Mark** | **Mark Awarded** |
| 1 | 3 | |
| 2 | 4 | |
| 3 | 6 | |
| 4 | 5 | |
| 5 | 7 | |
| 6 | 4 | |
| 7 | 5 | |
| 8 | 6 | |
| 9 | 3 | |
| 10 | 3 | |
| 11 | 7 | |
| 12 | 5 | |
| 13 | 7 | |
| **TOTAL MARK** | | |

## Formula List

**Area of trapezium** $= \frac{1}{2}(a + b)h$
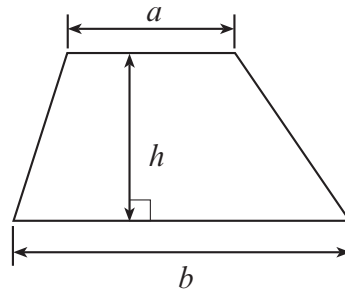
**Volume of prism** = area of cross-section × length
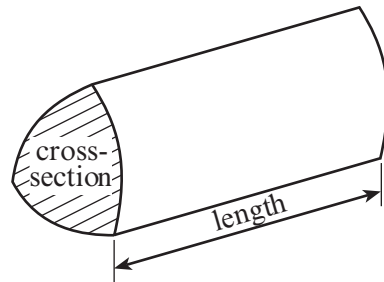
**Volume of sphere** $= \frac{4}{3}\pi r^3$

**Surface area of sphere** $= 4\pi r^2$
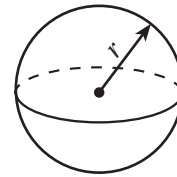
**Volume of cone** $= \frac{1}{3}\pi r^2 h$

