X100/201

NATIONAL
QUALIFICATIONS
2007

TUESDAY, 15 MAY
1.00 PM – 1.45 PM

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.

FORMULAE LIST

The roots of $ax^2 + bx + c = 0$ are $x = \dfrac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$ or $\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

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: $s = \sqrt{\dfrac{\sum (x - \bar{x})^2}{n - 1}} = \sqrt{\dfrac{\sum x^2 - (\sum x)^2 / n}{n - 1}}$, where n is the sample size.
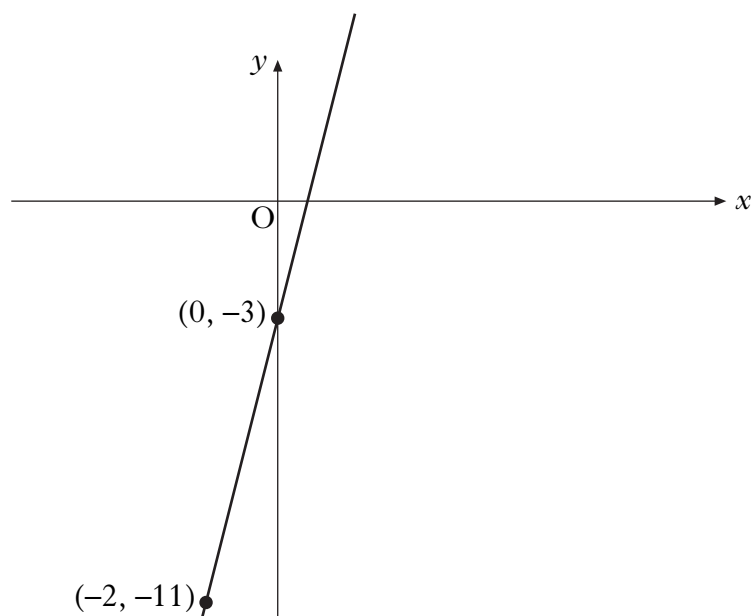
ALL questions should be attempted.

1. The table below shows the results of a survey of First Year pupils.

	Wearing a blazer	*Not wearing a blazer*
Boys	40	22
Girls	29	9

What is the probability that a pupil, chosen at random from this sample, will be a girl wearing a blazer? **1**
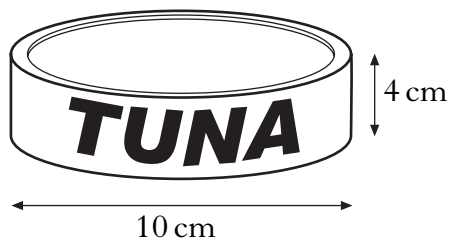
2.

Find the equation of the straight line passing through the points (0, −3) and (−2, −11). **3**

[Turn over

3. A tin of tuna is in the shape of a cylinder.

It has diameter 10 centimetres and height 4 centimetres.

Calculate its volume.

Take π = 3·14. **2**

4. Find the point of intersection of the straight lines with equations $x + 2y = -5$ and $3x - y = 13$. **4**

5. Multiply out the brackets and collect like terms.

$$(x + 3)(x^2 + 4x - 12)$$ **3**

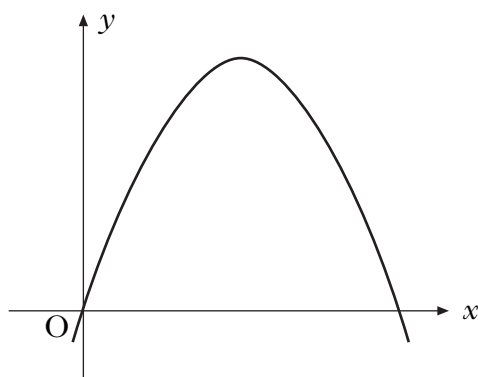**6.** (*a*) Show that the standard deviation of 1, 1, 1, 2 and 5 is equal to $\sqrt{3}$. **3**

