

Solving quadratic inequalities

Thursday, 22 February 2018 8:37 pm

★ Work to be completed by the end of the lesson:

Methods 1 and 2 textbook
Exercise 3G
Questions 1cd, 2bcd, 4djkil, 5def

RECAP

What is an inequality?
It's a way of describing a set of values.

Examples; $x > 0$ or $x \leq 2$ or $3 \leq x < 10$

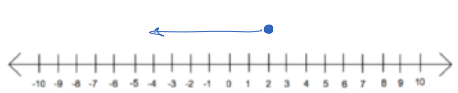
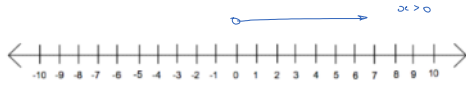
$$5 \leq x < 10$$

$$4x = 12$$

$$x = 3$$

These are all valid ways of using inequalities.

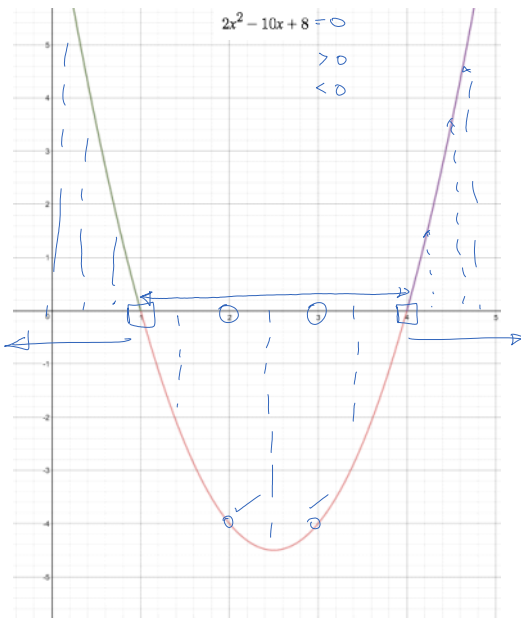
Inequalities on Number Lines:



Remember that the coloured in or plain circles are really important!

What's a quadratic inequality?

Look at the following graph.
How could we describe the section shown in red?



$$2x^2 - 10x + 8 = 0$$

$$x^2 - 5x + 4 = 0$$

$$x^2 - x - 4x + 4 = 0$$

$$x(x-1) - 4(x-1) = 0$$

$$(x-4)(x-1) = 0$$

$$x = 4 \text{ or } x = 1$$

$$2x^2 - 10x + 8 < 0$$

$$1 < x < 4 \quad y < 0$$

$$2x^2 - 10x + 8 > 0$$

$$x > 4 \text{ or } x < 1$$

$$y = 2x^2 - 10x + 8$$

$$y = 2$$

$$2x^2 - 10x + 8 = 2$$

$$2x^2 - 10x + 6 = 0$$

$$x = 4 \text{ or } x = 1$$

A **Quadratic Inequality** is basically a way to describe sections of the graph which fall above and below the x-axis.

