

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4351/02



S16-4351-02

MATHEMATICS (UNITISED SCHEME)

UNIT 1: Mathematics in Everyday Life

HIGHER TIER

A.M. THURSDAY, 26 May 2016

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. 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 10.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	4	
2.	4	
3.	4	
4.	3	
5.	5	
6.	3	
7.	2	
8.	3	
9.	4	
10.	7	
11.	3	
12.	3	
13.	6	
14.	5	
15.	6	
16.	3	
Total	65	

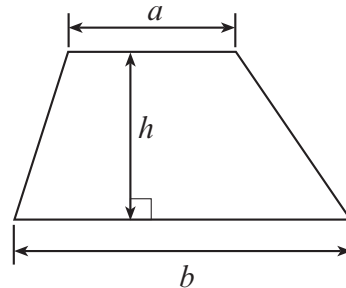
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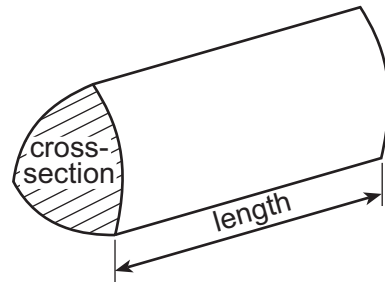
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Formula List

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

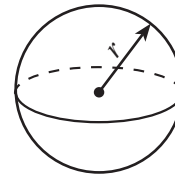


Volume of prism = area of cross-section \times length



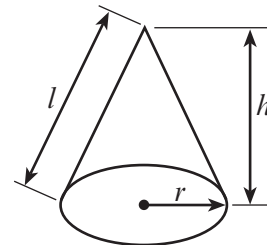
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

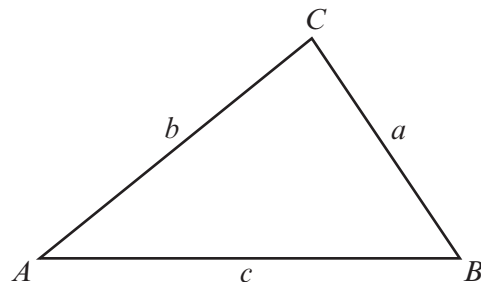


In any triangle ABC

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

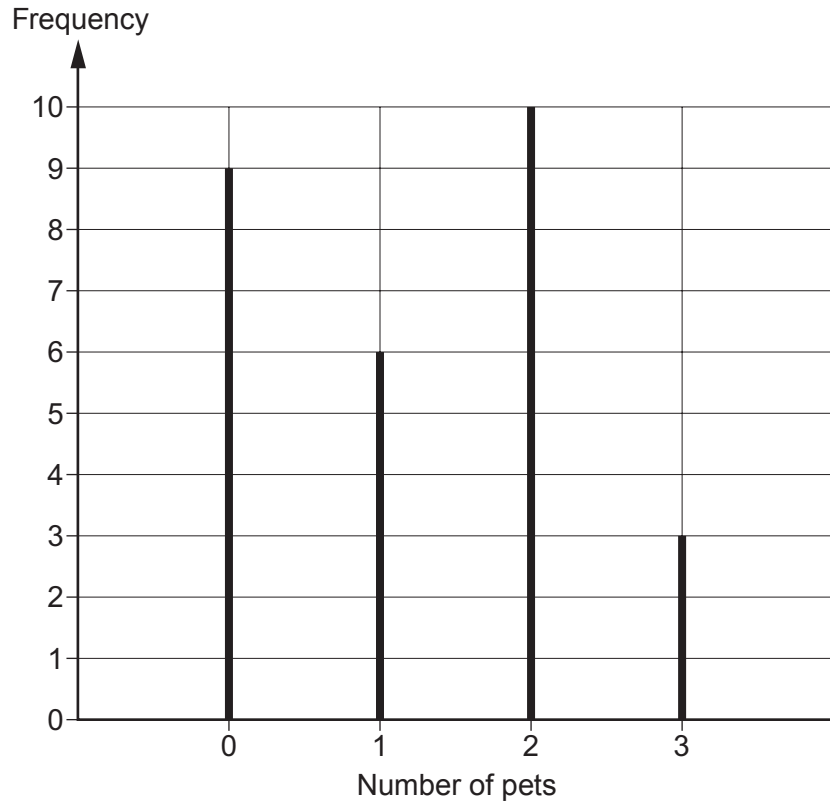
The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

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



1. The children in a primary school class were asked how many pets they each owned. The information was displayed on a vertical line diagram, as shown below.



