Y13 Pure Chapter 2—Functions and Graphs

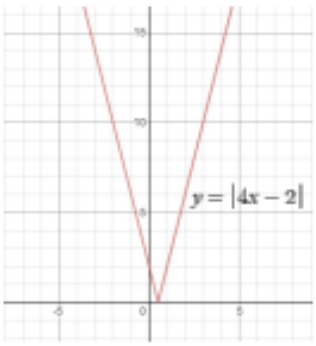
What do I need to be able to do?

By the end of this chapter you should be able to:

- Understand and use the modulus function
- Understand mappings and functions, and use domain and range
- Combine two or more functions to get a composite function
- Know how to find the inverse of a function both graphically and algebraically
- Sketch the graphs of the modulus function
- Apply a combination of transformations to a curve
- Transform a modulus function

The Modulus Function

To sketch the graph of $y = |ax + b|$, sketch $y = ax + b$ and then reflect any section of the graph that is below the x-axis in the x-axis



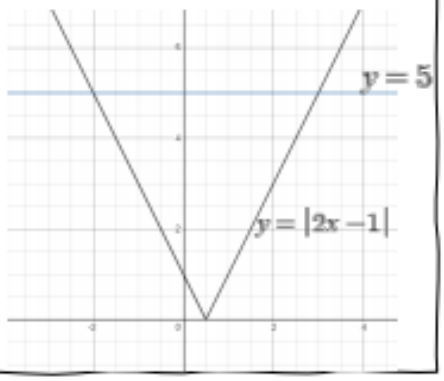
When solving modulus equations algebraically you consider the positive and negative argument (the function inside the modulus) separately

Eg:

Solve $|2x - 1| = 5$

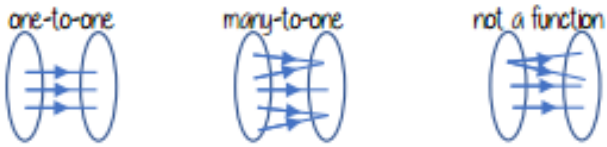
$2x - 1 = 5$
$2x = 6$
$x = 3$

$-(2x - 1) = 5$
$-2x + 1 = 5$
$-2x = 4$
$x = -2$



Functions and Mappings

A mapping is a function if each input has a distinct output. Functions can either be one-to-one or many-to-one



Y13 – Chapter 2 Functions and Graphs

Key words:

- Modulus – the absolute value or modulus of a real number x, denoted $|x|$, is the non-negative value of x without regard to its sign. For example, the absolute value of 3 is 3, and the absolute value of −3 is also 3.
- Composite function – A function made of other functions, where the output of one is the input to the other
- Inverse function – An inverse function is a function that undoes the action of another function

Pure Maths Year 2

Composite Functions

Always apply the inside function first.

To find fg(x) do g(x) first then substitute your answer into f(x) to find the answer

Eg: $f(x) = x^2$ and $g(x) = x + 1$

a) Find fg(2)
$g(2) = 2 + 1 = 3$
$f(3) = 3^2 = 9$

b) Find gf(x)
$f(x) = x^2$
$g(x^2) = x^2 + 1$

The Inverse Function

The inverse of a function performs the opposite operation to the original function. Inverse functions only exist for one-to-one functions.
The inverse of a function f(x) is written as $f^{-1}(x)$
The graphs of $y = f(x)$ and $y = f^{-1}(x)$ are reflections of each other in the line $y = x$
The domain of f(x) is the range of $f^{-1}(x)$
The range of f(x) is the domain of $f^{-1}(x)$

To find the inverse function:

1) Write it as $y =$
2) Swap x and y
3) Rearrange to make y the subject
4) Replace y with $f^{-1}(x)$

$f(x) = x^2 - 3$ find $f^{-1}(x)$

1) $y = x^2 - 3$
2) $x = y^2 - 3$
3) $\sqrt{(x + 3)} = y$
4) $f^{-1}(x) = \sqrt{(x + 3)}$