

# ELGIN ACADEMY

*Prelim Examination 2008 / 09*

<p><b>MATHEMATICS</b> <b>National Qualifications - Intermediate 2</b> <b>Maths 1, 2 and Applications</b> <b>Paper 2</b></p>
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**Time allowed - 1 hour 30 minutes**

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**Read carefully**

- 1. Calculators may be used in this paper.**
- 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.

**All questions should be attempted**

1. A patient in hospital is given 200mg of a drug at 0900. 12% of the amount of the drug at the beginning of each hour is lost, through natural body processes, by the end of that hour.

How many mg of the drug will be **lost** by 1200? [4]

2. David bought 4 cream eggs and 5 flakes in a sweet shop. They cost him £3.88.

(a) Taking the cost of a cream egg to be ' $x$ ' pence and the cost of a flake to be ' $y$ ' pence, construct an equation in  $x$  and  $y$  to show the above information. [1]

(b) Given that Carly bought 3 cream eggs and 2 flakes and paid a total of £2.14, construct a second equation. [1]

(c) Gavin bought 2 cream eggs and a flake. How much did he pay? [4]

3. The following formula is used in science.

$$F = \frac{mv - mu}{t}$$

Find  $F$  when  $m = 2$ ,  $u = 4$ ,  $v = 7$  and  $t = 3$ . [2]

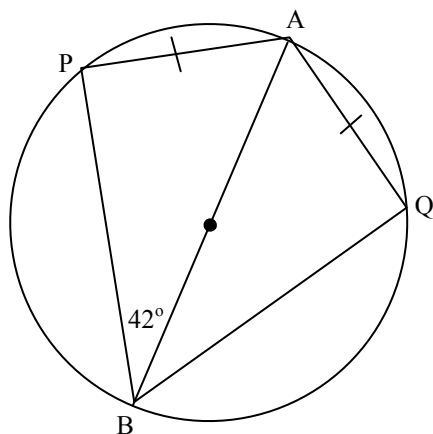
4. A young child was given a slab of moulding clay. It was a cuboid and measured 15.2cm by 4.8 cm by 3.4cm.

(a) Calculate the volume of the cuboid rounding your answer to 2 significant figures. [1]

The clay was made into 25 identical spheres.

(b) Using your answer from part (a), calculate the radius of one of the spheres. [4]

5. P and Q are points on the circumference of a circle centre O and diameter AB.



If  $\angle ABP = 42^\circ$  and  $AP = AQ$ , calculate the size of  $\angle PAQ$ .

[2]

6. The frequency table shows the ages of the members of a school drama group.

Age	Frequency	
11	7	
12	8	
13	8	
14	5	
15	3	
16	2	
17	1	

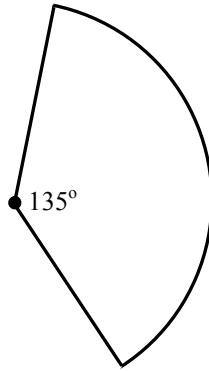
- (a) Copy the frequency table and add a cumulative frequency column.

[1]

- (b) Find the median age of the members.

