X101/202

NATIONAL QUALIFICATIONS 2007

TUESDAY, 15 MAY
1.00 PM – 1.45 PM

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.

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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: 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: $s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2 / n}{n-1}}$, where n is the sample size.

Marks

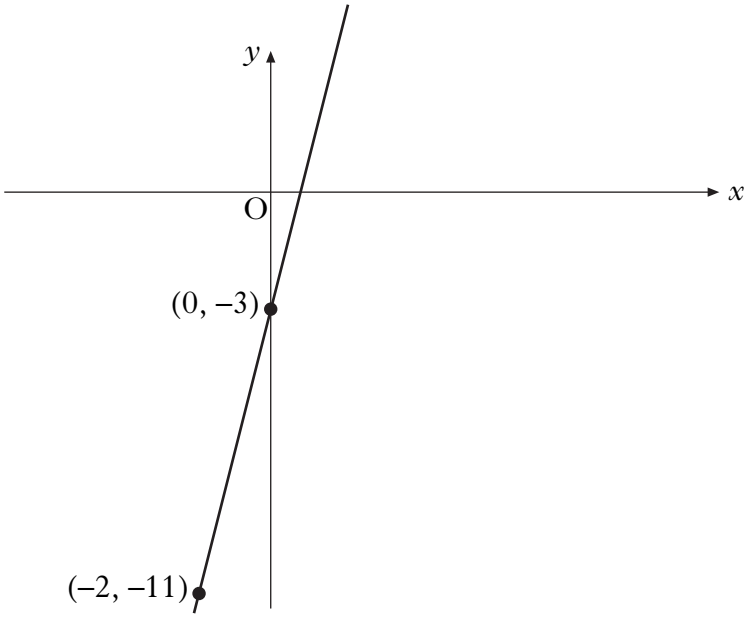
ALL questions should be attempted.

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.

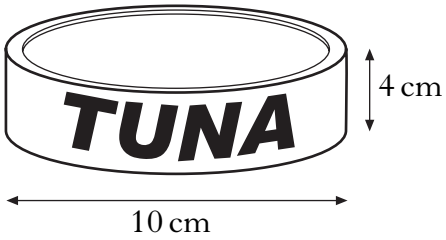


Find the equation of the straight line passing through the points (0, –3) and (–2, –11). **3**

[Turn over

Marks

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 $\pi = 3{\cdot}14$. **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.

