

ELGIN ACADEMY

Prelim Examination 2005 / 06

<p>MATHEMATICS National Qualifications - Intermediate 2 Maths 1, 2 and 3 Paper 2</p>
--

Time allowed - 1 hour 30 minutes

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.

1. Three years ago I bought a new car which cost £10 500.

The car depreciated in value by 20% during the first year and by 15% in subsequent years.

Calculate the value of my car after 3 years.

3

2. A group of students were asked to investigate the effect on the Ph value of adding a certain chemical to soil. They began by testing the Ph value of six samples taken from various regions in the country.

The results are given here:

4.2 3.9 5.5 4.9 6.1 2.4

The Mean Ph value for the sample is 4.5.

- (a) Calculate the Standard Deviation for these results.

3

- (b) After adding the chemical to the soil the mean Ph value was 4 and the Standard Deviation was 2.3

Comment on the effect of the chemical on the Ph value of the soil samples.

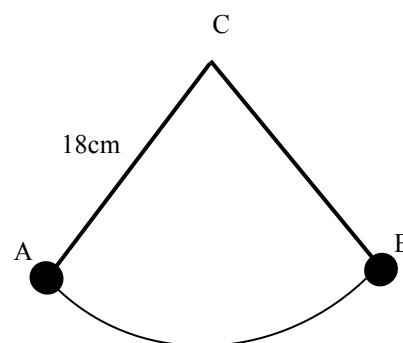
1

3. A pendulum travels along an arc of a circle, centre C.

The length of the pendulum is 18cm.

The pendulum swings from A to B

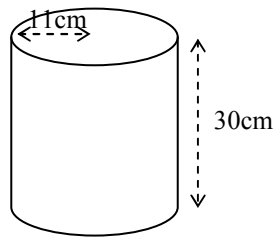
The length of the arc is 26.1cm.



Find the angle through which the pendulum swings from A to B

4

4. Pot pourri is packaged in large cylindrical containers of radius 11 cm and height 30 cm.

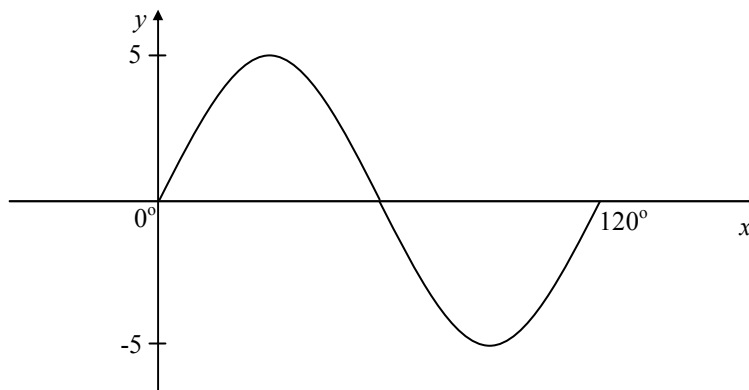


(a) Calculate the volume of one cylindrical container 2

For the Christmas Gift market the pot pourri is packaged into glass spheres.

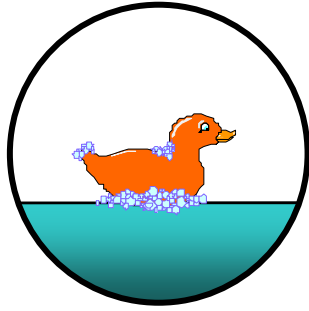
(b) How many spheres of radius 3.3 cm can be filled from one cylinder of pot pourri? 4

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



3

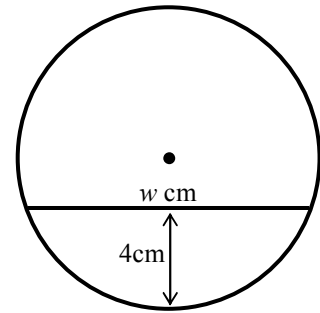
6. A child's toy is in the shape of a sphere with a duck and some water inside.



As the ball rolls around the water remains at the same level.

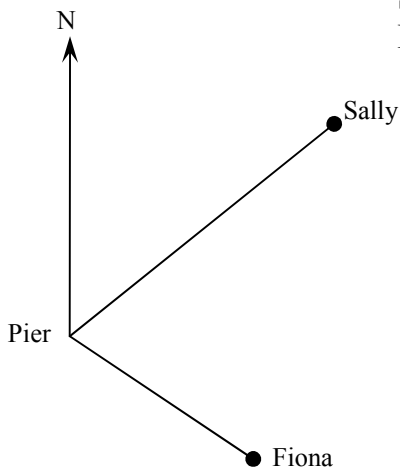
The diagram opposite shows the cross section when the sphere has been halved.

Given that the radius of the sphere is 6 cm and that the depth of the water is 4 cm, calculate the width of the water surface (w cm).



