

X101/11/01

NATIONAL MONDAY, 21 MAY
QUALIFICATIONS 9.00 AM – 9.45 AM
2012

MATHEMATICS
INTERMEDIATE 2
Units 1, 2 and
Applications of Mathematics
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

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.

ALL questions should be attempted.

Marks

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.

Mark	Frequency
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.

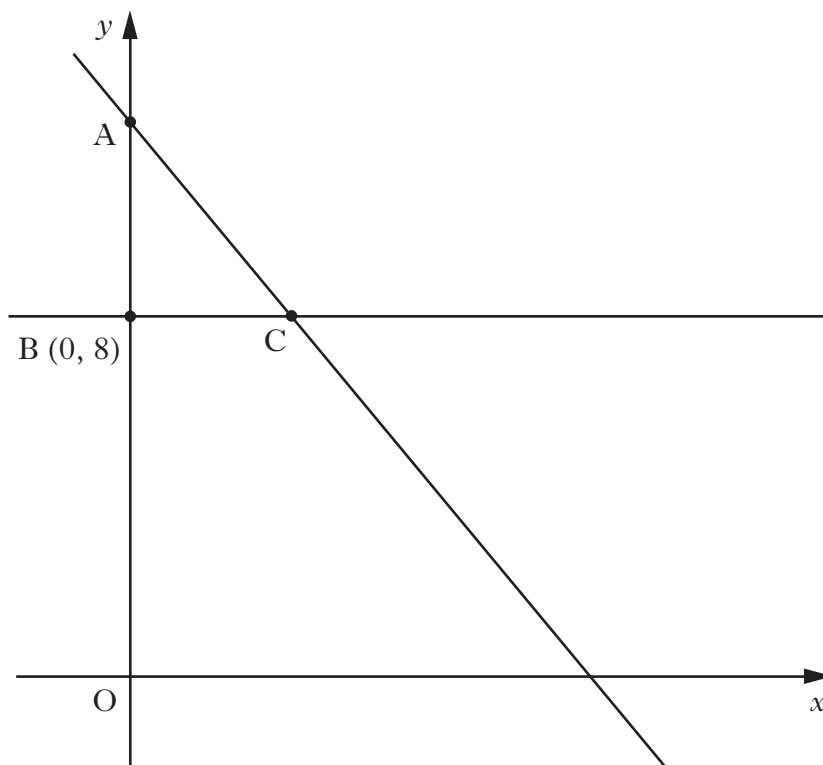
1

- (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.

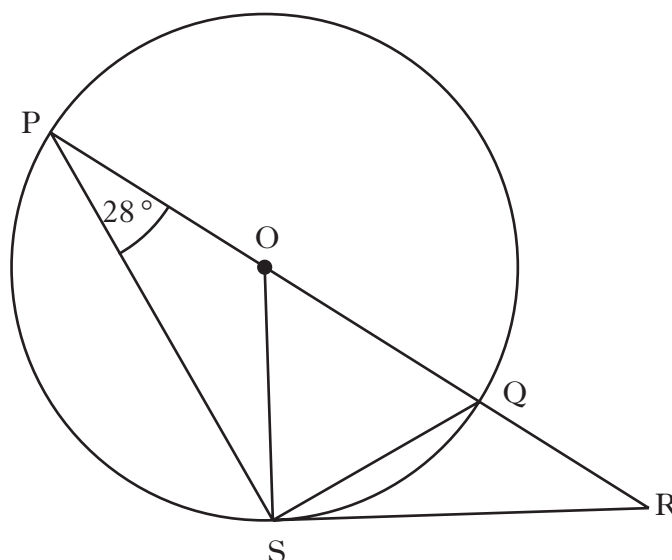
1

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° .

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?