   (*b*) **Write down** the standard deviation of 101, 101, 101, 102 and 105. **1**

7. The graph shown below is part of the parabola with equation $y = 8x - x^2$.

(*a*) By factorising $8x - x^2$, find the roots of the equation

$$8x - x^2 = 0.$$ **2**

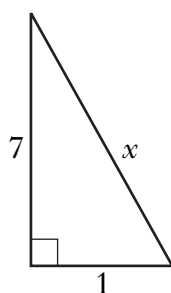(*b*) State the equation of the axis of symmetry of the parabola. **1**

(*c*) Find the coordinates of the turning point. **2**

8. Given that

$$\cos 60° = 0{\cdot}5,$$

what is the value of $\cos 240°$? **1**
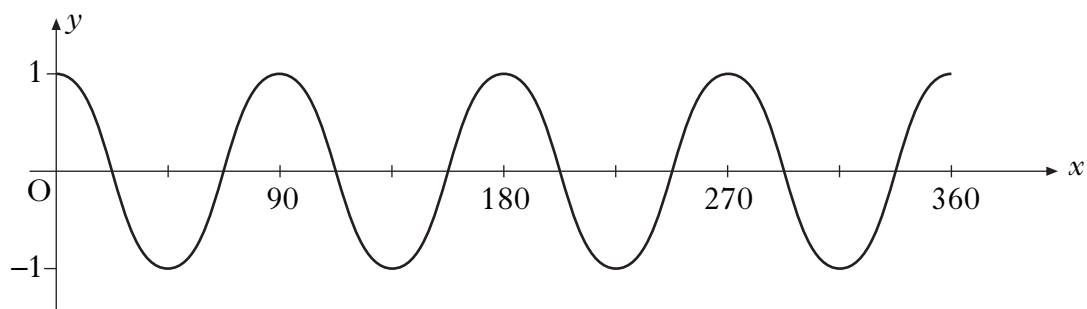
9. A right-angled triangle is shown below.

Using Pythagoras' Theorem, find x.
Express your answer as a surd in its simplest form. **3**
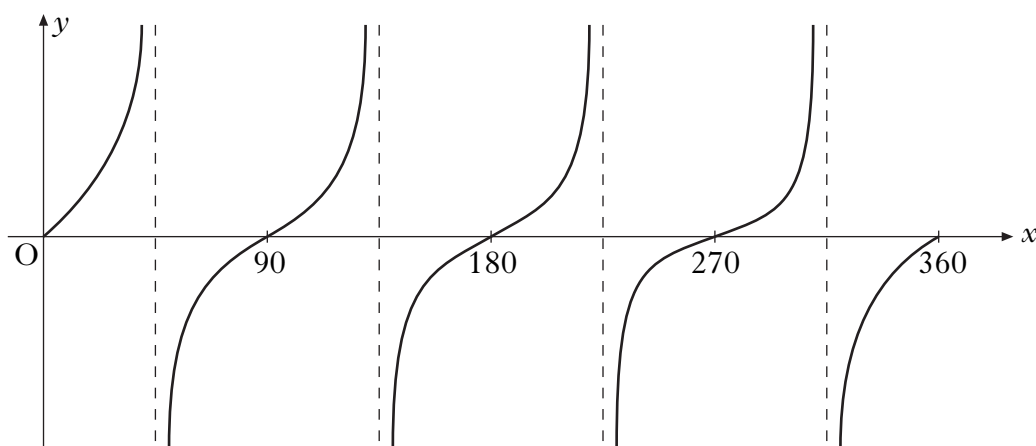
[Turn over for Questions 10 and 11 on *Page six*

10. (*a*) Part of the graph of $y = \cos ax°$ is shown below.

State the value of *a*. **1**

(*b*) Part of the graph of $y = \tan bx°$ is shown below.

State the value of *b*. **1**

11. A straight line is represented by the equation $y = ax + b$.

Sketch a possible straight line graph to illustrate this equation when $a = 0$ and $b > 0$. **2**

[*END OF QUESTION PAPER*]

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