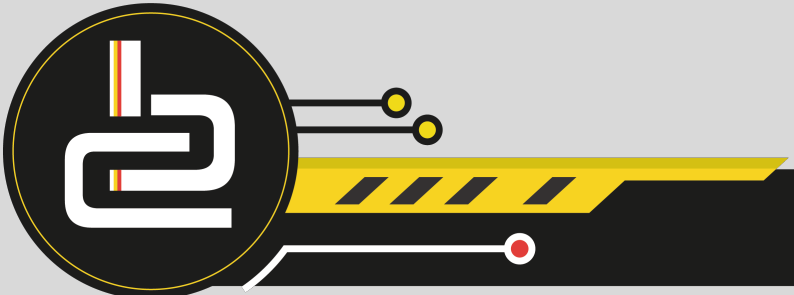




It's the way we're *wired*

GRADE 11 MATHS

Charmaine

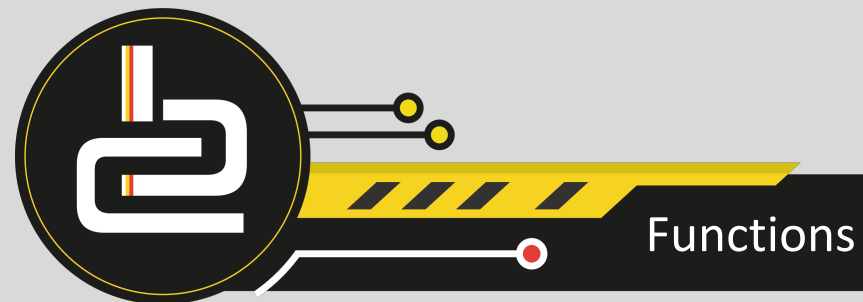


FUNCTIONS

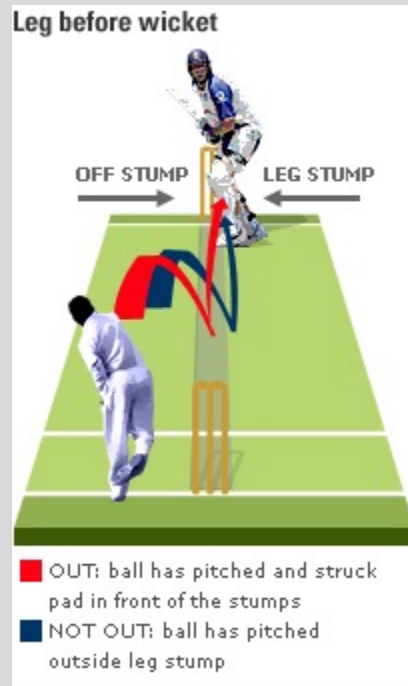
Functions are mathematical building blocks for designing machines, predicting natural disasters, curing diseases, understanding world economies and for keeping aeroplanes in the air.

Functions can take input from many variables, but always give the same output, unique to that function

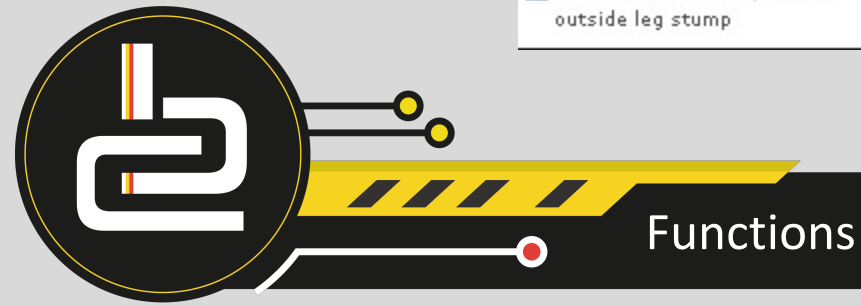
Functions also allow us to visualise relationships in terms of graphs, which are much easier to read and interpret than lists of numbers.



