Mock Grade 8/9

Maths Booklet 7

Paper 2H
Calculator

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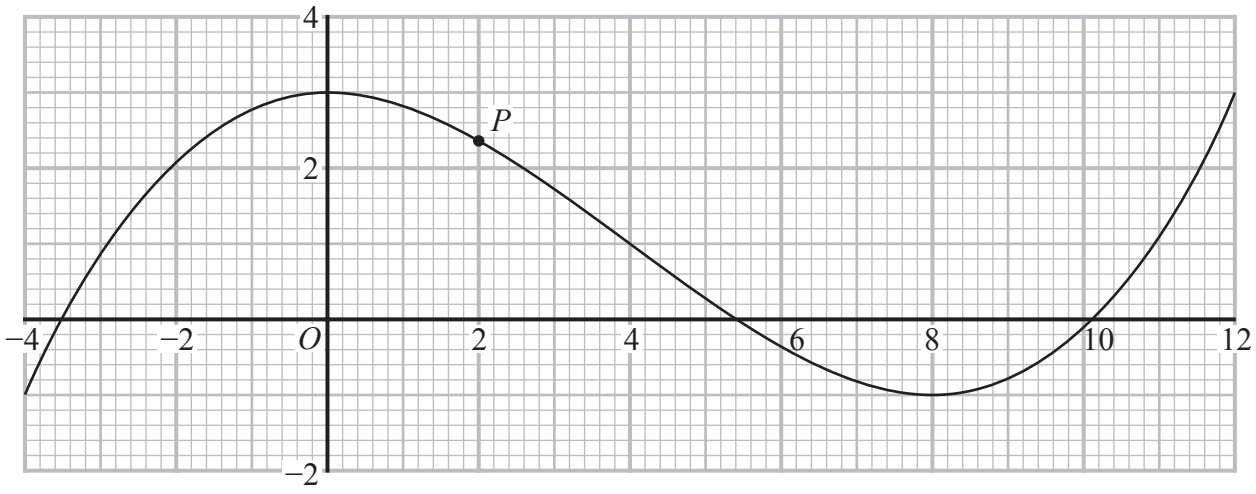
1 The diagram shows the graph of $y = f(x)$ for $-4 \leqslant x \leqslant 12$



The point P on the curve has x coordinate 2

(a) (i) Use the graph to find an estimate for the gradient of the curve at P.

.....

(3)

(ii) Hence find an equation of the tangent to the curve at P.
Give your answer in the form $y = mx + c$

.....

(2)

The equation $f(x) = k$ has exactly two different solutions for $-4 \leqslant x \leqslant 12$

(b) Use the graph to find the two possible values of k.

..... , ...

(2)

(Total for Question 1 is 7 marks)

2 The three solids **A**, **B** and **C** are similar such that

the surface area of **A** : the surface area of **B** = 4 : 9

and

the volume of **B** : the volume of **C** = 125 : 343

Work out the ratio

the height of **A** : the height of **C**

Give your ratio in its simplest form.

.....

(Total for Question 2 is 4 marks)

3 Jack plays a game with two fair spinners, **A** and **B**.

Spinner **A** can land on the number 2 or 3 or 5 or 7
Spinner **B** can land on the number 2 or 3 or 4 or 5 or 6

Jack spins both spinners.
He wins the game if one spinner lands on an odd number **and** the other spinner lands on an even number.

Jack plays the game twice.
Work out the probability that Jack wins the game both times.

.....

(Total for Question 3 is 4 marks)

4 $P = ef$

$e = 4.8$ correct to 2 significant figures.
$f = 0.26$ correct to 2 significant figures.

(a) Work out the lower bound for the value of P.
Show your working clearly.
Give your answer correct to 3 significant figures.

(2)

$$Q = \frac{t}{w}$$

$t = 2.73$ correct to 3 significant figures.
$w = 0.04$ correct to 1 significant figure.

(b) Work out the upper bound for the value of Q.
Show your working clearly.
Give your answer correct to 2 significant figures.

(2)

(Total for Question 4 is 4 marks)

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

When you subtract 20 from p and subtract 20 from q the answers are in the ratio $3 : 2$
When you add 45 to p and add 45 to q the answers are in the ratio $11 : 9$

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

.....

(Total for Question 5 is 5 marks)

6 ABC is an isosceles triangle with $AB = AC$.

B is the point with coordinates $(-1, 5)$
C is the point with coordinates $(2, 10)$
M is the midpoint of BC.

Find an equation of the line through the points A and M.
Give your answer in the form $py + qx = r$ where p, q and r are integers.

.....

(Total for Question 6 is 5 marks)

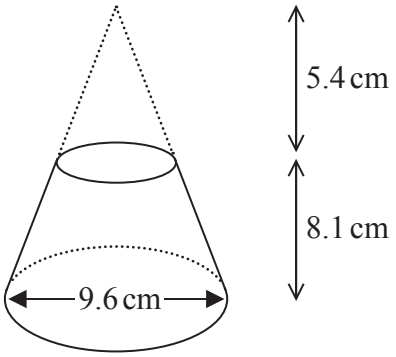
7 Solve $14 < \frac{m^2 + 6}{5} < 30$

Show all your working.

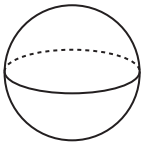
.....

(Total for Question 7 is 5 marks)

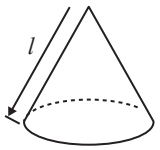
8 Here is a frustum of a cone.



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



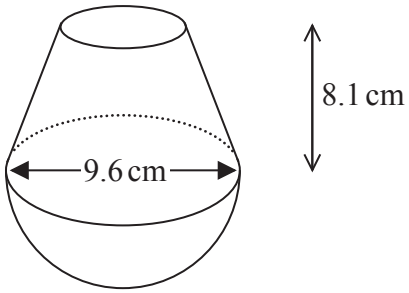
Volume of cone = $\frac{1}{3}\pi r^2 h$



The diagram shows that the frustum is made by removing a cone with height 5.4 cm from a solid cone with height 13.5 cm and base diameter 9.6 cm.

The frustum is joined to a solid hemisphere of diameter 9.6 cm to form the solid **S** shown below.

Solid **S**



The density of the frustum is 3.2 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

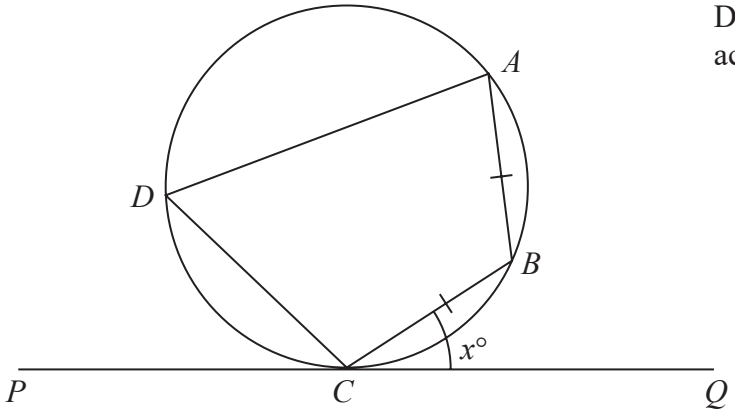


Diagram **NOT** accurately drawn

A, B, C and D are points on a circle.
PCQ is a tangent to the circle.
$AB = CB$.

Angle $BCQ = x°$

Prove that angle $CDA = 2x°$
Give reasons for each stage in your working.

(Total for Question 9 is 4 marks)