

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4351/02

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

A.M. TUESDAY, 11 June 2013

$1\frac{1}{4}$ hours

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.

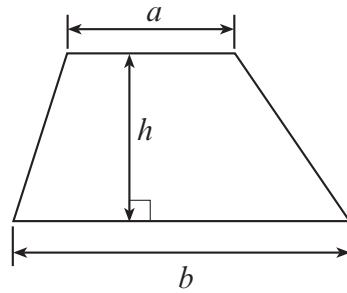
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 9.

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

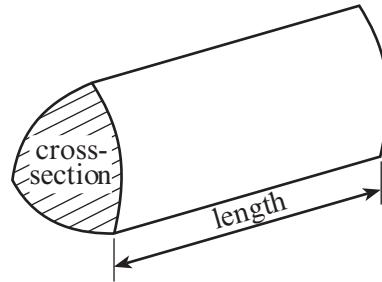


Formula List

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

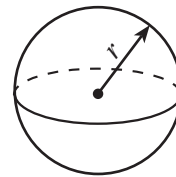


Volume of prism = area of cross-section \times length



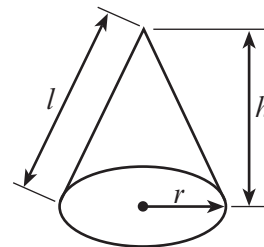
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

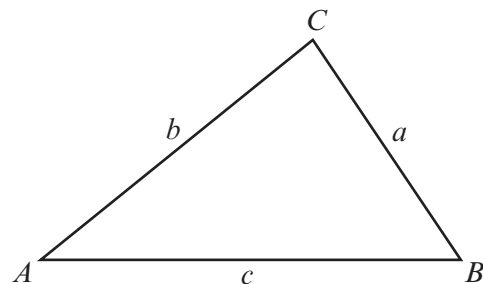


In any triangle ABC

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. An electricity bill, for a period of three months, showed that 1380 units had been used at a cost of 12·3 pence per unit.
The standing charge for this period was £13.86.
VAT at 5% is payable on the total cost of the units used and the standing charge.

Calculate the total amount to be paid.

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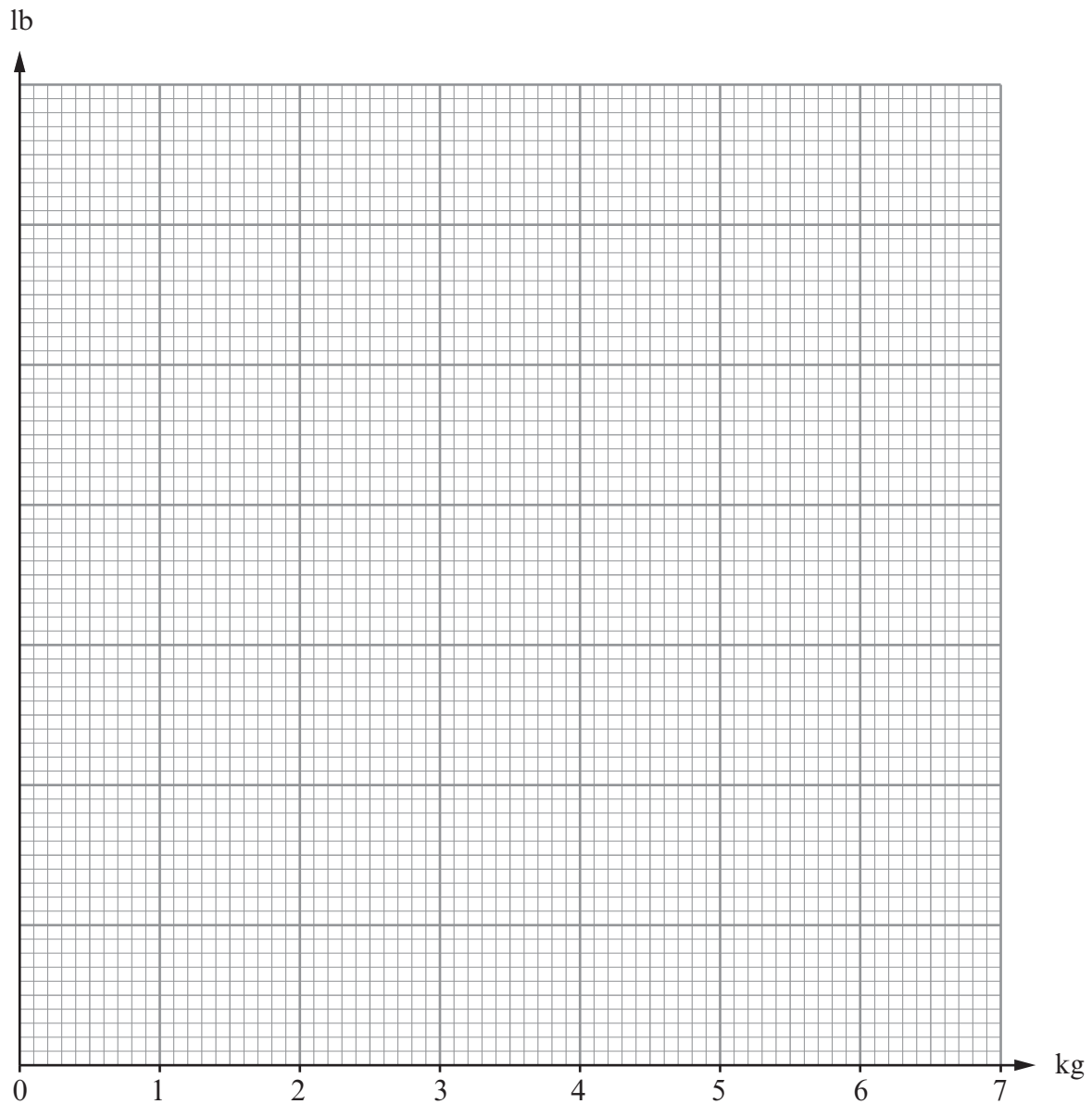


