

# ELGIN ACADEMY

*Prelim Examination 2007 / 08*

<p><b>MATHEMATICS</b> <b>National Qualifications - Intermediate 2</b> <b>Maths 1, 2 and 3</b> <b>Paper 1 (non-calculator)</b></p>
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**Time allowed - 45 minutes**

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

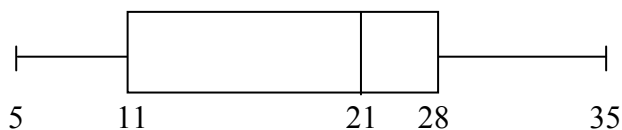
Volume of a sphere:  $\text{Volume} = \frac{4}{3} \pi r^3$

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 boxplot shows the number of hours of TV watched in a week by a group of students.



Calculate the semi-interquartile range.

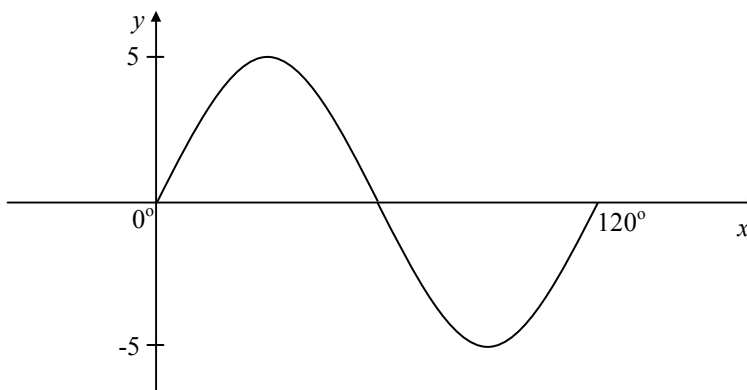
[2]

2. Multiply out the brackets and collect like terms.

$$(5p - 2q)(3p + q)$$

[2]

3. Write down the equation of the graph shown below:



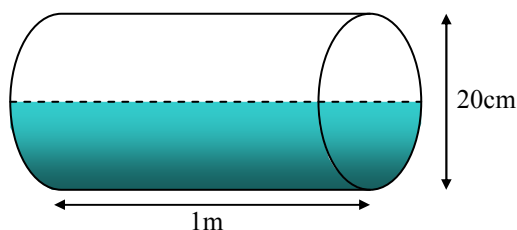
[3]

4. Multiply out the brackets and simplify

$$8 - 3(4x - 5) + 6x$$

[3]

5. A cylindrical oil drum is being stored on its side. It has a diameter of 20cm and length 1m.



If it is half full, how many litres of oil are in it? [Take  $\pi = 3.14$ ]

[5]

6. The 'running times' of a selection of children's DVDs are as follows:

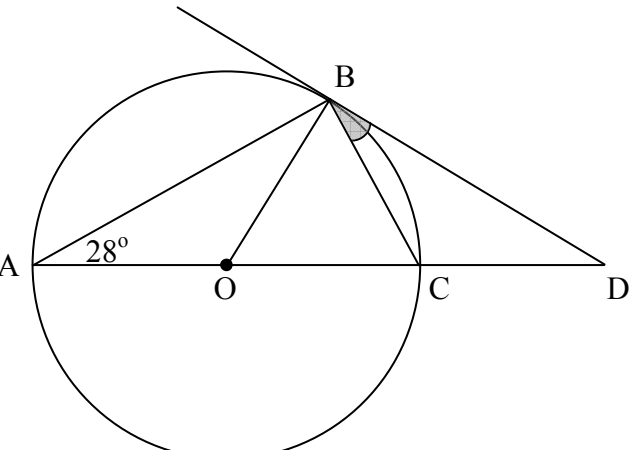
90	90	93	88	93	89	94	96	93	95	91	94
96	89	93	97	91	91	97	95	96	95	96	89

(a) Show this information in a dot-plot. [2]

(b) Calculate the semi-interquartile range for this data. [3]

(c) Jenna wanted to watch a DVD. What is the probability that the one she chooses will have a 'running time' of **more than** 90 minutes?  
Give your answer in its simplest form. [2]

7. Factorise  $x^2 - 3x - 28$  [2]

8.  In the diagram shown, BD is a tangent to the circle centre O.  
Angle BAC =  $28^\circ$ .  
Calculate the size of angle CBD. [3]

9. Simplify  $\frac{(x-3)^2}{x^2+x-12}$  [2]

10. Given that  $\tan 45^\circ = 1$ , which one of these is equal to  $\tan 45^\circ$ ?  
 $\tan 135^\circ$      $\tan 225^\circ$      $\tan 315^\circ$  [1]

**END OF QUESTION PAPER**