Complete the frequency table below and calculate the mean number of pets per child. [4]

Number of pets	Frequency

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2. Orienteering is a competition that involves running and using a compass to find directions. It is usually held in wooded and hilly areas of the country.
Liam and Krysta are competing in an orienteering event.

Liam starts from point *A* and Krysta starts from point *B*.
They are only given the finish point *P* of the race once they are at their starting positions.
Liam is told that point *P* is on a bearing of 108° from point *A*.
Krysta is told that point *P* is on a bearing of 230° from point *B*.

(a) By drawing suitable lines, mark the position of point *P* on the diagram below. [3]



(b) When training together, Liam and Krysta have the same running speed.
Neither of them stopped during the race. Both went as fast as they could and there were no injuries.
Both started at the same time.

Give a possible reason why the person who started furthest away from point *P* got there first. [1]

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3. Heather invests £900 for 3 years at 2% per annum compound interest.
Calculate the value of her investment at the end of the 3 years.
Give your answer correct to the nearest penny.

[4]

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4. The formula $P = \frac{2.65N - C}{D}$

is used to calculate the profit (**P**) a company makes, in pounds, when selling a particular item it manufactures.

- N** is the number of items sold.
- C** is a fixed manufacturing cost, in pounds.
- D** is a tax adjustment rate.

When the company sold 8000 of the items, it made a profit of £14 160.
The tax adjustment rate was 1.25.

Calculate the fixed manufacturing cost.

[3]

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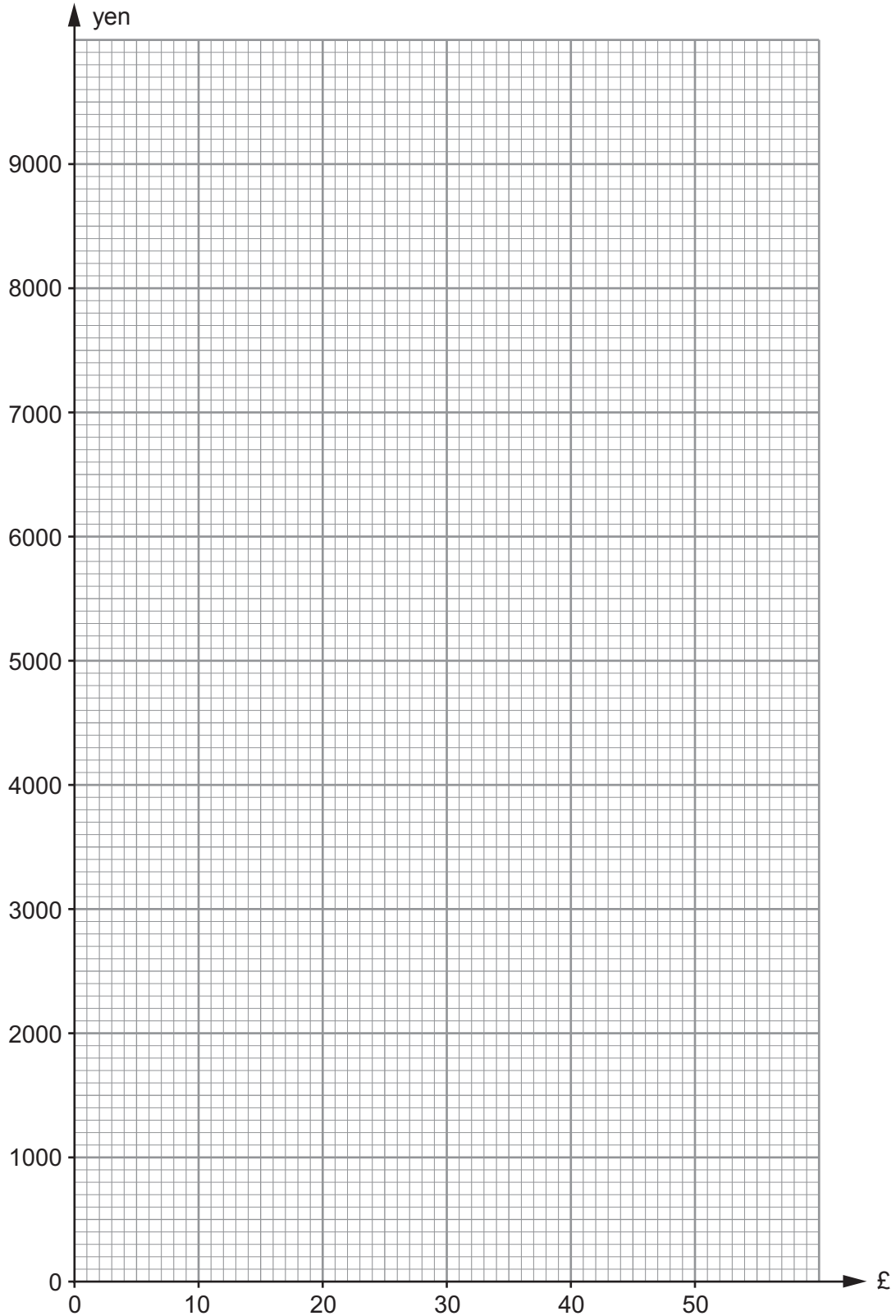
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5. Dylan is going on a trip to Japan.
The exchange rate at the time of his trip is $\text{£}1 \equiv 175 \text{ yen}$.

