

# X100/11/01

---

NATIONAL  
QUALIFICATIONS 2012

MONDAY, 21 MAY  
9.00 AM – 9.45 AM

MATHEMATICS  
INTERMEDIATE 2  
Units 1, 2 and 3  
Paper 1  
(Non-calculator)

**Read carefully**

- 1 You may **NOT** use a calculator.
- 2 Full credit will be given only where the solution contains appropriate working.
- 3 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:  $\text{Area} = \frac{1}{2}ab \sin C$

Volume of a sphere:  $\text{Volume} = \frac{4}{3}\pi r^3$

Volume of a cone:  $\text{Volume} = \frac{1}{3}\pi r^2 h$

Volume of a cylinder:  $\text{Volume} = \pi r^2 h$

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.

1. The National Debt of the United Kingdom was recently calculated as

£1 157 818 887 139.

Round this amount to four significant figures.

**1**

2. A teacher recorded the marks, out of ten, of a group of pupils for a spelling test.

<b>Mark</b>	<b>Frequency</b>
5	2
6	5
7	6
8	11
9	9
10	2

- (a) Copy the frequency table and add a cumulative frequency column.

**1**

- (b) For this data, find:

(i) the median;

**1**

(ii) the lower quartile;

**1**

(iii) the upper quartile.

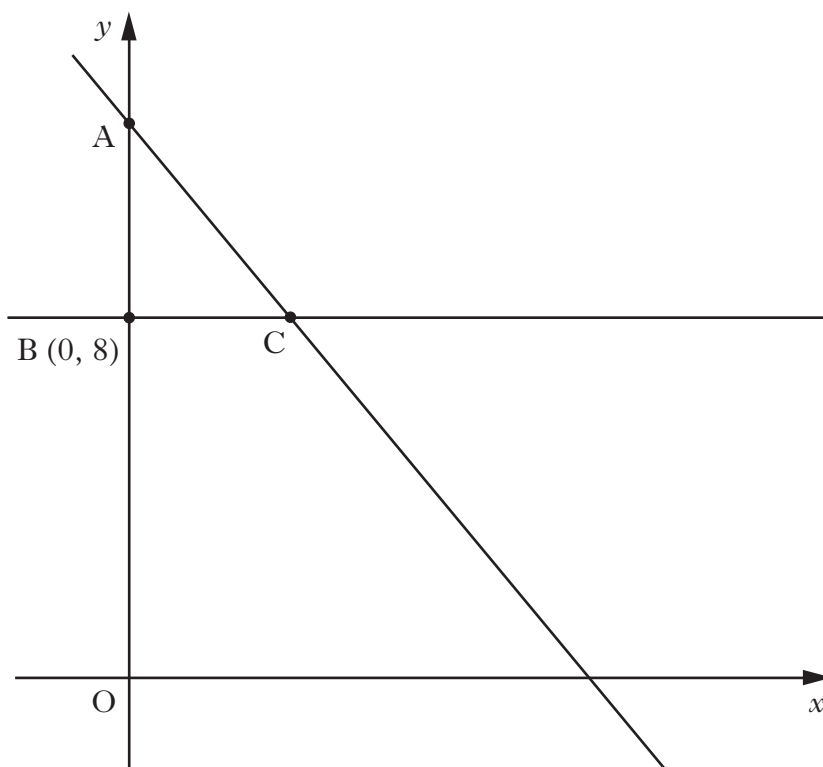
**1**

- (c) Draw a boxplot to illustrate this data.

**2**

**[Turn over**

3. The straight line with equation  $4x + 3y = 36$  cuts the  $y$ -axis at A.



- (a) Find the coordinates of A.