**Curved surface area of cone** $= \pi r l$
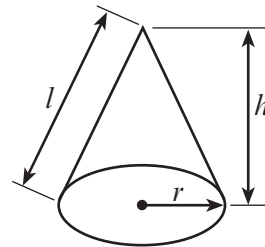
**In any triangle** $ABC$

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

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

**Area of triangle** $= \dfrac{1}{2} ab \sin C$
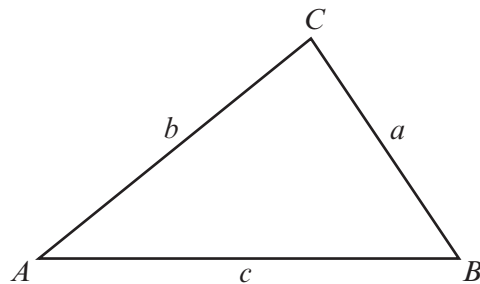
**The Quadratic Equation**

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.** The map shows part of the Spanish Mediterranean coastline.
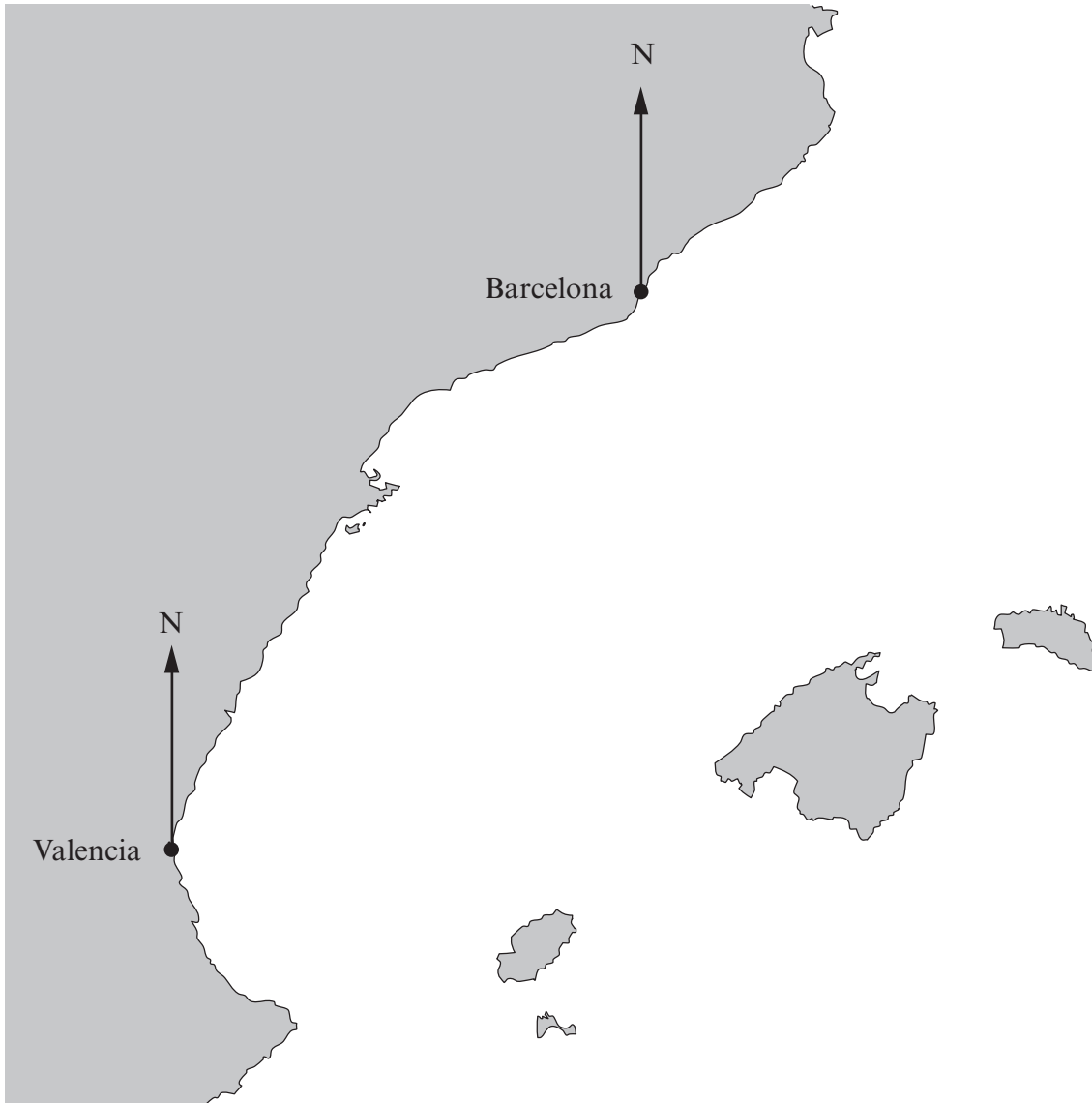


A ship is on a bearing of 070° from Valencia and on a bearing of 200° from Barcelona.
By drawing suitable lines on the diagram above, find and mark the position of the ship.

[3]

**2.** *(a)* A class sat a Geography test and a French test.
The marks gained by the pupils in these tests are summarised in the table below.

| Mark | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of pupils – Geography | | | | | 2 | 4 | 5 | 13 | 5 | 1 | |
| Number of pupils – French | | 2 | 5 | 4 | 6 | 5 | 0 | 4 | 3 | 0 | 1 |

(i) For which subject was there a greater range of marks?
You must give an explanation for your choice.

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[1]

(ii) **Without making any calculations**, which subject had the greater mean mark for the test?
You must give an explanation for your choice.

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[1]

*(b)* The following diagram is intended to show the number of girls and the number of boys who are members of a youth club.
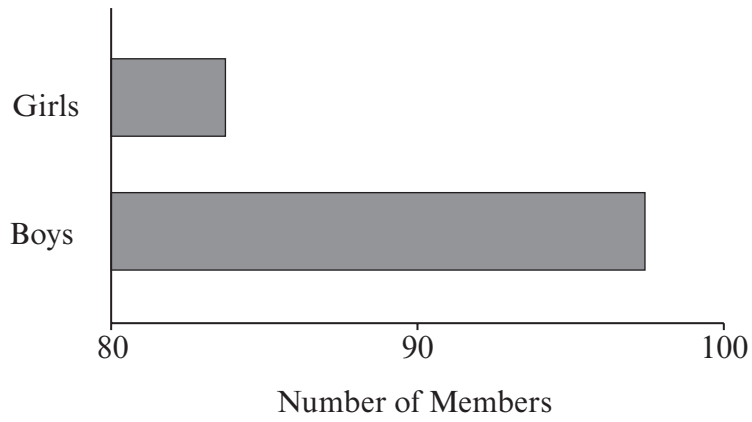


In what way could the information shown in the diagram be misunderstood?