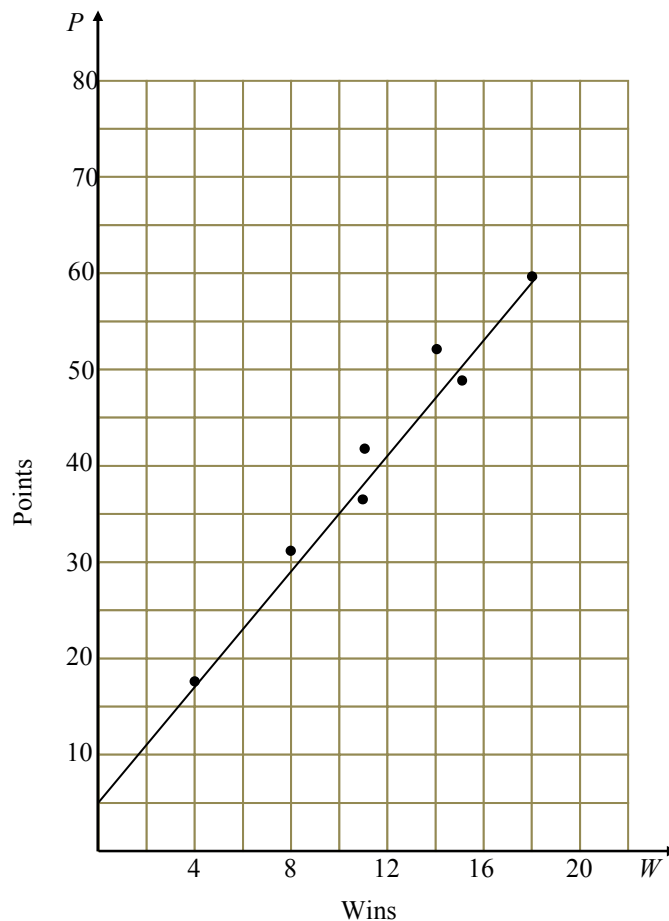
[1]

7. Calculate the area of the sector shown in the diagram, given that it has radius  $6.8\text{cm}$ .



[2]

8. A selection of the number of games won and the total points gained by teams in the Scottish Premier League were plotted on this scattergraph and the line of best fit was drawn.



- (a) Find the equation of the line of best fit. [3]
- (b) Use your equation to calculate the points gained by a team who won 27 matches. [1]

9. Jasmine has a part time job, works a basic 15 hours a week and gets paid £7.40 an hour.

Any overtime that she works gets paid at time and a half.

One week Jasmine worked her usual basic hours plus 12 hours overtime to cover staff holidays.

Calculate Jasmine's gross wage for this week.

[4]

10. The table shows the monthly repayments on loan over a 5 year period.

Monthly repayments		
	Without loan protection	With loan protection
£25000	£525.05	£549.80
£20000	£420.04	£439.84
£15000	£315.03	£329.88
£12500	£262.52	£274.90
£10000	£210.02	£219.92
£7500	£157.51	£164.94
£5000	£105.01	£109.06
£4000	£84.01	£87.97

Fazia wants to borrow £20000. How much extra will she pay over a year if she takes the loan with protection instead of without loan protection?

[3]

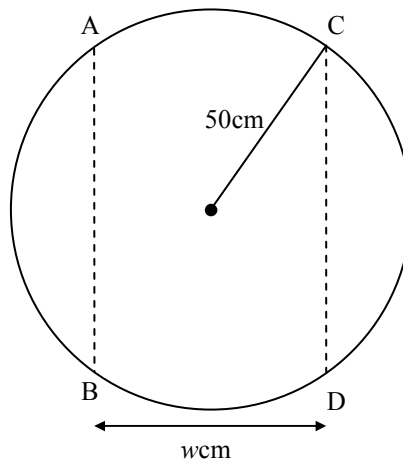
11. Jackie earns £10350 in a year. She has a total tax allowance of £5400 and pays tax on the remainder at 22%.

Calculate how much tax she will pay each month.

[4]

12. A kitchen table is circular in shape with two 'leaves' which can be folded to save space when the table is not in use.

The table has a radius of 50cm and can be represented by a circle centre O as shown in the diagram. The table is folded along the lines AB and CD.

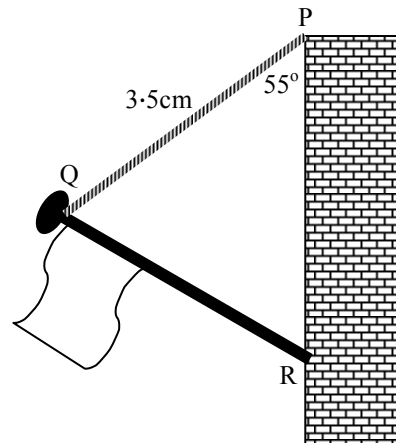


Given that  $AB = CD = 80\text{cm}$ , calculate the width,  $w$  cm, of the table when the 'leaves' are folded.

