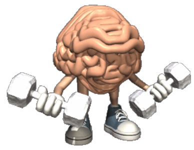
Warm Up



1) $t(x) = 3x^2 + 5$ $p(x) = \frac{-3x - 1}{2}$

a) Evaluate
p(-5) x t(4)

Input

Input

$p(x) = \frac{-3x-1}{2}$

$p(-5) = \frac{-3(-5)-1}{2}$

$\frac{+15-1}{2}$

$\frac{14}{2}$

$\boxed{p(-5) = 7}$

$t(x) = 3x^2+5$

$t(4) = 3(4)^2+5$

$3(16)+5$

$t(4) = 48+5$

$\boxed{t(4) = 53}$

$\underbrace{p(-5)}_{7} \times \underbrace{t(4)}_{53}$

$\boxed{=371}$

b) Evaluate
p(t(-2))

first

$t(x) = 3x^2+5$

$t(-2) = 3(-2)^2+5$

$= 3 \times 4 + 5$

$= 12 + 5$

$\boxed{t(-2) = 17}$

$p(t(-2))$

$p(17) = \frac{-3x-1}{2}$

$\frac{-3(17)-1}{2}$

$\frac{-51-1}{2}$

$-\frac{52}{2}$

$\boxed{p(t(-2)) = -26}$

c) Evaluate
p(x) = -17

d) Evaluate
t(x) = 113

output

$t(x) = 3x^2+5$

$113 = 3x^2+5$

$113-5 = 3x^2+5-5$

$108 = 3x^2$

$\frac{108}{3} = \frac{3x^2}{3}$

$36 = x^2$

$\sqrt{36} = \sqrt{x^2}$

$\boxed{\pm 6 = x}$

Homework Questions from

Page 281 #3,4,5,6,7,8,9

3a) F about 650 kg

3b) A 0.75 m

3c) D & E 400 kg

3d) D & H 2.25 m

4) a) 8m @ 6:00, 18:00

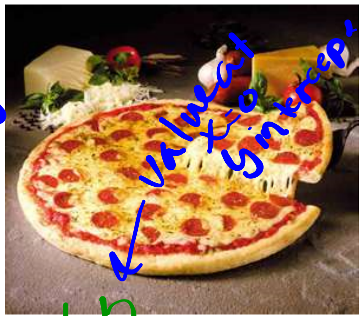
b) 2m @ 0:00, 12:00, 24:00

c) 4:00 it is 6.5m

d) 4m @ 2:00, ≈8:45, 14:15, 21:45

Linear Relationships

The table of values and graph show the cost of a pizza with up to 5 extra toppings.



rate of change

$0.75t + 12$

Number of Extra Toppings	Cost ($)
0	12.00
1	12.75
2	13.50
3	14.25
4	15.00
5	15.75

+1 $0.75

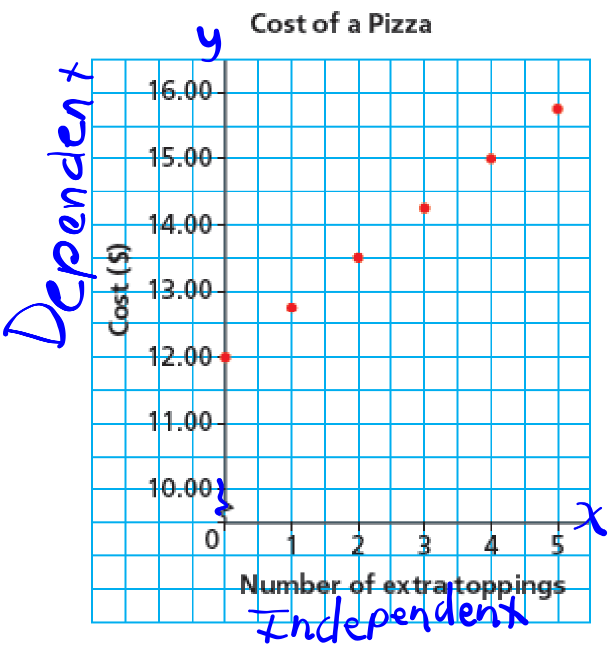
What is the independent variable? x

\# of topping

What is the dependent variable ? y

Cost of pizza

Graph



The cost for a car rental is \$60, plus \$20 for every 100 km driven.
The independent variable is the ____?____ and the dependent variable is ?____________

We can identify that this is a linear relation in different ways.

