GCSE

4351/02

WJEC CBAC

MATHEMATICS (UNITISED SCHEME)
UNIT 1: MATHEMATICS IN EVERYDAY LIFE
HIGHER TIER

P.M. MONDAY, 11 June 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. Do not use gel pen or correction fluid

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.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

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 **2**.

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

Formula List

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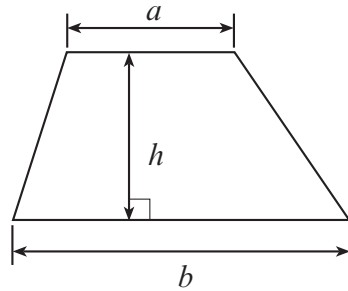
Volume of prism = area of cross-section × length
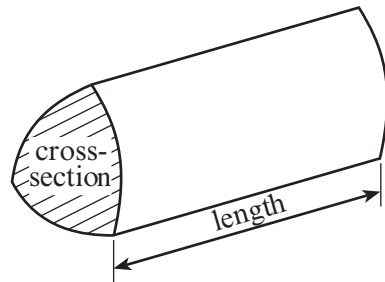
Volume of sphere $= \frac{4}{3}\pi r^3$

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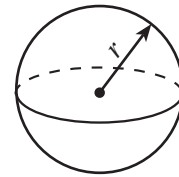
Volume of cone $= \frac{1}{3}\pi r^2 h$

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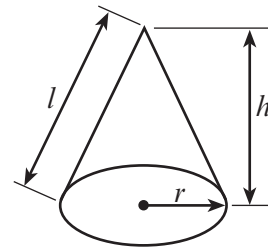
In any triangle ABC

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

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

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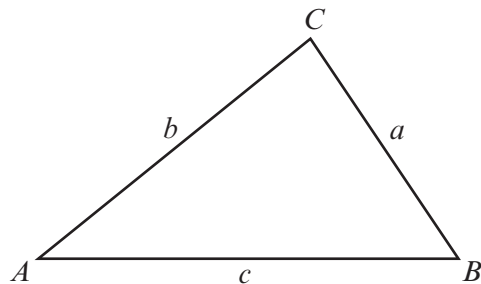
The Quadratic Equation

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

where $a \neq 0$ are given by

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

(4351-02)

1. A town's drama club carried out a survey by asking people questions as they left the local theatre on a Saturday night.
Part of the survey questionnaire is shown below.

---

1. Are you interested in drama?　　Tick (✓) one box only.

No interest ☐　　Some interest ☐　　Very interested ☐

2. How old are you?

Under 12 ☐　　12 to 20 ☐　　21 to 50 ☐　　50 to 75 ☐

3. Why would you not come to see another production?
What puts you off coming again?

....

....

(a) Explain why this is a biased survey.

....

....

[1]

(b) State **two** criticisms about the design of **question 2** in the survey.

(i) ....

....

[1]

(ii) ....

....

[1]

(c) What is the problem with the design of **question 3** in the survey?

....

....

[1]

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

Ellen has received her gas bill for the period January to April.
The details of the bill are as follows.

- Number of units of gas used is 9745.
- The cost of one unit of gas is 2.12 pence.
- The number of days in this period is 90.
- The Standing Charge is 12.4p per day.
- VAT at 5% is charged on the total gas bill.

Find, showing all your calculations, the cost of Ellen's gas bill including VAT.

....

....

....

....

....

....

....

....

....

....

....

....

....

....

[8]

(4351-02)

3. A French bus company runs a service from Cherbourg to Rennes, a distance of 172 kilometres. Thierry catches the 13:45 bus at Cherbourg and arrives in Rennes at 16:15.

What was the average speed of the bus in **miles per hour**?

....

....

....

....

....

....

....

[5]

(4351-02)   **Turn over.**

4. The table below shows the number of different priced season tickets that a football club sold last season.

Cost of ticket (£)	Number sold
250	6000
300	8000
350	8000
500	3000

Calculate the mean cost of the season tickets sold last season.

....

....

....

....

....

....

[3]

5. Find $\sqrt{6 \cdot 8^3}$ to 3 significant figures.

....

....

[2]

6. Arnold went to buy some golf balls.
They were priced at £2 each, but a box of 15 balls could be bought at a discount price of £24.

What was the percentage discount being offered when buying a box of 15 balls?

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

[4]

© WJEC CBAC Ltd.   (4351-02)   **Turn over.**

7. The following is a formula that is used by engineers to measure how far an object travels in a straight line under certain conditions.

$$s = ut + \frac{1}{2}at^2$$

- *s* is the distance travelled
- *u* is the object's initial velocity
- *a* is the acceleration of the object
- *t* is the time taken

The initial velocity of an object is 20 metres per second.
It travels a distance of 100 metres in 4 seconds.
Find the acceleration of the object.

....

....

....

....

....

....

