

# **X100/201**

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NATIONAL  
QUALIFICATIONS  
2009

THURSDAY, 21 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  $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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:  $\text{Area} = \frac{1}{2}ab \sin C$

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.**

1. The number of goals scored one weekend by each team in the Football League is shown below.

0	1	1	2	1	0	0	5	0	1	3
0	2	2	1	1	3	0	0	2	4	1

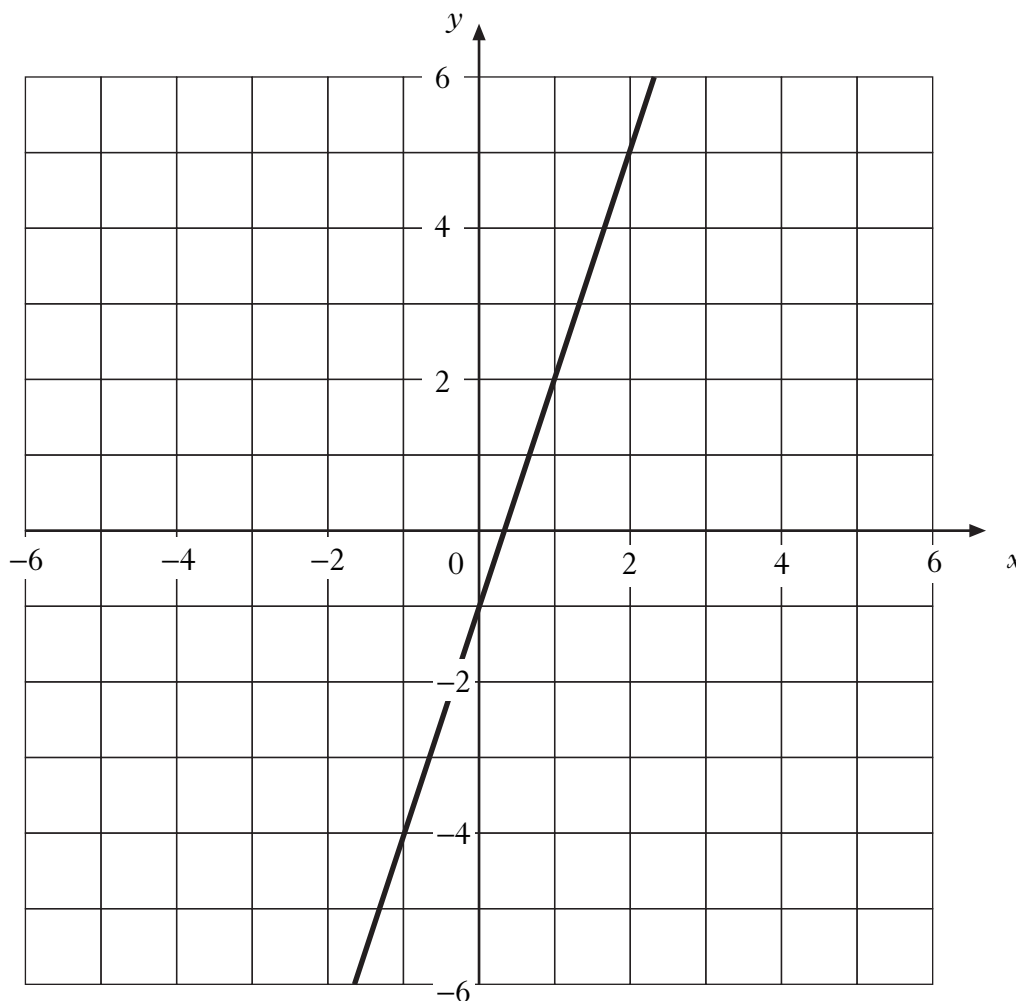
(a) Construct a dotplot for the data. 2

(b) The shape of the distribution is

- A skewed to the right
- B symmetric
- C skewed to the left
- D uniform.

Write down the letter that corresponds to the correct shape. 1

2.



Find the equation of the straight line shown in the diagram. 3

3. Factorise

$$x^2 - 5x - 24.$$

2

4. Multiply out the brackets and collect like terms.

$$(x + 5)(2x^2 - 3x - 1)$$

3

5. (a) The marks of a group of students in their October test are listed below.

41 56 68 59 43 37 70 58 61 47 75 66

Calculate:

(i) the median;

1

(ii) the semi-interquartile range.

3

(b) The teacher arranges extra homework classes for the students before the next test in December.

In this test, the median is 67 and the semi-interquartile range is 7.

Make **two** appropriate comments comparing the marks in the October and December tests.

2

6. An angle,  $a^\circ$ , can be described by the following statements.

- $a$  is greater than 0 and less than 360
- $\sin a^\circ$  is negative
- $\cos a^\circ$  is positive
- $\tan a^\circ$  is negative

Write down a possible value for  $a$ .

1

7. A straight line is represented by the equation  $x + y = 5$ .

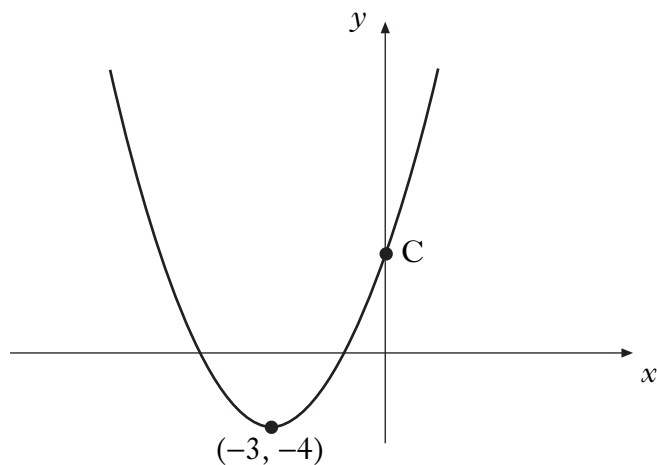
Find the gradient of this line.

2

8. Sketch the graph of  $y = 4 \cos 2x^\circ$ ,  $0 \leq x \leq 360$ .

9. The diagram below shows part of a parabola with equation of the form

$$y = (x + a)^2 + b.$$



- (a) Write down the equation of the axis of symmetry of the graph. 1
- (b) Write down the equation of the parabola. 2
- (c) Find the coordinates of C. 2

10. Simplify

$$\frac{\cos^3 x^\circ}{1 - \sin^2 x^\circ}$$

2

[END OF QUESTION PAPER]

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