

2500/405

NATIONAL
QUALIFICATIONS
2011

WEDNESDAY, 4 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. If you make use of this, you should write your name on it clearly and put it inside your answer booklet.



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	
3	

1. Evaluate

$$2 \cdot 4 + 5 \cdot 46 \div 60.$$

2. Factorise fully

$$2m^2 - 18.$$

3. Given that

$$f(x) = 5 - x^2, \text{ evaluate } f(-3).$$

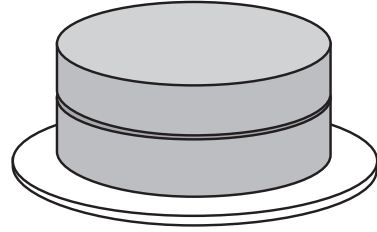
4. Solve the equation

$$3x + 1 = \frac{x - 5}{2}.$$

[Turn over

5. Jamie is going to bake cakes for a party.

He needs $\frac{2}{5}$ of a block of butter for 1 cake.



He has 7 blocks of butter.

How many cakes can Jamie bake?

6. A driving examiner looks at her diary for the next 30 days.

She writes down the number of driving tests booked for each day as shown below.

<i>Number of tests booked</i>	0	1	2	3	4	5	6
<i>Frequency</i>	1	1	3	2	9	10	4

(a) Find the median for this data.

(b) Find the probability that **more than** 4 tests are booked for one day.

KU	RE
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KU	RE
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	2
	1

7. (a) Brian, Molly and their four children visit Waterworld.
The total cost of their tickets is £56.



Let a pounds be the cost of an adult's ticket and c pounds the cost of a child's ticket.

Write down an equation in terms of a and c to illustrate this information.

- (b) Sarah and her three children visit Waterworld.

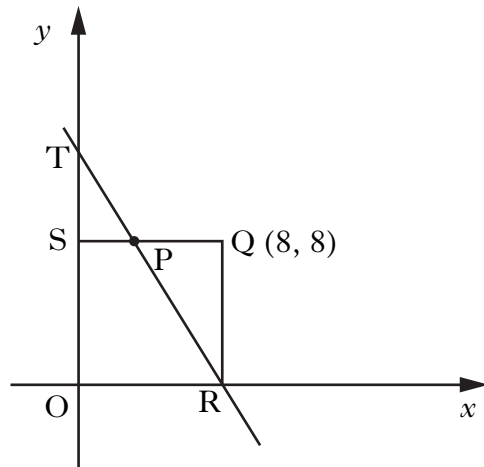
The total cost of their tickets is £36.

Write down another equation in terms of a and c to illustrate this information.

- (c) (i) Calculate the cost of a child's ticket.
(ii) Calculate the cost of an adult's ticket.

[Turn over

8. A square, OSQR, is shown below.
Q is the point (8, 8).



The straight line TR cuts the y -axis at T (0, 12) and the x -axis at R.

(a) Find the equation of the line TR.

3

The line TR also cuts SQ at P.

(b) Find the coordinates of P.

4

9. (a) Simplify $2a \times a^{-4}$.

1

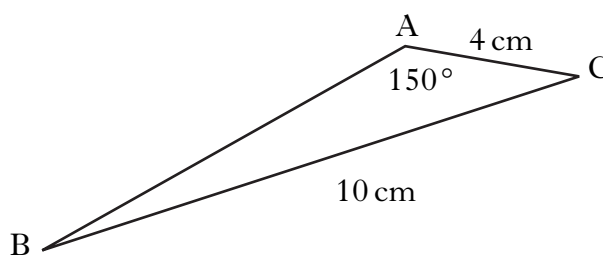
(b) Solve for x , $\sqrt{x} + \sqrt{18} = 4\sqrt{2}$.

3

KU	RE
	4
1	
	3
1	
	1

10. In triangle ABC

- AC = 4 centimetres
- BC = 10 centimetres
- angle BAC = 150°



Given that $\sin 30^\circ = \frac{1}{2}$, show that $\sin B = \frac{1}{5}$.

11. F varies directly as s and inversely as the square of d .

- (a) Write down a relationship connecting F , s and d .
- (b) What is the effect on F when s is halved and d is doubled?

