

2500/405

NATIONAL
QUALIFICATIONS
2009

WEDNESDAY, 6 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	
2	2
1	
1	
2	

1. Evaluate

$$(846 \div 30) - 1 \cdot 09.$$

2. Evaluate

$$4\frac{1}{3} - 1\frac{1}{2}.$$

3. Given that

$$f(x) = x^2 + 3,$$

(a) evaluate $f(-4)$

(b) find t when $f(t) = 52$.

4. (a) Factorise

$$x^2 - 4y^2.$$

(b) Expand and simplify

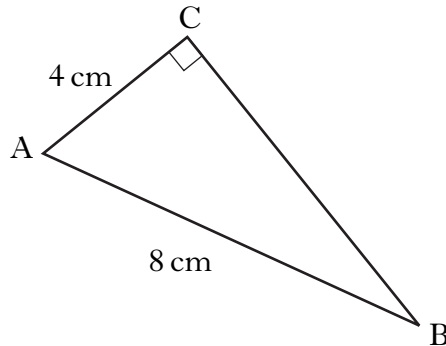
$$(2x - 1)(x + 4).$$

(c) Expand

$$x^{\frac{1}{2}}(3x + x^{-2}).$$

[Turn over

5. In triangle ABC:
- angle $ACB = 90^\circ$
 - $AB = 8$ centimetres
 - $AC = 4$ centimetres.

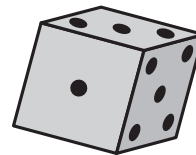


Calculate the length of BC.

Give your answer **as a surd in its simplest form.**

3

6. There are 4 girls and 14 boys in a class.
A child is chosen at random and is asked to roll a die, numbered 1 to 6.



Which of these is more likely?

A: the child is female.

OR

B: the child rolls a 5.

Justify your answer.

3

7. This year, Ben paid £260 for his car insurance.
This is an increase of 30% on last year's payment.

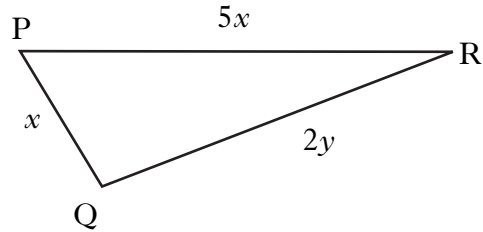
How much did Ben pay last year?

3

KU	RE
2	
	2
	3
3	

8. In triangle PQR:

- $PQ = x$ centimetres
- $PR = 5x$ centimetres
- $QR = 2y$ centimetres.



(a) The perimeter of the triangle is 42 centimetres.

Write down an equation in x and y to illustrate this information.

(b) PR is 2 centimetres longer than QR.

Write down another equation in x and y to illustrate this information.

(c) Hence calculate the values of x and y .

9. A formula used to calculate the flow of water in a pipe is

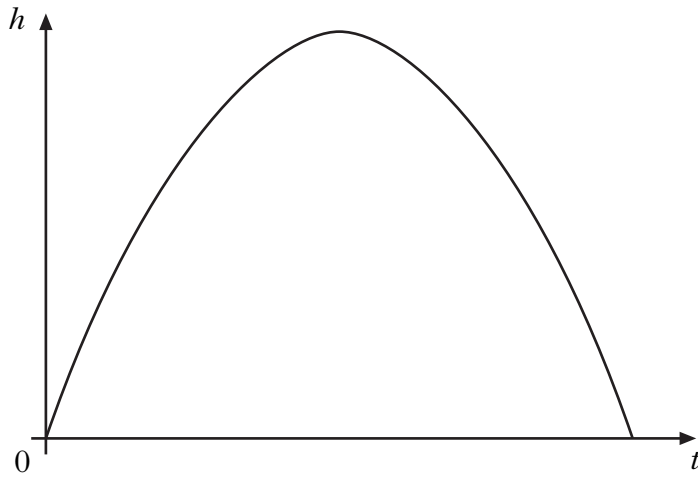
$$f = \frac{kd^2}{20}.$$

Change the subject of the formula to d .

[Turn over

- 10.** The diagram below shows the path of a rocket which is fired into the air.
The height, h metres, of the rocket after t seconds is given by

$$h(t) = -2t(t - 14).$$



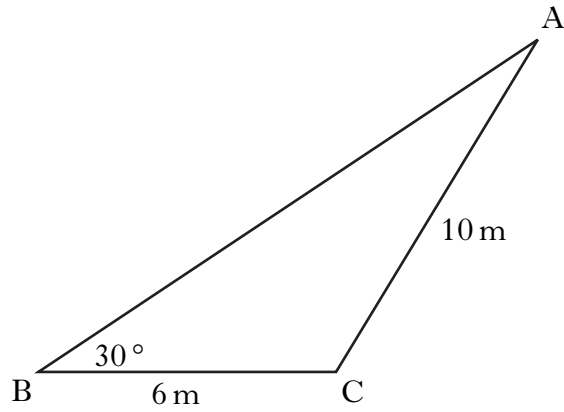
- (a) For how many seconds is the rocket in flight?
- (b) What is the maximum height reached by the rocket?

2

2

11. In triangle ABC:

- $BC = 6$ metres
- $AC = 10$ metres
- angle $ABC = 30^\circ$.



Given that $\sin 30^\circ = 0.5$, show that $\sin A = 0.3$.

3

[END OF QUESTION PAPER]

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