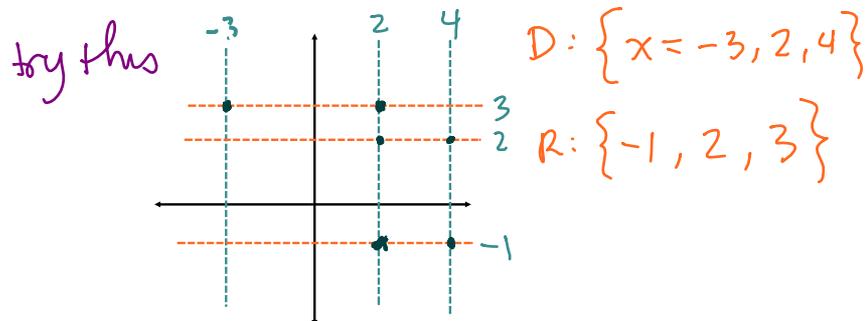
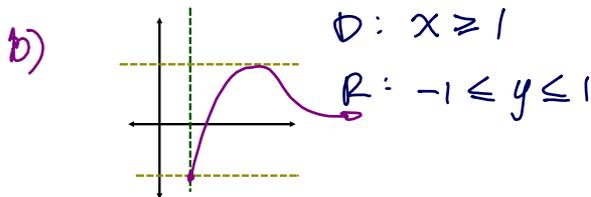
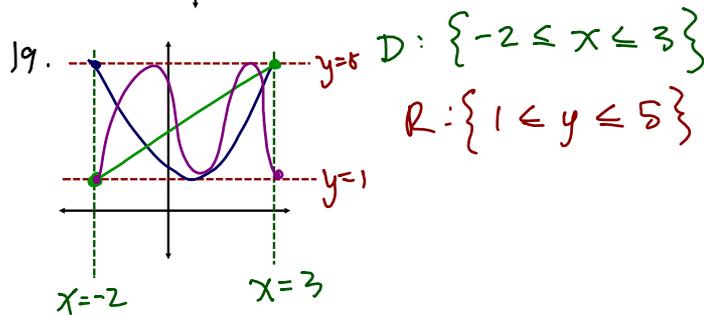
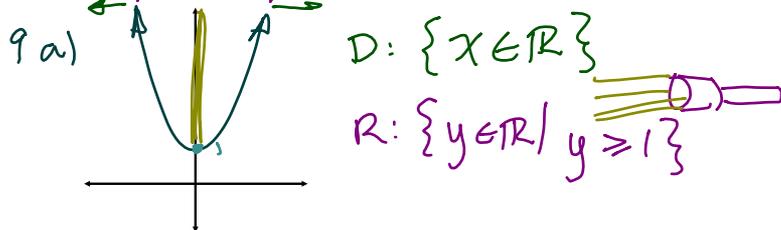
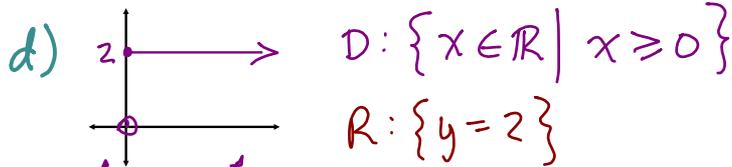
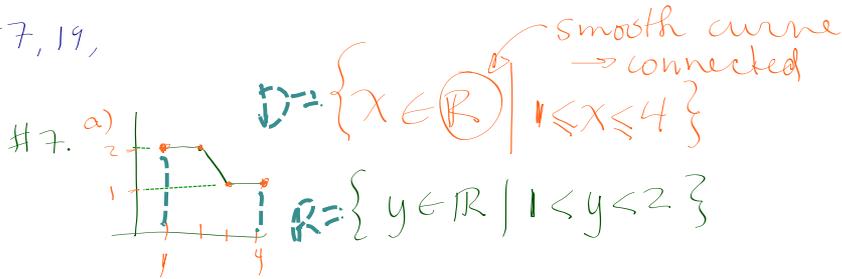


