Variations / Functions

Constant Function

Formula: $f(x) = b$ **OR** $y = b$

- slope is zero
- Domain: $\mathbb{R}$
- Range: $\mathbb{R}$

Example:

Jean pays $4 for a bag that he can fill with as much candy as he wants.

Independent variable $x = \#\ candy\ Jean\ puts\ into\ the\ bag$

Dependent variable $y = cost$

Equation: $y = 4$

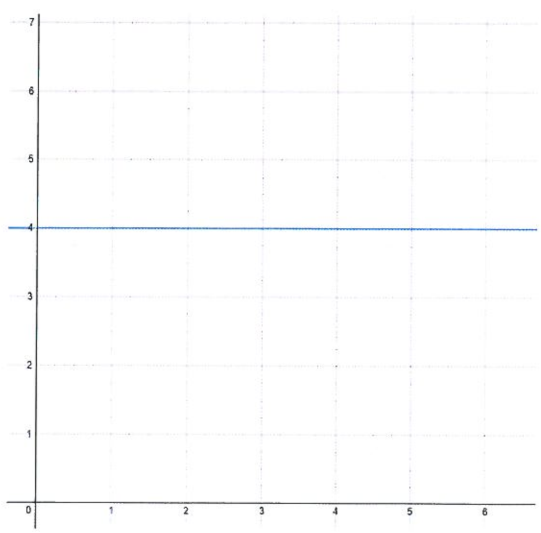
Table of values:

Equation: $y = 4$

X	0	1	2	3	…	X
Y	4	4	4	4	…	4

WORK SHOP: Calculations

$let\ x = 0$ $y = 4$ $= 4$	$let\ x = 1$ $y = 4$ $= 4$
$let\ x = 2$ $y = 4$ $= 4$	$let\ x = 3$ $y = 4$ $= 4$



Direct Variation

Formula: $f(x) = ax$ **OR** $y = ax$

- Domain: $\mathbb{R}$
- Range: $\mathbb{R}$

Example:

A plant grows at a rate of 5cm per month.

Independent variable $x = \#\, of\ months$

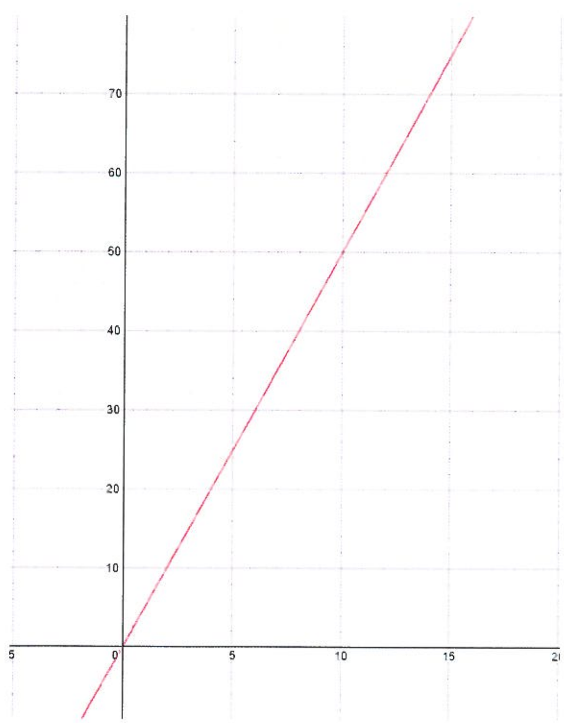
Dependent variable $y = height$

Equation: $y = 5x$

Table of values:

Equation: $y = 5x$

X	0	1	2	3	…	x
Y	0	5	10	15	…	5x



WORK SHOP: Calculations

$let\ x = 0$ $y = 5x$ $y = 5(0)$ $= 0$	$let\ x = 1$ $y = 5x$ $y = 5(1)$ $= 5$
$let\ x = 2$ $y = 5x$ $y = 5(2)$ $= 10$	$let\ x = 3$ $y = 5x$ $y = 5(3)$ $= 15$

Partial Variation

Formula: $f(x) = ax + b$ **OR** $y = ax + b$

- Domain: $\mathbb{R}$
- Range: $\mathbb{R}$

Example:

A pool with a capacity of 3000 liters is draining at a rate of 200 liters per hour

Independent variable $x = \#\ of\ hours$

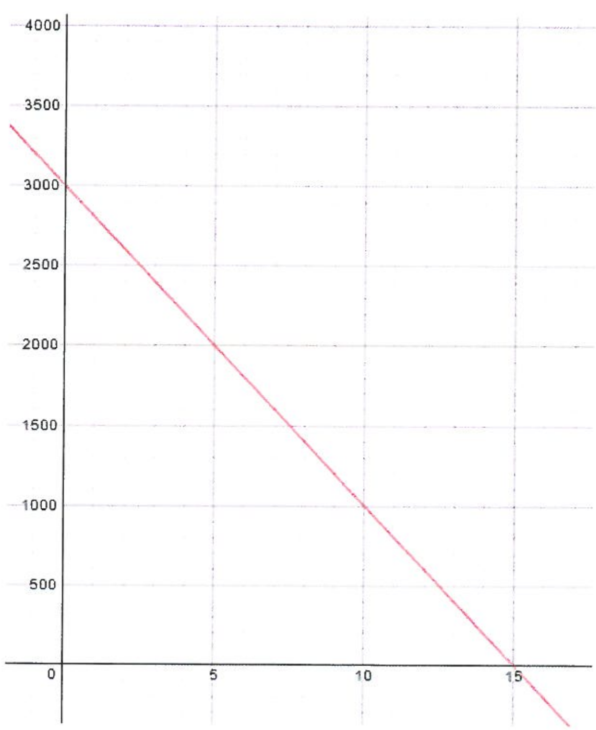
Dependent variable $y = \#\ of\ liters\ left\ in\ the\ pool$

