2500/405

NATIONAL QUALIFICATIONS 2010

WEDNESDAY, 5 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.





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

40% of $\pounds 11.50 - \pounds 1.81$.

2. Evaluate

$$\frac{2}{5} \div 1\frac{1}{10} \cdot$$

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

$$t = \frac{7s+4}{2} \ .$$

4. Two functions are given below.

$$f(x) = x^2 - 4x$$
$$g(x) = 2x + 7$$

- (a) If f(x) = g(x), show that $x^2 6x 7 = 0$.
- (b) Hence find **algebraically** the values of x for which f(x) = g(x).

[Turn over

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KU RE

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- 5. A bag contains 27 marbles. Some are black and some are white. The probability that a marble chosen at random is black is $\frac{4}{9}$. (a) What is the probability that a marble chosen at random is white? 1

 - (b) How many white marbles are in the bag?
- 6. Cleano washing powder is on special offer.



Each box on special offer contains 20% more powder than the standard box.

A box on special offer contains 900 grams of powder.

How many grams of powder does the standard box contain?

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KU RE 7. A straight line has equation y = mx + c, where m and c are constants. (a) The point (2, 7) lies on this line. Write down an equation in m and c to illustrate this information. 1 (b) A second point (4, 17) also lies on this line. Write down another equation in m and c to illustrate this information. 1 3 (*c*) Hence calculate the values of *m* and *c*. (d) Write down the gradient of this line. 1 8. (a) Simplify $\sqrt{2} \times \sqrt{18}$. 1 (b) Simplify $\sqrt{2} + \sqrt{18}$. 1

(<i>c</i>)	Hence show that	$\sqrt{2} \times \sqrt{18}$	$3\sqrt{2}$
		$\overline{\sqrt{2} + \sqrt{18}} =$	4

[Turn over

9. Part of the graph of the straight line with equation $y = \frac{1}{3}x + 2$, is shown below.



- (*a*) Find the coordinates of the point B.
- (b) For what values of x is y < 0?



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KU RE

10. A number pattern is shown below.

$$1^{3} = \frac{1^{2} \times 2^{2}}{4}$$
$$1^{3} + 2^{3} = \frac{2^{2} \times 3^{2}}{4}$$
$$1^{3} + 2^{3} + 3^{3} = \frac{3^{2} \times 4^{2}}{4}$$

(a) Write down a similar expression for $1^3 + 2^3 + 3^3 + 4^3 + 5^3$.

(b) Write down a similar expression for $1^3 + 2^3 + 3^3 + \ldots + n^3$.

- (c) Hence **evaluate** $1^3 + 2^3 + 3^3 + \ldots + 9^3$.
- **11.** Two triangles have dimensions as shown.



The triangles are equal in area.

Calculate the value of *x*.

[END OF QUESTION PAPER]

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