[3]

© WJEC CBAC Ltd.   (4351-02)

8. A 1200-litre tank initially contains 200 litres of water.
A valve is then opened, which allows 150 litres of water to flow into the tank every hour.

(a) On the graph paper below draw a line that will show the amount of water in the tank at any time up to 6 hours after the valve was opened.
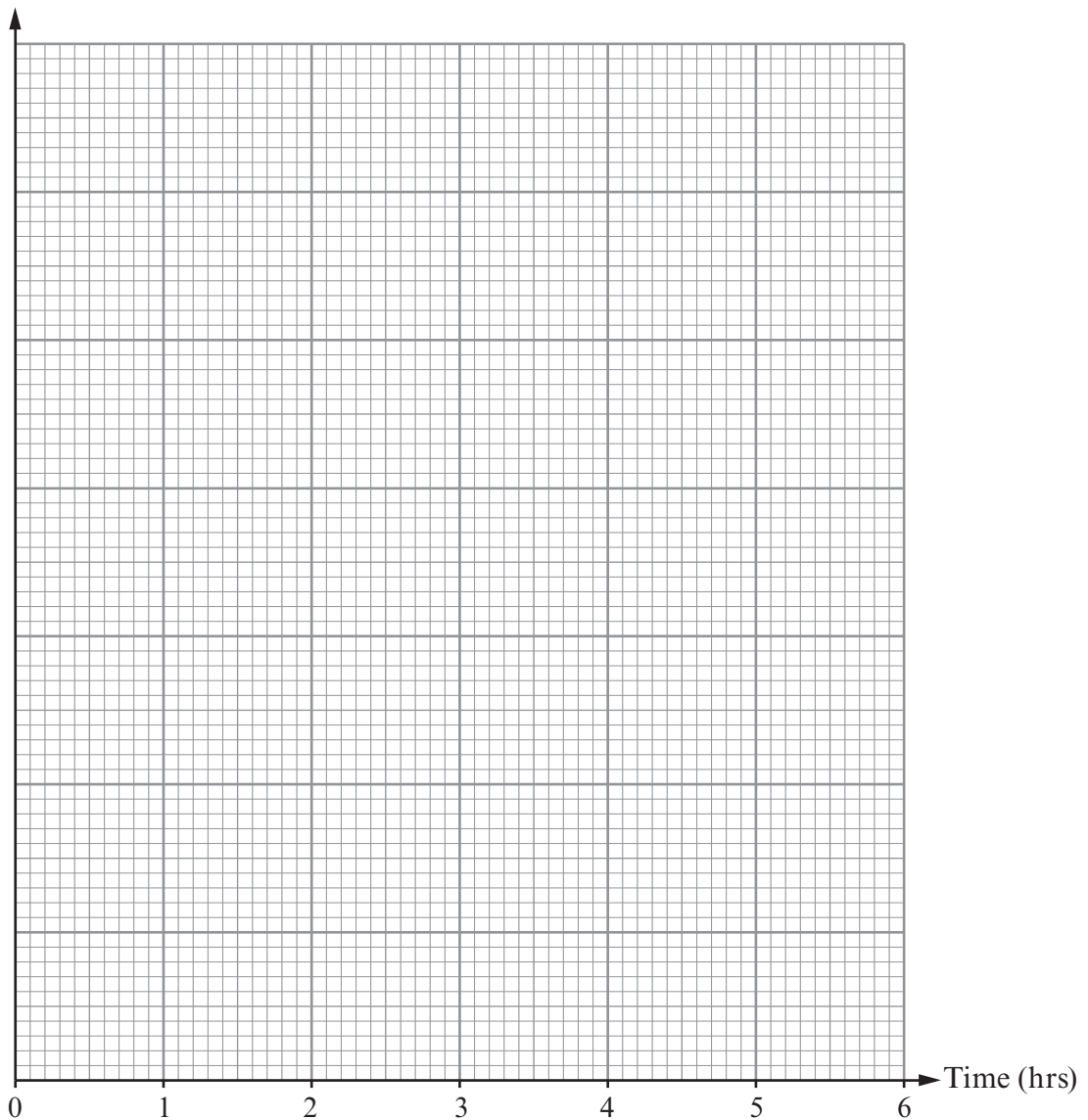
....

....

....

[3]

Volume of water in tank (litres)

Time (hrs)

(b) How much water was in the tank after 2 hours and 48 minutes?

....

[1]

© WJEC CBAC Ltd. (4351-02) **Turn over.**

9. A company orders a metal machinery part that is a cube with a cylindrical hole drilled through it.
The metal cube has sides of length 17 cm and the cylindrical hole has a radius of 4 cm.

