

IB Maths: AA HL

Further 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 Further Functions & Graphs
Difficulty	Medium

Level: IB Maths

Subject: IB Maths AA HL

Board: IB Maths

Topic: Further Functions & Graphs

Question 1

A function is defined by $f(x) = 54x - 13$, $-2 < x < 20$.

(a) Find the value of $f\left(\frac{5}{2}\right)$.

[1 mark]

(b) Write down the range of $f(x)$.

[2 marks]

(c) Find the value of $f^{-1}(122)$.

[2 marks]

(d) Write down the range of the inverse function.

[1 mark]

Question 2

Consider the function $f(x) = -6x - 3$. The domain of $f(x)$ is $-5 \leq x \leq 3$.

(a) Find

(i) $f(2)$

(ii) x when $f(x) = 15$.

[2 marks]

(b) Find the range of $f(x)$.

[3 marks]

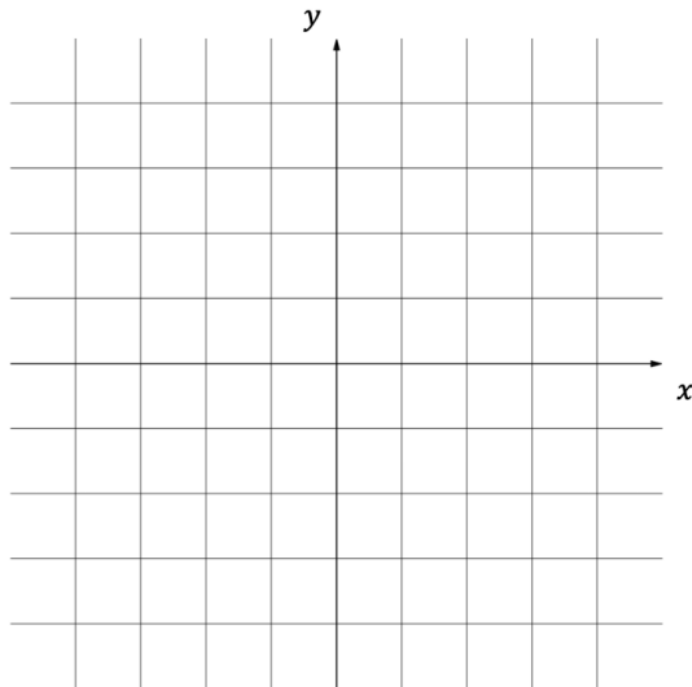
(c) Write down the domain of the inverse function.

[1 mark]

Question 3

Consider the function $g(x) = \sqrt{4 - x}$.

(a) Sketch the graph of the function $g(x)$, labelling the x and y intercepts.



[3 marks]

(b) Find

(i) $g(-5)$

(ii) x when $g(x) = \frac{1}{2}$.

[2 marks]

(c) Find

(i) the maximum possible domain of the function $g(x)$

(ii) the range of the function $g(x)$ that corresponds to the domain found in part (c) (i).

[2 marks]

Question 4

Consider the functions $f(x) = -x^5 + 2020$ and $g(x) = \frac{1}{\sqrt{(1-x)^3}} - 2$.

(a) Find the coordinates of the y -intercepts for the graph of

(i) f

(ii) g .

[2 marks]

(b) Find the coordinates of the x -intercepts for the graph of

(i) f

(ii) g .

[2 marks]

(c) For the graph of g , find the equation of

(i) the vertical asymptote

(ii) the horizontal asymptote.

[3 marks]

Question 5

Consider the functions $f(x) = x^{-4} - 2021$ and $g(x) = 2 - \sqrt{x-1}$.

(a) Find the maximum possible domain and range of g .

[2 marks]

(b) For the graph of f , find the equation of

(i) the vertical asymptote

(ii) the horizontal asymptote.

