

Goal: Point-Slope Form of Linear Functions

Objectives: I can...

- Identify when an equation is in point-slope form.
- Identify the differences between point-slope form and the other two forms of linear functions.
- Write point-slope form from given information or a scenario.
- Graph point-slope equations.
- Find the slope and intercepts from a point-slope equation.
- Identify important parts of a point-slope equation.

Essential Questions

- When are point-slope equations needed?
- What can you identify from a point-slope equation?
- How do you graph a point-slope equation?
- What do you need in order to write a point-slope equation?

Setup a slope equation given that the slope of a line going through points $(2,3)$ and (x,y) is 4.

What does it mean when the point is written (x,y) ?
How does this differ from writing it as (x_1,y_1) ?

Now, solve that equation for y in terms of x .

$$4 = \frac{y-3}{x-2}$$

What do you notice???

Now, solve that equation so that x and y are on one side and constants on the other.

$$4 = \frac{y-3}{x-2}$$

What do you notice???

We can see that both forms stem from a re-written version of the slope formula. This is why they have constant rates and are linear.

$$4 = \frac{y-3}{x-2}$$

Slope

Multiply both sides by $(x-2)$

$$y - 3 = 4(x - 2)$$

They become common forms because they are written in a way that makes equation writing easier. When would we use each type of form?

Distribute 4, move the $4x$, and move the 3

$$-4x + y = -5$$

Linear Standard

Distribute 4 and add 3

$$y = 4x - 5$$

Slope-Intercept

The first stem of the diagram represents a third form we have not learned yet. What do the values in this form represent in our problem?

$$4 = \frac{y-3}{x-2}$$

Slope

Multiply both sides by $(x-2)$

$$y - 3 = 4(x - 2)$$

Distribute 4, move the $4x$, and move the 3

$$-4x + y = -5$$

Linear Standard

Distribute 4 and add 3

$$y = 4x - 5$$

Slope-Intercept

This form is called **point-slope** form because we can identify a point of the graph and the slope from it.

$$4 = \frac{y-3}{x-2}$$

Slope

Multiply both sides by $(x-2)$

$$y - 3 = 4(x - 2)$$

Point-Slope

Distribute 4, move the $4x$, and move the 3

$$-4x + y = -5$$

Linear Standard

Distribute 4 and add 3

$$y = 4x - 5$$

Slope-Intercept

This is our chart when we replace our problem's values with math notation.

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

Slope

Multiply both sides by $(x - x_1)$

$$y - y_1 = m(x - x_1)$$

Point-Slope

Distribute m , move the mx , and move the y_1

Distribute m and add/subtract y_1

$$Ax + By = C$$

Linear Standard

Get y by itself

$$y = mx + b$$

Slope-Intercept

Get x & y on one side

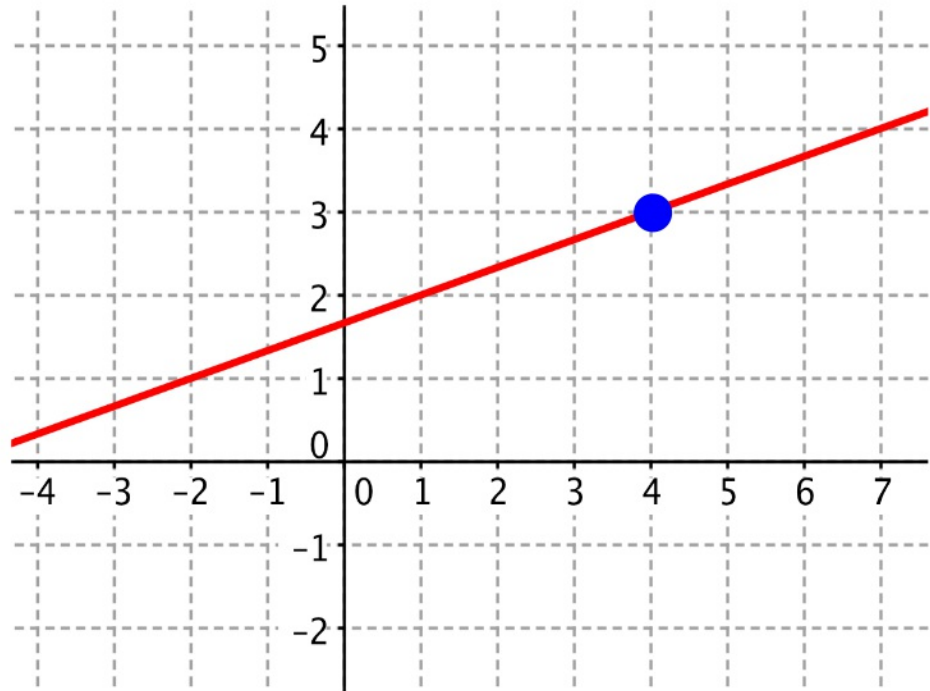
Let's Practice Point-Slope Form

We use point-slope form when we have a point and a slope of a line.

