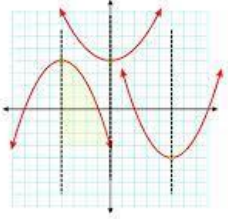


## Goals



By the end of this week, you should be able to:

- examine examples of quadratically related variables
- solve quadratic equations using the quadratic formula and by completing the square
- find the equation of a quadratic given sufficient information
- find turning points and zeros of quadratics and understand the role of the discriminant

## Theoretical components

### Factorising Quadratics

There are a number of methods, some you may have learnt these in high school. A method that may be new to you is called completing the square.

**Solving equations** (graphically means finding where the graph crosses the x-axis). This means that the solution to a function, the x-intercepts, the roots and the zeros are all descriptions of the same thing.

Solving quadratics can be done by using

- Quadratic Formula
- Graphing and finding the x-intercepts
- Fully factorised form (gives the roots easily)
- Completing the square

### Further reading:

- <https://www.mathsisfun.com/algebra/quadratic-equation.html>
- <https://www.mathsisfun.com/algebra/factoring-quadratics.html>
- <https://www.mathsisfun.com/algebra/completing-square.html>

You will need to have a good working knowledge of domain and range, functions and relations for the assignment. Make sure you have completed all the tasks on Mathspace.

### Quadratics:

You need to know about dilation, vertical translation, horizontal translation, vertex, axis of symmetry, reflection, roots, and intercepts

Forms: Base form  $y = x^2$

General form  $y = ax^2 + bx + c$

Vertex (h,k) form  $y = a(x - h)^2 + k$

Fully factorised form  $y = (ax - m)(fx - n)$

## Practical components

### Do the following questions:

Organise your solutions neatly in your exercise book.

You will require Chapter 2 of Maths Quest 11 Mathematical Methods (pdf – Google Classroom)

Ex 2C Factorising quadratic expressions

- Q's 2 (1<sup>st</sup> col), 7 (2<sup>nd</sup> col), 9

Ex 2D Factorising by completing the square

- Q's 1 (i), 2 (i), 7 (all)

Ex 2E Solving quadratic equations - Null Factor Law

- Q's 2 (1<sup>st</sup> col), 3 (1<sup>st</sup> col), 8, 10, 12

Ex 2F: Solving quadratic equations - completing the square

- Q's 2 (all)

## Investigation

See the following page

QFO

Quiz/Forum/Other

No mathspace this week.



## Week 9 Investigation

Use DESMOS or your CAS to **investigate the effect that the value of  $k$  has on the shape and position of the graph  $y = x^2$**  in the following situations:

	$k < 0$ Let $k = -1$	$k > 0$ Let $k = 1$	$0 < k < 1$ Let $k = \frac{1}{2}$	$k > 1$ Let $k = 2$
$y = kx^2$		--		
$y = x^2 + k$			--	--
$y = (x + k)^2$			--	--
$y = (kx)^2$		--		
$y = x^2 + kx$			--	--
Any other observations?				

Match the description by placing the relevant letter in the correct box. Then state the type of transformation - whether it is a translation, reflection, or dilation.

- A – the parabola shifts downward
- B – the parabola becomes wider
- C – the parabola shifts left and down
- D – the parabola becomes wider quickly
- E – the parabola shifts upward
- F – the parabola becomes narrower
- G – the parabola is concave down
- H – the parabola is the same
- I – the parabola shifts right and down
- J – the parabola becomes narrow quickly
- K – the parabola shifts left
- L – the parabola shifts right