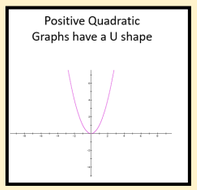
Unit 15: Equations and Graphs

Plotting Quadratic Graphs

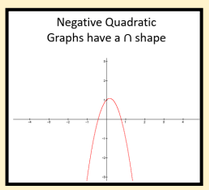
Quadratic Graphs

Quadratic graphs are curved and symmetrical

Positive Quadratic Graphs have a U shape

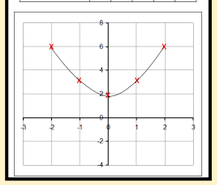


Negative Quadratic Graphs have a ∩ shape

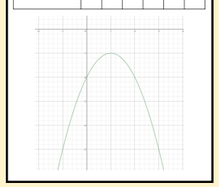


When you square a negative number the answer is always positive

x	-2	-1	0	1	2
$y = x^2 + 2$	6	3	2	3	6



	-2	-1	0	1	2	3
$y = -x^2 + 2x - 2$	-10	-5	-2	-1	-2	-5



Finding the roots of a Quadratic Graph

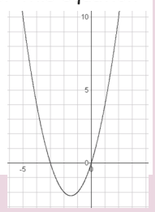
To find the roots of a graph we factorise

Find the roots for this equation

$x^2 + 3x = 0$

$x(x + 3) = 0$

$x = 0$ *or* $x = -3$



Steps:

1) Set the equation equal to 0
2) Factorise
3) Solve for x

Finding the turning points of a Quadratic Graph

Find the turning point for the equation

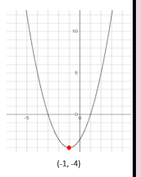
$y = x^2 + 2x - 3$

Will the graph have a minimum or a maximum turning point?

Minimum

What are the coordinates of the turning point?

$(x + 1)^2 - 4$



To find a maximum or minimum point you complete the square

Solving simultaneous equations by using the graph

The diagram shows the graphs of

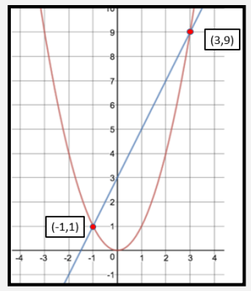
$y = x^2$

$y = 2x + 3$

Use the diagram to solve this pair of simultaneous equations:

$y = x^2$

$y = 2x + 3$



The points where the graphs intersect are the solutions of the simultaneous equations.

$x = -1, y = 1$ *or* $x = 3, y = 9$

Simultaneous Equations

Solving simultaneous equations by plotting the graphs

Sketch the graph of $y = x^2 - 3$

x	-3	-2	-1	0	1	2	3
$y = x^2 - 3$	6	1	-2	-3	-2	1	6

By drawing a suitable line on your graph, solve this pair of simultaneous equations:

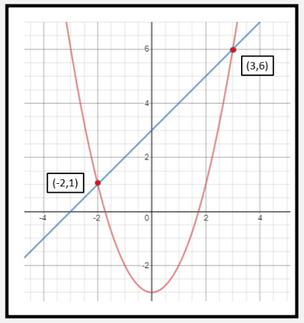
$y = x^2 - 3$

$y = x + 3$

x	-3	-2	-1	0	1	2	3
$y = x + 3$	0	1	2	3	4	5	6

The points where the graphs intersect are the solutions of the simultaneous equations.

Use a table of values to help you plot the graphs more accurately

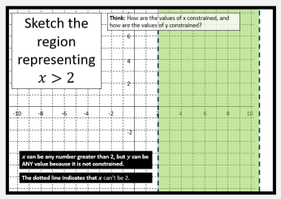


$x = -2, y = 1$ *or* $x = 3, y = 6$

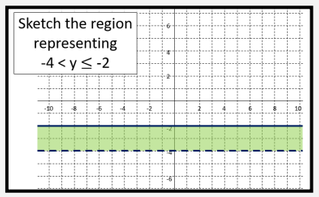
Graphical Inequality regions

Representing graphical inequalities

Sketch the region representing $x > 2$

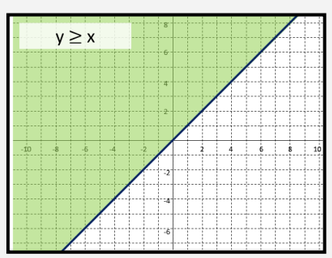


Sketch the region representing $-4 < y \leq -2$



If the line is a boundary for values that are included, the line must be drawn with a solid line

If the line is a boundary for values that are not included, the line must be drawn with a dashed line



Solving graphical inequalities

On the grid, shade the region whose coordinates satisfy the inequalities:

$y \geq -x$

$y < 2$

$y \geq x - 2$

To solve inequalities graphically

1. Draw the lines for the inequalities, treating them as equations (remember solid or dashed lines!)
2. Choose a point on either side of the line to test if the inequality is true or not
3. Shade the region that satisfies each inequality
4. The solution will be the unshaded region