2500/406

NATIONAL QUALIFICATIONS 2009

WEDNESDAY, 6 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.



[Turn over

KU RE 4. Two fridge magnets are mathematically similar. One magnet is 4 centimetres long and the other is 10 centimetres long. 10 cm 4 cm The area of the smaller magnet is 18 square centimetres. 3 Calculate the area of the larger magnet. 5. Tom looked at the cost of 10 different flights to New York. He calculated that the mean cost was £360 and the standard deviation was £74. A tax of $\pounds 12$ is then added to each flight

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Write down the new mean and standard deviation.



8. A company makes large bags of crisps which contain 90 grams of fat. The company aims to reduce the fat content of the crisps by 50%. They decide to reduce the fat content by 20% each year. Will they have achieved their aim by the end of the 3rd year? Justify your answer. KU RE

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9. Jane is taking part in an orienteering competition.



She should have run 160 metres from A to B on a bearing of 032°. However, she actually ran 160 metres from A to C on a bearing of 052°.

- (a) Write down the size of angle BAC.
- (*b*) Calculate the length of BC.
- (c) What is the bearing from C to B?

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$$W = \frac{1}{4} \left(M^2 - 4M + 272 \right).$$

At what age will a giraffe weigh 83 kilograms?

11. A cone is formed from a paper circle with a sector removed as shown. The radius of the paper circle is 30 cm. Angle AOB is 100 °.





- (*a*) Calculate the area of paper used to make the cone.
- (b) Calculate the circumference of the base of the cone.

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KU RE

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12.	The n^{th} term, T	$_{\eta}$ of the sequence 1, 3, 6, 10, is given	by the formula:	RE	
	$T_n = \frac{1}{2}n(n+1)$	1^{st} term $T_1 = \frac{1}{2} \times 1$	(1+1) = 1		
		2^{nd} term $T_2 = \frac{1}{2} \times 2$	(2+1) = 3		
		$3^{\rm rd}$ term $T_3 = \frac{1}{2} \times 3$	(3+1) = 6		
	(<i>a</i>) Calculate th	e 20 th term, T_{20} .	1		
	(<i>b</i>) Show that	$T_{n+1} = \frac{1}{2} \left(n^2 + 3n + 2 \right).$		2	

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(c) Show that $T_n + T_{n+1}$ is a square number.

[END OF QUESTION PAPER]