

# ELGIN ACADEMY

*Prelim Examination 2008 / 2009*

## 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:** 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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	1
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1. During the 2004 Athens Olympic games the BBC recorded audience figures for different events.



$1.07 \times 10^7$  people watched Paula Radcliffe compete in the marathon.  
 $8.8 \times 10^6$  people watched Kelly Holmes win in the 800 metres.

- (a) How many more people watched the marathon than the 800 metres?  
**Answer in scientific notation.**
- (b) Express this as a percentage of the 800 metres audience to the nearest percent.

2. Solve the inequation

$$3(2 - x) + 7 \geq 2x - 6, \text{ where } x \text{ is a whole number.}$$

3. Last year, for a Mathematical Competition the organisers bought 50 medals and 8 trophies for £58.50

Let  $m$  be the price of a medal and  $t$  the price of a trophy.

- (a) Write down an equation in  $m$  and  $t$  to illustrate this information.

This year they bought in 52 medals and 13 trophies which cost them 20% more than last year.

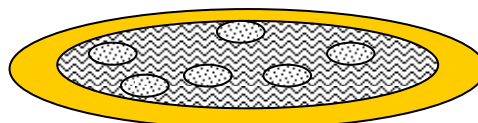
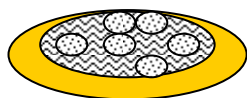
- (b) Write down an equation in  $m$  and  $t$  to illustrate this information.
- (c) Assuming that the cost of a medal and a trophy remained the same for both years, find **algebraically** the cost of 3 medals and 2 trophies.

4. The cost, £ $C$ , of a pizza varies directly as the number of toppings,  $T$ , and the square of its diameter,  $D$  inches.

An eight inch pizza with 3 toppings cost £5.20.

Serena reckons that a sixteen inch pizza with the same 3 toppings should cost £10.40 (double the 8inch cost).

Is she correct? [All working should be shown.]

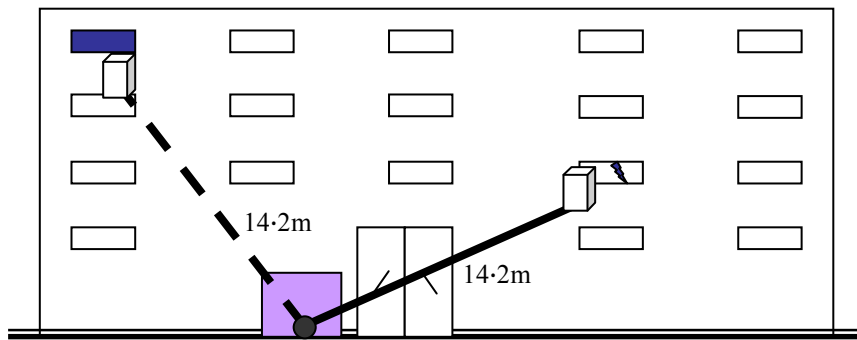


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5. Solve the following equation giving your answer correct to 2 significant figures.

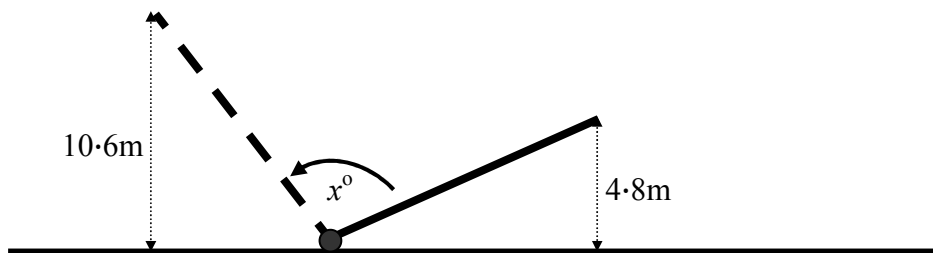
$$2x^2 - 5x - 5 = 0.$$

6. Two windows are broken in a block of flats and the owner has hired in a crane to allow him to carry out the repairs.



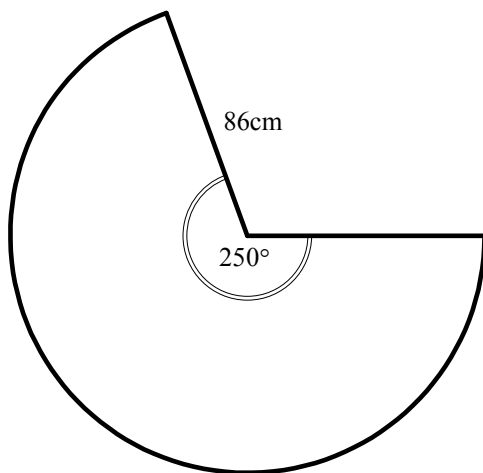
In the **two** positions shown above the arm of the crane is at its **full stretch** of 14.2m.

The diagram below represents the arms of the crane. The lower window is 4.8m above the ground and the higher window is 10.6m above the ground.



Find the angle,  $x^\circ$ , the crane had to turn through to get to the higher window from the lower window.

- 7.



The logo of Cheeses-R-Us, a cheese superstore, is shown across. The logo is a sector of a circle of radius of 86 cm. The larger angle at the centre is  $250^\circ$ .

The manager decides to improve the sign by applying gold tape around the full perimeter of the logo.

What length of tape will be required?