2. The following two pieces of information, given in both kilograms (kg) and pounds (lb), were seen in a cookery magazine.

Use 5 kg (11 lb) of apples. Wash and peel them.

Use 2 lb (0.9 kg) of sugar. Warm the sugar before use.

- (a) Use the information to draw a conversion graph between kilograms and pounds.



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(b) A person weighs 10 stone. (1 stone = 14lb.)

Use your graph to estimate the weight of this person in kilograms.
Remember to show the method you have used.

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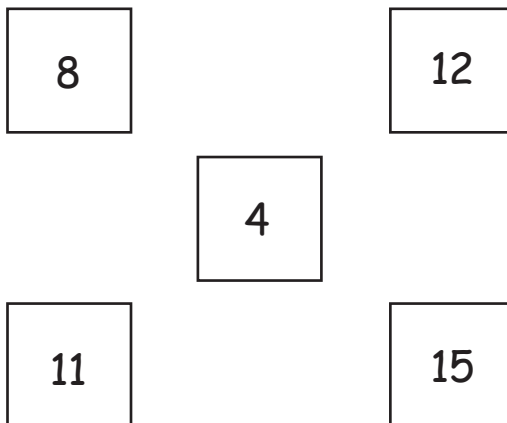
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3. Matthew is playing a game that uses numbered tiles.

The game involves working out the range and mean of the numbers on five tiles.

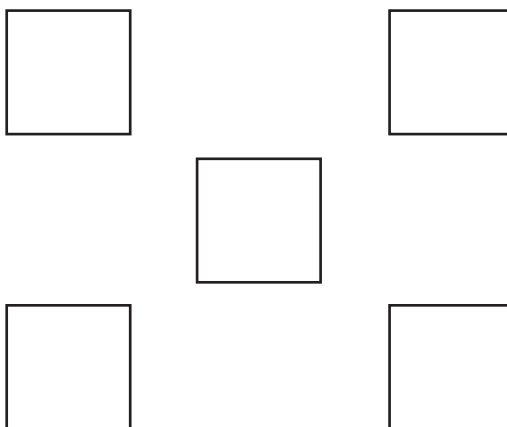
Matthew has these five tiles.



With his final move in a game, Matthew must replace **exactly two** of his tiles with two different tiles.

To win the game he must keep the **same range** as above but **increase the mean by 1**.

Fill in the numbers on the tiles below to show the three tiles he has kept, and the new numbers on the two tiles he has changed, if he is to win.



