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

1.	It is estimated that an iceberg weighs 84000 tonnes.	KU	RE	
-*	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.	4		
2.	Expand fully and simplify			
	$(1)^2$			
	$x(x-1)^2$.	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.	3		
	(b) A sample of 8 boxes is taken from another machine.			
	This sample has a mean of 103 and a standard deviation of $2 \cdot 1$.			
	Write down two valid comparisons between the samples.		2	
4.	Use the quadratic formula to solve the equation,			
	$3x^2 + 5x - 7 = 0.$			
	Give your answers correct to 1 decimal place .	4		
	[Turn over			
		I		

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.
- 6. A circle, centre O, has radius 36 centimetres.
 Part of this circle is shown.
 Angle AOB = 140°.



Calculate the length of arc AB.

2

3



KU RE Shampoo is available in travel size and salon size bottles. 7. The bottles are mathematically similar. $h \,\mathrm{cm}$ HAIR WASH $12\,\mathrm{cm}$ 1600 ml travel salon 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 [Turn over

8. As part of their training, footballers run around a triangular circuit DEF.



- $\angle EDF = 34^{\circ}$
- $\angle DFE = 82^{\circ}$
- DE = 46.4 metres
- $EF = 26 \cdot 2$ metres

How many **complete** circuits must they run to cover **at least** 1000 metres?

- The ratio of sugar to fruit in a particular jam is 5 : 4. It is decided to:
 - **decrease** the sugar content by 20%
 - **increase** the fruit content by 20%.

Calculate the new ratio of sugar to fruit. **Give your answer in its simplest form.**

4

4

KU RE



[Turn over for Questions 12 and 13 on Page eight





KU RE

5

2

2

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]