

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4351/02

MATHEMATICS (UNITISED SCHEME)

UNIT 1: Mathematics In Everyday Life

HIGHER TIER

A.M. WEDNESDAY, 6 November 2013

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.

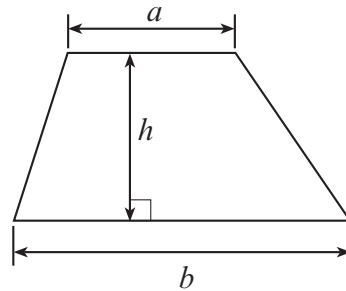
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 5.

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

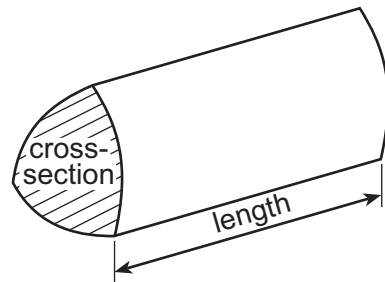
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Formula List

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

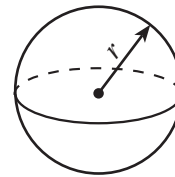


Volume of prism = area of cross-section \times length



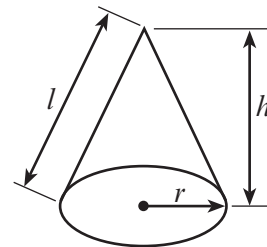
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

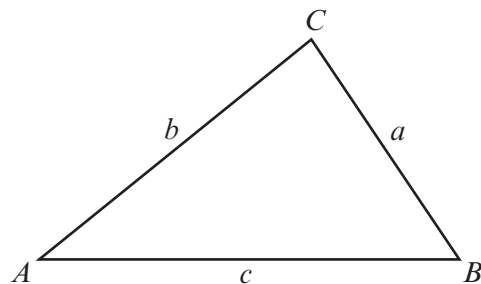


In any triangle ABC

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. A survey was carried out in Newcastle in the north of England.

The following two questions were asked.

Q1. Do you think it is right to play all of England's international matches down in London, which makes it difficult for people from the north of England to attend?

YES NO

Q2. How often have you visited the new Wembley stadium in London?

1-5 times 6-10 times 10 or more times

(a) Write down **one** criticism of the first question.

[1]

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(b) Give **two** reasons why the second question is **not** suitable.

[2]

Reason 1

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Reason 2

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2. The bearing of a ship in the Irish Sea is measured from two coastal locations. The ship is on a bearing of 040° from Moelfre and on a bearing of 335° from Hoylake.

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



(b) Write down the bearing of the ship from Douglas. [1]

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- 3. On 25 April 2013, David exchanged £650 into Russian roubles before departing for Moscow. During his stay in Moscow he spent 21 240 roubles. He returned to the UK on 7 May 2013 and exchanged the roubles he had left into pounds.

Data on the exchange values at these times is shown below.

	25 April 2013	7 May 2013
Conversion from pounds	£1 = 43.2 roubles	£1 = 44.7 roubles
Conversion back to pounds	£1 = 48.8 roubles	£1 = 49.5 roubles

Calculate how much he received for his roubles on his return to the UK.
Give your answer correct to the nearest penny.

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4. The formula used for converting a temperature measured in degrees Celsius ($^{\circ}\text{C}$) to its value in degrees Fahrenheit ($^{\circ}\text{F}$) is

$$F = \frac{9C}{5} + 32.$$

Metal is heated to a temperature of 140°F .
What is this temperature in degrees Celsius?

[3]

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

A company had an order for 600 identical thin flat glass items, each one of the shape and dimensions shown in the diagram.

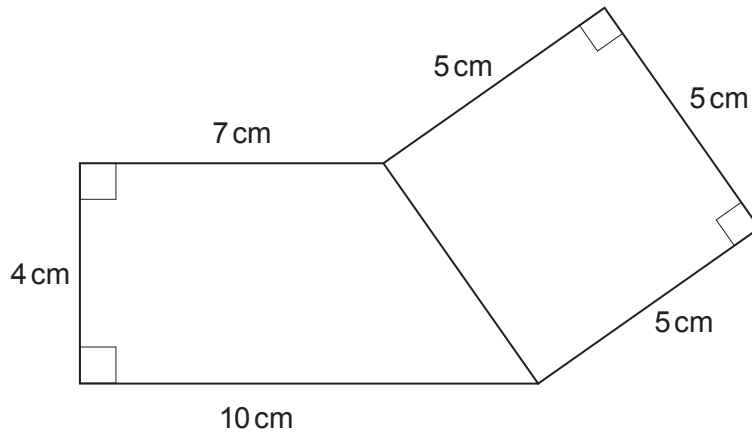


Diagram not drawn to scale

The company charged £6 per 250 cm² of glass used in producing these items.

