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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 $x = \dfrac{-b \pm \sqrt{\left(b^2 - 4ac\right)}}{2a}$

Sine rule: $\dfrac{a}{\sin \text{A}} = \dfrac{b}{\sin \text{B}} = \dfrac{c}{\sin \text{C}}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos \text{A}$ or $\cos \text{A} = \dfrac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle: Area $= \frac{1}{2}ab \sin \text{C}$

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

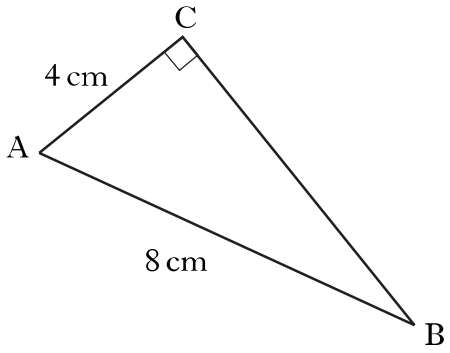
	KU	RE
1. Evaluate $(846 \div 30) - 1{\cdot}09$.	**2**	
2. Evaluate $4\frac{1}{3} - 1\frac{1}{2}$.	**2**	
3. Given that $f(x) = x^2 + 3$,		
(*a*) evaluate $f(-4)$	**2**	
(*b*) find t when $f(t) = 52$.		**2**
4. (*a*) Factorise $x^2 - 4y^2$.	**1**	
(*b*) Expand and simplify $(2x - 1)(x + 4)$.	**1**	
(*c*) Expand $x^{\frac{1}{2}}\left(3x + x^{-2}\right)$.	**2**	

[Turn over

	KU	RE

5. In triangle ABC:

- angle ACB = 90°
- AB = 8 centimetres
- AC = 4 centimetres.

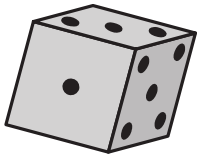


Calculate the length of BC.

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.

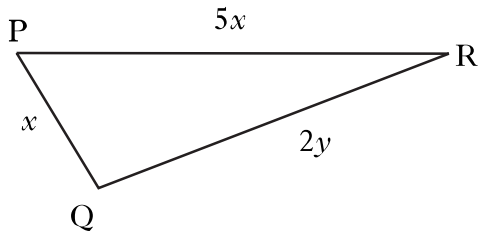
This is an increase of 30% on last year's payment.

How much did Ben pay last year? **3**

	KU	RE

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. **2**

(b) PR is 2 centimetres longer than QR.

Write down another equation in x and y to illustrate this information. **2**

(c) Hence calculate the values of x and y. **3**

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

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

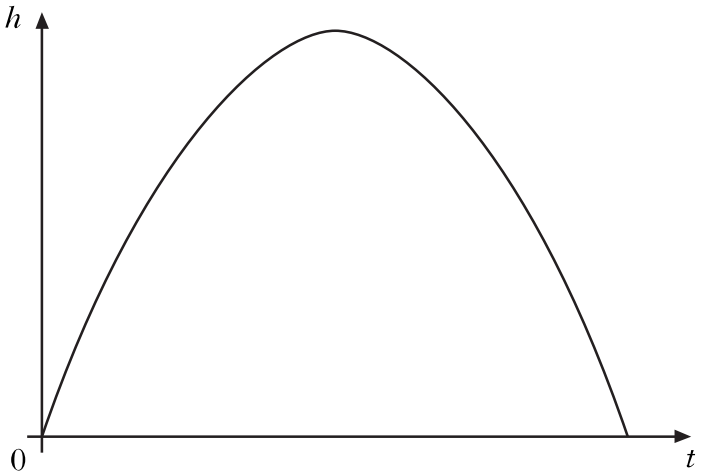
Change the subject of the formula to d. **3**

[Turn over

KU	RE

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

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



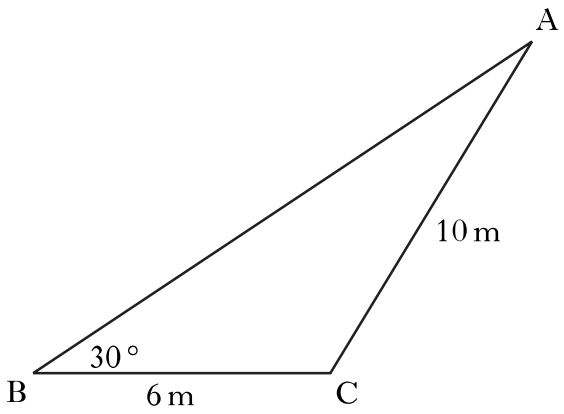
(*a*) For how many seconds is the rocket in flight? **2**

(*b*) What is the maximum height reached by the rocket? **2**

KU	RE

11. In triangle ABC:

- BC = 6 metres
- AC = 10 metres
- angle ABC = 30°.



Given that sin 30° = 0·5, show that sin A = 0·3. **3**

[*END OF QUESTION PAPER*]