## X100/11/01

NATIONAL 2013

WEDNESDAY, 22 MAY QUALIFICATIONS 9.00 AM - 9.45 AM

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

## **Read carefully**

- 1 You may <u>NOT</u> 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: Area =  $\frac{1}{2}ab$  sin C

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

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

volume of a cylinder: volume = $\pi r I$	Volume of a cylin	nder: Volume =	$\pi r^2$	h
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Standard deviation: 
$$s = \sqrt{\frac{\sum (x - \overline{x})^2}{n-1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2 / n}{n-1}}$$
, where *n* is the sample size.

**1.** Factorise

2.

$$-7bc$$
.

y A (0, 4) B (3, 0) x

6ab

Find the equation of the straight line AB.

**3.** The diagram below shows a sector of a circle, centre C.



The radius of the circle is 5 centimetres and angle ACB is 72°. Calculate the length of arc AB.

Take  $\pi = 3.14$ .

Marks

4. Solve algebraically the system of equations

$$2x - y = 10$$
  
 $4x + 5y = 6.$  3



The tangent SV touches the circle, centre O, at T. Angle PTQ is 37 ° and angle VTR is 68 °. Calculate the size of angle PQR.

3

5.

2

3

1

6. The stem and leaf diagram shows the number of minutes on average spent on homework per night by a group of first year pupils.

n = 30 1 0 represents 10 minutes

(*a*) Using the above data find:

(i)	the median;	1
(ii)	the lower quartile;	1
(iii)	the upper quartile.	1
Drav	w a boxplot to illustrate this data.	2

(c) A group of fourth year pupils was surveyed to find out how many minutes on average they spent on homework per night. The boxplot below was drawn for

this data.

*(b)* 



Compare the two boxplots and comment.

7. Simplify 
$$\frac{(x+4)^2}{x^2 - x - 20}$$
.

8. State the period of  $y = \sin 2x^{\circ}$ .

[Turn over

3

9. The diagram below shows part of the graph of  $y = 20 - (x - 4)^2$ .



- (a) State the coordinates of the maximum turning point.
  (b) State the equation of the axis of symmetry.
  1
- 10. Sketch the graph of  $y = \sin(x 90)^\circ$ ,  $0 \le x \le 360$ .

## [END OF QUESTION PAPER]