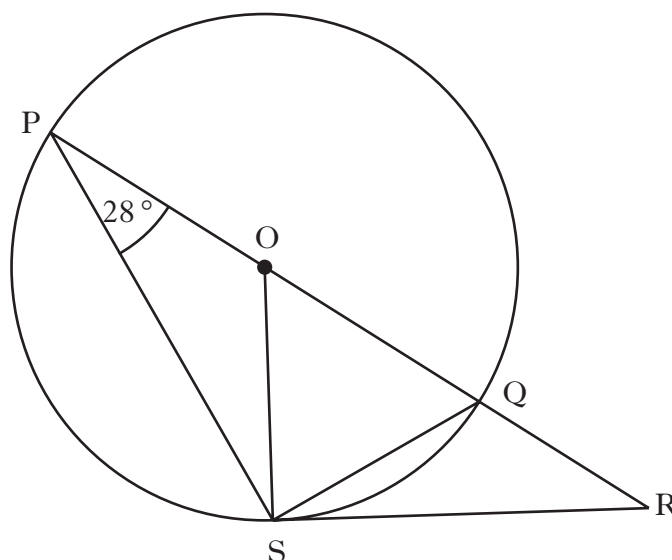
1

This line meets the line through  $B(0, 8)$ , parallel to the  $x$ -axis, at  $C$  as shown above.

- (b) Find the coordinates of C.

2

4.



In the above diagram,

- O is the centre of the circle
- PQ is a diameter of the circle
- PQR is a straight line
- RS is a tangent to the circle at S
- angle OPS is  $28^\circ$ .

Calculate the size of angle QRS.

3

5. One weekend, the attendances at five Premier League football matches were recorded.

8 900

12 700

59 200

10 300

9 700

The median attendance is 10 300.

- (a) Calculate the mean attendance.

1

- (b) Which of the two “averages” – the mean or the median – is more representative of the data?

You must explain your answer.

1

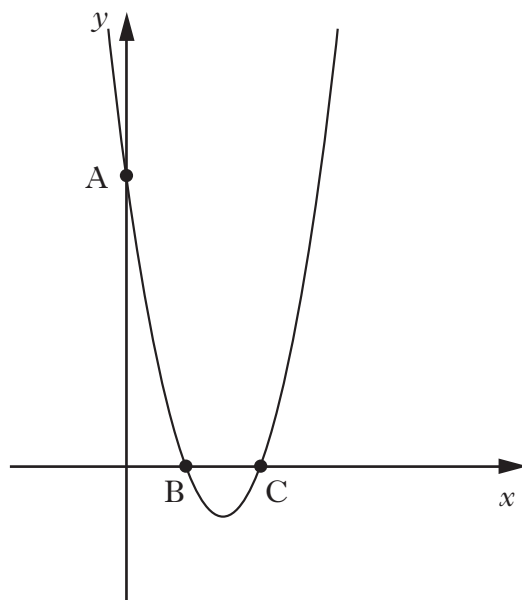
[Turn over

6. The equation  $x^2 - 6x + 8 = 0$  can also be written as  $(x - 2)(x - 4) = 0$ .

(a) Write down the roots of the equation  $x^2 - 6x + 8 = 0$ .

1

Part of the graph of  $y = x^2 - 6x + 8$  is shown below.



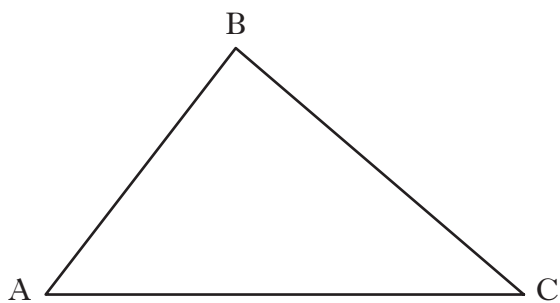
(b) State the coordinates of the points A, B and C.

3

(c) What is the equation of the axis of symmetry of this graph?

1

7.



The area of triangle ABC is 20 square centimetres.

AC = 16 centimetres and  $\sin C = \frac{1}{4}$ .

Calculate the length of BC.

2

8. (a) Factorise

$$a^2 + 2ab + b^2.$$

1

(b) Hence, or otherwise, find the value of

$$94^2 + 2 \times 94 \times 6 + 6^2.$$

2

9. Sketch the graph of  $y = -2 \sin x^\circ$ ,  $0 \leq x \leq 360$ .

3

10. Simplify  $\sqrt{2}(\sqrt{3} + \sqrt{2}) - \sqrt{6}$ .

2

[END OF QUESTION PAPER]

**[BLANK PAGE]**