GCSE Grade 8/9

Maths Booklet 7

Paper 2H
Calculator

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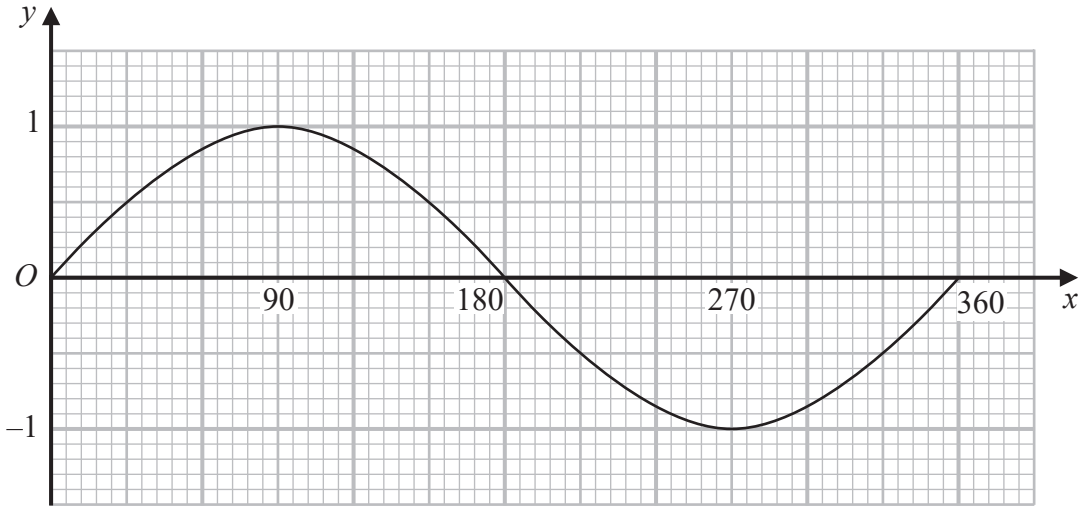
1 Here is a graph of $y = \sin x°$ for $0 \leqslant x \leqslant 360$



(a) Using this graph, find estimates of all **four** solutions of

$$\sin x° = 0.6 \quad \text{for } 0 \leqslant x \leqslant 720$$

.....

(2)

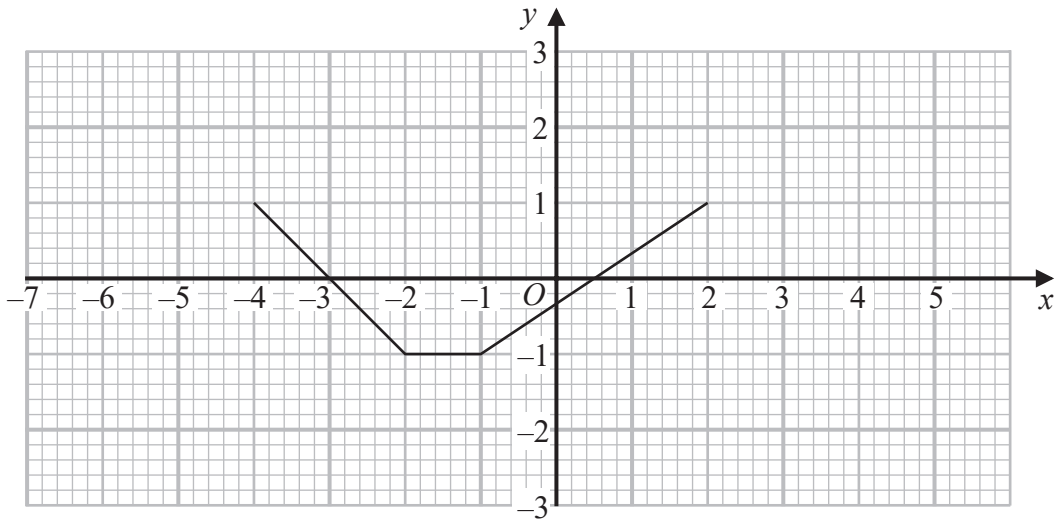
The graph of $y = \sin x°$ is reflected in the x-axis.

(b) Write down an equation of the reflected graph.

.....

(1)

Here is a graph of $y = f(x)$



(c) On the grid, draw the graph of $y = f(x – 2)$

(1)

(Total for Question 1 is 4 marks)

2 **A**, **B** and **C** are three spheres.

The volume of sphere **A** is $125\,cm^3$
The volume of sphere **B** is $27\,cm^3$

The ratio of the radius of sphere **B** to the radius of sphere **C** is 1 : 2

Work out the ratio of the surface area of sphere **A** to the surface area of sphere **C**.

.....

