

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4351/02



W15-4351-02

MATHEMATICS (UNITISED SCHEME)

UNIT 1: Mathematics in Everyday Life

HIGHER TIER

A.M. FRIDAY, 9 January 2015

1 hour 15 minutes

ADDITIONAL MATERIALS

A calculator will be required for this paper.

A ruler, a protractor and a pair of compasses may be required.

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.

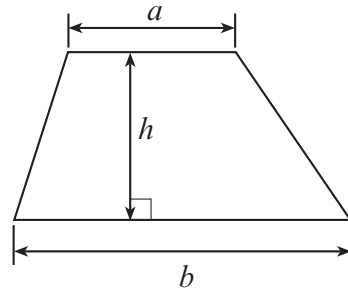
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 1.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	9	
2.	3	
3.	5	
4.	5	
5.	3	
6.	3	
7.	5	
8.	3	
9.	3	
10.	6	
11.	5	
12.	8	
13.	7	
Total	65	

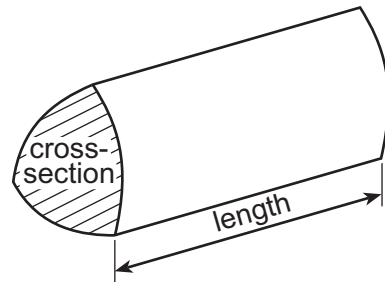
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Formula List

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

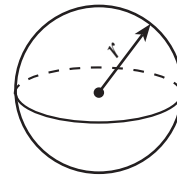


Volume of prism = area of cross-section \times length



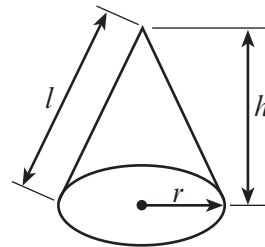
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

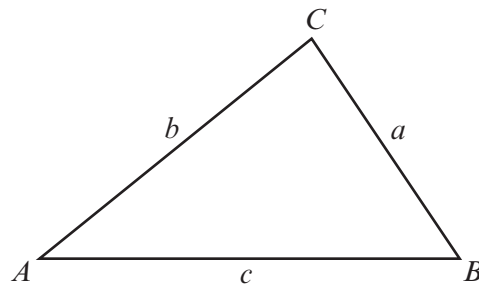


In any triangle ABC

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

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

2. The map shows a scale diagram of part of the North Sea coastline.

A ship is on a bearing of 035° from Aberdeen in Scotland and on a bearing of 290° from Stavanger in Norway.

By drawing suitable lines on the diagram below, find and mark the position of the ship. [3]



- 3. 800 students from the UK and 300 students from Russia apply to attend a Summer Camp. 20% of the UK students and 30% of the Russian students are chosen to attend the camp.

What percentage of all the students who are chosen to attend the camp are from Russia? [5]

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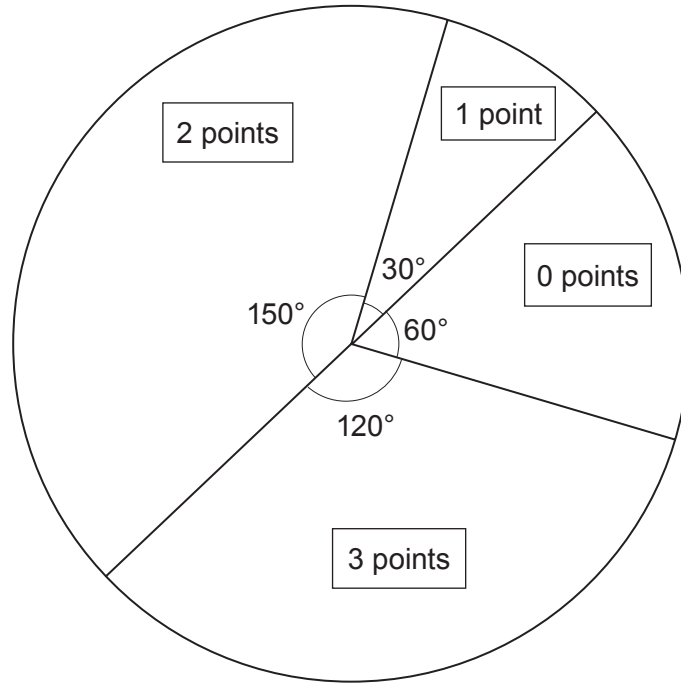
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4. Sara plays a game 72 times.
Each game results in Sara gaining 0 points, 1 point, 2 points or 3 points.

