## 2500/31/01

NATIONAL QUALIFICATIONS 2012

WEDNESDAY, 2 MAY 1.30 PM - 2.25 PM

MATHEMATICS STANDARD GRADE Credit Level Paper 1 (Non-calculator)

## 1 You may NOT 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. If you make use of this, you should write your name on it clearly and put it inside your answer booklet.





## 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.** Evaluate

$$7 \cdot 2 - 0 \cdot 161 \times 30.$$

2. Expand and simplify

$$(3x-2)(2x^2+x+5).$$

**3.** Change the subject of the formula to *m*.

$$L = \frac{\sqrt{m}}{k}$$

**4.** In the diagram,

- PQ is the diameter of the circle
- PQ = 12 centimetres
- PR = 10 centimetres.

Calculate the length of QR.

Give your answer as a surd in its simplest form.

[Turn over

KU RE

2

3

2

4



5. Mike is practising his penalty kicks. Last week, Mike scored 18 out of 30. This week, he scored 16 out of 25. Has his scoring rate improved? Give a reason for your answer.



6. The diagram shows part of the graph of  $y = 5 + 4x - x^2$ .



A is the point (-1, 0).

B is the point (5, 0).

(a) State the equation of the axis of symmetry of the graph.

(b) Hence, find the maximum value of  $y = 5 + 4x - x^2$ .

2 2

KU RE

3

7. Given  $2x^2 - 2x - 1 = 0$ , show that

$$x = \frac{1 \pm \sqrt{3}}{2}$$

- 8. The graph below shows two straight lines.
  - y = 2x 3

• 
$$x + 2y = 14$$



The lines intersect at the point P.

Find, **algebraically**, the coordinates of P.

[Turn over for Questions 9, 10 and 11 on Page six

KU RE

4

( <i>a</i> )	On Monday, she drives at a speed of $x$ kilometres per hour.		
	Find the time taken, in terms of x, for her journey.	1	
( <i>b</i> )	On Tuesday, she drives 5 kilometres per hour <b>faster</b> . Find the time taken, in terms of <i>x</i> , for this journey.		1
(c)	Hence find an expression, in terms of $x$ , for the difference in times of the two journeys.		
	Give this expression <b>in its simplest form</b> .		3
( <i>a</i> )	Evaluate $(2^3)^2$ .	1	
( <i>b</i> )	Hence find <i>n</i> , when $(2^3)^n = \frac{1}{64}$ .		1
The	e sum of consecutive even numbers can be calculated using the following other pattern: $2 + 4 + 6 = 3 \times 4 = 12$		
	$2 + 4 + 6 + 8 = 4 \times 5 = 20$ 2 + 4 + 6 + 8 + 10 = 5 × 6 = 30		
( <i>a</i> )	Calculate $2 + 4 + \cdots + 20$ .		1
( <i>b</i> )	Write down an expression for $2 + 4 + \cdots + n$ .		1
(c)	Hence or otherwise calculate $10 + 12 + \cdots + 100$ .		2
	[END OF QUESTION PAPER]		
	<ul> <li>(b)</li> <li>(c)</li> <li>(a)</li> <li>(b)</li> <li>(c)</li> </ul>	<ul> <li>(b) On Tuesday, she drives 5 kilometres per hour faster. Find the time taken, in terms of x, for this journey.</li> <li>(c) Hence find an expression, in terms of x, for the difference in times of the two journeys. Give this expression in its simplest form.</li> <li>(a) Evaluate (2<sup>3</sup>)<sup>2</sup>.</li> <li>(b) Hence find n, when (2<sup>5</sup>)<sup>n</sup> = 1/64.</li> <li>(c) Hence find n, when (2<sup>5</sup>)<sup>n</sup> = 1/64.</li> <li>(d) The sum of consecutive even numbers can be calculated using the following number pattern: 2 + 4 + 6 = 3 × 4 = 12 2 + 4 + 6 + 8 = 4 × 5 = 20 2 + 4 + 6 + 8 + 10 = 5 × 6 = 30</li> <li>(d) Calculate 2 + 4 + + 20.</li> <li>(e) Write down an expression for 2 + 4 + + n.</li> <li>(c) Hence or otherwise calculate 10 + 12 + + 100.</li> </ul>	<ul> <li>(b) On Tuesday, she drives 5 kilometres per hour faster. Find the time taken, in terms of x, for this journey.</li> <li>(c) Hence find an expression, in terms of x, for the difference in times of the two journeys. Give this expression in its simplest form.</li> <li>(a) Evaluate (2<sup>3</sup>)<sup>2</sup>.</li> <li>(b) Hence find n, when (2<sup>3</sup>)<sup>n</sup> = 1/64.</li> <li>(c) Hence find n, when (2<sup>3</sup>)<sup>n</sup> = 1/64.</li> <li>(d) The sum of consecutive even numbers can be calculated using the following number pattern: 2 + 4 + 6 = 3 × 4 = 12 2 + 4 + 6 + 8 = 4 × 5 = 20 2 + 4 + 6 + 8 = 10 = 5 × 6 = 30</li> <li>(a) Calculate 2 + 4 + ··· + 20.</li> <li>(b) Write down an expression for 2 + 4 + ··· + n.</li> <li>(c) Hence or otherwise calculate 10 + 12 + ··· + 100.</li> </ul>