

ELGIN ACADEMY

Prelim Examination 2006 / 07

<p>MATHEMATICS National Qualifications - Intermediate 2 Maths 1, 2 and Applications Paper 1 (non-calculator)</p>
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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: $\text{Volume} = \pi r^2 h$

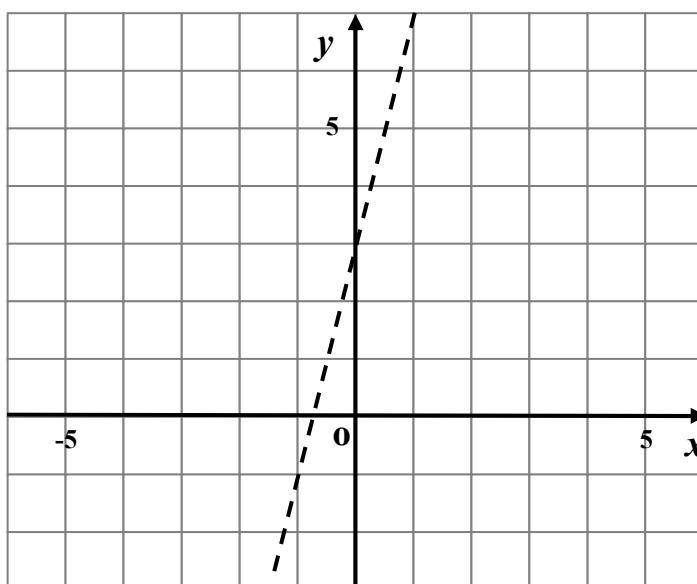
Standard deviation: $s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2 / n}{n - 1}}$, where n is the sample size.

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



[3]

3. (a) Daryl takes out a loan of £5000 over 3 years and finds that the monthly repayment is £150. Calculate how much the loan will cost him. [3]

(b) Daryl decides to take the loan with protection. 8% is added to the monthly payment for this.

Calculate how much Daryl's monthly payment would be with this loan protection. [2]

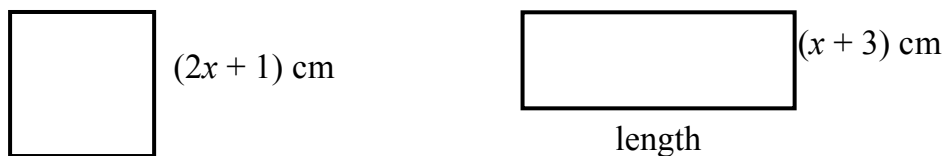
4. (a) Factorise (i) $49 - 25a^2$ [1]

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

(b) Multiply out the brackets and tidy up terms

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

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



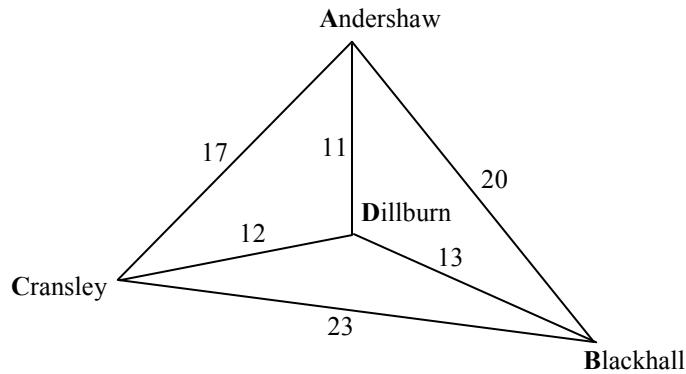
Find an expression for the length of the rectangle [4]

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

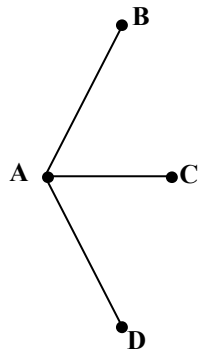
How much did she pay for the ticket when she bought it? [3]

7. Billy is a lorry driver and has to make deliveries to four farms.

The network diagram below shows the distances (in miles) between the four farms.



(a) Copy and complete this tree diagram to show all the possible routes that Billy could take if he starts at Andershaw. [3]



(b) Billy's boss has told him to use the shortest route possible. Use your tree diagram to write down the route that Billy should take. [3]

END OF QUESTION PAPER