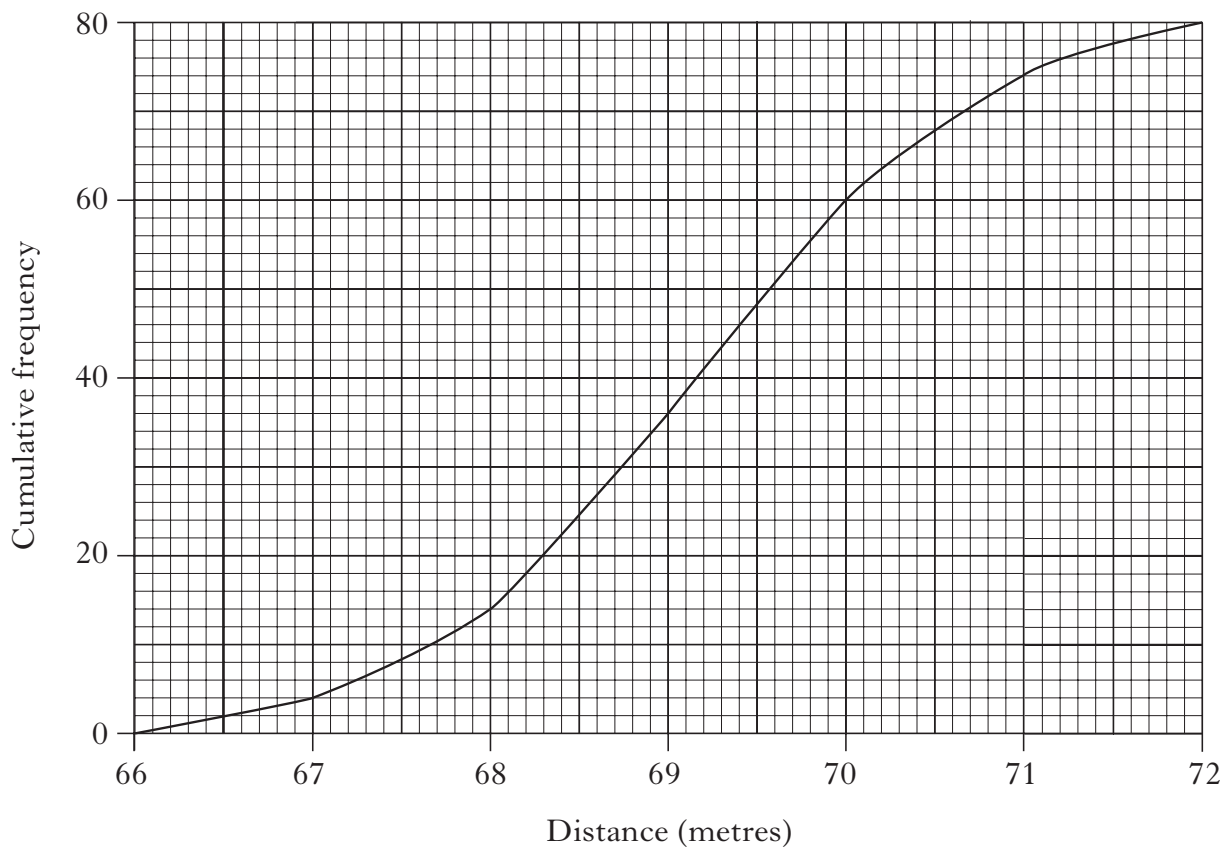
You must explain your answer.

1

[Turn over

6. During an athletics meeting, the distances of 80 attempts in the discus competition are recorded.

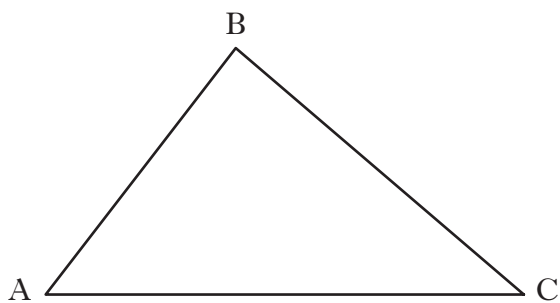
The cumulative frequency curve derived from the distances is shown below.



Use the curve to find the interquartile range of the distances.

3

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

[Turn over

9. Maureen has her electricity supplied by the Use Less Power Company. She has designed a spreadsheet to check her bills.

	A	B	C	D	E	F	G	H	I
1	Use Less Power Company					Cost per unit = 16p			
2									
3									
4		Previous Reading	Present Reading	Units Used	Cost of Units	Standing Charge	Sub-total	VAT at 5%	Total cost
5									
6	Jan-Mar	75 812	76 915	1103	£176.48	£14.99	£191.47	£9.57	£201.04
7	Apr-Jun	76 915	77 408	493	£78.88	£14.99	£93.87	£4.69	£98.56
8	Jul-Sep	77 408	77 632	224	£35.84	£14.99	£50.83		
9	Oct-Dec	77 632	78 519	887					

She receives a bill each quarter. Electricity costs 16p per unit and there is a standing charge of £14.99 per quarter.

- (a) Write down the **formula** to enter in cell E8 the cost of the units for the period from July to September. 1
- (b) Write down the **formula** to enter in cell H8 the cost of the VAT at 5% for the period from July to September. 1
- (c) What value will appear in cell I8? 2

10. A copy of Logan Pollock's payslip is shown below for one week in February.

Name L. Pollock	Employee No. 027	Tax Code 64L	Week Ending 14/02/2012
Basic Pay £296.00	Overtime Pay £55.50	Bonus —	Gross Pay £351.50
National Insurance £20.04	Income Tax £45.40	Pension £21.09	Deductions £86.53
			Net Pay £264.97

Logan worked 40 hours for his basic pay.

If overtime was paid at the rate of "time and a half", calculate how many hours of overtime he worked during that week.

3

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