

IB Maths: AA HL

Quadratic Functions & Graphs

Topic Questions

These practice questions can be used by students and teachers and is Suitable for IB Maths AA HL Topic Questions

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

Level: IB Maths

Subject: IB Maths AA HL

Board: IB Maths

Topic: Quadratic Functions & Graphs

Question 1a

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

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

[3 marks]

Question 1b

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

[3 marks]

Question 2a

(a) 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

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

[1 mark]

Question 2c

(c) 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

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

[2 marks]

Question 3b

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

[3 marks]

Question 3c

(c) 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

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

[3 marks]

Question 4b

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

[2 marks]

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

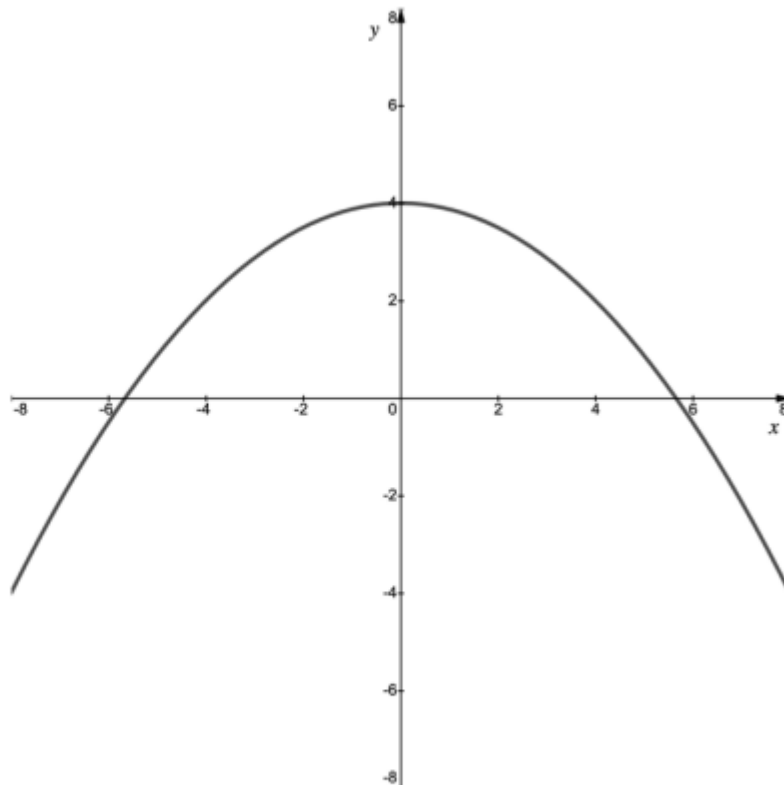
The equation $y = x^2 + px + q$ has no real roots. Show that $p^2 < 4q$.

[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.



(a) Write down the maximum height of the bridge above the water.

[1 mark]

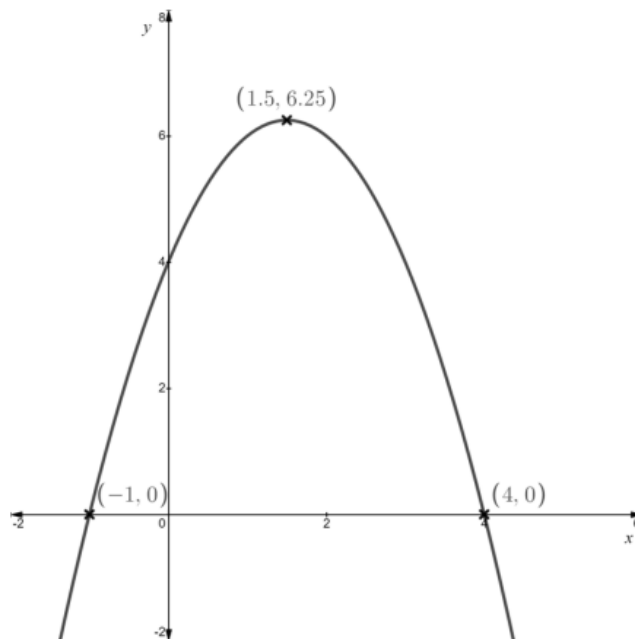
Question 8b

(b) Show that the bridge is wide enough to span a river of width 11m.

[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.



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

[1 mark]

Question 9b

(b) 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 $x^{\frac{2}{5}} + x^{\frac{1}{5}} = 6$.

[4 marks]

Question 12a

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

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

[3 marks]

Question 12b

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

[3 marks]