Make
- a table of values

Distance (km)	Cost (\$)
0	60
100	80
200	100
300	120
400	140

+20

rate of change in D

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

$$= \frac{+\$20}{+100\text{km}}$$

$$= \$0.20/\text{km}$$

value at x=0

y intercept

$$C = 0.20d + 60$$

$$C(d) = 0.20d + 60$$

Graph is on 2 slides over

5.6 Properties of Linear Relations

- a table of values

Independent variable → Distance (km); Dependent variable → Cost ($)

Distance (km)	Cost ($)
0	60
100	80
200	100
300	120
400	140

Rate of Change

Important

given a chart

given graph

rate of change= $\dfrac{\overset{y}{\text{change in dependent variable}}}{\underset{x}{\text{change in independent variable}}} = \dfrac{\text{rise}}{\text{run}} = \dfrac{\$20}{100\text{ km}}$

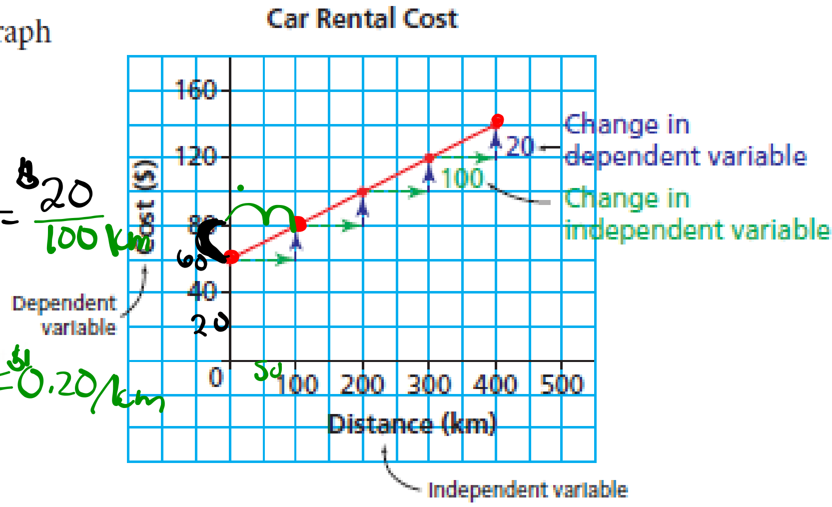
$= \$0.20/\text{km}$

Rate of change for this question is

$\text{rate of change} = \dfrac{\Delta y}{\Delta x} =$

We can use each representation to calculate the **rate of change**.

- a graph



$$\frac{\Delta y}{\Delta x} = \frac{\$20}{100\text{ km}}$$

$= \$0.20/\text{km}$

The rate of change can be expressed as a fraction:

Important

Rate of Change = $\frac{\text{change in dependent}}{\text{change in independent}} = \frac{\text{rise}}{\text{run}}$

Example 2 Determining whether an Equation Represents a Linear Relation

rate of change

a) Graph each equation.

y intercept (value when $x=0$)

i) $y = -\frac{3}{1}x + 25$

downhill

SOLUTION

a) Create a table of values, then graph the relation.

