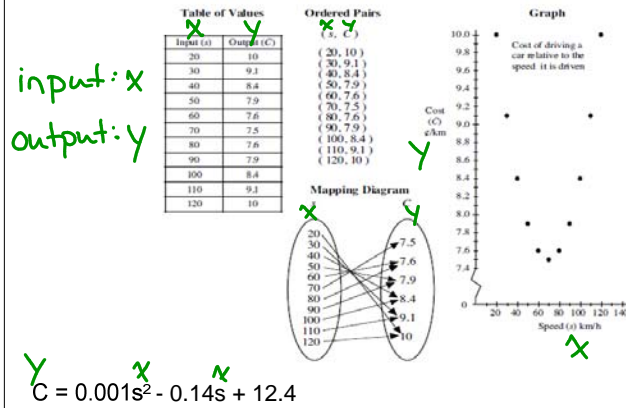


4.2 Relationships Between Variables

A comparison between two sets of elements is called a **relation**. This can be represented in the following ways:

- ✓ ~ Words
- ✓ ~ Equation
- ~ Function Notation
- ✓ ~ Table of Values
- ~ Mapping Diagram
- ✓ ~ Ordered Pairs
- ✓ ~ Graph



Terminology

Dependent Variable - variable along y-axis

Independent Variable - variable along x-axis

Input - x

Output - y

Domain - under which x-values does the graph live (all possible x's)

Range - under which y-values does the graph live (all possible y's)

(x, y)

$y = 3x - 5$

- ~ dependent variable
- ~ outputs of the relation
- ~ 2nd coordinate of an ordered pair
- ~ graphed on the vertical axis

- ~ independent variable
- ~ inputs of the relation
- ~ 1st coordinate of an ordered pair
- ~ graphed on the horizontal axis

Functions

$3 \rightarrow 3x - 4 \rightarrow 5$

Consider the relation described by the equation  $y = 2x - 5$ .

a) Complete the first five rows of the following table of values which shows some of the possible input values.

Input (x)	Output (y)	Ordered pair (x,y)
-2	-9	(-2,-9)
-1	-7	(-1,-7)
0	-5	(0,-5)
1	-3	(1,-3)
2	-1	(2,-1)
6	7	(6,7)
4	3	(4,3)

$y = 2(-2) - 5 = -9$   
 $y = 2(-1) - 5 = -7$   
 $y = 2(0) - 5 = -5$

b) Show the data in a mapping diagram.

$(-2, -9)$   
 $(-1, -7)$   
 $\vdots$

Functions

$3 \rightarrow 3x - 4 \rightarrow 5$

b) Plot the ordered pairs in a) on the grid provided.

c) Connect the points on the grid, and extend the line in both directions with arrows at both ends.

d) Use the graph to determine the value of y when  $x = 6$ .

e) Use the equation to determine the value of y when  $x = 6$ , and verify the answer in d).

$y = 2x - 5$   
 $y = 2(6) - 5$   
 $y = 7$

f) Write the value of y when  $x = 6$  in the table of values using the first blank space in a).

g) Use the graph to determine the value of x when  $y = 3$ . Put this information in the last row in a).

h) Complete the following statement:

This relation is called a linear relation because the graph of the relation is a straight line.

$y = 2x - 5$   
 $3 = 2x - 5$   
 $+5 \quad +5$   
 $8 = 2x$   
 $\frac{8}{2} = \frac{2x}{2} \quad x = 4$