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What is the reason for this?

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[2]

**3.** Olga wants to paint one side of a garden wall.
The wall is 2 metres high and 35 metres long.

35 m



2 m
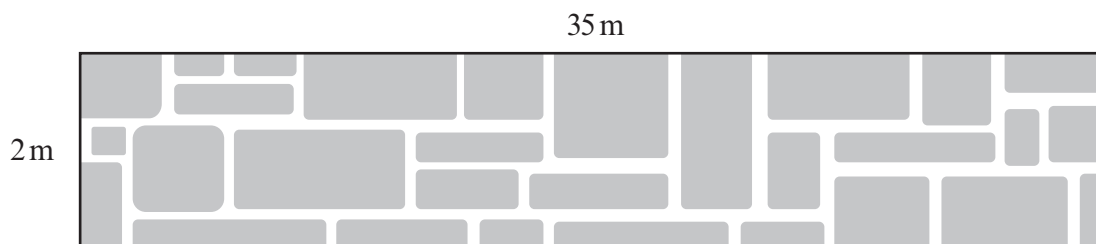
*Diagram not drawn to scale*

She has found the following information about the special paint that she needs.

- It is only sold in 5 litre and 2 litre tins
- One litre is enough to cover an area of $6\,m^2$
- The tins are sold at a price of
  - £12 for a 5 litre tin
  - £6 for a 2 litre tin

Showing all your calculations, find the least amount she has to pay for enough paint to cover the wall.

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[6]

**4.** *(a)* A hollow container has a volume of $2\,\text{m}^3$.

(i) Calculate this volume when given in $\text{cm}^3$.

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[2]

(ii) How many litres of water would this container hold when full?

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[1]

*(b)* Calculate the area of the triangle below.



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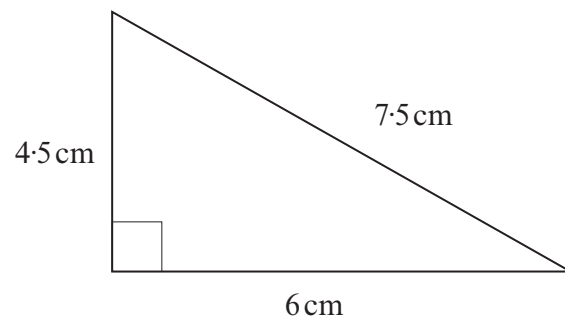
[2]

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

A book store displays the following offer.

BUY 3 AND GET THE CHEAPEST **FREE**

Karl wants to buy seven books costing £5.99, £7.50, £7.50, £7.99, £7.99, £10 and £10.
Karl wants to pay as little as possible for the books.

Show whether this offer is as good for Karl as another offer, which would give him 25% off the total cost of the seven books.

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[7]

**6.** Heather invests £9000 for 3 years at 5% per annum compound interest.
Find the compound interest earned in the 3 years.

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[4]

**7.** *(a)* A British company manufactures and sells souvenir plates in France.

The profit (**P**) it makes, in pounds, is calculated using the formula

$$P = \frac{1{\cdot}8N - F}{E}$$

where **N** is the number of plates sold,
**F** is a fixed cost, in euros, for the manufacturing process
and **E** is the exchange rate for the number of euros obtained for each pound.

When the company sells 900 plates, its profit is £1050.
Given that the exchange rate is £1 = 1.2 euros, calculate the fixed cost **F**.

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[3]

*(b)* A similar company is based in Britain.

The profit (**P**) it makes, in pounds, is calculated using the formula

$$P = 1{\cdot}5N - F$$

where   **N** is the number of plates sold
and       **F** is a fixed cost, in pounds, for the manufacturing process.

The following graph is drawn using this formula.
What information is given by the points *A* and *B* on the graph?



Point *A* ..................................................................................................................................

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Point *B* ..................................................................................................................................