Equation: $y = -200x + 3000$

Table of values:

Equation: $y = -200x + 3000$

x	0	1	2	3	…	x
y	3000	2800	2600	2400	…	-200x+3000



WORK SHOP:
Calculations

$let\ x = 0$
$y = -200x + 3000$
$y = -200(0) + 3000$
$= 0 + 3000$
$= 3000$

$let\ x = 1$
$y = -200x + 3000$
$y = -200(1) + 3000$
$= -200 + 3000$
$= 2800$

$let\ x = 2$
$y = -200x + 3000$
$y = -200(2) + 3000$
$= -400 + 3000$
$= 2600$

$let\ x = 3$
$y = -200x + 3000$
$y = -200(3) + 3000$
$= -600 + 3000$
$= 2400$

Second Degree Variation/ Quadratic Function (Parabola)

Formula: $f(x) = x^2$ **OR** $y = x^2$

- Domain: $\mathbb{R}$
- Range: $[0, +\infty[$

Example:

Superman follows a parabolic flight path to the top of a building. The relationship between the numbers of seconds that pass and how high superman is located from the ground.

Independent variable $x = \#\, seconds$

Dependent variable $= height\ from\ the\ ground\ where\ superman\ is\ located$

Equation: $y = x^2$

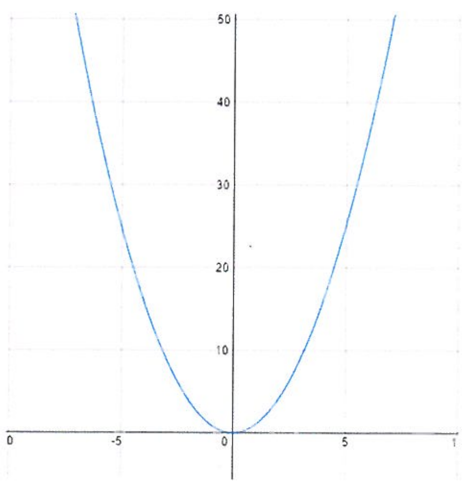
Table of values:

Equation: $y = x^2$

x	0	1	2	3	...	x
y	0	1	4	9	...	x^2

WORK SHOP: Calculations

let $x = 0$ $y = x^2$ $y = (0)^2$ $= 0$	let $x = 1$ $y = x^2$ $y = (1)^2$ $= 1$
let $x = 2$ $y = x^2$ $y = (2)^2$ $= 4$	let $x = 3$ $y = x^2$ $y = (3)^2$ $= 9$



Rational Function

Formula: $f(x) = \frac{k}{x}$ **OR** $y = \frac{k}{x}$

- *where k is a constant value*

- Domain: $]0, \infty[$
- Range: $]0, \infty[$
- Curved line
- Never touches the axes
- There is a rapid decrease that lessens
- As the x value increases the y value decreases
- $xy = k$

Example:

Renting a bus for a weekend will cost $600.
The cost per person depends on the number of people going on the trip.

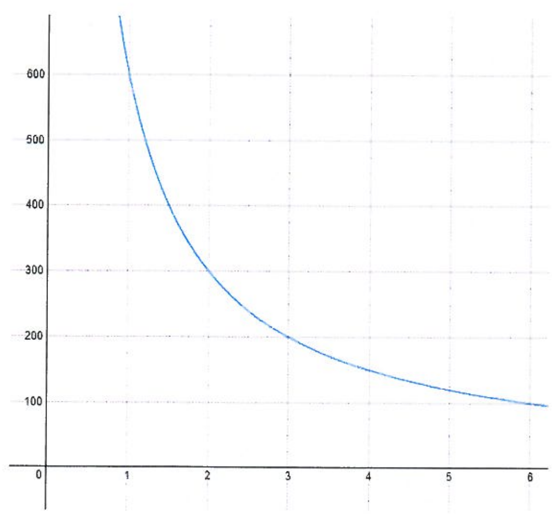
Independent variable $x = \#\ of\ people$
Dependent variable $y = cost\ per\ person$
Constant variable $k = 600\ (cost\ of\ renting\ the\ bus)$

Equation: $y = \frac{600}{x}$

Table of values:

Equation: $y = \frac{600}{x}$

x	0	1	2	3	4	5	6	…	x
y	0	600	300	200	150	120	100	…	x^2



WORK SHOP: Calculations

$let\ x = 1$	$let\ x = 2$	$let\ x = 3$
$y = \frac{600}{x}$	$y = \frac{600}{x}$	$y = \frac{600}{x}$
$y = \frac{600}{1}$	$y = \frac{600}{2}$	$y = \frac{600}{3}$
$= 600$	$= 300$	$= 200$
$let\ x = 4$	$let\ x = 5$	$let\ x = 6$
$y = \frac{600}{x}$	$y = \frac{600}{x}$	$y = \frac{600}{x}$
$y = \frac{600}{4}$	$y = \frac{600}{5}$	$y = \frac{600}{6}$
$= 150$	$= 120$	$= 100$