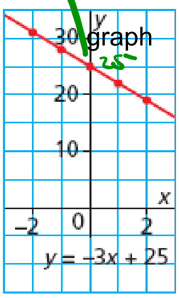
i) $y = -3x + 25$

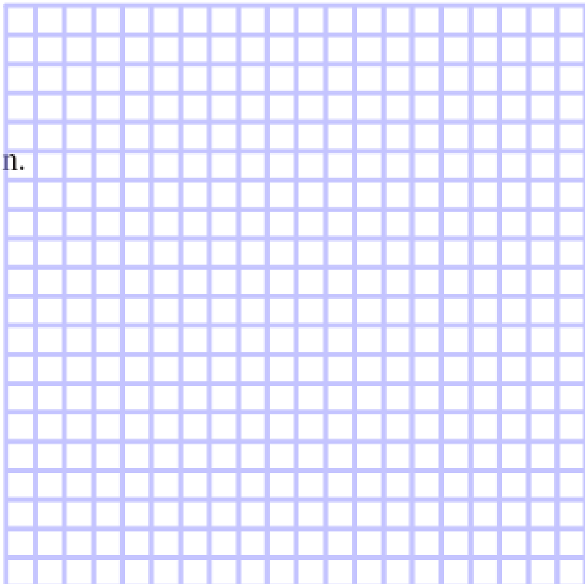
x	y
−2	31
−1	28
0	25
1	22
2	19

+1

−3

rate $= \frac{-3}{1}$





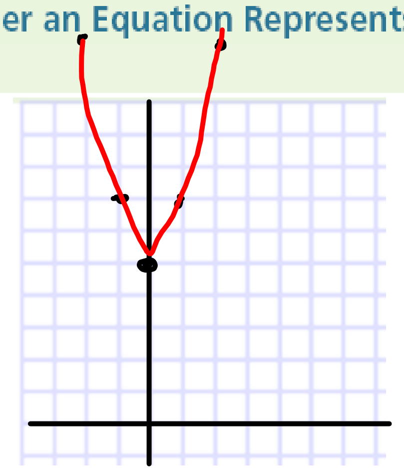
ontinues.)

Example 2 Determining whether an Equation Represents a Linear Relation

ii) $y = 2x^2 + 5$

x	y
-2	13
-1	7
0	5
1	7
2	13

graph

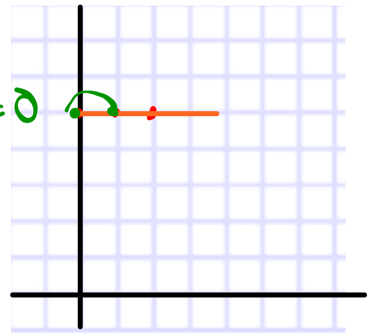


iii) $y = 5$

x	y
0	5
1	5
2	5

graph

$\frac{\text{rise}}{\text{run}} = \frac{0}{1} = 0$



Example 2 Determining whether an Equation Represents a Linear Relation

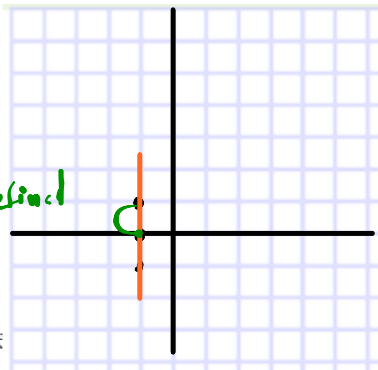
iv) $x = 1$

graph

x	y
1	-1
1	0
1	1

$\frac{\text{rise}}{\text{run}} = \frac{1}{0}$

$= \text{undefined}$



NOTICE

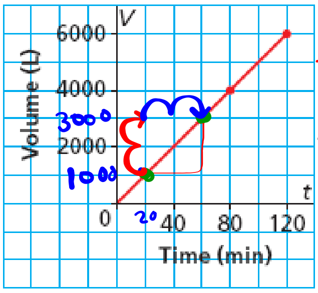
b) The graphs in parts i, iii, and iv are straight lines, so the equations represent linear relations; that is, $y = -3x + 25$, $y = 5$, and $x = 1$.
The graph in part ii is not a straight line, so its equation does not represent a linear relation.

Example 4 Determining the Rate of Change of a Linear Relation from Its Graph

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.

