

# **ELGIN ACADEMY**

*Prelim Examination 2007 / 08*

<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:  $\text{Volume} = \frac{4}{3} \pi r^3$

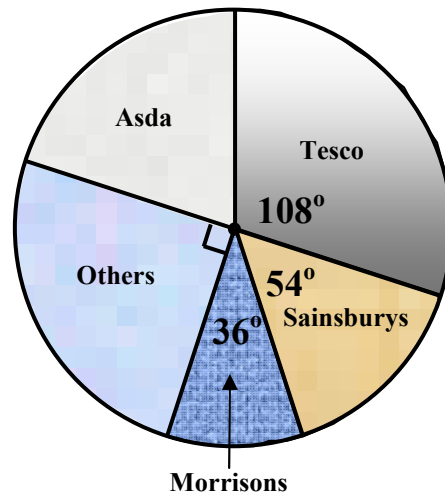
Volume of a cone:  $\text{Volume} = \frac{1}{3} \pi r^2 h$

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. The pie chart shows the approximate share of the market of several leading supermarkets.



If £9 000 000 000 was spent in Britain's supermarkets last year, calculate how much was spent in Asda.

[3]

2. Bill invested £10 000 in the Dodgy Building Society but his money lost 5% per annum over the first 2 years.

At the end of this time he decided to move his money to the Goody Building Society which guaranteed that his money would gain 6% per annum over the next 2 years.

How much did Bill gain or lose over the four years?

[5]

3. (a) 6 patients were asked how long they had waited past their appointment time to see their doctor at their last visit.  
Here are the times (in minutes).

8      9      10      12      14      19

Calculate (i) the mean [1]  
(ii) the standard deviation [3]

of these times.

- (b) At their next visit the same six patients were asked the same question and it was found that although the mean waiting time was the same the standard deviation was 3.

Make a valid comment about this second set of times with particular reference to the standard deviation. [1]

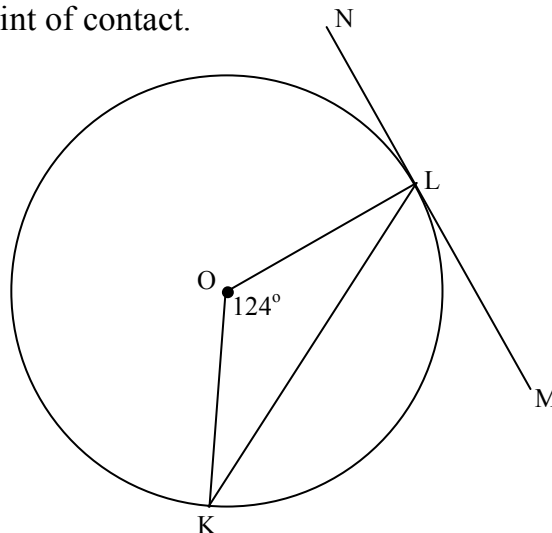
4. A formula for calculating Maximum Heart Rate (MHR) is

$$\text{MHR} = 217 - (0.85 \times \text{age in years})$$

- (a) Stewart is 60. Calculate his maximum heart rate. [2]

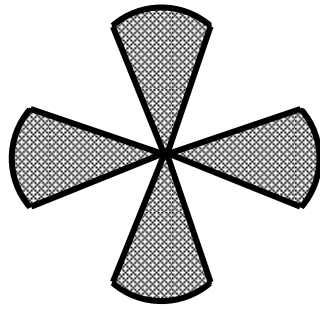
- (b) Jennifer calculates her maximum heart rate to be 176.  
What age is she? Give your answer the nearest year. [3]

5. K and L are points on the circumference of a circle centre O. NM is a tangent to the circle with L the point of contact.