How to draw a quadratic inequality

Example: Solve the function $(x-3)(x+2) \geq 0$

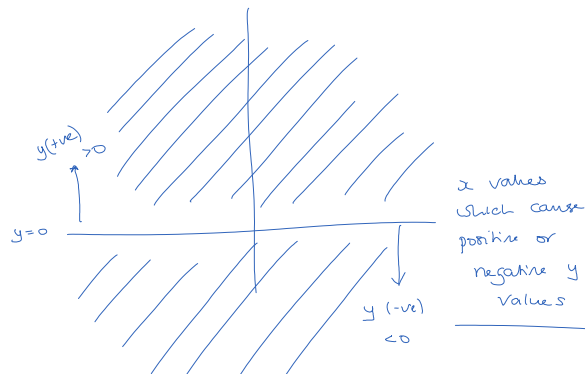
1. Solve the equation $(x-3)(x+2) = 0$

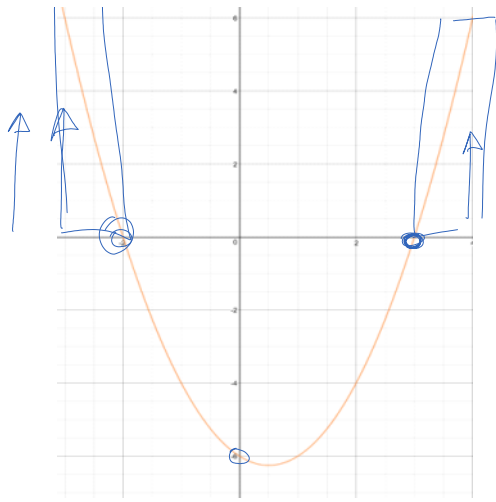
$$x = 3 \text{ or } x = -2$$

Find the y-axis intercept:

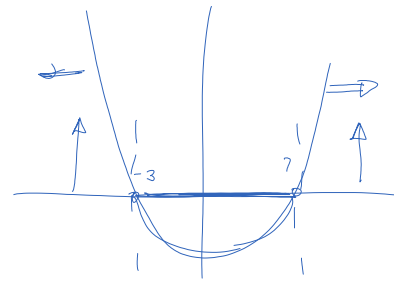
$$(0-3)(0+2) = -3 \times 2 = -6$$

2. Sketch the graph of the equation:



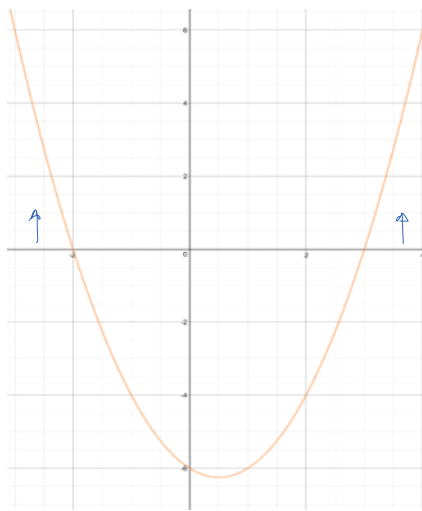


≥ 0 (+ve)
 x values
 $x > 3$ or $x < -2$



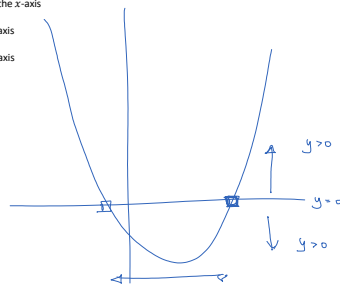
≥ 0
 ≤ 0
 $-3 \leq x \leq 7$
 $x > 7$ or $x < -3$

3. Use the graph to determine the set of x-values which satisfy the inequality



Short cuts

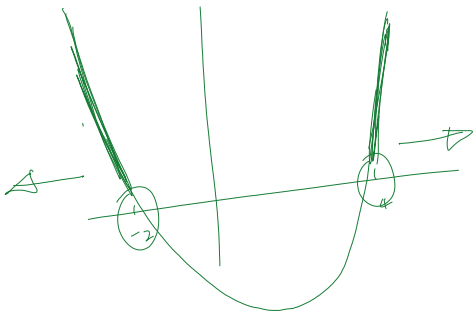
- ✓ When you are looking the points which > 0 you are looking for the points which lie above the x-axis but do not lie on the x-axis
- ✓ When you are looking the points which < 0 you are looking for the points which lie below the x-axis but do not lie on the x-axis
- When you are looking the points which ≥ 0 you are looking for the points which lie above the x-axis AND lie on the x-axis
- When you are looking the points which ≤ 0 you are looking for the points which lie below the x-axis AND lie on the x-axis



1

$$x^2 - 2x - 8 = 0$$

$$x = -2 \quad x = 4$$



$x^2 - 2x - 8 \leq 0$ (negative y)

$x^2 - 2x - 8 \geq 0$ (positive y)

$x \geq 4$ or $x \leq -2$

$$\underline{\underline{-2 \leq x \leq 4}}$$