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

Graph A
Filling a Water Tank

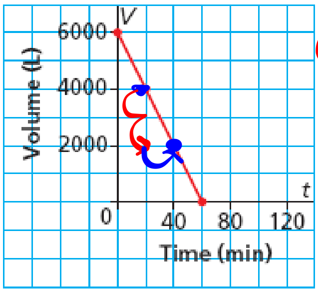


$\frac{\text{rise}}{\text{run}} = \frac{+2000\text{L}}{+40\text{min}}$

divide out

$\boxed{\text{rate} = 50\text{L/min}}$

Graph B
Emptying a Water Tank

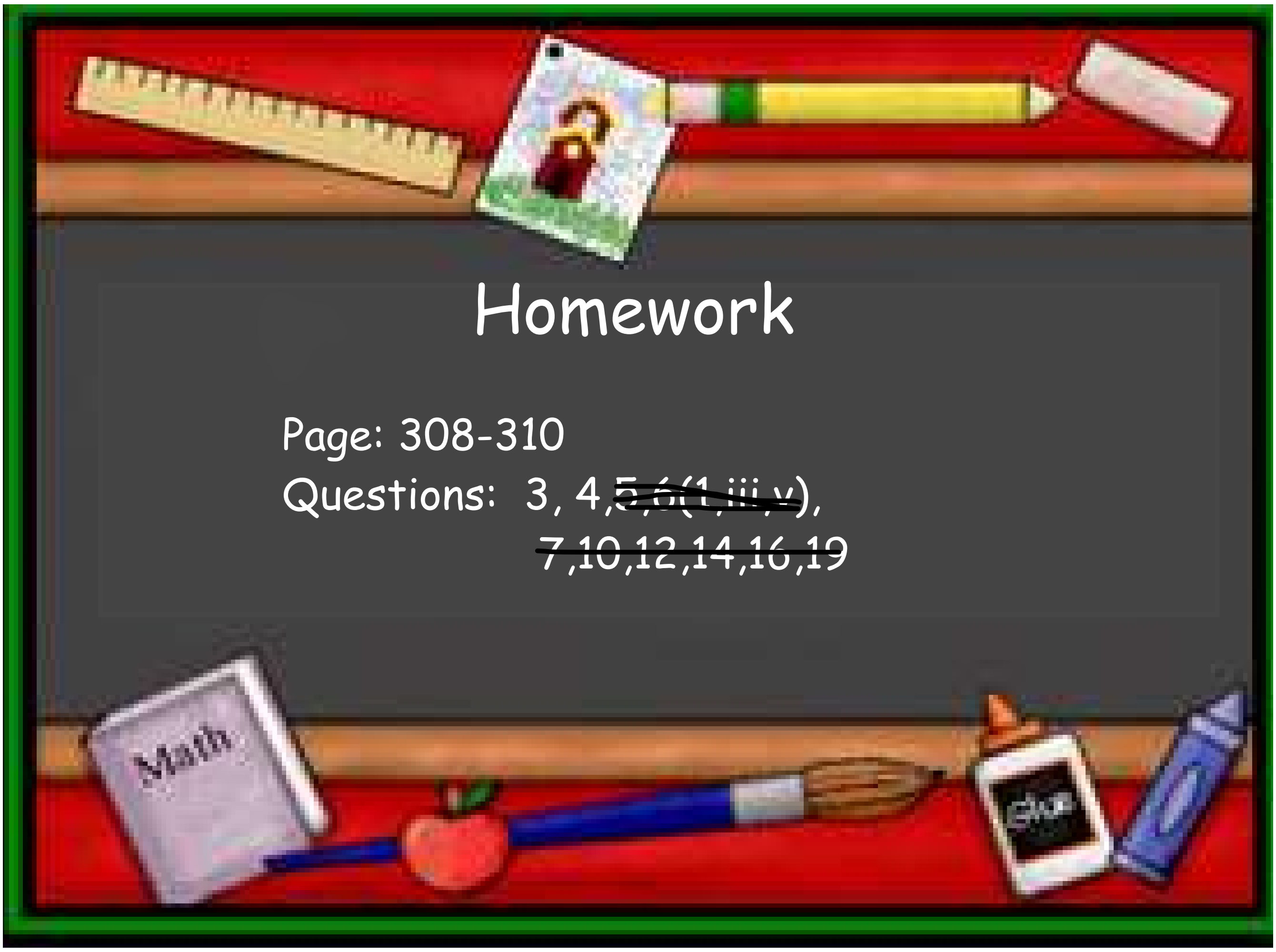


$\text{rise} = \frac{-2000\text{L}}{120\text{min}} = \boxed{100\text{L/min}}$

a) Identify the independent and dependent variables.

Time (min) Volume (L)

b) Determine the rate of change of each relation, then describe what it represents.


Homework
Page: 308-310
Questions: 3, 4,~~5,6(1,iii,v~~),
~~7,10,12,14,16,19~~
Math

pg 308 - 310
3, # 4

3a)

Time (min)	Distance (m)
0	10
2	50
4	90
6	130

+2, +2, +2

+40, +40, +40

$\text{rate} = \frac{\Delta y}{\Delta x} = \frac{40\,m}{2\,min} = 20\,m/min$

divide

Same

Same

all Same

then linear

3b)

Time (s)	Speed (m/s)
0	10
1	20
2	40
3	80

+1, +1

+10, +20

$\text{rate} = \frac{\Delta y}{\Delta x} = \frac{10\,m/s}{+1\,s} = 10\,m/s^2$

$\text{rate} = \frac{\Delta y}{\Delta x} = \frac{+20\,m/s}{1\,s} = 20\,m/s^2$

Not same

so Not linear