

2500/405

NATIONAL
QUALIFICATIONS
2007

THURSDAY, 3 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	
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3	

1. Evaluate

$$6 \cdot 04 + 3 \cdot 72 \times 20.$$

2. Evaluate

$$3\frac{1}{6} \div 1\frac{2}{3}.$$

3. There are 400 people in a studio audience.

The probability that a person chosen at random from this audience is male is $\frac{5}{8}$.

How many males are in this audience?

4.

$$P = \frac{2(m-4)}{3}$$

Change the subject of the formula to m .

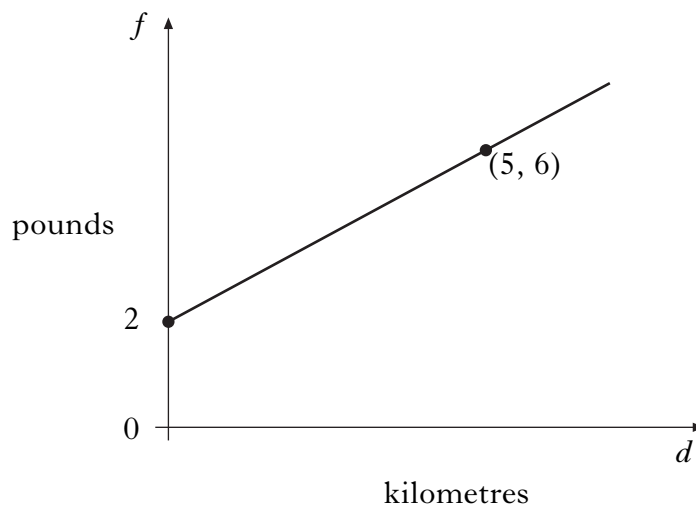
5. Remove brackets and simplify

$$(2x + 3)^2 - 3(x^2 - 6).$$

[Turn over

6. A taxi fare consists of a £2 “call-out” charge **plus** a fixed amount per kilometre.

The graph shows the fare, f pounds for a journey of d kilometres.



The taxi fare for a 5 kilometre journey is £6.

Find the equation of the straight line in terms of d and f .

4

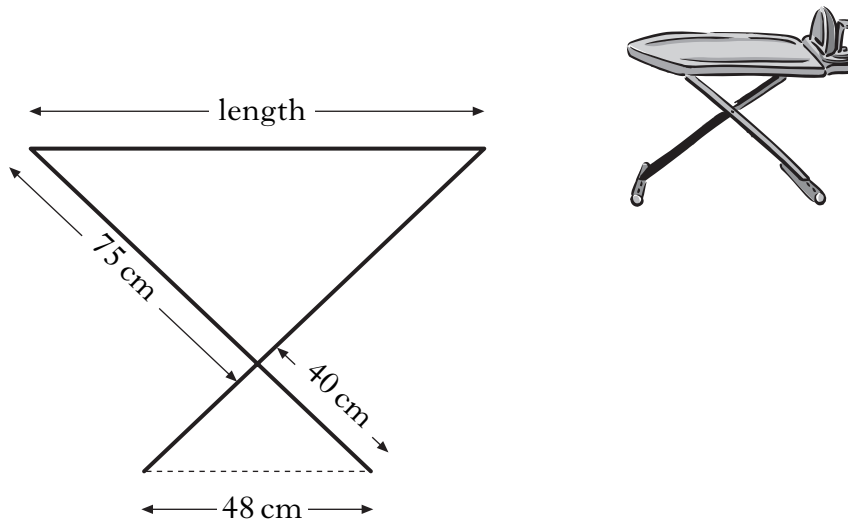
7. Remove brackets and simplify

$$a^{\frac{1}{2}}(a^{\frac{1}{2}} - 2).$$

2

8. Mick needs an ironing board.

He sees one in a catalogue with measurements as shown in the diagram below.



When the ironing board is set up, two similar triangles are formed.

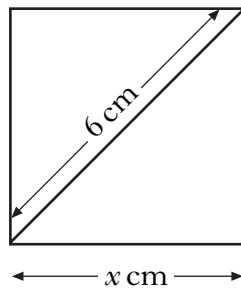
Mick wants an ironing board which is at least 80 centimetres in length.

Does this ironing board meet Mick's requirements?

Show all your working.

3

9. A square of side x centimetres has a diagonal 6 centimetres long.



Calculate the value of x , giving your answer as a surd in its simplest form.

3

[Turn over

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10. A relationship between T and L is given by the formula, $T = \frac{k}{L^3}$ where k is a constant.

When L is doubled, what is the effect on T ?

11. (a) A cinema has 300 seats which are either standard or deluxe.

Let x be the number of standard seats and y be the number of deluxe seats.

Write down an algebraic expression to illustrate this information.

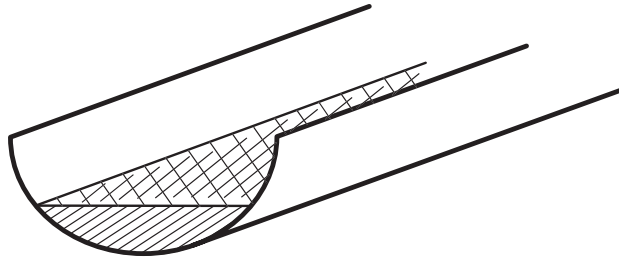
(b) A standard seat costs £4 and a deluxe seat costs £6.

When all the seats are sold the ticket sales are £1380.

Write down an algebraic expression to illustrate this information.

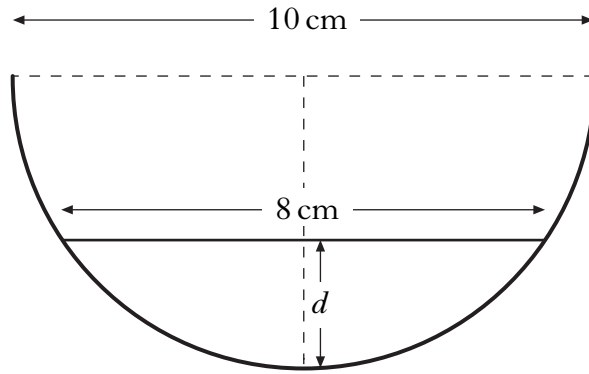
(c) How many standard seats and how many deluxe seats are in the cinema?

12. The diagram shows water lying in a length of roof guttering.



The cross-section of the guttering is a semi-circle with diameter 10 centimetres.

The water surface is 8 centimetres wide.



Calculate the depth, d , of water in the guttering.

4

[Turn over for Questions 13 and 14 on *Page eight*

