# Mock Grade 8/9

# Maths Booklet 1

Paper 3H
Calculator

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**1** Kaidan and Sonja went on two different car journeys.

For Kaidan's journey
distance = 80 km correct to the nearest 5 km
time = 2.7 hours correct to 1 decimal place

For Sonja's journey
distance = 33 km correct to 2 significant figures
time = 1 hour correct to the nearest 0.1 hour

Kaidan says,
"My average speed could have been greater than Sonja's average speed."

By considering bounds, show that Kaidan is correct.
Show your working clearly.

**(Total for Question 1 is 4 marks)**

**2**

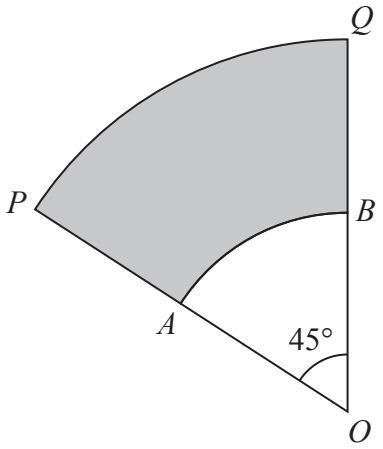



Diagram **NOT** accurately drawn

*OPQ* is a sector of a circle, centre *O*
*OAB* is a sector of a circle, centre *O*

*A* is the point on *OP* such that $OA : AP = 3 : 2$
*B* is the point on *OQ* such that $OB : BQ = 3 : 2$
Angle $POQ = 45°$

The area of the shaded region is $\frac{81}{2}\pi$ cm$^2$

Work out the perimeter of the shaded region.
Give your answer in terms of $\pi$.

cm

**(Total for Question 2 is 6 marks)**

**3** (a) Solve $\frac{4-3x}{5} - \frac{3x-5}{2} = -3$

Show clear algebraic working.

$x =$ .....

**(3)**

(b) Solve the inequality $5y^2 - 17y \leqslant 40$

.....

**(3)**

**(Total for Question 3 is 6 marks)**

**4** The curve with equation $y = f(x)$ has one turning point.

The coordinates of this turning point are $(-6, -4)$

(a) Write down the coordinates of the turning point on the curve with equation

(i) $y = f(x) + 5$

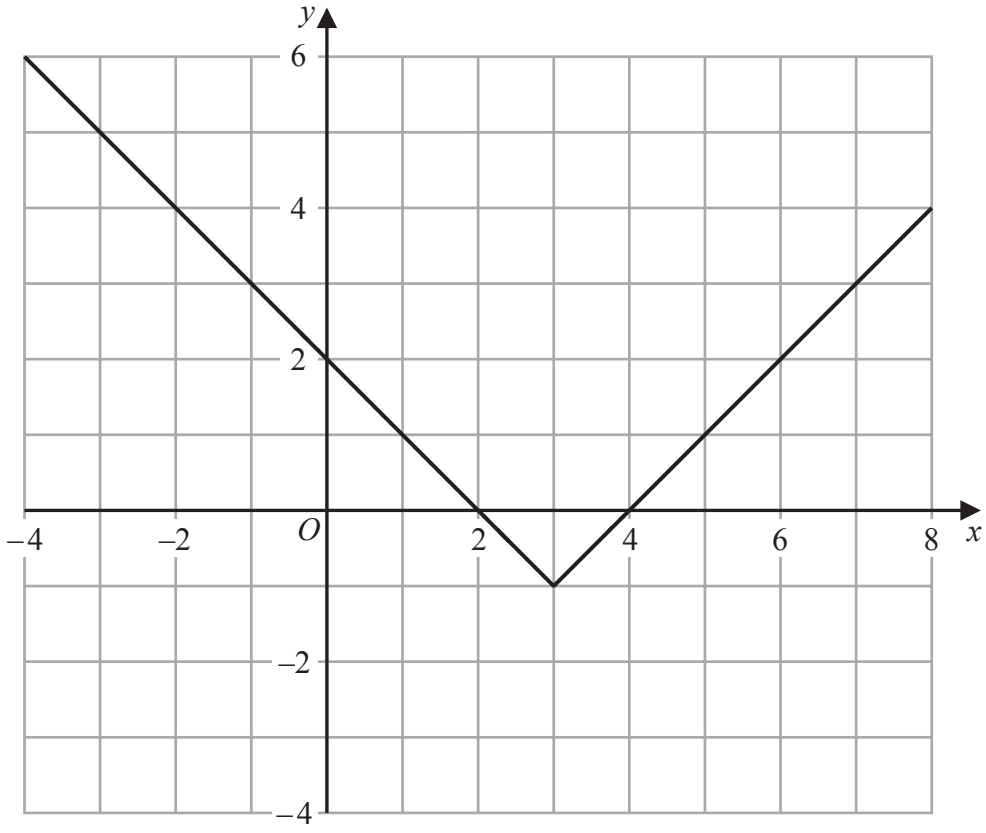
(.....,.....)

(ii) $y = f(3x)$

(.....,.....)

**(2)**

The graph of $y = g(x)$ is shown on the grid below.




