X100/11/01

NATIONAL TUESDAY, 19 MAY QUALIFICATIONS 9.00 AM - 9.45 AM 2015 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 = $\pi r^2 h$

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. Multiply out the brackets and collect like terms.

$$(2x+6)(5x-3)+9x$$
 3

2. A hanging basket is in the shape of a cone.



The diameter is 20 centimetres and the height is 18 centimetres. Calculate the volume of the hanging basket.

Take $\pi = 3.14$.

[Turn over

3

Marks



AC is a tangent to the circle, centre O, with point of contact B. DE is a diameter of the circle and F is a point on the circumference. Angle ABD is 77° and angle DEF is 64°. Calculate the size of angle BDF.

4. The diagram below shows the graph with equation $y = kx^2$ passing through the point (4, 48).



5. The standard deviation of 1, 2, 2, 2, 8 is equal to \sqrt{a} . Find the value of *a*.



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6. Part of the graph of $y = a \sin bx^{\circ}$ is shown in the diagram.



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- State the values of *a* and *b*.
- 7. The graph below shows part of the parabola with equation of the form $y = (x + a)^2 + b.$



The minimum turning point (2, -4) is shown in the diagram.

(*a*) State the values of:

	(i) a	1
	(ii) <i>b</i> .	1
<i>(b)</i>	Write down the equation of the axis of symmetry of the graph.	1

		Marks
8.	Using graphical means, solve the system of equations:	
	y = 2x + 5	
	y = 3x + 6.	
	Use the squared paper provided.	3
9.	Write the following in order of size starting with the smallest.	
	$\cos 90^{\circ}$ $\cos 100^{\circ}$ $\cos 300^{\circ}$	
	Justify your answer.	2
10 .	Express $\sqrt{45} + 6\sqrt{5} - \sqrt{20}$ as a surd in its simplest form.	3
11.	A straight line is represented by the equation $y = mx + c$.	

Sketch a possible straight line graph to illustrate this equation when m < 0 and c > 0.

2

2

12. A book club has **seven** members.

The ages of the members have been used to construct the following boxplot.



After an **eighth** member joins the club, a new boxplot is drawn.

This boxplot is shown below.



What age is the eighth member?

[END OF QUESTION PAPER]

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