

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

KU	RE
2	
2	
3	
2	
2	

1. Evaluate

$$40\% \text{ of } \pounds 11.50 - \pounds 1.81.$$

2. Evaluate

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

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

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?

(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?

KU	RE
1	1
3	

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.

(b) A second point $(4, 17)$ also lies on this line.

Write down another equation in m and c to illustrate this information.

(c) Hence calculate the values of m and c .

(d) Write down the gradient of this line.

8. (a) Simplify $\sqrt{2} \times \sqrt{18}$.

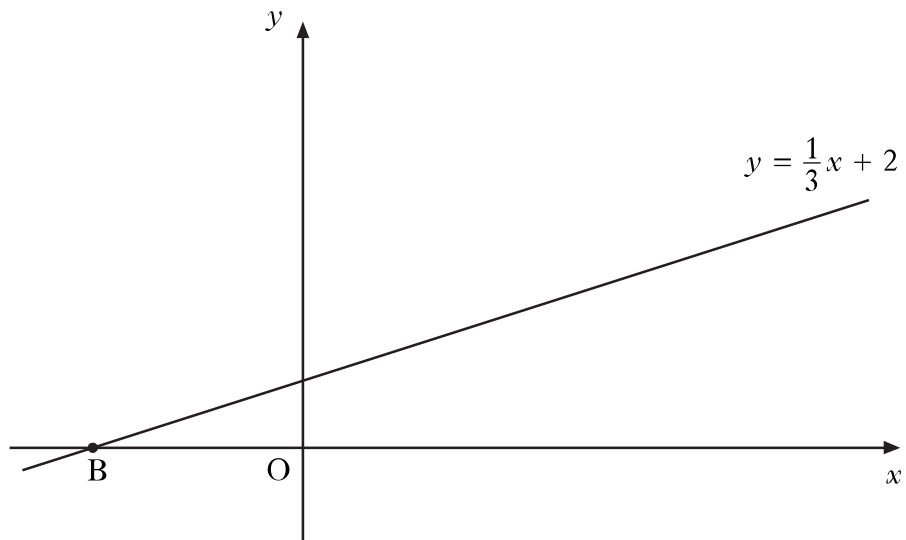
(b) Simplify $\sqrt{2} + \sqrt{18}$.

(c) Hence show that $\frac{\sqrt{2} \times \sqrt{18}}{\sqrt{2} + \sqrt{18}} = \frac{3\sqrt{2}}{4}$.

KU	RE
1	
1	
	3
	1
1	
	1
2	

[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 $y < 0$?

2

1

10. A number pattern is shown below.

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

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

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

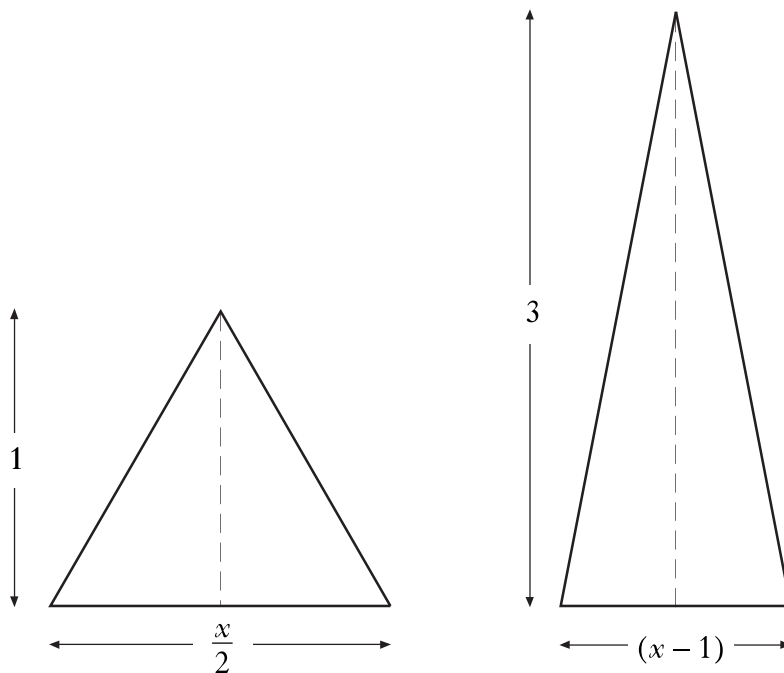
- (a) Write down a similar expression for $1^3 + 2^3 + 3^3 + 4^3 + 5^3$.
- (b) Write down a similar expression for $1^3 + 2^3 + 3^3 + \dots + n^3$.
- (c) Hence **evaluate** $1^3 + 2^3 + 3^3 + \dots + 9^3$.

1

2

2

11. Two triangles have dimensions as shown.



The triangles are equal in area.

Calculate the value of x .

4

[END OF QUESTION PAPER]