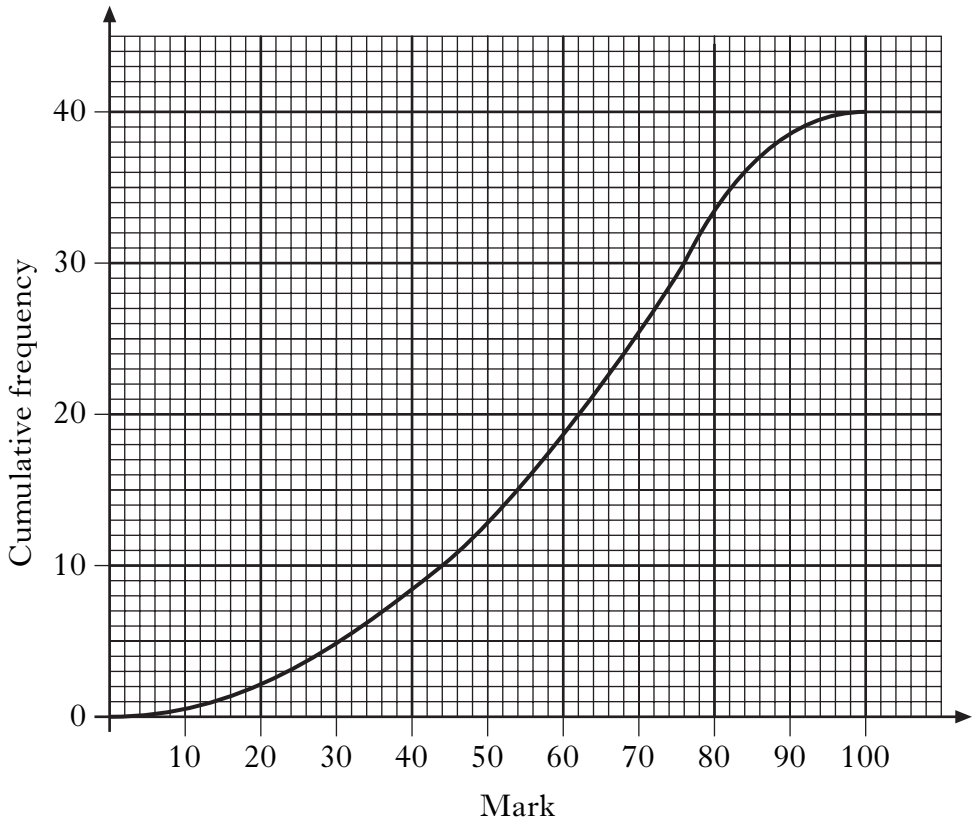
$$(x + 3)(x^2 + 4x - 12)$$ **3**

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**

Marks

7. A group of 40 students sat a class test.
The cumulative frequency curve derived from their marks is shown below.

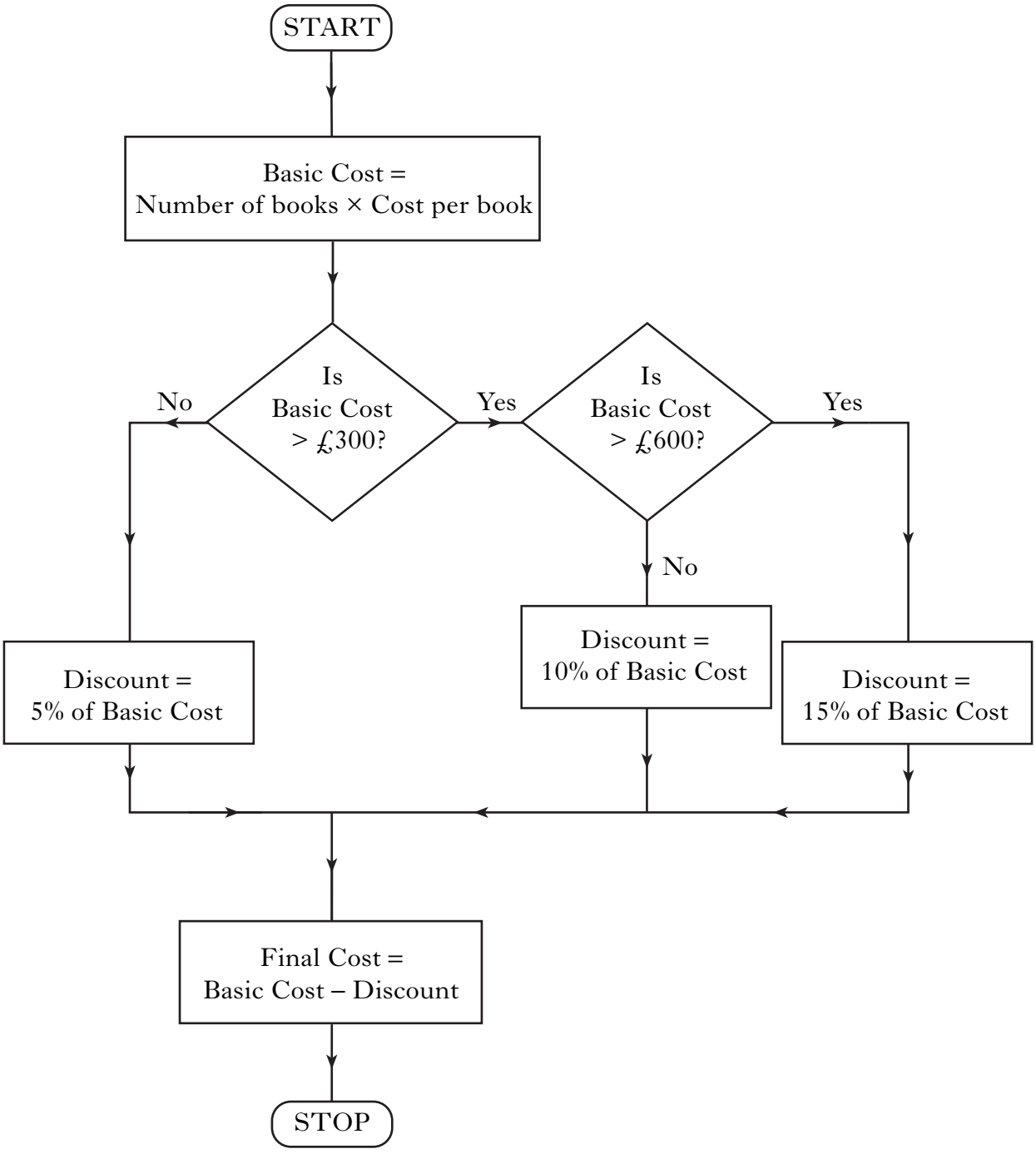


Calculate the semi-interquartile range for the data represented in the diagram. **3**

[Turn over

Marks

8. The flowchart below shows how a publisher calculates the final cost of orders.



A Mathematics department orders 80 books at £9·50 each.
Calculate the final cost of this order. **3**

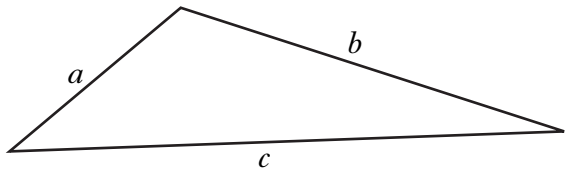
Marks

9. Given that

$$\cos 60° = 0{\cdot}5,$$

what is the value of $\cos 240°$? **1**

10. A triangle has sides with lengths a, b, c.



The area, A, of this triangle can be calculated by using the formula

$$A = \sqrt{s(s-a)(s-b)(s-c)} \qquad \text{where } s = \tfrac{1}{2}(a+b+c).$$

(a) Calculate the value of s when $a = 3$, $b = 6$, $c = 7$. **1**

(b) Using the values for s, a, b and c from part (a), calculate A.
Give your answer for A correct to the nearest whole number. **3**

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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