(c) Find the coordinates of the x -intercepts for the graph of

(i) f

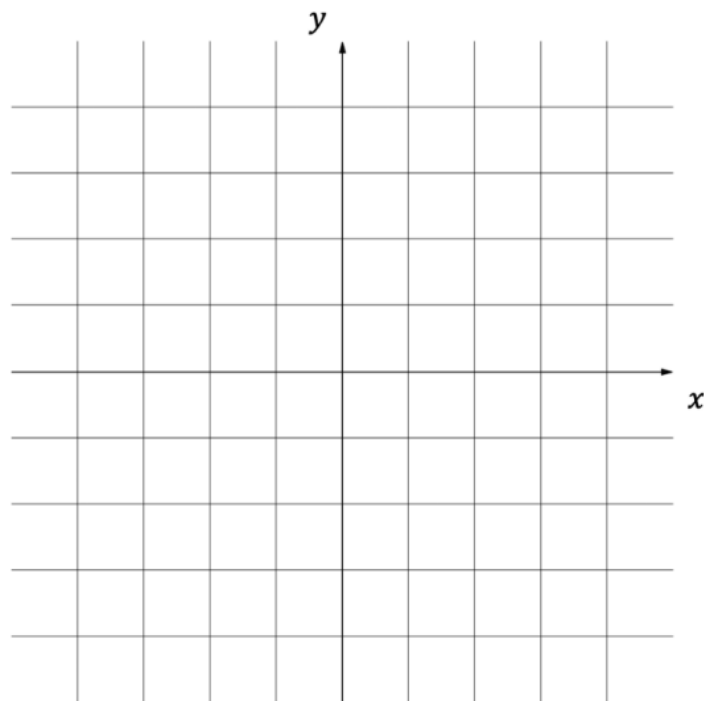
(ii) g .

[2 marks]

Question 6

Consider the functions $f(x) = -x^2 - x + 6$ and $g(x) = (2x + 1)^2 - 9$.

(a) Sketch the graphs of the functions $f(x)$ and $g(x)$ and label the coordinates of the vertices for both functions.



[4 marks]

(b) Find the coordinates for the points of intersection of $f(x)$ and $g(x)$.

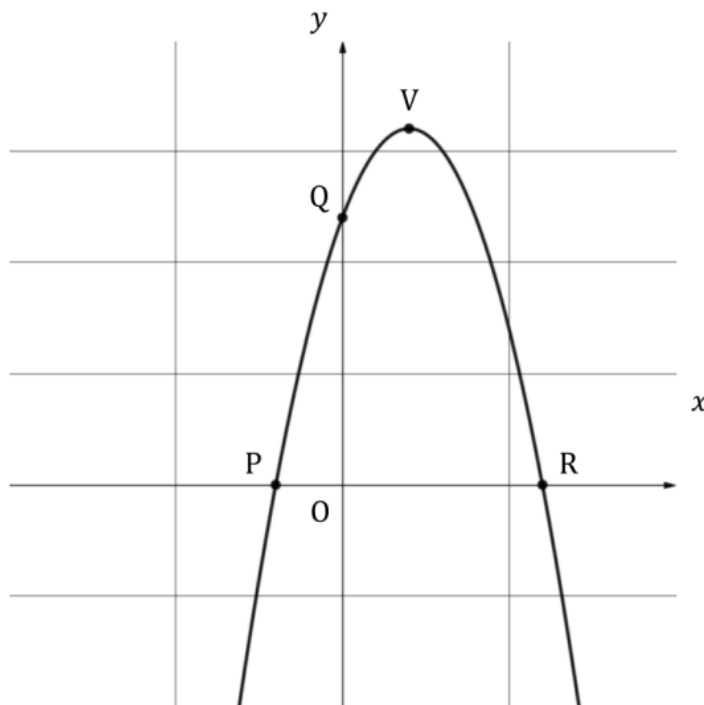
[2 marks]

(c) Find the x -intercepts of $f(x)$ and $g(x)$.