Calculate how much the company charged for the 600 items.

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6. A car production line uses robot-operated machinery.
A rust-proofing machine treats 5 identical components in 37 minutes.

How long would it take this machine to treat 17 of these components?
Give your answer in hours, minutes and seconds.

[3]

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Answer: hours minutes seconds

7. An empty cylindrical tank has a base radius of three metres and is four metres high.

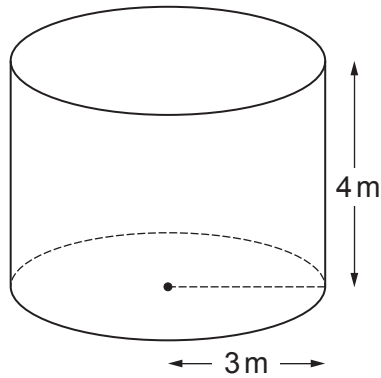


Diagram not drawn to scale

- (a) Calculate the volume of this tank.

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- (b) Water is pumped into the tank at a constant rate of 1800 litres per minute. The pump stops automatically immediately before the tank overflows. For how many whole minutes is water pumped into the tank?

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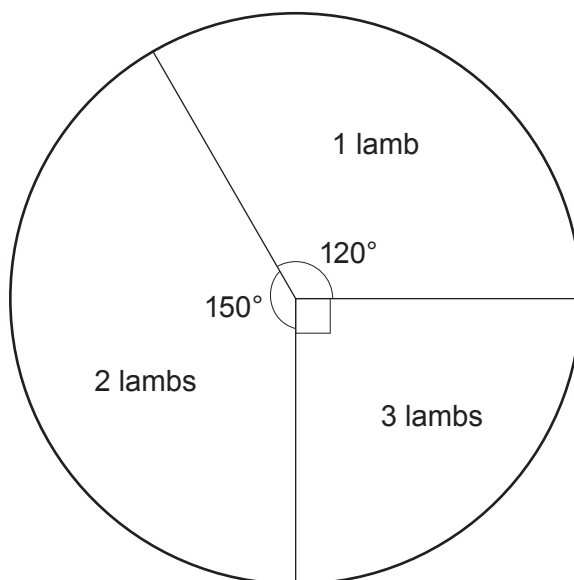
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8. Twenty four sheep each gave birth to one, two or three lambs. The proportions of sheep that gave birth to one, two or three lambs are shown in the pie chart below.



Calculate the mean number of lambs born per sheep.
Give your answer correct to 1 decimal place.

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9. A major high street store employs 3655 people.
This is a reduction of 14% in the number of people it employed last year.

How many people were employed by the store last year?

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10. The inside of a large industrial container has a height of 3 metres, measured correct to the nearest 10 centimetres.
It is used to hold a single stack of flat metal plates.
Each metal plate has a thickness of 4 centimetres, measured correct to the nearest millimetre.

(a) Find the greatest possible number of these plates that could be stacked in the container. [3]

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(b) Is it always possible to stack 73 of these plates in the container?
You must show all your working. [3]

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11. Amira travelled 180 miles by car.
She completed the first two-thirds of her journey in 3 hours.

Her average speed for the remainder of her journey was 75% of her average speed for the first 3 hours.

How long did it take Amira to complete her whole journey? [4]

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12. A ball is dropped vertically from a height of 10 metres onto a smooth horizontal surface. After each bounce the ball reaches a height equal to 70% of its previous height.