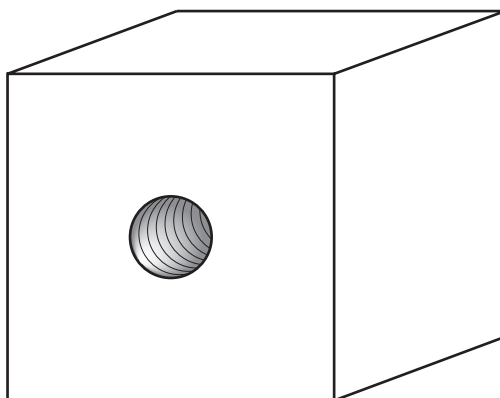Calculate the volume of metal in the machinery part ordered.

Diagram not drawn to scale

[5]

(4351-02)

10. The length of the edge of a wooden cube is 4·5 cm, measured correct to the nearest mm.

(a) Write down the least and greatest possible length of the edge of the cube.

Least length .... cm   Greatest length .... cm

[2]

(b) The length of a shelf is 190 cm, measured correct to the nearest 10 cm.

Explain, showing all your calculations, why it is not certain that you can place 41 of the cubes, side by side, along the shelf.

....

....

....

....

....

....

....

....

....

[4]

© WJEC CBAC Ltd.   (4351-02)   **Turn over.**

11. Carys invested some money in a new bank account that paid interest at 4% per annum.
No further deposits or withdrawals were made.
At the end of one year she had £884 in this account.

How much money did Carys originally invest?

....

....

....

....

....

....

[3]

12. Machine A is three times as quick as Machine B in assembling identical circuit boards. Machine A is allocated two and a half times as many of these circuit boards to assemble than is allocated to Machine B.

Machine B took 4 hours to assemble all of its allocation.

How long did it take for Machine A to complete its allocation? Give your answer in hours and minutes.

....

....

....

....

....

....

....

....

[4]

(4351-02) **Turn over.**

13. A plot of land $ABCDE$ is shown below where $AB = 15\,\text{m}$, $BC = 10\,\text{m}$, $CD = 15\,\text{m}$, $A\hat{B}C = 90°$, $B\hat{C}D = 90°$ and $B\hat{A}E = 160°$.

DE is an arc of a circle with centre at A.
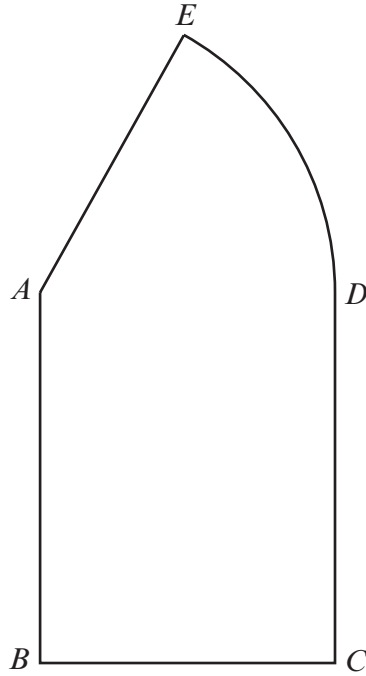
Diagram not drawn to scale

(a)   Calculate the perimeter of the plot of land.

....

....

....

....

....

....

[4]

(b)   Calculate the area of the plot of land.

....

....

....

....

....

[3]

(4351-02)

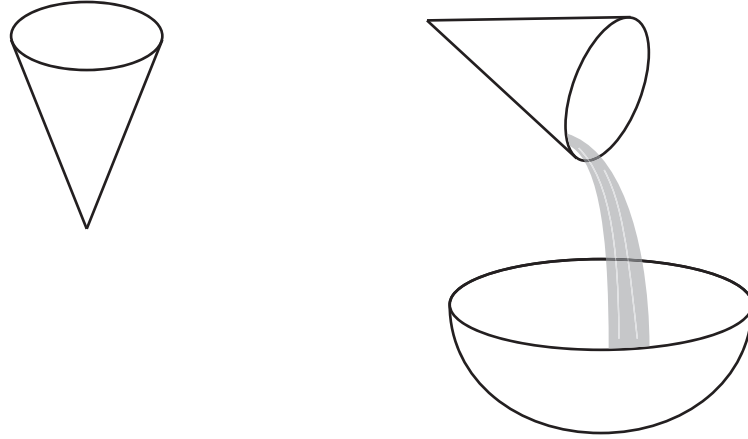**14.** A water feature consists of a cone-shaped container filling up with water which, when full, tips its contents into a hemispherical bowl.

Mr Davies buys a cone-shaped container, which has a radius of 19·8 cm and a height of 15 cm.

The hemispherical-shaped containers are produced in various sizes.
Each hemispherical container holds a **whole** number of litres, ranging from 2 litres to 10 litres.

What is the diameter, correct to the nearest mm, of the smallest possible hemispherical bowl that Mr Davies should buy in order to collect all the water from his cone-shaped container?

[7]

Question number	Additional page, if required. Write the question numbers in the left-hand margin	Examiner only

(4351-02)