The pie chart below summarises the results of the 72 games played.



Use the information from the pie chart to complete the frequency table below, and then calculate the mean number of points Sara scored per game.
Give your answer correct to 1 decimal place. [5]

Points gained	Number of games
0	
1	
2	
3	

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Mean = points

5. (a) Evaluate $\sqrt[3]{8 \cdot 4^2 - 2 \cdot 7^3}$, correct to 3 significant figures. [2]

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- (b) Evaluate $10 \frac{2}{3} \div 2 \frac{2}{9}$.

Your answer must be given as a whole number and a fraction (not as a decimal). [1]

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6. Each year, a fruit-growing company reduces the number of strawberry plants it grows by $\frac{1}{8}$ of the number of plants it grew the previous year. In 2012, it grew 5440 strawberry plants. How many strawberry plants did the company grow in 2014? [3]

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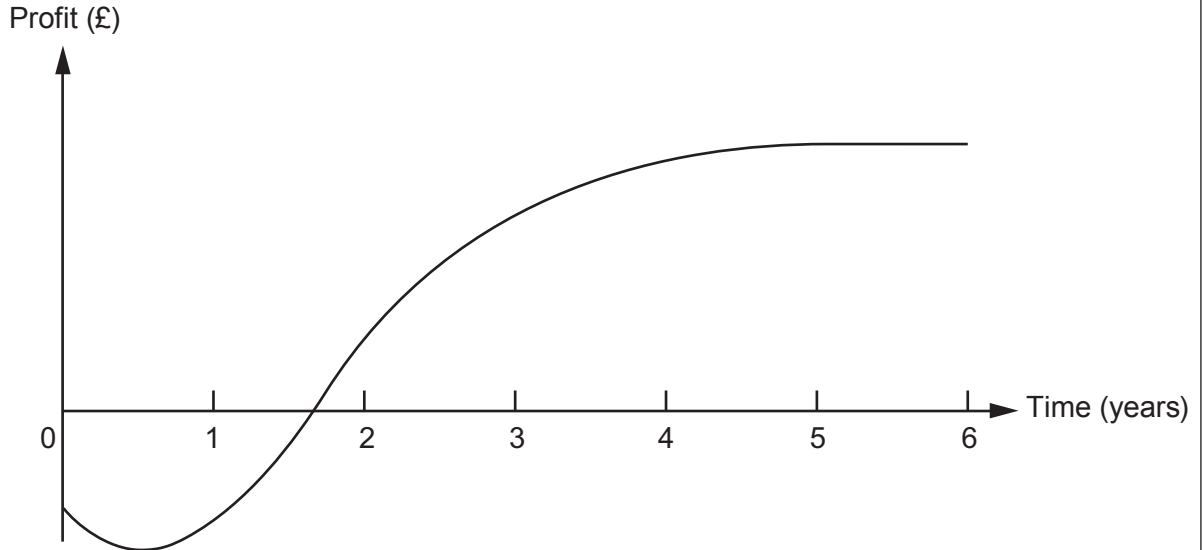
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7. (a) A company that manufactures and sells wooden toys was set up six years ago. It has produced a graph, shown below, to illustrate how profitable the business has been over these six years.



- (i) What significant fact can be stated about what happened during the company's second year in business? [1]

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- (ii) What seems to have happened after four years? [1]

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- (iii) Describe what happened during the first six months after the business was set up. [1]

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(b) The profit (P), in pounds, made on one type of toy, is calculated using the formula

$$P = 2.75S - 0.18M - 247$$

where S is the number of toys sold,
and M is the number of toys manufactured.

Calculate how many of these toys were sold when the company made a profit of £1220 from the 650 toys it manufactured. [2]

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8. Equal-sized trucks were hired to carry 250 tons of soil from one building site to another.

