Today we will be learning about functions.

Functions _____   23.9.15

A function is an equation that changes an input number (x) into an output number f(x) or y.

For example, f(4) means I have substituted 4 for x into the function.

A straight line equation is a function y = mx + c, where y is the output and x is the input.

When talking about functions, we call the input numbers the domain and the output numbers the range.

If you wanted to talk about 2 different functions, you might use f(x) and g(x).

Functions _____

Sometimes functions have different notation. They can be represented using y or sometimes f(x) or f:x→

Daily Practice   25.9.2015

Q1. Calculate the original price of a book that is in the sale for £10.28 with 15% off.

$85\% = 10.28$
$1\% = 10.28 \div 85 = 0.1209$
$100\% = 0.12 \times 100 = \underline{£12.09}$

Q2. Solve the equation $\frac{1}{4-3}x + 3 = \frac{21-2x}{-3}$

$\frac{9}{4}x = 18$
$7x = 18 - 2x$
$+2x \quad +2x$
$9x = 72$
$x = 8$

Q3. Given n = 4 and h = -5, what is the value of $2n^2 - 5h$?

$2(4)^2 - 5(-5)$
$32 + 25 = \underline{57}$

Q4. 380 x 360 (non-calculator)

$\begin{array}{r} 380 \\ \times 360 \\ \hline 000 \\ 22800 \\ +114000 \\ \hline 136800 \end{array}$

$\begin{array}{r}38 \\ \times 36\end{array}$ $\begin{array}{r}30 \\ \times 30 \\ \hline 900\end{array}$ $\begin{array}{r}30 \\ \times 8 \\ \hline 240\end{array}$

$30 \times 38 = 1140$
$38 \times 6 = 228$ $1368 \times 100 = 136800$ $\underline{136800}$

Q5. Calculate the length of AC

$20^2 - 15^2 = 175$

$\sqrt{175} = 13.2$

$AC = 13.2 \times 2 = \underline{26.4cm}$

Today we will be continuing to learn about functions.
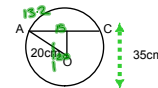
1. Given a function $f(x) = x^2 + 3$

The domain is {–1, 0, 1, 2, 3}, calculate the range

$f(-1) = (-1)^2 + 3 = 4$ $f(2) = 7$
$f(0) = 0^2 + 3 = 3$ $f(3) = 12$
$f(1) = 4$ Range = {4, 3, 4, 7, 12}

Functions

2. Given the function $g(x) = -x + 3 - 2x^2$

The domain is {–3, 2, 8, 5, 1},

calculate the range

$g(-3) = -12$

Range = {–12, –7, –133, –52, 0}

3. Given the function h(x) =

$2x^3 - 8x + 4$

The domain is {–2, –1, 0, 2, 4, 8},

calculate the range

4. Given that f(x) = 5x – 1,

find the value of

(i) f(–2)   (ii) f(0.2)

(iii) f(–10)   (iv) f(2k)

5. If f(x) = 3x – 12 and

g(x) = 2 – 4x,

solve these equations:

(i) f(x) = 4

(ii) g(x) = –10

(iii) g(x) = f(4)

(iv) g(x) = f(x)

Today we will be learning about quadratic functions and how to sketch them.

Functions

4. Given that f(x) = 5x – 1, find the value of

(i) f(–2)   (ii) f(0.2)   (iii) f(–10)   (iv) f(2k)

f(-2) = 5(-2)-1   5(0·2) -1   5(-10)-1   5(2k)-1
     = -11   = 1 - 1   = -51   10k-1
                     = 0

5. If f(x) = 3x – 12 and g(x) = 2 – 4x, solve these equations:

(i) f(x) = 4
3x-12 = 4
+12 +12
3x = 16
$x = \frac{16}{3}$

(ii) g(x) = –10
2-4x = -10
-4x = -12
x = 3

(iii) g(x) = f(4)
2-4x = 3(4)-12
2-4x = 0
-4x = -2
$x = \frac{1}{2}$

(iv) g(x) = f(x)
2-4x = 3x-12
+12   +12
14-4x = 3x
+4x   +4x
14 = 7x
2 = x

Sketching Quadratic Functions   28·9·15

Quadratic functions are functions where 2 is the highest power of the variable i.e. x^2

If you sketch a quadratic function, it will make a curve known as a parabola.