FUNCTIONS



If a cricket player is hit on his batting pads and the umpire thinks that the ball would have hit the stumps behind him, he is given out LBW (leg before wicket). At professional levels of the game, sophisticated software is used to determine if the ball will hit the stumps. The software uses functions to predict the flight of the ball if the cricket player's leg had not been in the way.

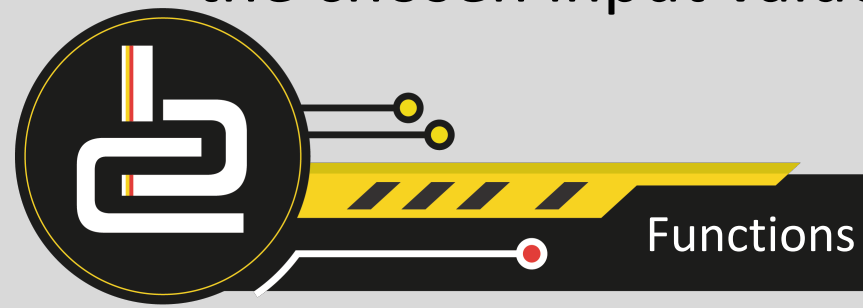


FUNCTIONS

A function is a mathematical relationship between two variables, where every input variable has one output variable.

In functions, the x -variable is known as the input or independent variable, because its value can be chosen freely.

The calculated y -variable is known as the output or dependent variable, because its value depends on the chosen input value.



FUNCTIONS

Set Notation:

Examples:

$\{x : x \in \mathbb{R}, x > 0\}$	The set of all x -values such that x is an element of the set of real numbers and is greater than 0.
$\{y : y \in \mathbb{N}, 3 < y \leq 5\}$	The set of all y -values such that y is a natural number, is greater than 3 and is less than or equal to 5.
$\{z : z \in \mathbb{Z}, z \leq 100\}$	The set of all z -values such that z is an integer and is less than or equal to 100.

Interval notation:

Examples:

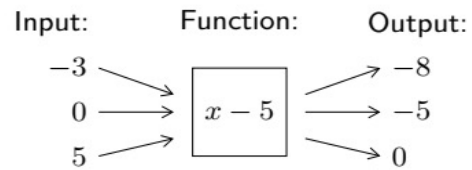
$(3; 11)$	Round brackets indicate that the number is not included. This interval includes all real numbers greater than but not equal to 3 and less than but not equal to 11.
$(-\infty; -2)$	Round brackets are always used for positive and negative infinity. This interval includes all real numbers less than, but not equal to -2 .
$[1; 9)$	A square bracket indicates that the number is included. This interval includes all real numbers greater than or equal to 1 and less than but not equal to 9.



WAYS OF EXPRESSING FUNCTIONS

1. Words: "The relationship between two variables is such that one is always 5 less than the other."

2. Mapping diagram:



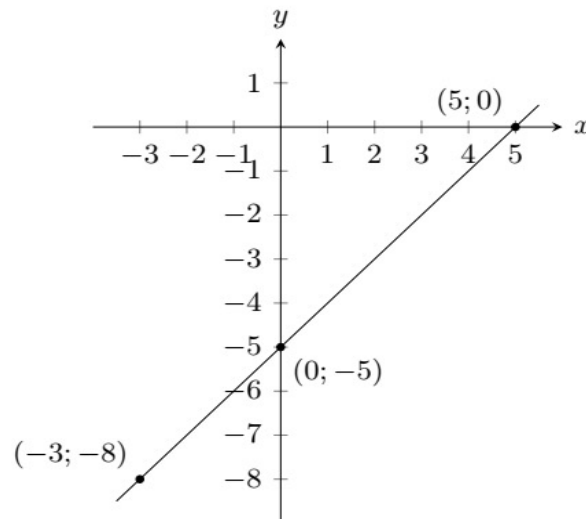
3. Table:

