Unit 3 - Linear Functions
Lesson #5

WRITING EQUATIONS FOR HORIZONTAL AND VERTICAL LINES.

- ❑ A horizontal line represents a *constant function*. Its equation will always be:
- ❑ A vertical line represents all the places where x is a specific number. This is not a function and can't be solved for *y*. Its equation will always be:

WRITING LINEAR EQUATIONS FROM WORD PROBLEMS
You want to use the given information to decide which form will be the easiest to use to write the equation. To write a linear equation you will:

Word problems in Slope-intercept form

When a word problem involves a constant rate or speed and a beginning amount, it can be written in slope-intercept form: $y = mx + b$. To do this, recognize which number will represent m, the rate, and which number will represent b, the y-intercept.

1. An airplane 30,000 feet above the ground begins descending at the rate of 2000 feet per minute. Assume the plane continues at the same rate of descent. The plane's height and minutes above the ground are related to each other.

   Identify the variables in this situation: x= _____ y= _____

   What is the given information in this problem (find all that apply)?
   y-intercept _____ slope _____ one point (,) a second point: (,)

a. Write an equation to model the situation.

b. <u>Use your equation</u> to find the altitude of the plane after 5 minutes.

2. Suppose you receive $100 for a graduation present, and you deposit it in a savings account. Then each week thereafter, you add $5 to the account but no interest is earned. The amount in the account is a function of the number of weeks that have passed.

Identify the variables in this situation: x= _____ y= _____

What is the given information in this problem (find all that apply)?
y-intercept _____ slope _____ one point (,   ) a second point: (,   )

a. Find an equation for the amount y you have after x weeks.

b. Use your equation to find when you will have $310 in the account.

Word Problems in Point-slope form
When a word problem involves a constant rate or speed and gives a relationship at some point in time between each variable, an equation can be written in point-slope form to model the relationship.

1. Marty is spending money at the average rate of $3 per day. After 14 days he has $68 left. The amount left depends on the number of days that have passed.

Identify the variables in this situation: x= _____ y= _____

What is the given information in this problem (find all that apply)?
y-intercept _____ slope _____ one point (,   ) a second point: (,   )

a. Write an equation for the situation.

b. Use your equation to find the amount of money he began with.

2. Diane knows a phone call to a friend costs 25 cents for the first 3 minutes and 10 cents for each additional minute. The number of minutes you call and the cost of the call are related.

Identify the variables in this situation: x= _____ y= _____

What is the given information in this problem (find all that apply)?
y-intercept _____ slope _____ one point (,) a second point: (,)

a. Write an equation for the situation.

b. Use your equation to find the cost of a 30-minute call.

More Word Problems in Point-slope form
Sometimes instead of giving a rate, a word problem gives two relationships at different points in time between variables. This kind of problem is giving you two points. You must find the slope and then use one of the points to write an equation.

1. Suppose a 5-minute overseas call costs $5.91 and a 10-minute call costs $10.86. The cost of the call and the length of the call are related.

Identify the variables in this situation: x= _____ y= _____

What is the given information in this problem (find all that apply)?
y-intercept _____ slope _____ one point (,) a second point: (,)

a. What is the cost y of a call of x minutes duration? (Assume this is a constant-increase situation)

b. How long can you talk on the phone if you have $12 to spend?

2. Biologists have found that the number of chirps some crickets make per minute is related to temperature. The relationship if very close to being linear. When crickets chirp 124 times a minute, it is about 68 degrees Fahrenheit. When they chirp 172 times a minute, it is about 80 degrees Farenheit.

       Identify the variables in this situation: x= _____ y= _____

       What is the given information in this problem (find all that apply)?

       y-intercept _____   slope _____   one point (,   )   a second point: (,   )

a. Find an equation for the line that models this situation.

b. How warm is it when the crickets are chirping 150 times a minute?

MORE WORD PROBLEM PRACTICE:

1. Nick is given $50 to spend on a vacation . He decides to spend $5 a day. The amount Nick has left and the number of days are related.

       Identify the variables in this situation: x= _____ y= _____

       What is the given information in this problem (find all that apply)?

       y-intercept _____   slope _____   one point (,   )   a second point: (,   )

a. Write an equation relating x and y.

b. Use your equation to find out when Nick will have $15 left.

2. Julio plans a diet to gain 0.2 kg a day. After 14 days he weighs 40 kg. The number days he diets and his weight are related.

       Identify the variables in this situation: x= _____ y= _____

       What is the given information in this problem (find all that apply)?
       y-intercept _____   slope _____   one point (,   )   a second point: (,   )

a. Write an equation relating Julio's weight , w, to the number of days, d, on his diet.

b. How long will it take Julio to reach his goal weight of 50 kg?

3. A plane loses altitude at the rate of 5 meters per second. It begins with an altitude of 8500 meters. The plane's altitude is a function of the number of seconds that pass.

       Identify the variables in this situation: x= _____ y= _____

       What is the given information in this problem (find all that apply)?
       y-intercept _____   slope _____   one point (,   )   a second point: (,   )

a. Write an equation modeling this situation.

b. Use your equation to find out how much time will pass before the plane will land (hint: what is the altitude when the plane lands?)