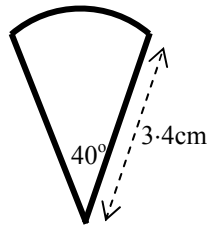


If  $\angle \text{LOK} = 124^\circ$ , calculate the size of  $\angle \text{KLM}$ . [3]

6. A blazer badge has a logo like the one shown. The logo has to be outlined in gold braiding.



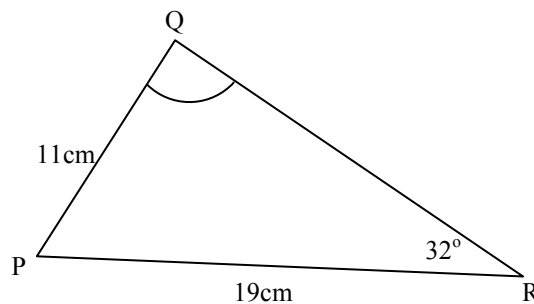
It is made up from 4 identical sectors of a circle with radius 3.4cm all meeting at a point.



If the angle at the centre of each sector is  $40^\circ$ , calculate how much braiding would be required to outline the logo.

[5]

7. Calculate the size of the obtuse angle at Q given that  $PQ = 11\text{cm}$ ,  $PR = 19\text{cm}$  and  $\angle PRQ = 32^\circ$ .



[4]

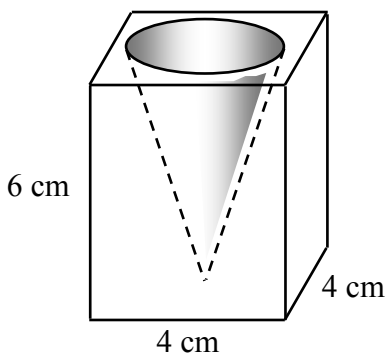
8. A company representative set up a spreadsheet to help him work out his expenses for the mileage travelled. Part of it is shown below.

1	B	C	D	E
2	Date	Number of Miles	Rate per mile	Total
3	12 <sup>th</sup> January	132	55p	£72.60
4	13 <sup>th</sup> January	145	55p	£79.75
5	14 <sup>th</sup> January	80	55p	
6	15 <sup>th</sup> January	127	55p	£69.85
7	16 <sup>th</sup> January	65	55p	£35.75
8				

- (a) The formula  $(C5 * D5)/100$  is entered in cell E5. What entry would appear in this cell? [1]
- (b) What formula would be entered in cell E8 to calculate the total expenses due for that week? [1]

9. Kenny has a gross salary of £189.40 per week. He pays income tax of £25.56 and National Insurance of £11.34. Calculate his net pay. [2]

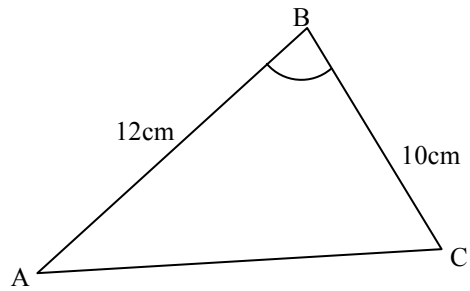
10.



A glass candle holder is in the shape of a cuboid with a cone removed. The cuboid measures 4 cm by 4 cm by 6 cm. The cone has a diameter of 3 cm and a height of 5 cm.

Calculate the volume of glass in the candle holder. [4]

