

# IB Maths: AA HL

## Inequalities

### 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	2.8 Inequalities
Difficulty	Medium

**Level: IB Maths**

**Subject: IB Maths AA HL**

**Board: IB Maths**

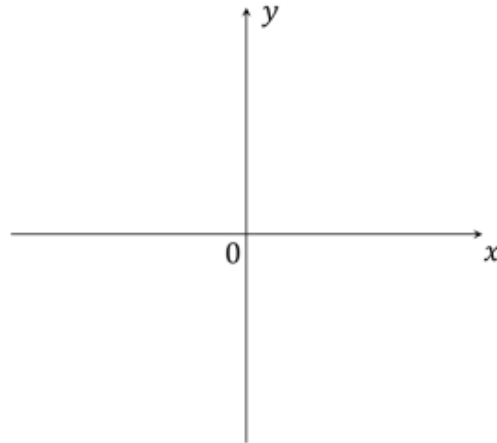
**Topic: Inequalities**

## Question 1

Consider the functions  $f(x) = 3x^2 + x - 2$  and  $g(x) = -2x^2 + 3x + 5$ .

a)

Sketch the graph of the function  $f(x)$  on the axes provided, labelling the vertex as well as the  $x$ - and  $y$ -intercepts.



[3 marks]

b)

Solve the inequality  $f(x) < g(x)$ .

[4 marks]

## Question 2

Solve the inequality  $5x^2 - 8x - 48 \geq 2x^2 + 4x - 12$ .

[4 marks]

## Question 3

Consider the inequality  $\frac{x^2 - 3x - 10}{x - 1} < 0$ .

a)

Explain why you need to consider the cases  $x < 1$ ,  $x = 1$  and  $x > 1$  separately when rearranging the inequality to find a solution.

[2 marks]

b)

Solve the inequality.

[5 marks]

### Question 4

The functions are defined such that  $f(x) = \frac{x+4}{2x-1}$  and  $g(x) = 2x - 4$ .

Given that  $f$  has the largest possible valid domain,

a)

State the domain and range of  $f$ .

[2 marks]

b)

Solve the inequality  $f(x) \leq g(x)$ .

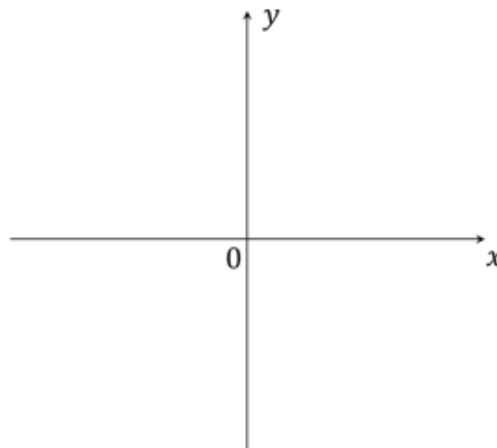
[4 marks]

### Question 5

Consider the function  $f(x) = -2 \sin x$  in the interval  $-2\pi \leq x \leq 2\pi$ .

a)

Sketch a graph of the function over the given interval on the axes provided, labelling all  $x$ -intercepts as well as local minima and maxima.



[3 marks]

b)

Solve the inequality  $f(x) > 1$ .

[4 marks]

### Question 6

Solve the inequality  $\frac{3x-2}{5} + 3 > \frac{4x-4}{5}$

[4 marks]

### Question 7

Consider the functions  $f(x) = x^2 - 9 + \frac{4}{x}$  and  $g(x) = -x + 5$ .

a)

Sketch the graphs of  $f(x)$  and  $g(x)$ , clearly labelling any points of intersection or asymptotes.

[4 marks]

b)

Determine the values of  $x$  such that  $f(x) \geq g(x)$ .

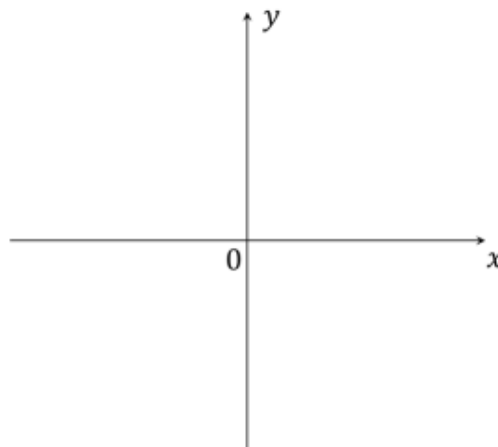
[3 marks]

### Question 8

Consider two functions,  $f(x) = \ln(x+3) + 4$  and  $g(x) = e^{x-3}$ .

a)

Sketch both functions on the axes below, clearly labelling the asymptotes and points of intersection.



[4 marks]

b)  
Hence or otherwise, solve the inequality  $f(x) \geq g(x)$ .

[2 marks]

### Question 9

Consider the polynomial  $q(x) = x^3 - 8x^2 + 19x - 12$ .

a)  
Given that  $(x - 4)$  is a factor of  $q(x)$ , determine the  $x$ -intercepts of  $q(x)$ .

[4 marks]

b)  
Hence or otherwise, solve the inequality  $x^3 + 19x \leq 8x^2 + 12$ .

[3 marks]

### Question 10

Consider the two functions  $f(x) = 2 \sin 2x$  and  $g(x) = \cos x$ , both having the domain  $0 \leq x \leq 2\pi$ .  
Solve the inequality  $f(x) \geq g(x)$ .

[3 marks]