Unit 4: Linear Relations

Sec 4.1: Writing Equations to Describe Patterns

Variable
– a letter representing a quantity that can vary or change.

Operations
– addition, subtraction, multiplication, division or exponents.

Expression

- An expression is a mathematical statement made up of numbers and/or variables connected by operations.
- It does NOT contain an equal sign!
- Example: $3p$

Equation

- An equation is a mathematical statement where two expressions are equal.
- It has a equal sign!
- Example: $3p = 9$

In this unit we will be describing linear relations using words, equations, graphs, tables and pictures.

Examples:

1. Luke wants to earn money this winter shovelling drive-ways. He will get paid $9 an hour.

a). What two quantities are being compared in this problem?

? and ?

b). Which quantity is the independent variable and which is the dependent variable?

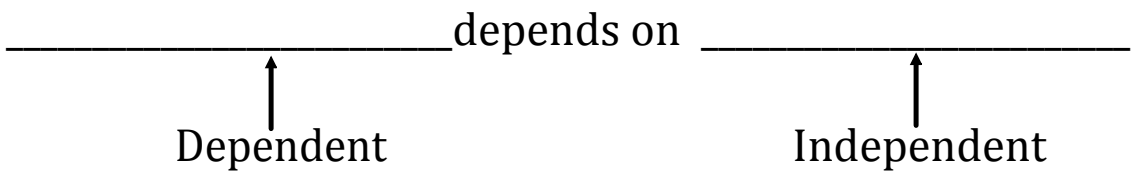
► **independent variable** – a variable whose value **is not** determined by the other variable. It does not depend on anything.

Hours worked is the independent variable.

► **dependent variable** – a variable whose value is determined by the other variable.
It always depends on the independent variable.

Since the amount earned depends on the hours worked then, amount earned is the dependent variable.

When trying to figure out which quantity is the independent and which is the dependent variable, complete the following sentence



“ The amount earned depends on the hours worked.”

c). Complete the table of values.

Number of hours worked (h)	Amount Earned (A)
1	
2	
3	
4	
5	

Independent Variable

Dependent Variable

d). Write an expression to represent the amount Luke earns per hour?

?

e). Write an equation to represent the amount Luke will earn?

?

► whenever the independent variable **increases by the 1**, you can use the following strategy to find the equation.

Number of hours worked (h)	Amount Earned (A)
1	9
2	18
3	27
4	36
5	45

Find the difference in the dependent variable

18 - 9 = 9

27 - 18 = 9

36 - 27 = 9

45 - 36 = 9

- the number that the dependent variable increases by should be the same!

- use this number to multiply the independent variable by.

	Number of hours worked (h)	Amount Earned (A)	
x 9	1	9	9
x 9	2	18	9
x 9	3	27	9
x 9	4	36	9
x 9	5	45	

Does 1 x 9 = 9 ? YES

Does 2 x 9 = 18 ? YES

Does 3 x 9 = 27 ? YES

etc....

Therefore, the equation is: $A = 9h$

f). Use the equation to determine how much Luke will make shovelling 11 hours in one week?

$$A = 9h$$
$$A = 9 \times 11$$
$$A = 99$$

He will earn $99 with 11hours of shovelling

g). Use the equation to determine how many hours will Luke will need to shovel to earn $72?

$$A = 9h$$
$$72 = 9 \times ?$$
$$h = 8$$

It will take him 8 hours to earn $72.

Complete page 159
#'s 4, 5, 6, and 7