(a) Draw a conversion graph between £ and yen on the graph paper below.
The graph should show the conversion from $\text{£}0$ to $\text{£}50$.

[3]



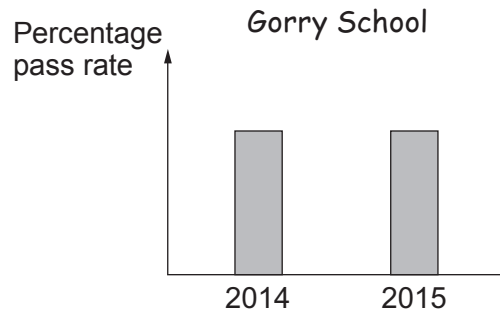
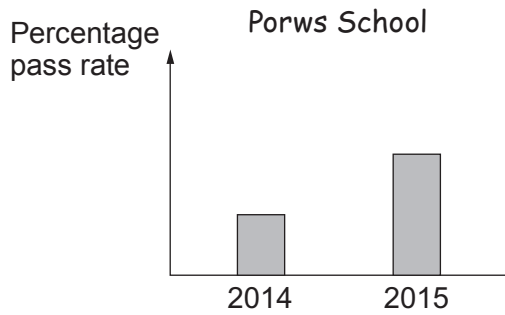
(b) Use your graph, or otherwise, to convert 20 000 yen into pounds.
Give your answer correct to the nearest pound.

[2]

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6. (a) Explain why the following statement and diagrams may give a misleading impression.
Include an example to show how this could happen. [2]

'Porws School celebrates, as percentage pass rate doubles, but no increase at Gorry School.'



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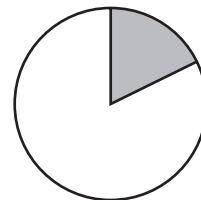
(b) Explain why the statement beneath the following pie charts may not be true. [1]

Westbridge Council



■ female councillors
□ male councillors

Eastbridge Council



'There are more female councillors on Westbridge council than on Eastbridge Council.'

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7. Calculate $\frac{854.7}{(43.2 - 37.6)^3}$, giving your answer correct to 3 significant figures. [2]

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8. In a game, it is possible for **each** player to score between 1 and 10 points. Lois and Beca play the game five times.

The table below shows the points scored by Lois in each game.

	Game 1	Game 2	Game 3	Game 4	Game 5
Lois	5	2	8	5	1
Beca					

Beca had a higher mean score than Lois.
Beca had a lower median score than Lois.
Beca had a lower range of scores than Lois.

Complete the table above with a set of possible scores gained by Beca. [3]

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9. A sprinter covers 100 metres in 10 seconds.

Calculate his average speed in miles per hour.

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

People can choose to ‘Gift Aid’ the amount of money that they donate to a charity. This means that for every £10 donated with ‘Gift Aid’, the charity can claim an extra £2.50 from the Government.

A certain charity received donations of £24 810 last year.

The charity was able to claim ‘Gift Aid’ on one third of this amount.