$$y - y_1 = m(x - x_1)$$

Point (x_1, y_1)

Slope



****Why is it better to write the equation for this graph in point-slope form rather than slope-intercept form?***

Write a point-slope equation given the information

1. $(2,5)$
 $m=1/2$

2. point $(-8,12)$
Slope -3

3. $(-1,-6)$
Slope $-5/2$

4. $(-6,0)$
rate=8

5. $(-3,0)$
 $(2,5)$

6. $(-7,15)$
 $(1,4)$

Identify the point and the slope from the point-slope equations.

1. $y - 9 = -2(x - 5)$

2. $y + 1 = \frac{1}{7}(x - 2)$

3. $y + 11 = \frac{-5}{13}(x + 8)$

4. $y = \frac{2}{7}(x - 4)$

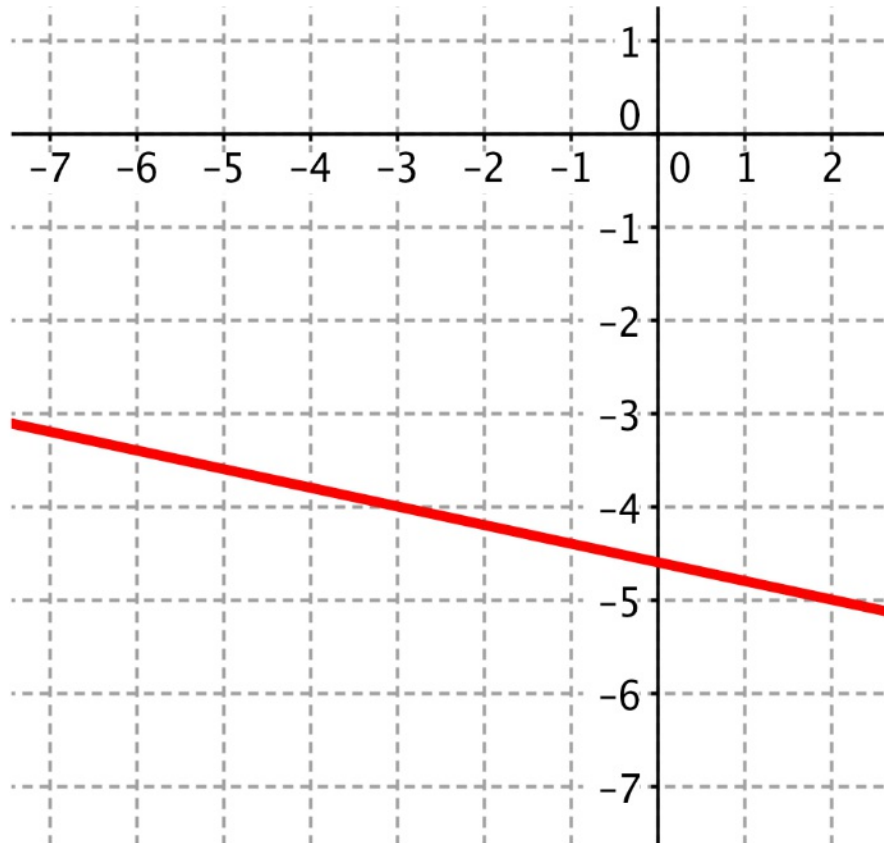
Identify the intercepts from
the point-slope equations.