11. The area of triangle ABC is  $51.4\text{cm}^2$ .  
AB = 12cm and BC = 10cm.

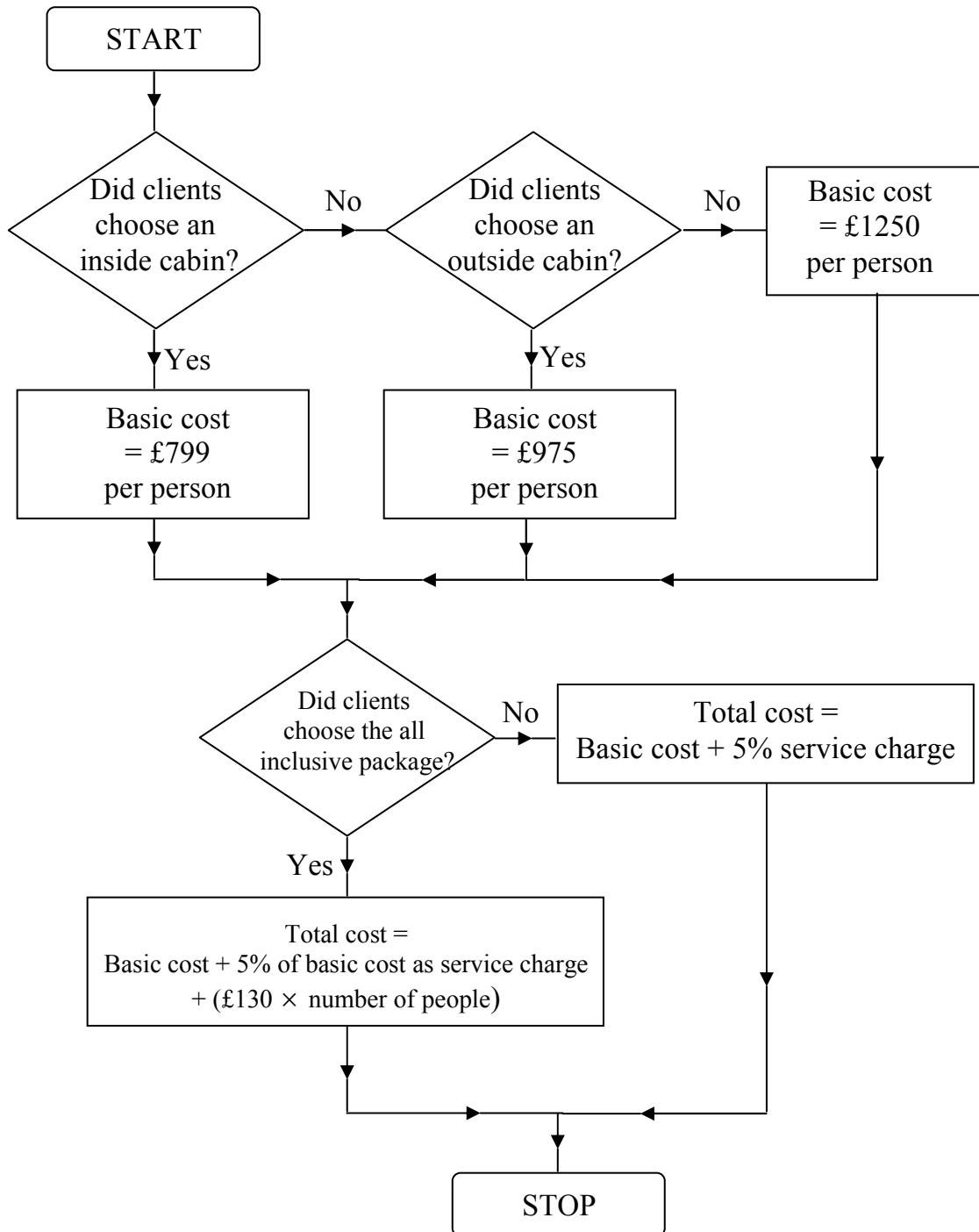


- (a) Calculate the size of the acute angle ABC. [2]
- (b) Hence, or otherwise, calculate the length of AC. [3]
12. Find the equation of the line which is parallel to the line with equation  $3y + 5x = 4$  and passes through the point (0, -3). [3]

13. The cost of a cruise depends on the type of cabin chosen. Clients booking a cruise are offered three cabin types to choose from: inside, outside or suite.

Clients can also choose an all inclusive package which covers the cost of drinks on board ship.

The flowchart below is used to calculate the cost of the cruise.



Use the flowchart to calculate the total cost of the cruise for 4 people who choose to have an outside cabin and the all inclusive package.

[4]