

# UNIT 4: REAL-WORLD PROBLEMS

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## Equations of Lines (slope-intercept form)

I can write and evaluate an equation in slope-intercept form given a real life situation.

When you have a real world (word problem) that requires you to write an equation in slope intercept form, there are two things that you want to look for:

1. **A Rate.** The rate is your **slope** in the problem. The following are examples of a rate

*slope (m)*

- \$3 per day
- \$2 an hour
- 60 mph
- 2 m/s
- \$6 a minute
- 45 words per minute

This number is always related to the x-value.

Per is a key word that is often associated with slope.

$$y = mx + b$$

2. **A Flat Fee.** A flat fee or starting value is your **y-intercept**. This value is a constant. It never changes.

*y-int (b)*

$$y = mx + b$$

Use the chart below to help you organize your information as you analyze each word problem. This will help you to write your equation!

One time charge

Flat Fee (starting #)	b (y-intercept)	?
Rate	m (slope)	?

$$y = mx + b$$

Take a look at the examples below to better clarify how this chart can help you!

### Example 1

You are visiting Baltimore MD, and a taxi company charges a flat fee of \$3.00 for using the taxi and an additional \$0.75 per mile. Write an equation that you could use to find the cost of a taxi ride in Baltimore, MD. Let  $x$  represent the number of miles and  $y$  represent the total cost.

- How much would a taxi ride for 8 miles cost?

Flat Fee (starting #)	b (y-intercept)	3
Rate	m (slope)	.75 $\left(\frac{3}{4}\right)$

Cost = rate(miles) + fee

$$y = mx + b$$

$$y = \frac{3}{4}x + 3$$

- The equation could be used to find the cost of a taxi ride in Baltimore, MD is  $y = \frac{3}{4}x + 3$
- To find out the cost for an 8 mile ride, substitute 8 for x.

$$y = \frac{3}{4} \left(\frac{8}{1}\right) + 3$$

$$y = \frac{3}{1} \left(\frac{8}{1}\right) + 3$$

$$y = 6 + 3$$

A taxi ride would cost \$9 for 8 miles.

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### Example 2

A plumber charges a fee of \$120 to make a house call. He also charges \$10.00 an hour for labor. Write an equation that you could use to find the amount a plumber charges for a house call based on the number of hours of labor. Let  $x$  represent the number of hours of labor and  $y$  represent the total cost.

- How much would a house call cost that requires 2.5 hours of labor?

Flat Fee (starting #)	b (y-intercept)	120
Rate	m (slope)	10

$$y = mx + b$$

$$y = 10(x) + 120$$

- The equation could be used to find the amount a plumber charges is  $y = 10x + 120$
- To find out the cost for the 2.5 hours, substitute 2.5 for  $x$ .

$$y = 10(2.5) + 120$$

$$y = 25 + 120$$

A plumber would cost \$145 for 2.5 hours.

### Your Turn...

- Hannah's electricity company charges her \$0.10 per kWh (kilowatt-hour) of electricity, plus a basic connection charge of \$15.00 each month. Write a linear function that models her monthly electricity bill as a function of electricity usage. Let  $y$  represent the cost and  $x$  represent the amount of electricity.

- How much would her bill be if she used 500kWh of electricity?

Flat Fee (starting #)	b (y-intercept)	15
Rate	m (slope)	.10

$$y = mx + b$$

$$y = .10(x) + 15$$

- The equation could be used to find the charge on her electric bill is  $y = .10x + 15$
- To find out the cost for the electricity, substitute 500 for  $x$

$$y = .10(500) + 15$$

$$50 + 15$$

A bill would be \$65 for 500kWh.