FUNCTIONS

2

Table of contents & cheatsheet

Definitions

Function a mathematical relationship where each input has a single output. It is often written as $f(x)$ where x is the input
Domain all possible x values, the input. (the domain of investigation)
Range possible y values, the output. (the range of outcomes)
Coordinates uniquely determines the position of a point, given by (x, y)

2.1. Types of functions 28

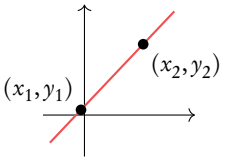
Linear functions $y = mx + c$

m is the *gradient*,
c is the y *intercept*.

Midpoint: $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

Distance: $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

Gradient: $m = \frac{y_2-y_1}{x_2-x_1}$

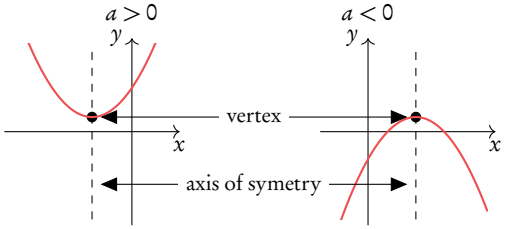


Parallel lines: $m_1 = m_2$ (same gradients)
Perpendicular lines: $m_1 m_2 = -1$

Quadratic functions $y = ax^2 + bx + c = 0$

Axis of symmetry: x-coordinate of the vertex: $x = \frac{-b}{2a}$

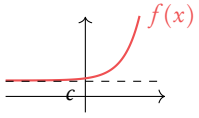
Factorized form: $y = (x + p)(x + q)$



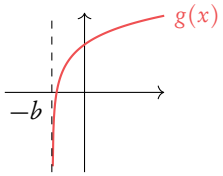
If $a = 1$ use the factorization method $(x + p) \cdot (x + q)$
If $a \neq 1$ use the quadratic formula
When asked excplicity complete the square

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

Exponential
$f(x) = a^x + c$

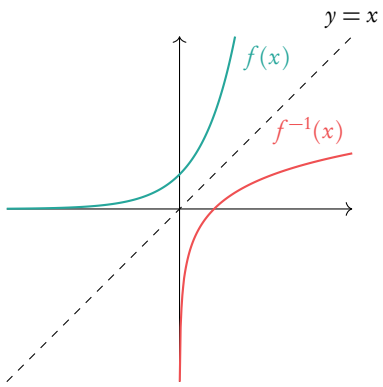


Logarithmic
$g(x) = \log_a(x + b)$



2.2. Rearranging functions 35

Inverse function, $f^{-1}(x)$ reflection of $f(x)$ in $y = x$.



Composite function, $(f \circ g)(x)$ is the combined function f of g of x.
When $f(x)$ and $g(x)$ are given, replace x in $f(x)$ by $g(x)$.

Transforming functions

Change to $f(x)$	Effect
$f(x) + a$	Move graph a units upwards
$f(x + a)$	Move graph a units to the left
$a \cdot f(x)$	Vertical stretch by factor a
$f(a \cdot x)$	Horizontal stretch by factor $\frac{1}{a}$
$-f(x)$	Reflection in x-axis
$f(-x)$	Reflection in y-axis