

**2500/406**

NATIONAL  
QUALIFICATIONS  
2010

WEDNESDAY, 5 MAY  
2.45 PM – 4.05 PM

MATHEMATICS  
STANDARD GRADE  
Credit Level  
Paper 2

- 1 **You may use a calculator.**
- 2 Answer as many questions as you can.
- 3 Full credit will be given only where the solution contains appropriate working.
- 4 Square-ruled paper is provided.



## FORMULAE LIST

The roots of  $ax^2 + bx + c = 0$  are  $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

**Sine rule:**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

**Cosine rule:**  $a^2 = b^2 + c^2 - 2bc \cos A$  or  $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

**Area of a triangle:** Area =  $\frac{1}{2}ab \sin C$

**Standard deviation:**  $s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2 / n}{n-1}}$ , where  $n$  is the sample size.

KU	RE
4	
2	
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	2
4	

1. It is estimated that an iceberg weighs 84 000 tonnes.  
 As the iceberg moves into warmer water, its weight decreases by 25% each day.  
 What will the iceberg weigh after 3 days in the warmer water?  
 Give your answer **correct to three significant figures**.

2. Expand fully and simplify

$$x(x - 1)^2.$$

3. A machine is used to put drawing pins into boxes.  
 A sample of 8 boxes is taken and the number of drawing pins in each is counted.  
 The results are shown below:

102    102    101    98    99    101    103    102

(a) Calculate the mean and standard deviation of this sample.

(b) A sample of 8 boxes is taken from another machine.

This sample has a mean of 103 and a standard deviation of 2.1.

Write down two valid comparisons between the samples.

4. Use the quadratic formula to solve the equation,

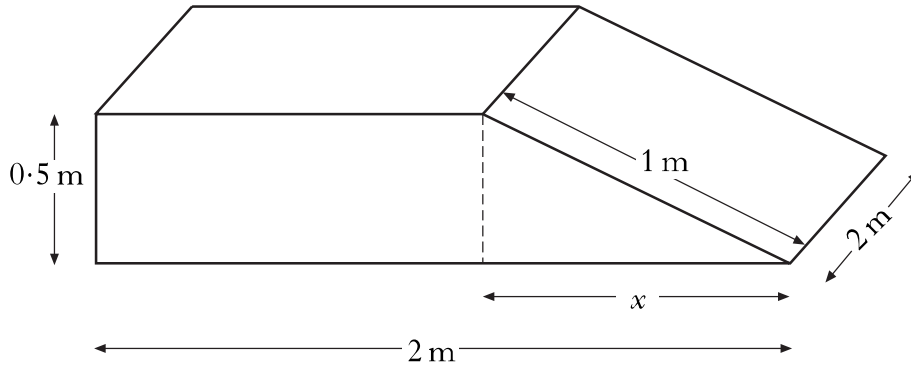
$$3x^2 + 5x - 7 = 0.$$

Give your answers correct to **1 decimal place**.

[Turn over

5. A concrete ramp is to be built.

The ramp is in the shape of a cuboid and a triangular prism with dimensions as shown.



(a) Calculate the value of  $x$ .

(b) Calculate the volume of concrete required to build the ramp.

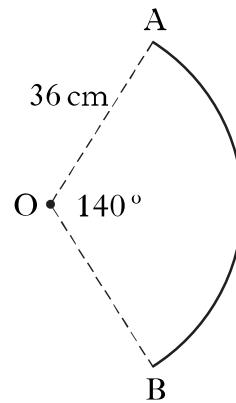
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6. A circle, centre  $O$ , has radius 36 centimetres.

Part of this circle is shown.

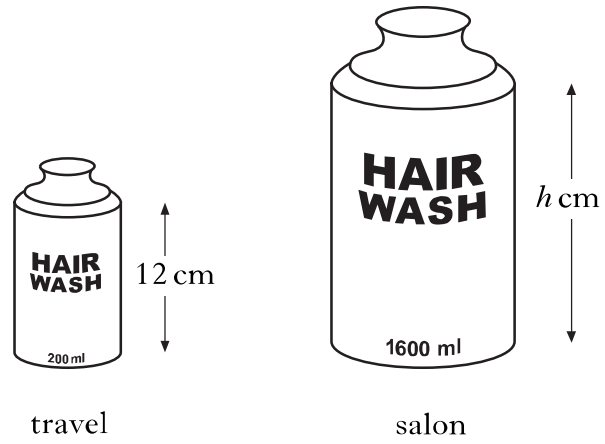
Angle  $AOB = 140^\circ$ .



Calculate the length of arc  $AB$ .

3

7. Shampoo is available in travel size and salon size bottles.  
The bottles are mathematically similar.



The travel size contains 200 millilitres and is 12 centimetres in height.  
The salon size contains 1600 millilitres.  
Calculate the height of the salon size bottle.

3

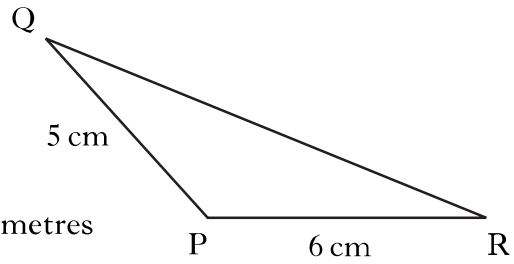
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10. In triangle PQR:

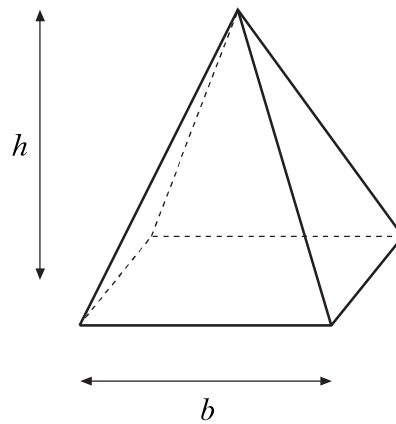
- $PQ = 5$  centimetres
- $PR = 6$  centimetres
- area of triangle PQR = 12 square centimetres
- angle QPR is **obtuse**.



Calculate the size of angle QPR.

11. The height,  $h$ , of a square-based pyramid varies directly as its volume,  $V$ , and inversely as the square of the length of the base,  $b$ .

- (a) Write down an equation connecting  $h$ ,  $V$  and  $b$ .



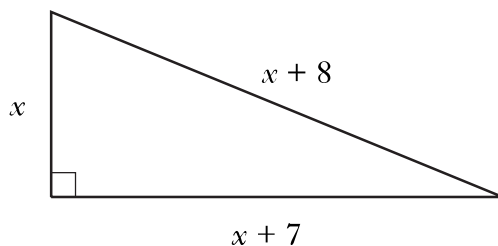
A square-based pyramid of height 12 centimetres has a volume of 256 cubic centimetres and length of base 8 centimetres.

- (b) Calculate the height of a square-based pyramid of volume 600 cubic centimetres and length of base 10 centimetres.

**[Turn over for Questions 12 and 13 on Page eight**

KU	RE
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	2
	2

12. A right-angled triangle has dimensions, in centimetres, as shown.



**Calculate** the value of  $x$ .

13. The depth of water,  $D$  metres, in a harbour is given by the formula

$$D = 3 + 1.75 \sin 30 h^\circ$$

where  $h$  is the number of hours after midnight.

(a) Calculate the depth of water at 5 am.

(b) Calculate the maximum difference in depth of the water in the harbour.

**Do not use a trial and improvement method.**

[END OF QUESTION PAPER]