ELGIN ACADEMY

Prelim Examination 2007 / 08

MATHEMATICS
National Qualifications - Intermediate 2
Maths 1, 2 and 3
Paper 1 (non-calculator)

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 $x = \dfrac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$ or $\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle: Area = ½ $ab \sin C$

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

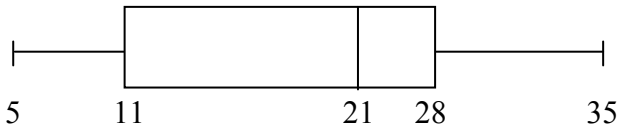
Volume of a cone: Volume = $\dfrac{1}{3}\pi r^2 h$

Volume of a cylinder: Volume = $\pi r^2 h$

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

All questions should be attempted *Marks*

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

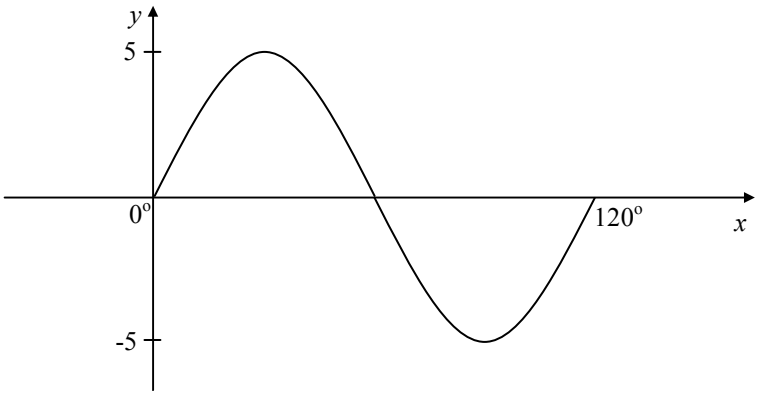


Calculate the semi-interquartile range. **[2]**

2. Multiply out the brackets and collect like terms.

$$(5p - 2q)(3p + q)$$ **[2]**

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

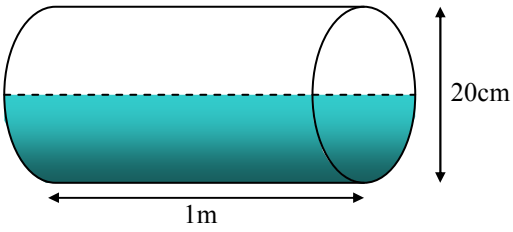


[3]

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 $\pi = 3{\cdot}14$] **[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

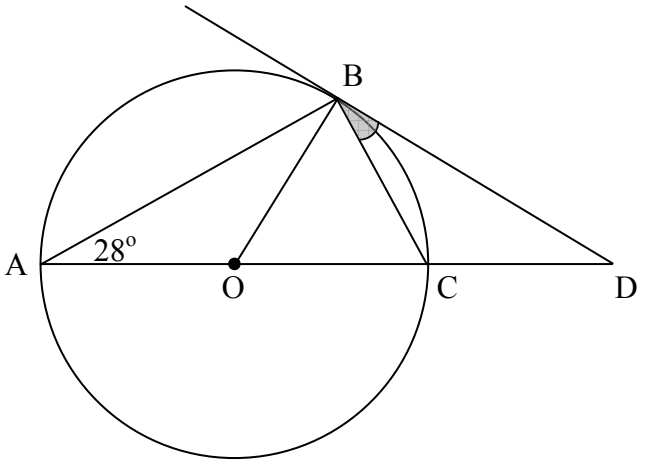
(a) Show this information in a dot-plot. **[2]**

(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°.

Calculate the size of angle CBD.

[3]

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

10. Given that tan 45° = 1, which one of these is equal to tan 45°?

tan 135° tan 225° tan 315° **[1]**

END OF QUESTION PAPER