12. The sums, S_2 , S_3 and S_4 of the first 2, 3 and 4 natural numbers are given by:

$$S_2 = 1 + 2 = \frac{1}{2} (2 \times 3) = 3$$

$$S_3 = 1 + 2 + 3 = \frac{1}{2} (3 \times 4) = 6$$

$$S_4 = 1 + 2 + 3 + 4 = \frac{1}{2} (4 \times 5) = 10$$

- (a) Find S_{10} , the sum of the first 10 natural numbers.
- (b) Write down the formula for the sum, S_n , of the first n natural numbers.

[END OF QUESTION PAPER]

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WEDNESDAY, 4 MAY
2.45 PM – 4.05 PM

MATHEMATICS
STANDARD GRADE
Credit Level
Paper 2

- 1 **You may use a calculator.**
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FORMULAE LIST

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KU	RE
3	
3	
4	
3	

1. Olga normally runs a total distance of 28 miles per week.
 She decides to increase her distance by 10% a week for the next four weeks.
 How many miles will she run in the fourth week?

2. Expand and simplify

$$(3x + 1)(x^2 - 5x + 4).$$

3. Solve the equation

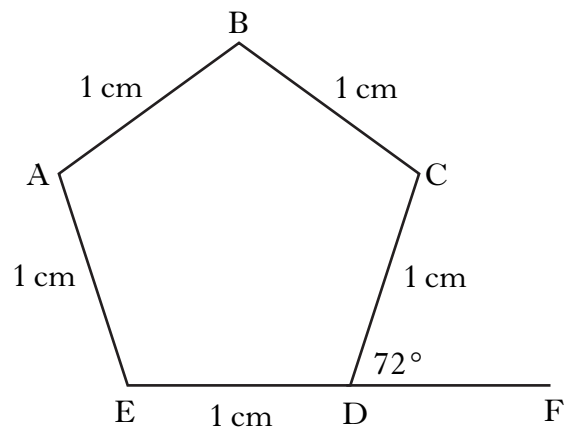
$$2x^2 + 3x - 7 = 0.$$

Give your answers **correct to 2 significant figures**.

4. A car is valued at £3780.
 This is 16% less than last year's value.
 What was the value of the car last year?

[Turn over

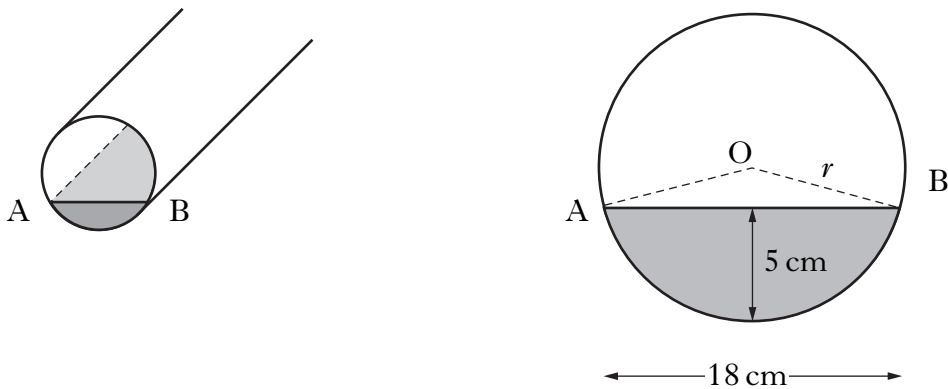
7. ABCDE is a regular pentagon with each side 1 centimetre.
 Angle CDF is 72° .
 EDF is a straight line.



- (a) Write down the size of angle ABC.
 (b) Calculate the length of AC.

1
3

8. A pipe has water in it as shown.



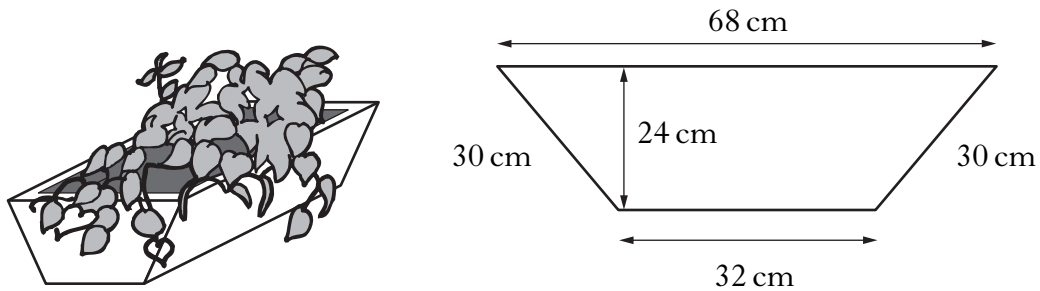
- The depth of the water is 5 centimetres.
 The width of the water surface, AB, is 18 centimetres.
 Calculate r , the radius of the pipe.