For working:

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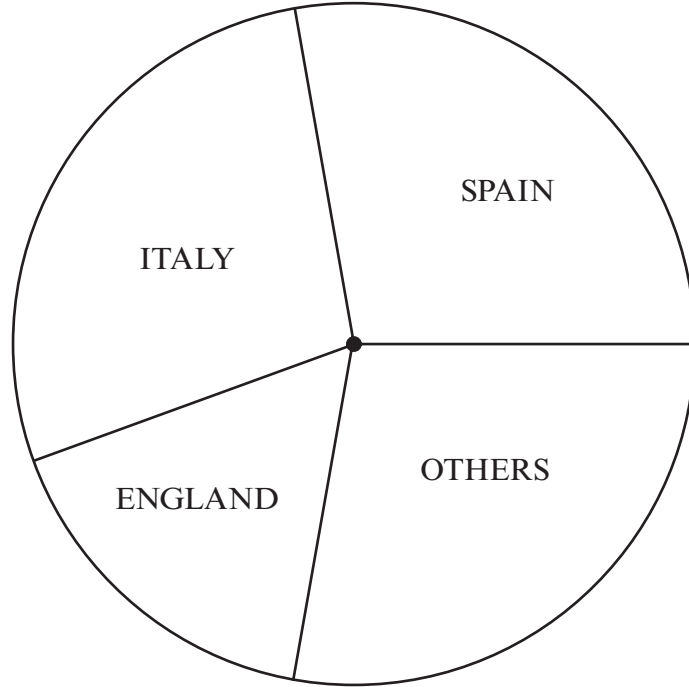
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4. A sports magazine used the following pie chart to illustrate the countries from which the first 18 European Championship League winners came.



How many times did a team from Spain win the Championship?

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5. A plot of land labelled $ABCD$ is shown below.
 AB is parallel to DC and BC is perpendicular to AB .
 $AB = 100$ metres and $DC = 40$ metres.

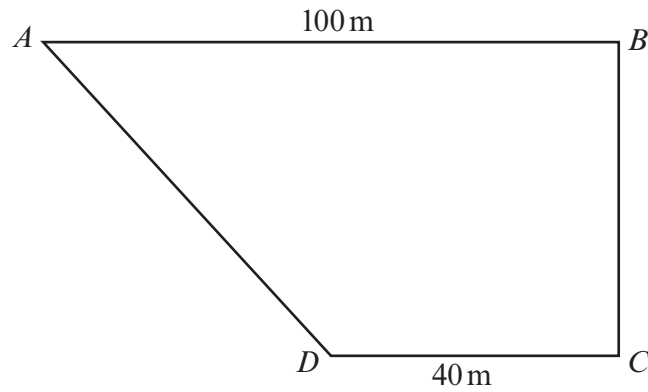


Diagram not drawn to scale

The area of this plot of land is 3500 m^2 .

A cable is to be laid from point B to point C .

Calculate the length of this cable.

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6. Nicola used her car to travel from her home to her friend's house.
It took her two and a half hours, driving at an average speed of 30 mph.

Her return journey home, along the same route, took three hours.

Calculate her average speed on her journey home.

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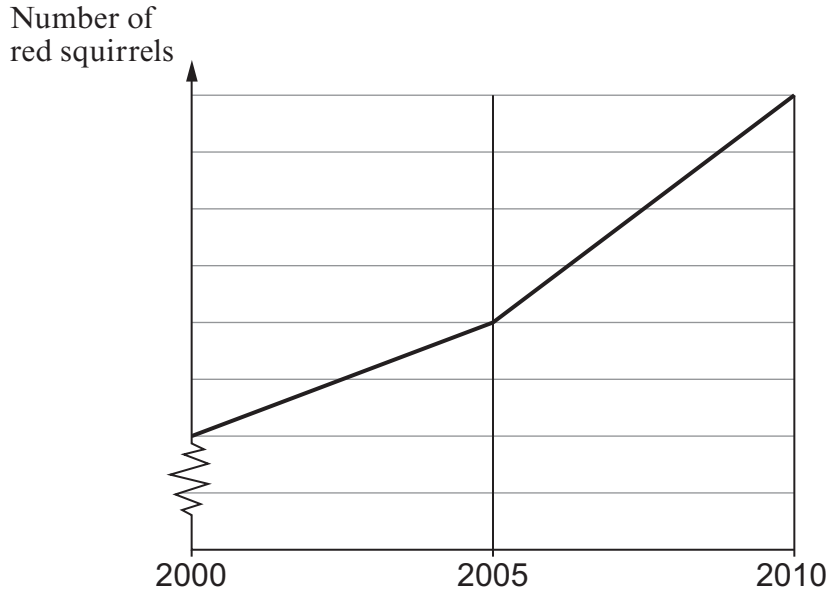
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7. (a) The following comment and graph appeared in a newspaper.

'The number of red squirrels doubled between 2000 and 2005 and doubled again between 2005 and 2010.'



