

## Goals

This week:

- Quadratic functions, their graphs, and features
- Quadratic skills (factorising, completing the square)
- Using CAS to sketch functions

## Theoretical Components

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  $y = (ax - m)(fx - n)$

Make notes on the following chapters and websites:

- 2G The quadratic formula
- 2H The discriminant
- 2I Graphs of quadratic functions as power functions (turning point form)
- 2J Graphs of quadratic functions (intercepts method)
- 2K Using technology to solve quadratic equations
- 2L Simultaneous quadratic and linear equations
- <https://www.mathsisfun.com/algebra/quadratic-equation.html>
- <https://www.mathsisfun.com/algebra/quadratic-equation-graphing.html>

## 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)

- 2G: 1a, h, 2, 8, 10, 13
- 2H: 5
- 2I: 6, 7
- 2J: 3a, 4b, 5g, 9b
- 2K: 1c, 4
- 2L: 1j, l, n, p, 3- 5, 7-10

Mathspace Task

## Investigation

See next page

QFO

Quiz/Forum/Other

Start thinking on your assignment.

## Week 11 Investigation

This week, we are investigating function families:

- Linear
- Quadratic
- Square Root
- Cubic
- Hyperbolas (reciprocal functions)
- Semi-Circles
- Absolute Value
- Exponential
- Logarithmic
- Hybrid / Piecewise

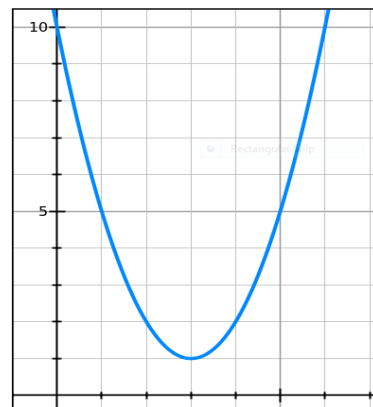
Your investigation is to sketch an example of EACH of the above functions and identify and describe what it is about these functions that make them identifiable as the function named.

- What are their main features?
- How are their equations recognisable algebraically?
- Give the equation of the example you have chosen?
- State the domain and range?

For example:

Linear function is so named because linear means 'line' and the linear functions are always straight lines.

Quadratic example:  $y = (x - 3)^2 + 1$   
Domain:  $x$  can be any real number  
( $-\infty < x < \infty$ )  
Range:  $y$  can be any real number  
 $y \geq 1$



Consider working in pairs, sharing the functions and then coming together in one of your lessons to swap notes, explain to each other and finish the investigation by the end of Week 9. This will hopefully achieve/encourage group collaboration and communications skills when sharing with your partner.

Sketching tools: CAS calculator, <https://graphsketch.com/> ,  
<https://www.intmath.com/functions-and-graphs/graphs-using-jsxgraph.php> ,  
<https://www.desmos.com/calculator>