3

[Turn over

9. A flower planter is in the shape of a prism.

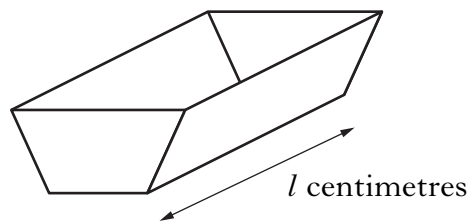
The cross-section is a trapezium with dimensions as shown.



(a) Calculate the area of the cross-section of the planter.

2

(b) The volume of the planter is 156 litres.



Calculate the length, l centimetres, of the planter.

3

10. Tom and Samia are paid the same hourly rate.

Harry is paid $\frac{1}{3}$ more per hour than Tom.

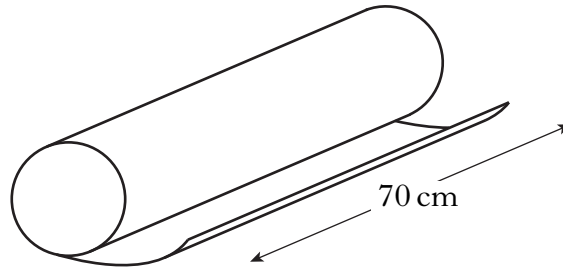
Tom worked 15 hours, Samia worked 8 hours and Harry worked 12 hours.

They were paid a total of £429.

How much was Tom paid?

3

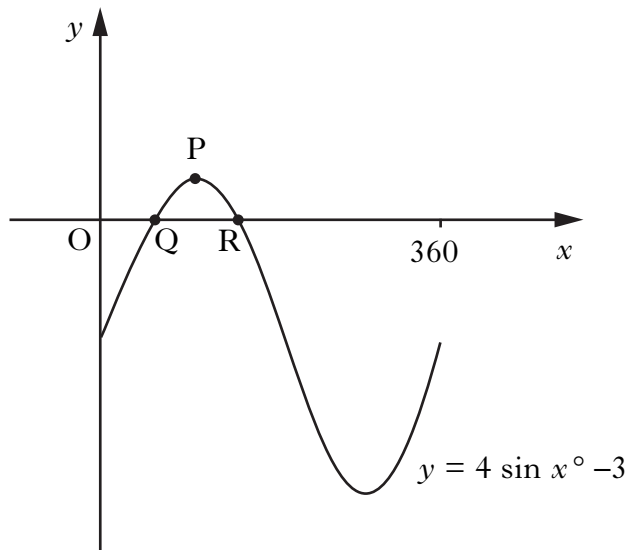
11. Paper is wrapped round a cardboard cylinder **exactly** 3 times.
The cylinder is 70 centimetres long.



The area of the paper is 3000 square centimetres.
Calculate the diameter of the cylinder.

4

12. Part of the graph of $y = 4 \sin x^\circ - 3$ is shown below.



The graph cuts the x -axis at Q and R.
P is the maximum turning point.

- (a) Write down the coordinates of P.
(b) Calculate the x -coordinates of Q and R.

1

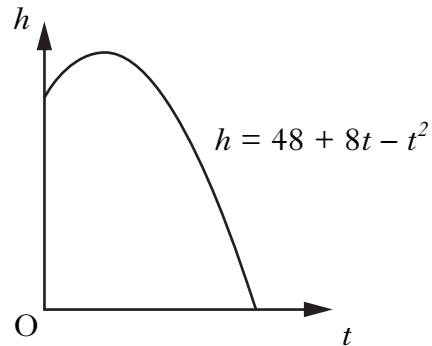
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[Turn over for Question 13 on *Page eight*

13. The diagram shows the path of a flare after it is fired.

The height, h metres above sea level, of the flare is given by

$h = 48 + 8t - t^2$ where t is the number of seconds after firing.



Calculate, **algebraically**, the time taken for the flare to enter the sea.

4

[END OF QUESTION PAPER]