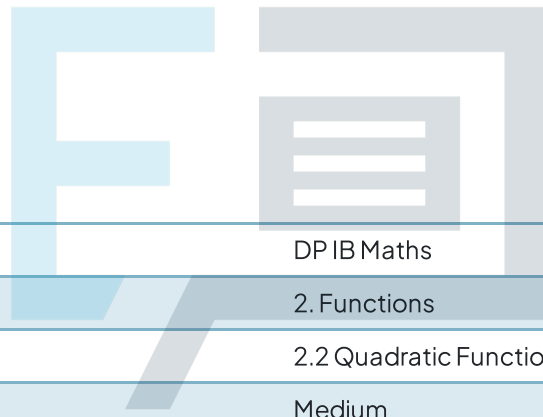




2.2 Quadratic Functions & Graphs

Question Paper



Course	DP IB Maths
Section	2. Functions
Topic	2.2 Quadratic Functions & Graphs
Difficulty	Medium

Exam Papers Practice

To be used by all students preparing for DP IB Maths AA SL
Students of other boards may also find this useful

Question 1a

The curve C has equation $y = x^2 - 3x + 2$.

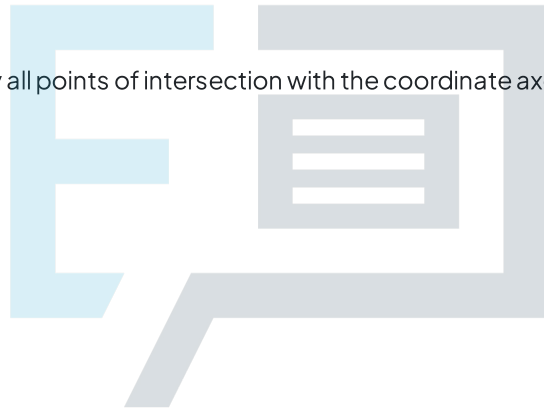
Find the coordinates of any points where C intersects the coordinate axes.

[3 marks]

Question 1b

Sketch the graph of C , showing clearly all points of intersection with the coordinate axes.

[3 marks]



Exam Papers Practice

Question 2a

Write the quadratic function $y = x^2 + 8x - 9$ in the form $y = a(x + b)^2 + c$ where a , b and c are integers to be found.

[2 marks]

Question 2b

Write down the minimum point on the graph of $y = x^2 + 8x - 9$.

[1 mark]

Question 2c

Sketch the graph of $y = x^2 + 8x - 9$, clearly labelling the minimum point and any point where the graph intersects the coordinate axes.

[3 marks]

Question 3a

Solve the equation $2x^2 + x - 6 = 0$.

[2 marks]

Question 3b

Find the coordinates of the turning point on the graph of $y = 2x^2 + x - 6$.

[3 marks]

Question 3c

Sketch the graph of $y = 2x^2 + x - 6$, labelling the turning point and any points where the graph crosses the coordinate axes.

[2 marks]

Question 4a

Find the minimum value of the function $f(x) = x^2 + 4x + 5$.

[3 marks]

Question 4b

Hence, or otherwise, prove that the function $f(x) = x^2 + 4x + 5$ has no real roots.

[2 marks]



Exam Papers Practice

Question 5

The function $f(x) = kx^2 + 2kx - 3$ has two distinct real roots.

Show that $k < -3$ or $k > 0$.

[3 marks]

Question 6

The equation $2x^2 - 4x + 3 - 2k = 0$ has real roots.

Find the possible values of k .

[3 marks]

Question 7

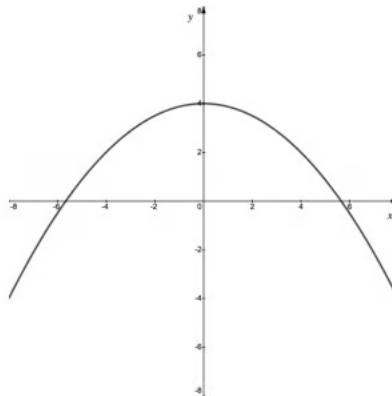
The equation $y = x^2 + px + q$ has no real roots. Show that $p^2 < 4q$.

[2 marks]

Question 8a

The graph below shows the curve $f(x) = 4 - \frac{x^2}{8}$.

The curve is to be used as the model for the arch on a bridge where the water level under the bridge is represented by the x -axis. All measurements are in meters.



Write down the maximum height of the bridge above the water.

[1 mark]

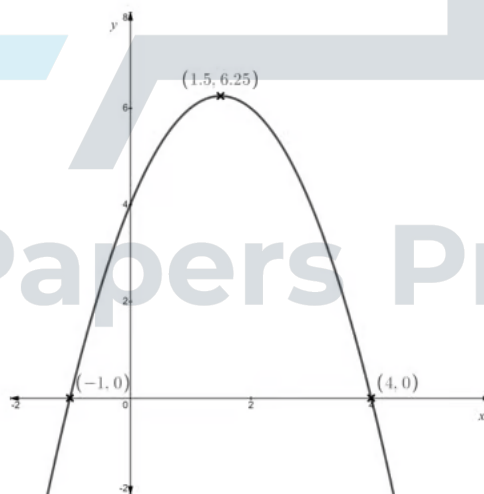
Question 8b

Is the bridge wide enough to span a river of width 11 m?

[3 marks]

Question 9a

The diagram below shows the graph of $y = f(x)$, where $f(x)$ is a quadratic function. The intercepts with the x -axis and the turning point have been labelled.



Write down the equation of the axis of symmetry for the graph of $y = f(x)$.

[1 mark]

Question 9b

The function $f(x)$ can be written in the form of $f(x) = a(x - h)^2 + k$. Find the values of a , h and k .

[3 marks]

Question 10

Solve the equation $x^4 - 13x^2 + 36 = 0$.

[3 marks]



Question 11

Solve $x^{\frac{2}{5}} + x^{\frac{1}{5}} = 6$.

Exam Papers Practice [4 marks]

Question 12a

Let $f(x) = 2px^2 + (2p - 5)x + p - \frac{5}{2}$, for $x \in \mathbb{R}$ where $p \in \mathbb{Q}$.

Show that the discriminant of f is $-4p^2 + 25$.

[3 marks]

Question 12b

Find the values of p so that the function $f(x)$ has two **distinct** roots.

[3 marks]



Exam Papers Practice