On the first day, it took 10 hours for 3 of these trucks to move 100 tons of soil.

On the second day, 5 of these trucks were used to move the remaining 150 tons of soil.

How long did it take to complete the work on the second day?

You may assume that all other conditions remained the same for both days.

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9. In a competition, Dewi threw the javelin 69.93 metres.
This was an improvement of 8% on his previous best throw.

Calculate the length of his previous best throw.

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- 10.** Thin aluminium strips were attached, end to end, around the square base of a statue. The strips were bent around the corners of the base, where necessary.

The length of each side of the square base was 350 cm, measured correct to the nearest 10 cm. Each aluminium strip was 20 cm long, measured correct to the nearest centimetre.

Find the smallest possible number of strips that could have been used.

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11. Vinisha uses the following rough guide when calculating how much fuel her car uses.

Speed	Miles per gallon
70 mph	42
50 mph	48
30 mph	40

For one particular journey, Vinisha noted that she had driven

- at a speed that was constantly around 50 mph for an hour and a half, then
- at a speed that was constantly around 70 mph for 3 hours, and finally
- at a speed that was constantly around 30 mph for 30 minutes.

How much fuel did she use for this journey?

Give your answer to the nearest gallon.

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12. The diagram shows two concentric circles with centre O .
 $OP = 10$ cm and $OR = 6$ cm.
The area of the shaded section is 48.03 cm 2 .

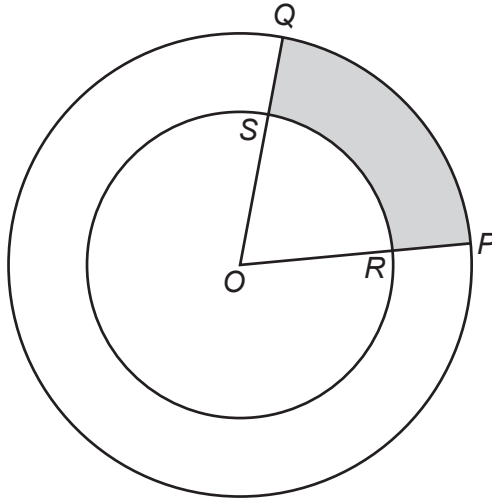


Diagram not drawn to scale

- (a) Calculate the size of \widehat{POQ} .

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(b) Using your answer to part (a), calculate the length of the perimeter of the shaded section, *PQSR*. [4]

Examiner only

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13. (a) A solid wooden object is formed by removing two hemispheres from the top and bottom of a wooden cylinder, as shown below.

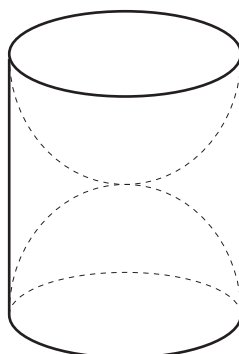


Diagram not drawn to scale

- The radius of each hemisphere is 15 cm.
- The hemispheres touch at the centre of the cylinder.

Calculate the volume of wood in the object.

[3]

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- (b) A solid cone shape is removed from a solid wooden cube, as shown below.

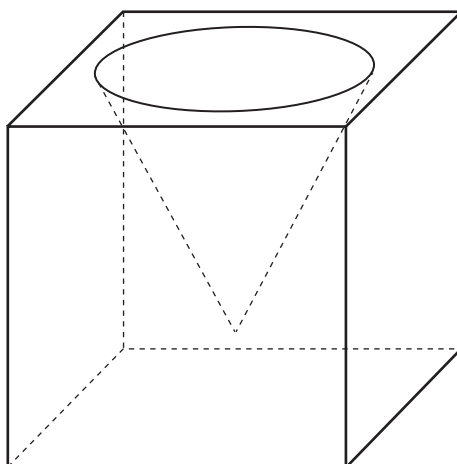


Diagram not drawn to scale

The length of each side of the cube is x cm.
The base radius of the cone is $0.4x$ cm.
The height of the cone is $0.9x$ cm.

Once the cone has been removed, the volume of the remaining wood is 849.2 cm^3 .

Calculate the value of x .

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