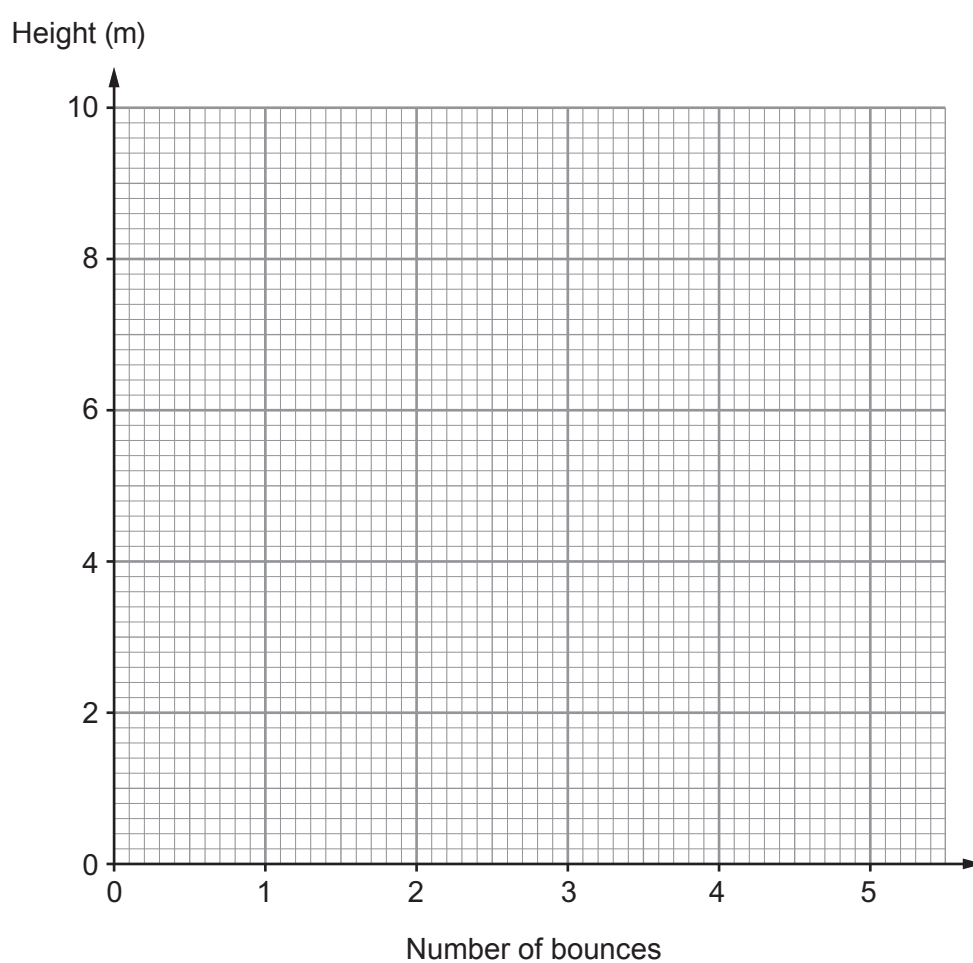
- (a) On the graph below, plot the height the ball reaches after each bounce, up to and including the fifth bounce. [4]

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- (b) Explain clearly why you should **not** connect the points you have plotted on the graph. [1]

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13. The diagram below shows two circles, both with O as their centre.
 $OA = 12$ cm, $OC = 8$ cm and $\widehat{AOB} = 70^\circ$.

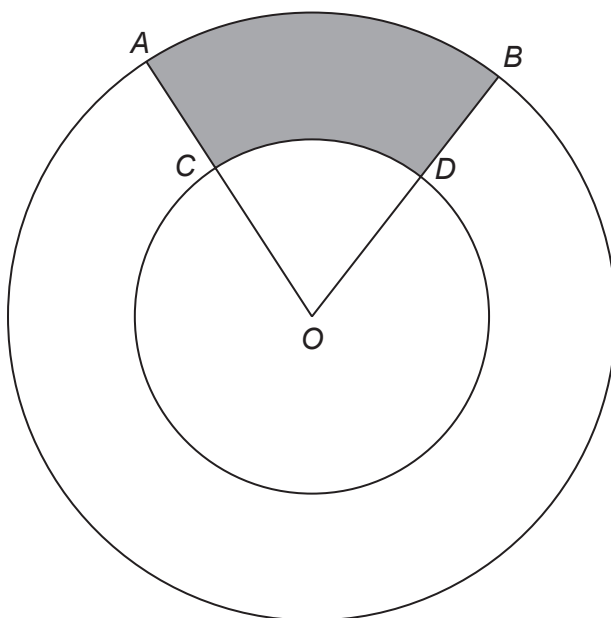


Diagram not drawn to scale

- (a) Calculate the length of the arc AB .

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- (b) Calculate the area that has been shaded.

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14. Diana has created a very large sculpture for display in a city centre park. It is called 'Mother and Child' and is in the form of a large hemisphere with a small hemisphere attached as shown.

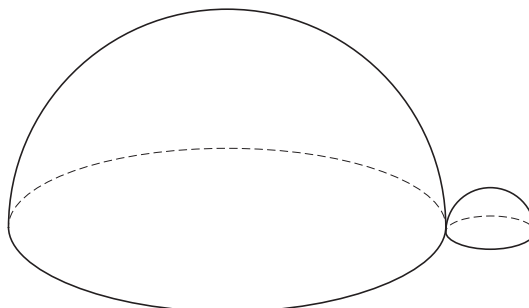


Diagram not drawn to scale

The radius of the small hemisphere is one-fifth of the radius of the large hemisphere. The total volume of the sculpture is 456 m^3 .

Calculate the radius of the large hemisphere.

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