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[2]

**8.** A jug has a capacity of 600 ml measured correct to the nearest 10 ml.

*(a)* Write down the least and greatest possible values of the capacity of the jug.

Least possible capacity = ................................. ml.    Greatest possible capacity = ................................. ml.

[2]

*(b)* A tank has a capacity of 73 litres measured correct to the nearest litre.

Explain, showing all your calculations, why it is not always possible for the tank to hold water poured from 120 full jugs without overflowing.

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[4]

**9.** A building firm used 3 machines to concrete an area of $600\,m^2$, to a fixed depth, in 5 hours.

The following day they need to concrete a further area of $1120\,m^2$, to the same depth, with the work being completed in 4 hours.

Given that all conditions are similar, what is the least number of machines the firm should use on the second day?

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[3]

**10.** This year a conservation group counted the number of trees in a park and recorded a total of 1144 trees.

They claim that there has been a reduction of 35% in the number since they last counted the trees in 2006.

How many trees were there in the park in 2006?

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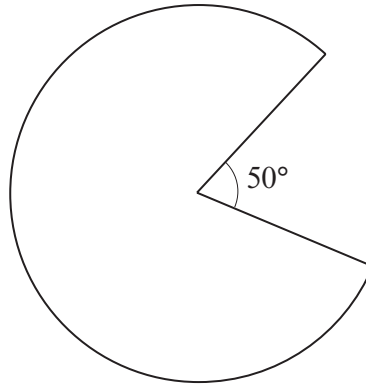
[3]

**11.** A company logo is in the shape of a sector of a circle as shown below.



*Diagram not drawn to scale*

*(a)* The logo on the side of their headquarters uses a sector of a circle, whose radius is 3 metres.
Calculate the length of the perimeter of this logo.

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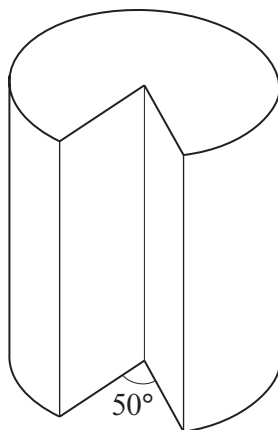...................................................................................................................................................

[3]

*(b)* A solid metal block is made as part of a machine that prints the logo onto the company's products.
The part is made from a solid metal cylinder of radius 2 cm and height 6 cm, as shown below.



*Diagram not drawn to scale*

Calculate the volume of metal that has been **cut out** of the cylinder.

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[4]

**12.** Two cars each travel 120 miles.
One of the cars travels the whole distance at an average speed of 50 mph.
The second car travels half the distance at an average speed of 40 mph and half the distance at an average speed of 60 mph.

What is the difference in the times taken by the two cars, in minutes, to complete the journey?
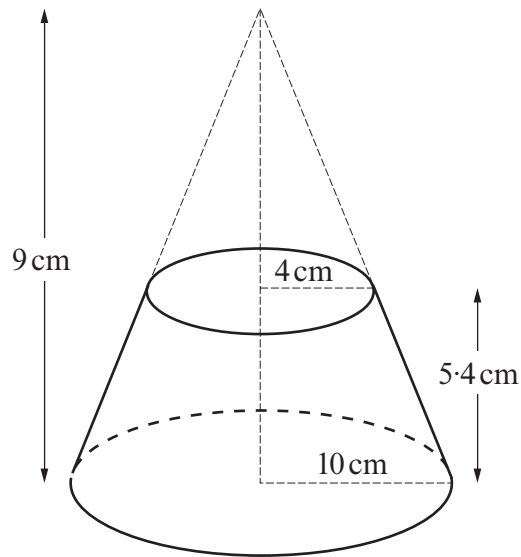
[5]

**13.** A frustum is the shape remaining when the top of a cone has been removed.

*(a)* Find the volume of the solid metal frustum shown below.



*Diagram not drawn to scale*

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[4]

*(b)* The metal frustum shown above is melted down and is re-shaped into a sphere.
Assuming there is no waste, what is the radius of this sphere in centimetres?
Give your answer correct to two decimal places.

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[3]