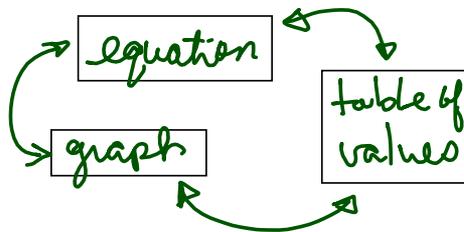
#7, 19,



$$\left. \begin{array}{l} C = \text{cost} \\ n = \# \text{ of toppings} \end{array} \right\} C = 12 + 0.75n$$

## 5.6 Properties of Linear Relations

Make Connections: pg. 300



These three concepts represent the definition of all the points of a relation

\* The graphical representation of a **linear** relation is a **straight line**.

\* In a table of values, if the changes in x-values are **constant**, the changes in y-values will also be **constant**.

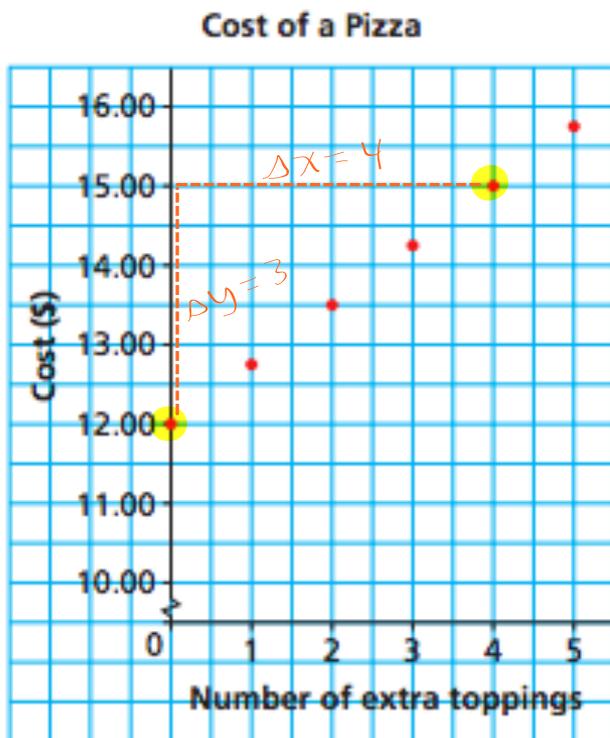
| x | y |
|---|---|
| 0 | 8 |
| 2 | 7 |
| 4 | 6 |

*1st differences are constant +2* (pointing to x values)

*1st differences are also constant -1* (pointing to y values)

\* Linear relations have a **constant rate of change**

*the steepness of the line*



rate of change =  $0.75 \text{ \$ / topping}$

*↳ slope (m)*

$m = \frac{\text{dependent variation}}{\text{independent variation}}$

$= \frac{\Delta y \text{ (change in y)}}{\Delta x \text{ (change in x)}}$

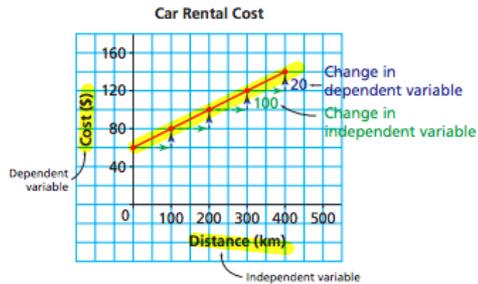
In this case...

$$m = \frac{15 - 12}{4 - 0} = \frac{3}{4} = 0.75$$

ex. The cost for a car rental is \$60 plus \$20 for every 100 km driven. Identify that this is a linear relation with a table of values, a set of ordered pairs, a graph and an equation.

| d   | C   |
|-----|-----|
| 0   | 60  |
| 100 | 80  |
| 200 | 100 |
| 300 | 120 |

*Handwritten notes: +100 on the left of the d column, +20 on the right of the C column.*