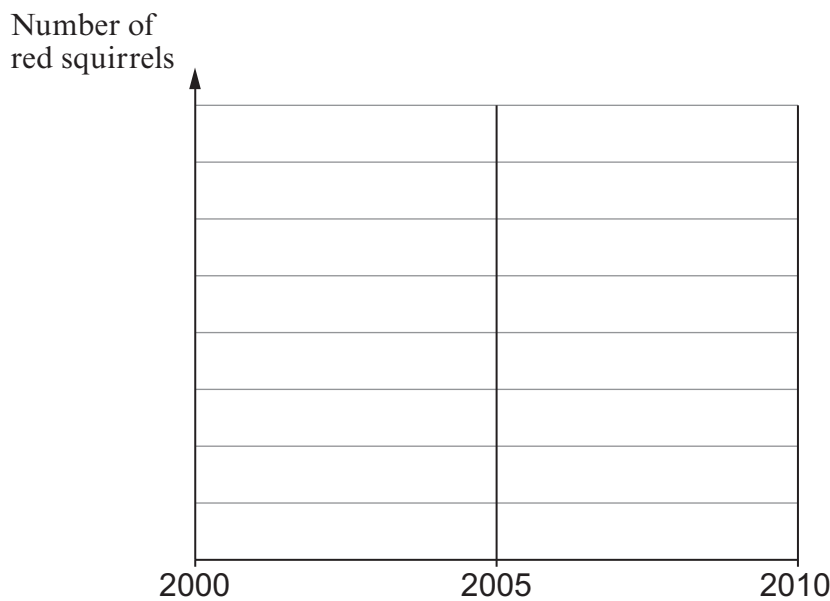
(i) Explain why it is not possible to check from the diagram whether the comment is true or not.

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(ii) There were 40 red squirrels in 2005. Complete the diagram shown below to **clearly** make the comment in the newspaper correct.

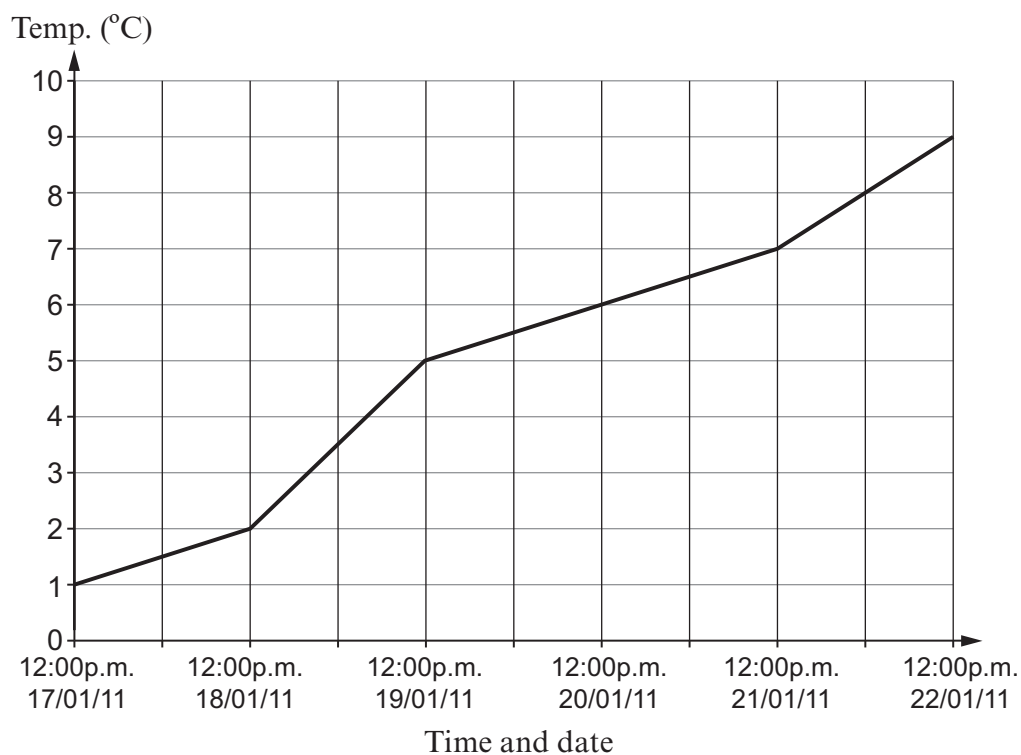


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(b) In another newspaper, the following comment and graph were published.

'Temperature has risen on each of the last five days.'



How could this graph mislead you to make an incorrect temperature reading at certain times?

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- 8. Dylan invests £12 000 for 3 years at 4% per annum compound interest.
Find the compound interest earned in the 3 years.
Your answer should be given correct to the nearest penny.

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

A handrail alongside a straight path is 60 metres long, measured correct to the nearest 10 cm.