Calculate the extra amount of money that the charity was able to claim from the Government.

[7]

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11. A pump is used to fill empty tanks with oil.
It takes 27 minutes to fill 6 identical tanks when the flow rate is 5 litres per second.

Calculate how long it would take to fill 8 of these tanks when the flow rate is 9 litres per second.

[3]

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12. Bethan sold her house for £137 750.
She lost 5% of the price she had paid for the house.
How much had she paid for her house?

[3]

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13. A company logo is made up of three parts: a square and two identical sectors attached to two of its sides, as shown below.



Diagram not drawn to scale

The logo displayed outside the company's head office has a central square with a side length of 7 metres.

- (a) Calculate the total area of this logo. [3]

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- (b) Calculate the total length of the perimeter of this logo. [3]

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15. Two solid, identical spheres are attached to the ends of a solid cylinder, as shown below.

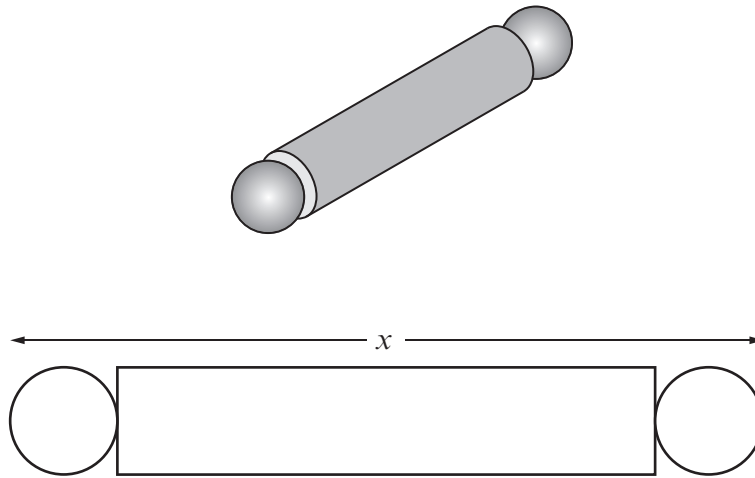


Diagram not drawn to scale

The radius, r , of each sphere is the same as the radius of the cylinder.
The length of the cylinder is $9r$.
The volume of the whole object is 3340 cm^3 .

Calculate the total length, x , of the object.

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16. A and B are two hollow cones.

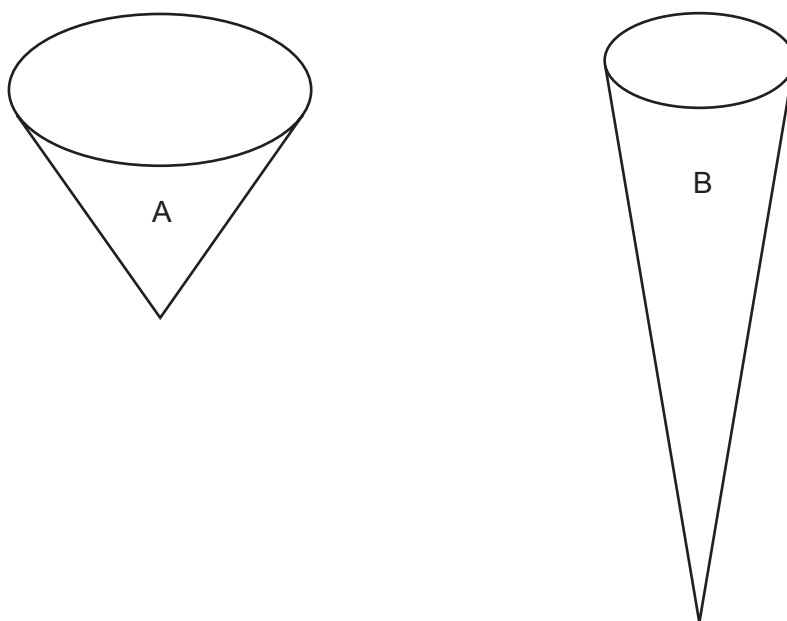


Diagram not drawn to scale

The base radius of cone B is half the base radius of cone A.
The height of cone B is twice the height of cone A.

Cone A is completely filled with water.
Is it ever possible to pour all of this water into cone B without it overflowing?
You must show working to justify your answer.

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END OF PAPER