Input variable (x)	-3	0	5
Output variable (y)	-8	-5	0

4. Set of ordered number pairs: $(-3; -8), (0; -5), (5; 0)$

5. Algebraic formula: $f(x) = x - 5$

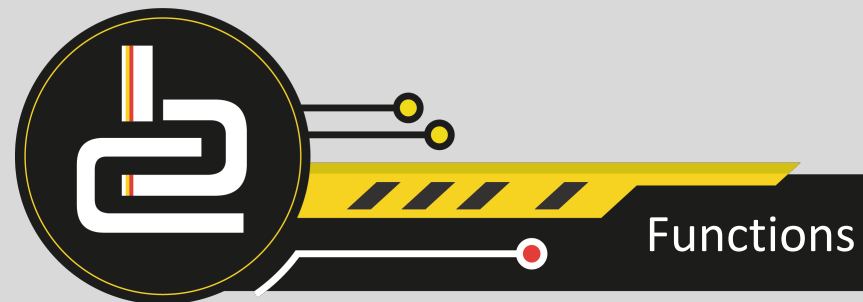
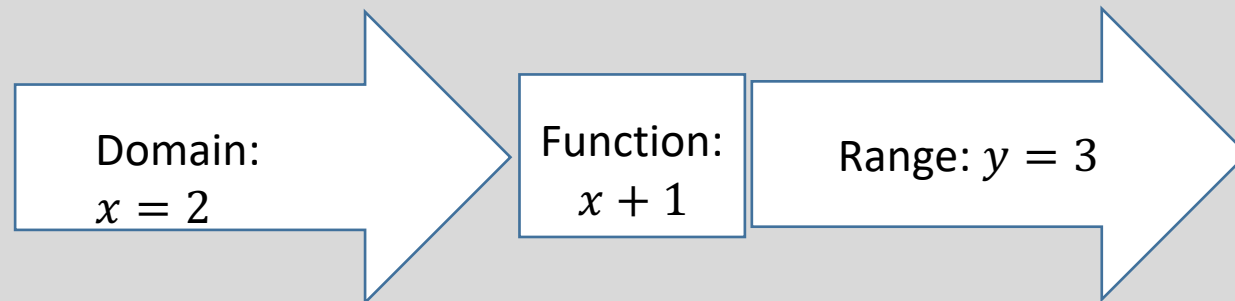
6. Graph:



FUNCTIONS

The domain of a function is the set of all independent x -values from which the function produces a single y -value for each x -value.

The range is the set of all dependent y -values which can be obtained using an independent x -value.



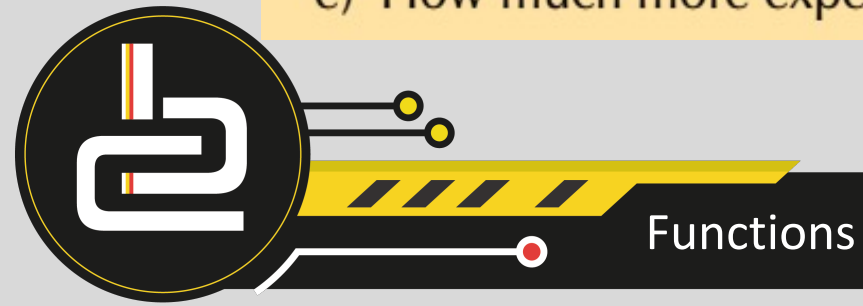
EXAMPLES: FUNCTIONS

The cost of petrol and diesel per litre are given by the functions P and D , where:

$$P = 13,61V \quad D = 12,46V$$

Use this information to answer the following:

- Evaluate $P(8)$
- Evaluate $D(16)$
- How many litres of petrol can you buy with R 300?
- How many litres of petrol can you buy with R 275?
- How much more expensive is petrol than diesel? Show your answer as a function.



FUNCTIONS

- a) 108,88
- b) 199,36
- c) 22,043litres
- d) 20,206litres
- e) 1,15 per litre