[4]

13. A flagpole is attached to a wall and is supported by a wire PQ as shown in the diagram.

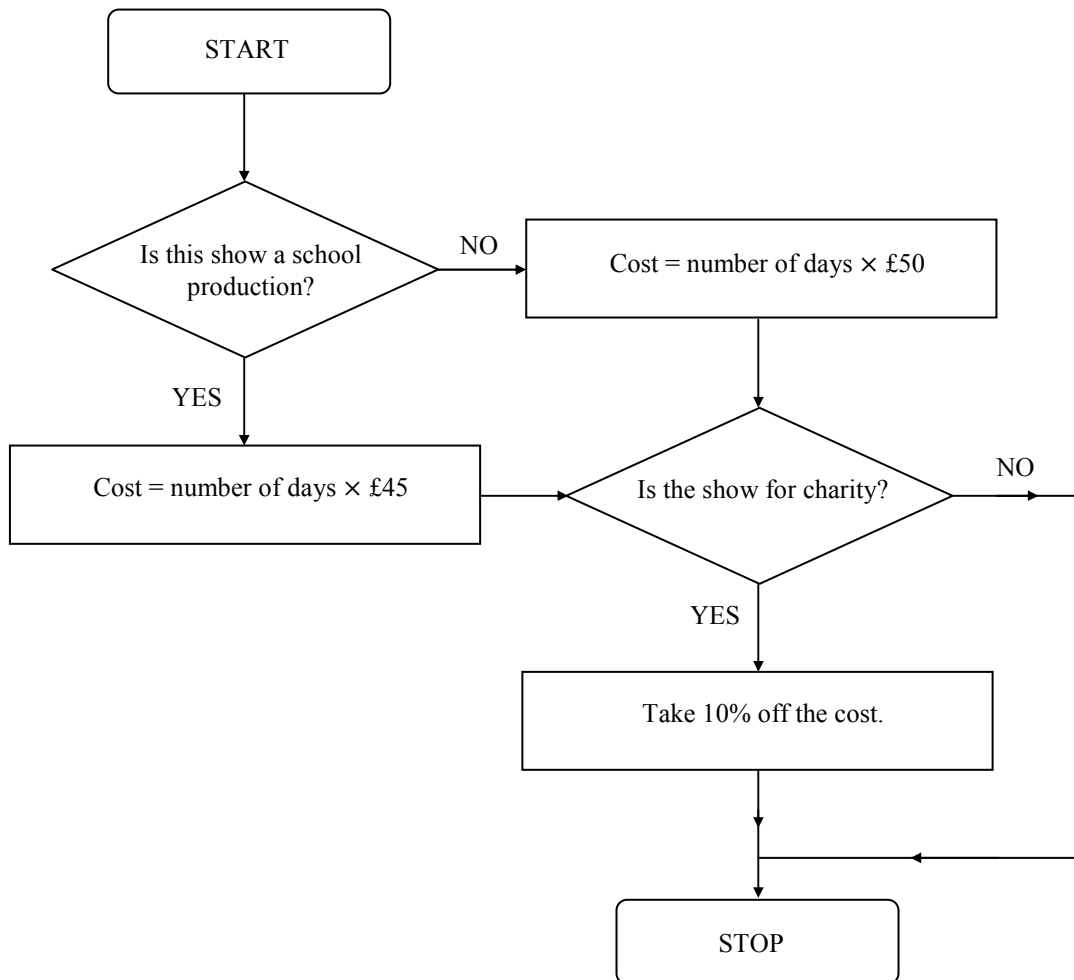
The wire is 3.5 metres long and makes an angle of  $55^\circ$  with the vertical wall.



Given that the point P is 4.5metres above R in the diagram, calculate the length of the flagpole.

[4]

14. The flowchart is used to calculate the cost of hiring some lighting equipment.



Use the flowchart to calculate how much it would cost to hire the equipment for a school show for 10 days if the show is being performed for charity.

[4]

**END OF QUESTION PAPER**