1. $y - 4 = -3(x + 2)$

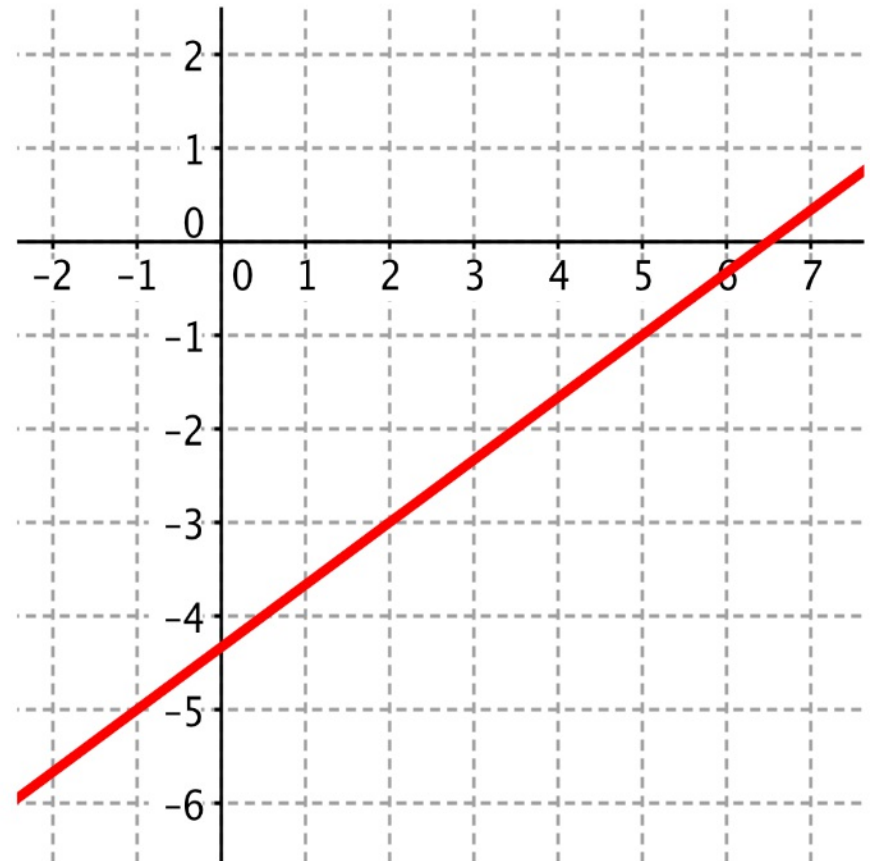
2. $y + 6 = \frac{2}{3}(x - 1)$

Write a point-slope equation from the graph

1.

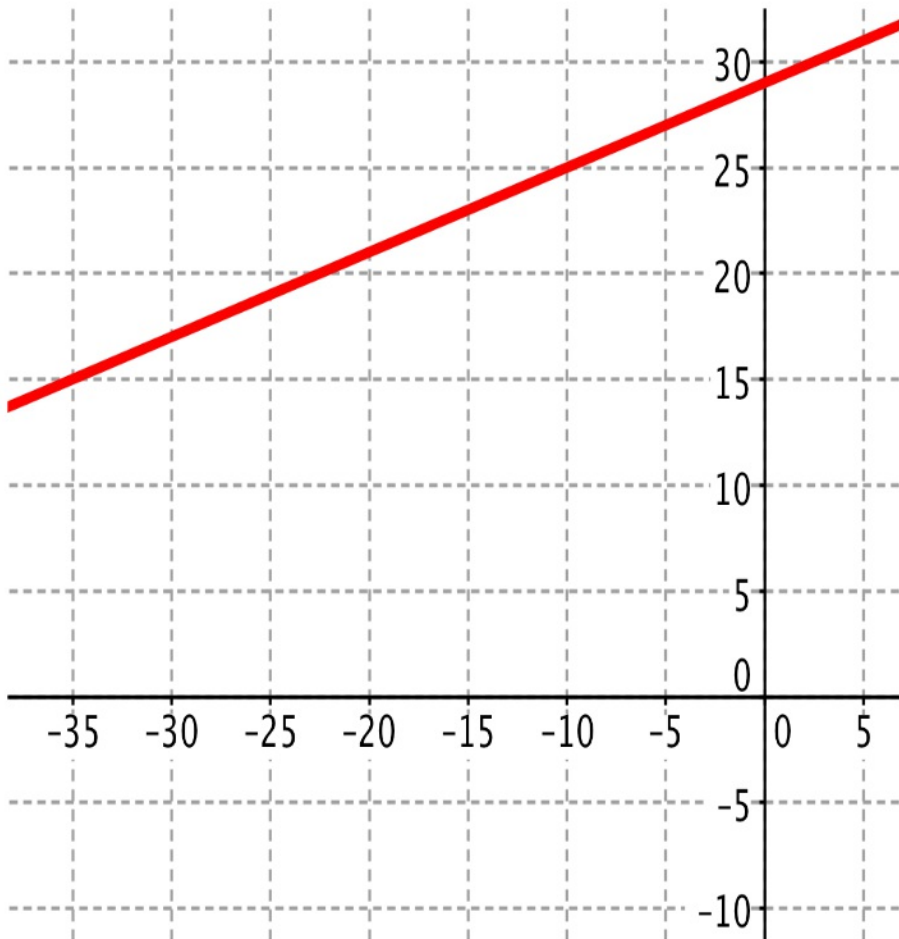


2.