The simplest form of quadratic function is $y = kx^2$ $k \neq 0$

Other forms are $y = ax^2 + bx + c$ and $y = (x + p)^2 + q$ $a \neq 0$

Sketching Quadratic Functions

A quadratic function can be sketched using a similar method to sketching a straight line (using a table of values).

Because there is an x^2 term, the graph will get quite large quite quickly.
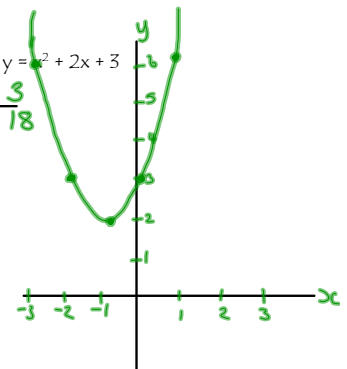

Sketching Quadratic Functions

Examples:

1. Draw a sketch of the parabola $y = x^2 + 2x + 3$

x	-3	-2	-1	0	1	2	3
f(x)/y	6	3	2	3	6	11	18

$f(-3) = (-3)^2 + 2(-3) + 3$
$= 9 - 6 + 3$
$= 6$

Sketch: $y = x^2$
$y = -2x^2 + 10$
$y = (x-2)^2$

2. Draw a sketch of the parabola $y = (x - 1)^2$

Sketch the following quadratic functions:

(a) $y = x^2$ (e) $g(x) = (x - 5)^2$

(b) $y = 2x^2 - 3x$

(c) $f(x) = -x^2 + x - 4$

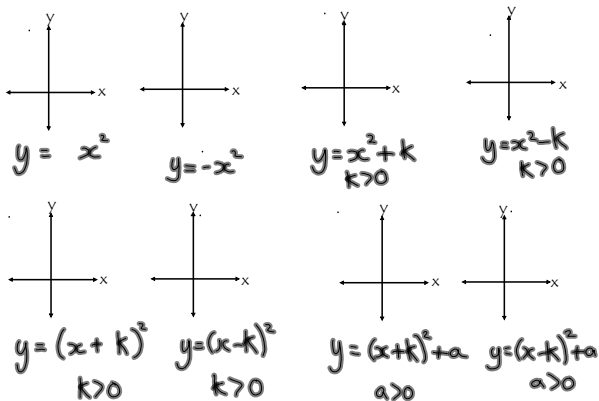(d) $f(x) = 2x^2 - 4x - 3$

Daily Practice   30.9.15

20 Questions Mental Maths

Today we will be investigating the effect of changing the equation of a quadratic function.

$1 \times 10^{-2} = 0.01$

$\frac{1}{100}$

Interpreting Quadratic Functions

$y = x^2$ $y = -x^2$ $y = x^2 + k$, $k > 0$ $y = x^2 - k$, $k > 0$

$y = (x + k)^2$, $k > 0$ $y = (x - k)^2$, $k > 0$ $y = (x + k)^2 + a$, $a > 0$ $y = (x + k)^2 + a$, $a > 0$
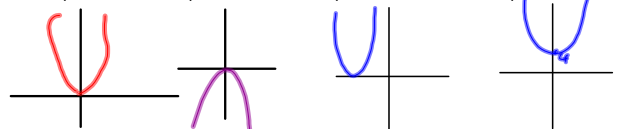
Draw a rough sketch of the following functions

(a) $y = 2x^2$ (b) $y = -0.5x^2$ (c) $y = (x + 3)^2$ (d) $y = x^2 + 4$

(e) $y = -(x + 2)^2$ (f) $y = (x - 5)^2 + 3$ (g) $y = -x^2 + 3$