

4.5 Part 1 Interpreting Graphs of functions

Monday, April 17, 2023 1:45 PM

4.5 Interpreting Graphs of Functions Part 1

A. Intercepts : x-intercept and y-intercept

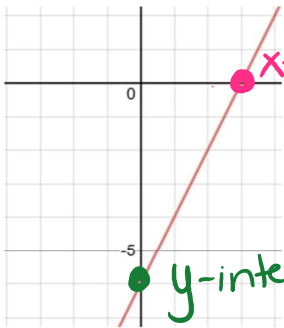
x-intercept – the point where the graph crosses the x-axis.

To find the x-intercept **make $y = 0$ and solve for x .**

y-intercept – the point where the graph crosses the y-axis.

To find the y-intercept **make $x = 0$ and solve for y .**

Example 1 : Determine the coordinates of the intercepts.



x-intercept $x = 3$ or $(3, 0)$

y-intercept $y = -6$ or $(0, -6)$

Example 2 : Determine the coordinates of the intercepts. Use the intercepts to graph the function.

$$2x + 4y = 8$$

x-intercept

make $y = 0$

$$2x + 4(0) = 8$$
$$2x = 8$$
$$\frac{2x}{2} = \frac{8}{2}$$
$$x = 4$$

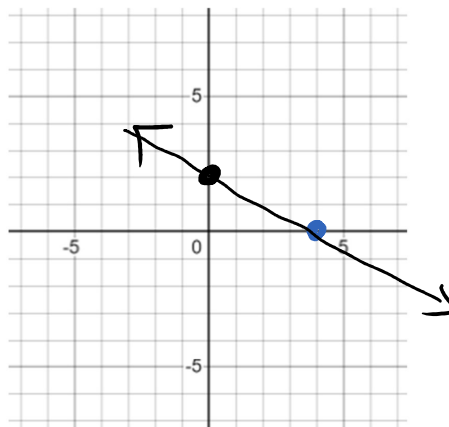
$(4, 0)$

y-intercept

make $x = 0$

$$2(0) + 4y = 8$$
$$4y = 8$$
$$\frac{4y}{4} = \frac{8}{4}$$
$$y = 2$$

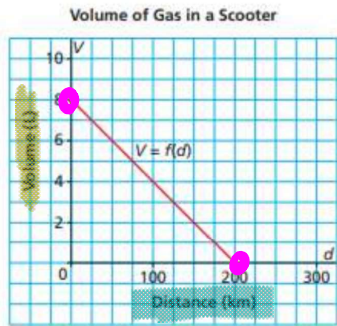
$(0, 2)$



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Example 3 : This graph shows the fuel consumption of a scooter with a full tank of gas at the beginning of a journey.



a) Write the coordinates of the points where the graph intersects the axes. Determine the vertical and horizontal intercepts. Describe what these intersection points represent.

$(0, 8)$ y-intercept (V-intercept)
Volume of gas before the journey

$(200, 0)$ x-intercept (D-intercept)
Distance travelled when the tank becomes empty.

b) What are the domain and range of this function?

Domain
 $0 \leq D \leq 200$
 $[0, 200]$

Range
 $0 \leq V \leq 8$
 $[0, 8]$

B. Rate of Change

In a linear relation, the rate of change is the comparison between the change in the dependent variable and the change in the independent variable. It is tradition to represent rate of change with the letter m .

$$m = \text{rate of change} = \frac{\text{change in dependent variable}}{\text{change in independent variable}} = \frac{\text{vertical displacement}}{\text{horizontal displacement}} = \frac{\text{change in } y\text{'s}}{\text{change in } x\text{'s}}$$

Example 4 : Determines the rate of change of the following linear relation:

a)

x	y
0	20
3	25
6	30

+3
+3
+5
+5

x's { change in independent variable = 3

y's { change in the dependent variable = 5

rate of change = $\frac{5}{3}$ y's / x's

b)

time

Time, t (s)	Distance, d (m)
-1	100
1	80
3	60

+2
+2
-20
-20

rate of change = $\frac{-20}{2} \frac{m}{s}$
= -10 m/s

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Example 5 : Constructs a table of values and determines the rate of change.

For a service call, a plumber charges \$75, plus \$50 per hour for each hour worked. The total cost for service is related to time.

Time (hrs)	Cost (\$)
0	75
1	125
2	175
3	225

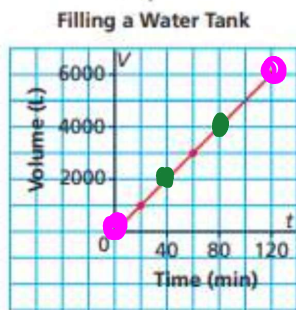
Handwritten annotations: On the left, three curly braces indicate an increase of +1 in time for each row. On the right, three curly braces indicate an increase of +50 in cost for each row.

$$\text{rate of change} = \frac{50}{1}$$

$$m = \$50/\text{hr}$$

$m = \text{rate of change}$

Example 6 : A water tank on a farm holds 6000L. The graph represents the tank being filled at a constant rate. Determine the rate of change and what the rate represents.



$$m = \frac{\text{vertical change}}{\text{horizontal change}}$$

$$m = \frac{6000}{120}$$

$$m = 50 \text{ L/min}$$

Time	Volume
0	0
120	6000

Handwritten annotations: A blue arrow on the left indicates a change of +120 in time. A blue arrow on the right indicates a change of +6000 in volume. Below this, the word 'or' is written. A second table shows:

Time	Volume
40	2000
80	4000

Handwritten annotations: A green arrow on the left indicates a change of +40 in time. A green arrow on the right indicates a change of +2000 in volume.

$$m = \frac{2000}{40} = 50 \text{ L/min}$$

Practice: p.308 #3, 4, 5, 7, 14, 15 et p.319 #4, 5, 7, 8, 12, 13

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