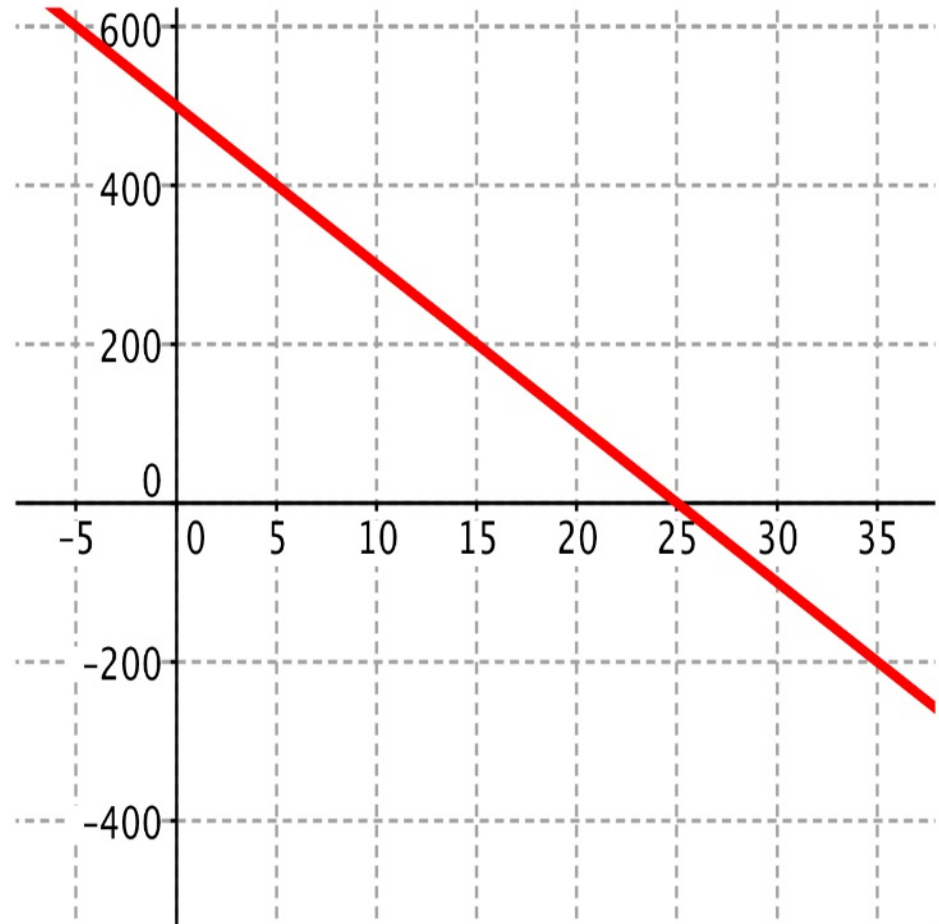


Write a point-slope equation from the graph

3.



4.



Rewrite each point-slope equation in standard form and slope-intercept form.