(Total for Question 2 is 3 marks)

3 In a village,

if it rains on one day, the probability that it will rain on the next day is 0.8
if it does **not** rain on one day, the probability that it will rain on the next day is 0.6

A weather forecaster says,

"There is a 70% chance that it will rain in the village on Monday."

Work out an estimate for the probability that it will rain in the village on Wednesday.
You must show all your working.

.....

(Total for Question 3 is 4 marks)

4 The time period, T seconds, of a simple pendulum of length l cm is given by the formula

$$T = 2\pi\sqrt{\frac{l}{g}}$$

Katie uses a simple pendulum in an experiment to find an estimate for the value of g.

Here are her results.

$l = 52.0$ correct to 3 significant figures.
$T = 1.45$ correct to 3 significant figures.

Work out the upper bound and the lower bound for the value of g.
Use $\pi = 3.142$
You must show all your working.

upper bound = ...

lower bound = ...

(Total for Question 4 is 4 marks)

5 p and q are two numbers such that $p > q$

When you subtract 5 from p and subtract 5 from q the answers are in the ratio 5 : 1
When you add 20 to p and add 20 to q the answers are in the ratio 5 : 2

Find the ratio $p : q$
Give your answer in its simplest form.

.....

(Total for Question 5 is 5 marks)

6 The straight line $\mathbf{L}_1$ passes through the points with coordinates (4, 6) and (12, 2)
The straight line $\mathbf{L}_2$ passes through the origin and has gradient -3

The lines $\mathbf{L}_1$ and $\mathbf{L}_2$ intersect at point P.

Find the coordinates of P.

(..... , ...)

(Total for Question 6 is 4 marks)

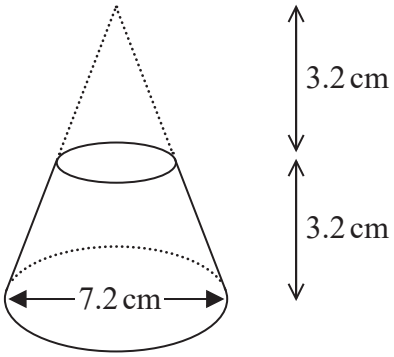
7 Solve $22 < \frac{m^2 + 7}{4} < 32$

Show all your working.

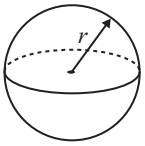
.....

(Total for Question 7 is 5 marks)

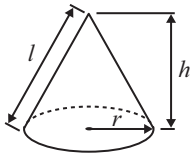
8 Here is a frustum of a cone.



Volume of sphere = $\frac{4}{3}\pi r^3$



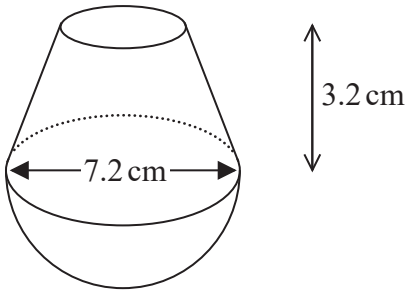
Volume of cone = $\frac{1}{3}\pi r^2 h$



The diagram shows that the frustum is made by removing a cone with height 3.2 cm from a solid cone with height 6.4 cm and base diameter 7.2 cm.

The frustum is joined to a solid hemisphere of diameter 7.2 cm to form the solid **S** shown below.

Solid **S**



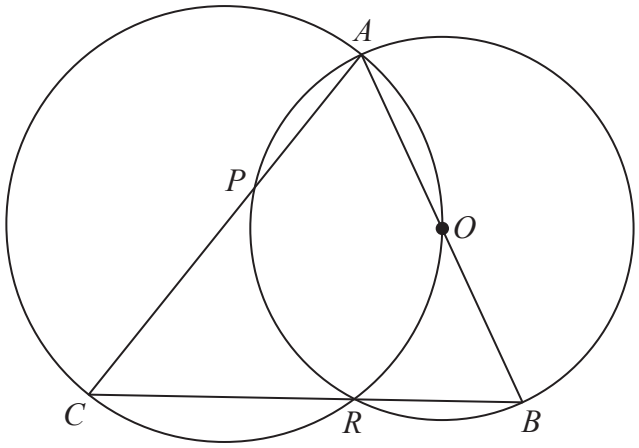
The density of the frustum is 2.4 g/cm^3
The density of the hemisphere is 4.8 g/cm^3

Calculate the average density of solid **S**.

.....g/cm^3

(Total for Question 8 is 5 marks)

9



A, *B*, *R* and *P* are four points on a circle with centre *O*.
A, *O*, *R* and *C* are four points on a different circle.
The two circles intersect at the points *A* and *R*.

CPA, *CRB* and *AOB* are straight lines.

Prove that angle *CAB* = angle *ABC*.

(Total for Question 9 is 4 marks)