# Maths Specialist

Test 1

**Composite functions**

A function is one that:

* passes the vertical line test
* is one-to-one or many-to one (each x value has only one corresponding y value)

A non-function is one that:

* fails the vertical line test
* is one-to-many (each x value has more than one corresponding y value)

Composite Functions:

Consider the functions f(x) and g(x)

x -> f(x) -> g(x)

Domain(f(x)) -> Range(f(x))=Domain(g(x)) -> Range(g(x))

Eg. If Domain(f(x)) = {2,4,6} and f(x) = 2x, g(x) = x2 + 1

Range(f(x)) = {4,8,12} = Domain(g(x))

Range(g(x)) = {17,65,145}

Also: f(g(x))=fg(x)=f○g(x)=2[g(x)]

=2(x2 + 1)

**Inverse functions**

An inverse function is the function reflected in the line y = x

(x, y) -> (y, x), i.e. y = 3x + 7 -> x = 3y + 7

\*Exchange x and y values y =

f-1(x) =

\*Take care for many-to-one functions!

y = x2 reflected in the line y = x gives a reflection of y = (i.e. not a function), so a suitable restriction x>0 will give an inverse for y = x2

**Absolute value: equations**

Solving inequalities:

**Graphs of rational functions**

Consider the graph of

Vertical asymptotes where y = 0 on original graph

Reciprocal function -> hyperbolic graph

Sketching polynomials:

Consider some or all of:

* intercepts with the x and y axes
* vertical/horizontal/oblique asymptotes
* behaviour as x -> ±∞ and as y -> ±∞
* stationary/turning points (use differentiation)

, where y is the graph of f(x) but where f(x) is negative, it is reflected around the x axis

, where in quadrants 1 and 4 the graph will be the same as that of f(x), however quadrants 2 and 3 will be the parts of the graph of f(x) in quadrants 1 and 4 reflected in the y axis.

If

Domain of g(x): **R**, range of g(x): y0, domain of f(x): x0, range of f(x): y

Why is fg(x) defined for all real x? g(x) is defined for all real x and the output from g(x) consists of numbers that are all within the domain of f(x), thus fg(x) is defined for all real x.