Thin strips of metal of length 40 cm, measured correct to the nearest centimetre, are attached, end to end, along the top of the handrail.

These metal strips must cover the whole length of the handrail.

What is the minimum number of metal strips required to guarantee that the whole length of the handrail is covered?

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10. (a) A school's new photocopier will copy three times as many sheets as its old photocopier in the same amount of time.
It used to take 20 minutes to copy 500 sheets on the old photocopier.
How long will the new photocopier take to copy 600 similar sheets?

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- (b) In one round of a competition, Sian is given an initial score of $6\frac{3}{5}$.
Her score is to be revised to take into account the degree of difficulty of that round.

Her new score is found by calculating $6\frac{3}{5} \div \frac{9}{10}$.

Find Sian's new score.

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

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11. At a particular time, the following three exchange rates were available.

$$£1 = 1.20 \text{ euros}, \quad £1 = \$1.58, \quad 1 \text{ euro} = \$1.26$$

A sum of money is exchanged from pounds (£) to euros.
That amount of euros is then changed to dollars (\$).

Calculate the **percentage** loss in doing this compared with changing the initial sum of money directly into dollars.

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12. A farmer decided that he would gradually decrease the number of acres he was using for growing wheat.

His plan was to reduce the number of acres each year by $\frac{1}{4}$ of what it was the previous year.

He now has 450 acres for growing wheat.

How many acres did he have for growing wheat two years ago?

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13. A landing area, as shown below, is marked out for a throwing event in a sports field.
 AB is an arc of a circle centre O . The angle $\widehat{AOB} = 60^\circ$ and $OA = OB = 80$ m.

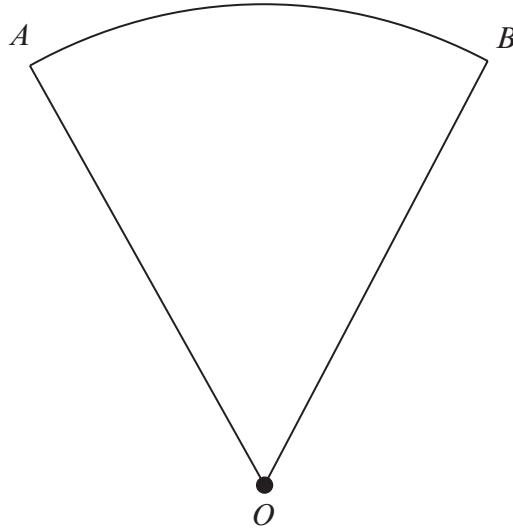


Diagram not drawn to scale

A rope is used to mark the boundary of the whole landing area.

- (a) Calculate the area enclosed by the rope.

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- (b) What is the total length of the rope that is used to mark the landing area?

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14. A solid object is made out of two identical cones and a sphere. The three shapes are joined together as shown in the diagram, with the sphere touching the centres of the circular bases of both cones.

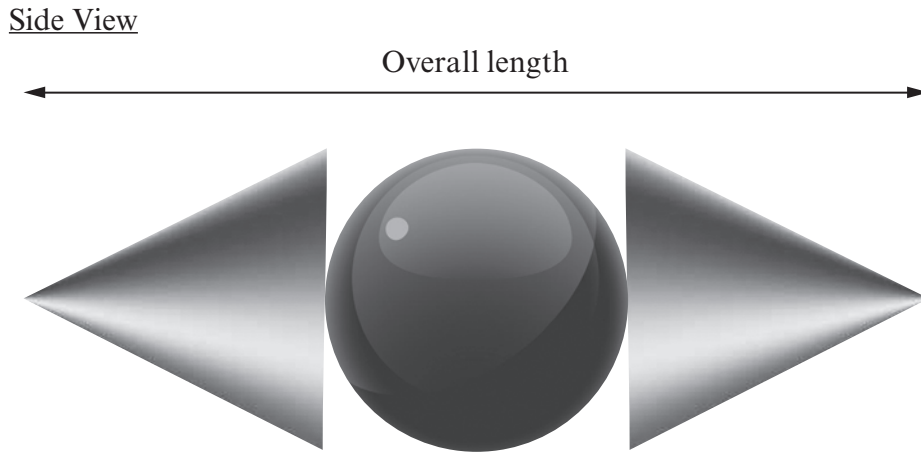


Diagram not drawn to scale

The radius of the sphere and the radius of the circular base of each cone is 3 cm.
The volume of the whole object is 245 cm^3 .

Calculate the overall length of the object.

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Question number	Additional page, if required. Write the question numbers in the left-hand margin.
	[Ruled area for writing question numbers]

