

ELGIN ACADEMY

Prelim Examination 2006 / 07

| |
|---|
| <p>MATHEMATICS National Qualifications - Intermediate 2 Maths 1, 2 and 3 Paper 1 (non-calculator)</p> |
|---|

Time allowed - 45 minutes

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.

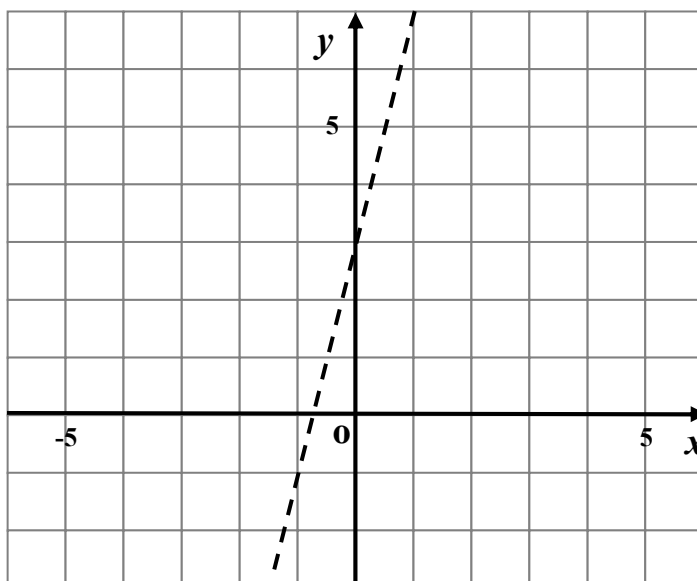
1. The number of text messages sent from Chloe's mobile phone was recorded over a period of 21 days. The results are shown in this table:

| | | | | | | |
|----|---|----|---|---|---|----|
| 6 | 8 | 5 | 6 | 7 | 7 | 6 |
| 6 | 9 | 10 | 6 | 5 | 6 | 8 |
| 10 | 5 | 8 | 6 | 9 | 9 | 10 |

- (a) Construct a frequency table for the above data and add a cumulative frequency column. [2]
- (b) What is the probability that if a day is chosen at random that Chloe had sent more than 7 messages from her mobile? Give your answer in its simplest form. [2]

2. Simplify $\sqrt{27} - \sqrt{3} + \sqrt{48}$. [3]

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



[3]

4. Express $b^{\frac{1}{2}}(b + b^{-\frac{1}{2}})$ in its simplest form. [3]

5. A quadratic function is represented by the equation.

$$x^2 - 4x + 5 = 0$$

Determine the axis of symmetry of the graph of the function. [2]

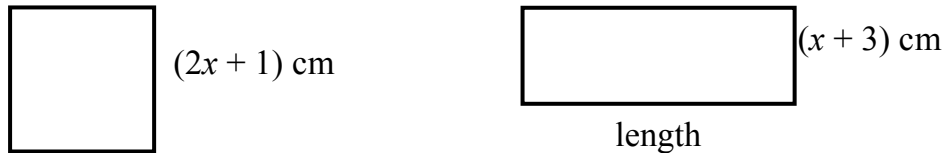
6. (a) Factorise (i) $49 - 25a^2$ [1]

(ii) $2d^2 + 7d - 15$ [2]

(b) Multiply out the brackets and tidy up terms

$$8 - 5(2x - 3) + 6x$$
 [2]

7. The square and rectangle shown below have the same **perimeter**.



Find an expression for the length of the rectangle [4]

8. Sobia sold a concert ticket on the internet for £75. She calculated that she had made 25% profit on the original cost.

How much did she pay for the ticket when she bought it? [3]

9. Express $\frac{5}{k} - \frac{3}{k+4}$, $k \neq 0, k \neq -4$ as a fraction in its simplest form. [3]

END OF QUESTION PAPER