[2 marks]

Question 7

The diagram below shows part of the graph of the function $f(x) = -x^2 + bx + c$, where b and c are both integers. Points $P(-2, 0)$ and $R(6, 0)$ represent the x -intercepts, point $Q(0, 12)$ represents the y -intercept, point V represents the vertex of the graph of f and O represents the origin $(0, 0)$.



(a) Write down the value of c .

[1 mark]

(b) Find the value of b and write down $f(x)$.

[3 marks]

(c) Write down the coordinates of V.

[2 marks]

Question 8

The function $g(x) = ax^2 + bx + c$ intercepts the y -axis at -16 , has an x -intercept when $x = -4$ and can be obtained by an appropriate translation of the graph $y = 2x^2$.

(a) (i) Find the values of a , b and c .

(ii) Write down $g(x)$.

[4 marks]

(b) Find the other x -intercept of $g(x)$.

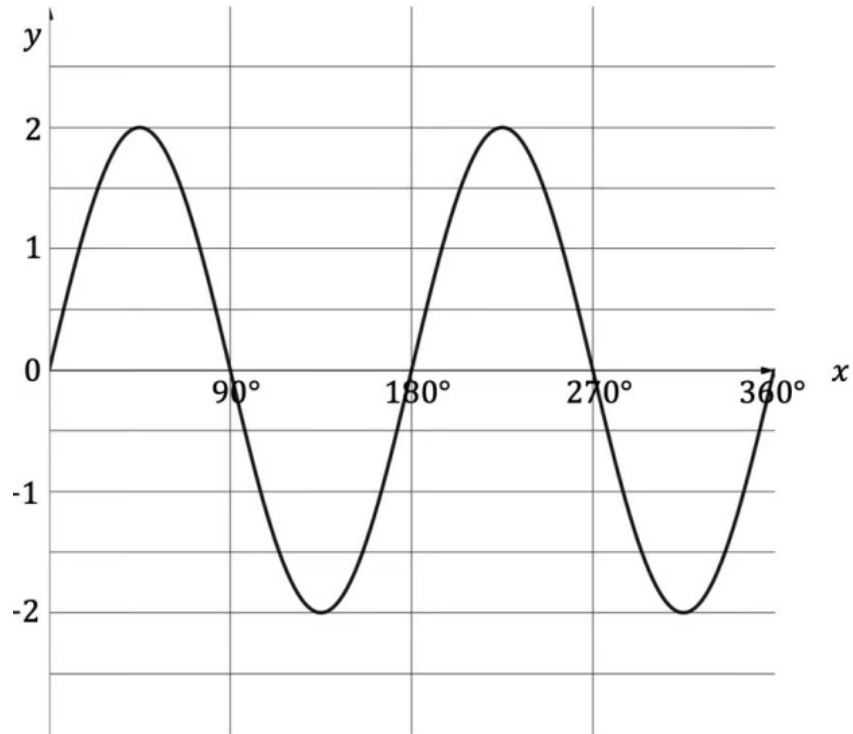
[1 mark]

(c) Write down the coordinates of the vertex of $g(x)$.

[2 marks]

Question 9

The diagram below shows the graph of the function $f(x) = 2 \sin(2x)$ for $0^\circ \leq x \leq 360^\circ$.



(a) State the amplitude of $f(x)$.

[1 mark]

(b) Calculate the period of $f(x)$.