⊗ as a set:

$$\{(0, 60), (100, 80), (200, 100), (300, 120)\}$$

⊗ equation:

$$C = 60 + \frac{20d}{100}$$

$$C = 60 + 0.2d$$

*slope*

ex. Represent graphically the following:

a)  $f(x) = x^2 + 2$

| x  | y |
|----|---|
| -2 | 6 |
| -1 | 3 |
| 0  | 2 |
| 1  | 3 |
| 2  | 6 |

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

b)  $g(x) = -2x - 1$

| x  | y  |
|----|----|
| -2 | 3  |
| -1 | 1  |
| 0  | -1 |
| 1  | -3 |
| 2  | -5 |

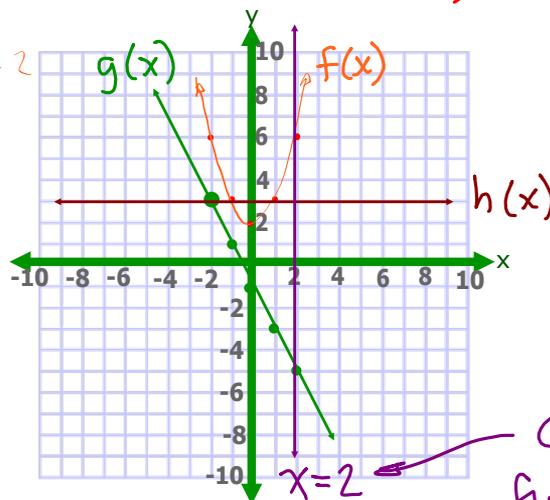
c)  $h(x) = 3$

| x  | y |
|----|---|
| -2 | 3 |
| -1 | 3 |
| 0  | 3 |
| 1  | 3 |
| 2  | 3 |

d)  $x = 2$

| x | y  |
|---|----|
| 2 | 5  |
| 2 | 0  |
| 2 | 1  |
| 2 | 13 |

*can be anything*

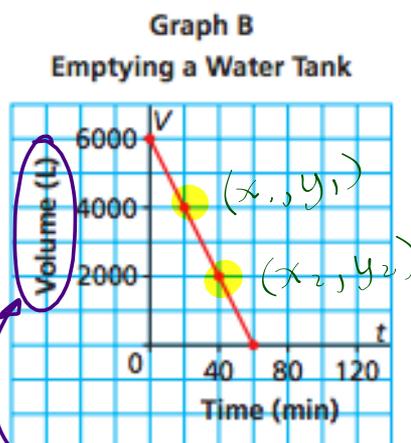
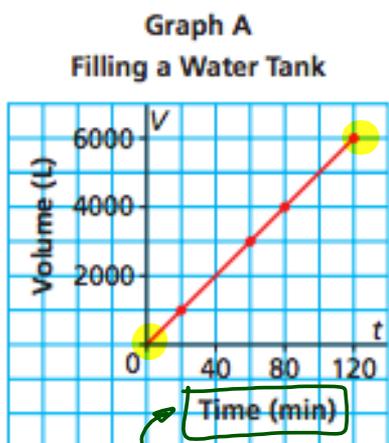


*cannot use function notation since it's NOT a function  
Fails VLT*

A water tank on a farm near Swift Current, Saskatchewan, holds 6000 L.

Graph A represents the tank being filled at a constant rate.

Graph B represents the tank being emptied at a constant rate.



- a) Identify the independent and dependent variables.
- b) Determine the rate of change of each relation, then describe what it represents.

rate of change =  $m$

$$m = \frac{\Delta y}{\Delta x} = \frac{\text{rise}}{\text{run}}$$

$$= \frac{6000 \text{ L}}{120 \text{ min}} = 50 \text{ L/min}$$

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{(2000) - (4000)}{(40) - (20)}$$

$$= \frac{-2000 \text{ L}}{20 \text{ min}}$$

$$= -100 \text{ L/min}$$