1. $y - 13 = 5(x + 11)$

2. $y + 7 = -9(x - 4)$

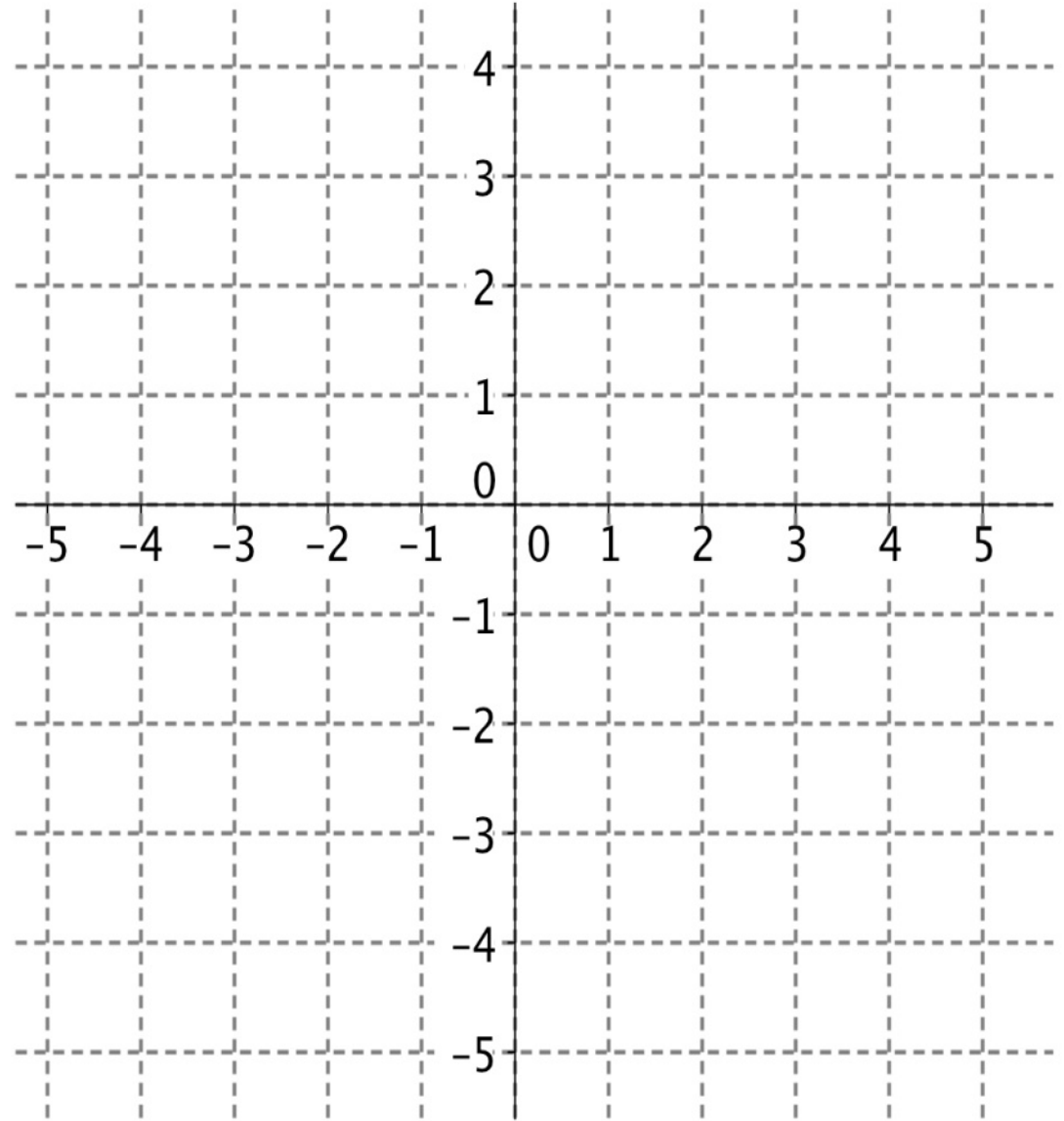
Rewrite each point-slope equation in standard form and slope-intercept form.