(b) On the grid, sketch the graph of $y = 2g(x)$ for $-1 \leqslant x \leqslant 7$

**(2)**

The graph of $y = h(x)$ intersects the $x$-axis at two points.
The coordinates of the two points are $(-1, 0)$ and $(6, 0)$

The graph of $y = h(x + a)$ passes through the point with coordinates $(2, 0)$, where $a$ is a constant.

(c) Find the two possible values of $a$

..... , .....

**(2)**

**(Total for Question 4 is 6 marks)**

**5** (a) Show that $(2x + 3)(x + 4)(3x + 1)$ can be written in the form $ax^3 + bx^2 + cx + d$ where $a$, $b$, $c$ and $d$ are integers.

**(3)**

(b) Solve $(1 - x)^2 < \frac{16}{9}$

**(3)**

**(Total for Question 5 is 6 marks)**

**6** $P = ef$

$e = 4.8$ 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 6 is 4 marks)**

**7** Solve algebraically the simultaneous equations

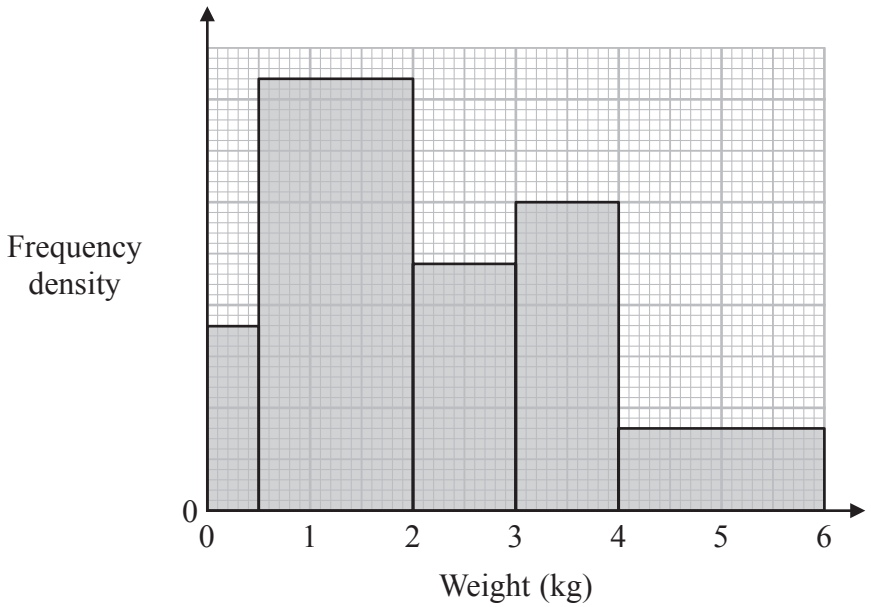
$$3xy - y^2 = 8$$
$$x - 2y = 1$$

.....

**(Total for Question 7 is 5 marks)**

**8** A postman records the weight of each parcel that he delivers.

The histogram shows information about the weights of all the parcels that the postman delivered last Monday. No parcels weighed more than 6 kg.




63 of the parcels that the postman delivered last Monday each had a weight between 0.5 kg and 2 kg.

(a) Work out the total number of parcels the postman delivered last Monday.

.....

**(3)**

The postman picks at random two of the records of the parcels he delivered last Monday.

(b) Work out an estimate for the probability that each parcel weighed more than 2.25 kg.

.....

**(3)**

**(Total for Question 15 is 6 marks)**

**9** $A$, $B$ and $C$ are points on a circle with centre $O$.

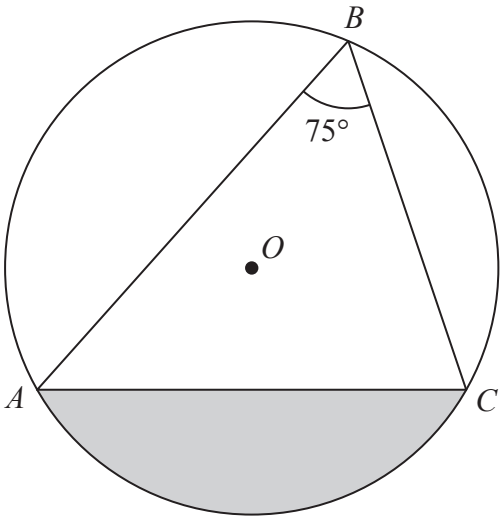



Diagram **NOT** accurately drawn

Angle $ABC = 75°$

The area of the shaded segment is $200\,\text{cm}^2$

Calculate the radius of the circle.
Give your answer correct to 3 significant figures.

..... cm

**(Total for Question 9 is 5 marks)**

**10** A boat sails from point $X$ to point $Y$ and then to point $Z$.

$Y$ is on a bearing of 280° from $X$.
$Z$ is on a bearing of 220° from $Y$.

The distance from $X$ to $Y$ is 3.5 km.
The distance from $Y$ to $Z$ is 6 km.

Work out the bearing of $Z$ from $X$.
Give your answer correct to 1 decimal place.

.....°

**(Total for Question 10 is 5 marks)**