

# ELGIN ACADEMY

*Prelim Examination 2005 / 2006*

## **MATHEMATICS** **Standard Grade - Credit Level**

### **Paper II**

**Time allowed - 80 minutes**

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Read Carefully

1. Answer as many questions as you can.
2. Full credit will be given only where the solution contains appropriate working.
3. **You may use a calculator**

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

Standard Deviation:  $s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}} = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n - 1}}$

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3	
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1. The Blackbird is a two-seater high speed jet.

In December 1964 it broke a world speed record by travelling at  $1.02 \times 10^4$  metres per second.



Calculate, correct to three significant figures, the distance travelled if the jet were to maintain this speed for one hour. Express your answer in scientific notation.

2. In 2004 a house was valued at £125000. Due to the excessive increase in house prices the same house was worth £132500 one year later. Assuming the house prices continued to rise by the same percentage each year, what would the same house be worth in 2008 ?

3. The faces of a die in the shape of a regular icosahedron (20 – sided shape) are numbered from 1 to 20. The die is rolled.

Find the probability that the uppermost face will be a number which is not prime.

4. Swimmer A was asked to swim  $8 \times 50$  metres freestyle. Her times are shown below.



Swim number	1	2	3	4	5	6	7	8
Time (in seconds)	38.2	39.0	39.1	38.8	39.4	40.0	39.3	40.6

- (a) Calculate the mean time for her swims (to one decimal place).

- (b) Calculate the standard deviation correct to 1 decimal place.

Swimmer B was asked to swim  $8 \times 50$ m as before. His mean time was 38.1seconds and standard deviation was 1.4 seconds.

- (c) How does the performance of Swimmer A compare with the performance of Swimmer B?

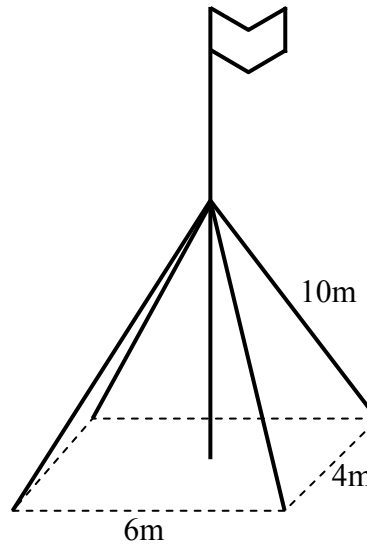


8. A flagpole is positioned at the centre of a rectangle which measures 6m by 4m

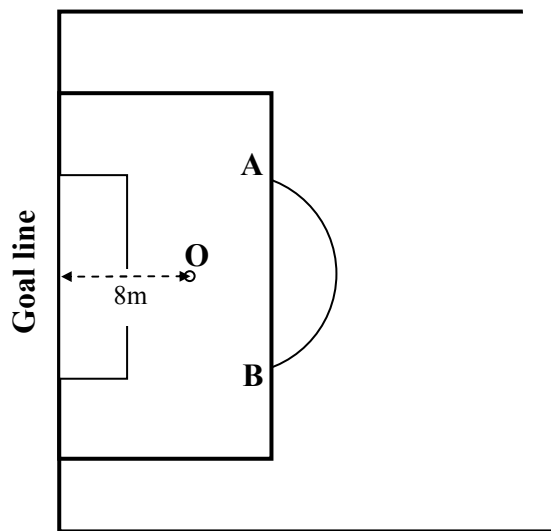
The flagpole is supported **two thirds of the way up** by four steel ropes, each 10 metres long

The ropes are secured at the four corners of the rectangle.

Calculate the height of the flagpole to the nearest metre.



9. The diagram below shows part of a football pitch designed for under 12's.



The penalty spot O is 8 metres from the goal line, and the line AB is 11 metres from the goal line.

A circular arc, with centre O and **radius 6 metres** is marked.

Calculate the length of the arc AB to the nearest metre.

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