1. $y - 4 = \frac{3}{4}(x - 2)$

2. $y + 6 = \frac{-1}{3}\left(x + \frac{7}{2}\right)$

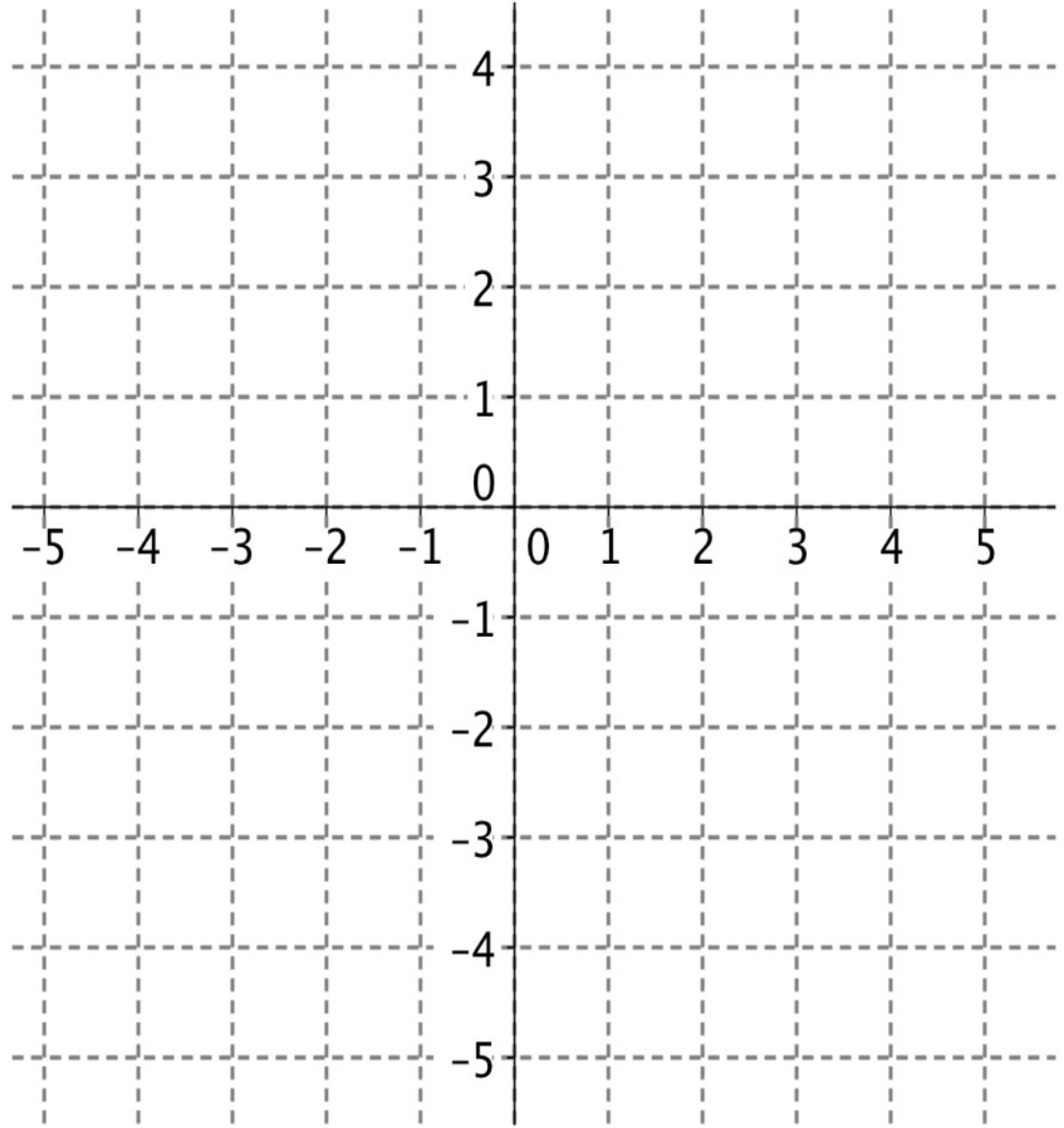
Graphing Point-Slope Form

$$y - 1 = \frac{-2}{3}(x + 4)$$



Graphing Point-Slope Form

$$y - 13 = \frac{-7}{2}(x - 1)$$



Write a slope-intercept equation for the table

1.

x	y
-4	-37
2	5
4	19
5	26
8	47
9	54

2.

x	y
1	7
2	15
3	23
5	39
8	63
11	87

Tony knows that if he raises the price of his award winning spaghetti by \$0.50 he will lose 10 customers. If he raises the price by \$2 he will lose 40 customers. Suppose the rate at which he loses customers is constant in relation to how much he raises the price. Write an equation to model the situation.

Josh wants to put an ad in the school yearbook. He checked with Mr. Flanagan and he said that 2 ads would cost \$30 and 5 ads would cost \$55. Assuming the pricing is linear, write an equation to model the scenario and then tell how much it would cost to put 1 ad.

Max's mother is driving home at 45 mph. She called and said that after 2 hours of driving she was 140 miles from home. Assuming she is driving at one speed without stopping write an equation for the situation and then find how long it took her to get home.

Difference Between Forms

Standard

When to use: Used when a situation has two constant rates of change and a total value.

Information from equation: The standard form equation does not tell you anything about the graph. You must convert it to a different form to attain useful graphical information.

Slope-Intercept

When to use: Used when a situation has one constant rate of change and an initial starting value.

Information from equation: The slope-intercept form equation tells the slope and y-intercept of the graph.

Point-Slope

When to use: Used when a situation has two data points or 1 data point and a rate.

Information from equation: The point-slope form equation gives the slope and a coordinate point of a function.

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