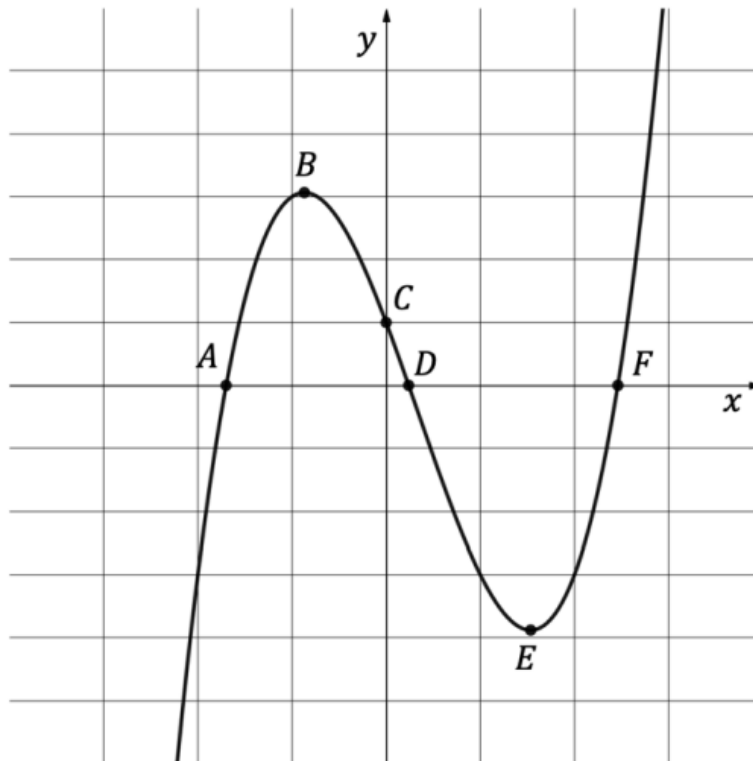
[2 marks]

(c) Find the possible values of x when $f(x) = -1$.

[4 marks]

Question 10

The diagram below shows part of the graph of the function $f(x) = x^3 - x^2 - 4x + 1$.



(a) Points A , C , D and F represent where the graph of f intersects the coordinate axes, write down the coordinates for

- (i) A
- (ii) C
- (iii) D
- (iv) F .

[4 marks]

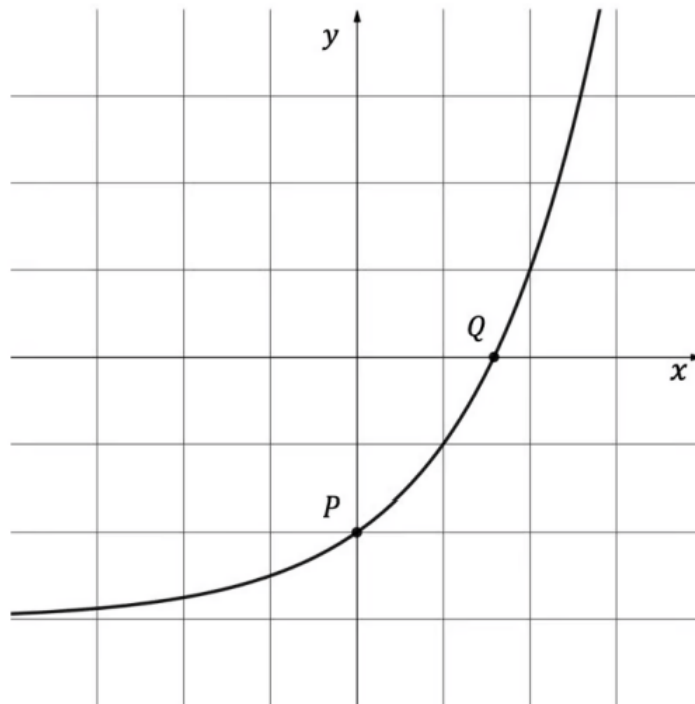
(b) Points B and E represent the local maximum and minimum respectively for $f(x)$, write down the coordinates for

- (i) B
- (ii) E .

[2 marks]

Question 11

The diagram below shows part of the graph of the function $f(x) = 2^x - 3$.



(a) Find

- (i) $f(2)$
- (ii) x when $f(x) = -1$.

[2 marks]

(b) The point P represents the y -intercept of $f(x)$. Write down the coordinates of P.

[1 mark]

(c) The point Q represents the x -intercept of $f(x)$. Write down the coordinates of Q.

[1 mark]

(d) (i) Draw the line $y = -3$ on the graph above.

(ii) Write down the number of solutions to the equation $f(x) = -3$.

[2 marks]