4

7. Fiona and Sally are going sea fishing. They both leave the pier at the same time.



Sally sets off on a bearing of 050° and travels 12 miles.
Fiona sets off on a bearing of 125° and travels 8.5 miles.

How far apart are the girls fishing?

4

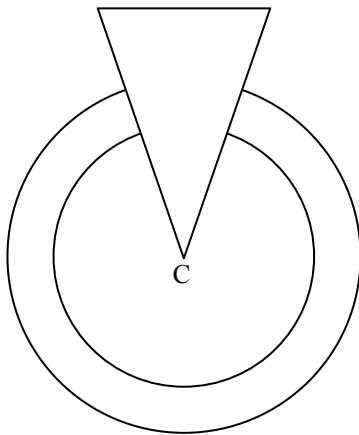
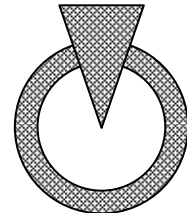
8. At a party, Peter bought 3 cans of cola and 2 bottle of orange juice costing a total of £2.55.
- (a) Taking the cost of a can of cola as 'x' pence and 'y' as the cost of a bottle of orange juice, write an equation to illustrate this. 1

Later Billy bought 2 cans of cola and 3 bottles of orange juice and was charged £2.70.

- (b) Construct a second equation to illustrate this. 1
- (c) Calculate the cost of a can of cola and the cost of a bottle of orange juice. 4

9. A charity produced this badge to promote itself in the community.

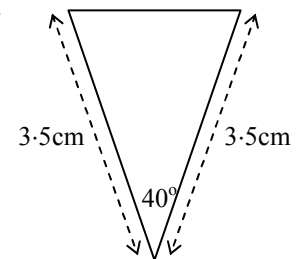
It is made up from a circular hoop of metal with an isosceles triangle set **into it** as shown in the diagram below.



C is the centre of the circular hoop.

The radii of the circles are 2.5cm and 3cm.

The dimensions of the isosceles triangle are as shown in this diagram.

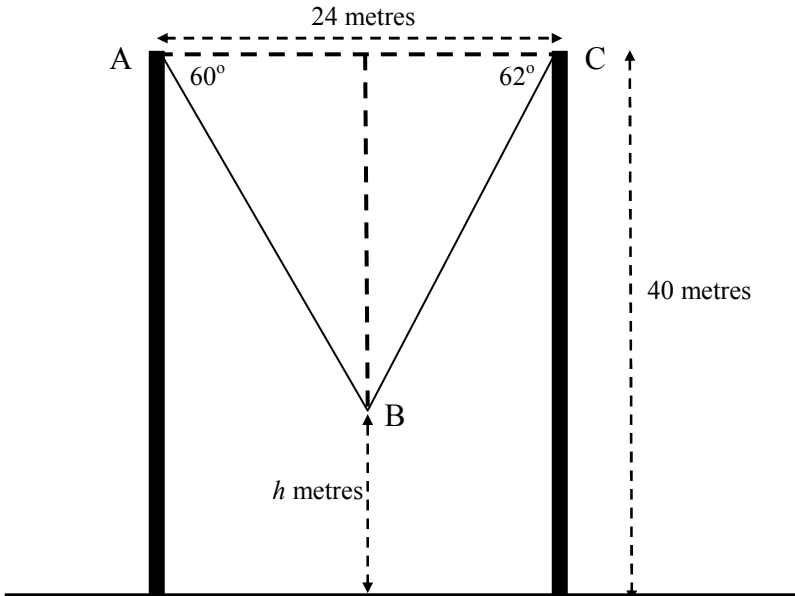


Calculate the area of metal required to make the badge.

7

10. The upright posts on a bungee jump are 24 metres apart and 40 metres high.

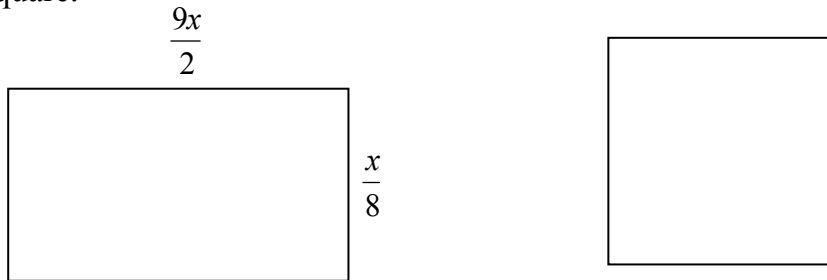
For one jump the initial fall was not exactly half way between the posts but made angles of depression of 60° and 62° with the horizontal as shown in the diagram.



Calculate how far from the ground (h metres) the bungee jumper will be after this initial fall.

6

11. Given that the square and the rectangle have the same area, find the length of a side of the square.



3

END OF QUESTION PAPER