

## Linear Models and Rates of Change

### Objectives

- Find the slope of a line given two points
- Write the equation of a line with a given point and slope
- Interpret slope as a ratio or a rate in a real life application
- Sketch the graph of a linear equation in slope-intercept form
- Write equations of lines that are parallel or perpendicular to a given line

## Review

Summary of equations of lines

Give an example of each form.

General Form

$$3x + 4y - 2 = 0$$

Standard Form

$$3x + 4y = 2$$

Vertical line

$$x = 4$$

Horizontal line

$$y = -2$$

Point-slope form

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

Slope intercept form

$$y = mx + b$$

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}; x_2 \neq x_1$$

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

## Parallel and Perpendicular lines

What determines two lines being parallel or perpendicular?

Are any of these lines parallel or perpendicular?

$$3x - 5y = 8$$

$$\frac{2}{3}x - 6 = y$$

$$2x - 3y = 18$$

$$5x + 3y - 4 = 0$$

Write an equation of a line in general form of the line passing through  $\left(\frac{7}{8}, \frac{3}{4}\right)$  &  $\left(\frac{5}{4}, -\frac{1}{4}\right)$

$$32x + 12y - 37 = 0$$

A company reimburses its sales representative \$150 per day for lodging and meals plus \$0.34 per mile driven. How much does it cost the company if a sales representative drives 134 miles on a given day?

$$y = 0.34x + 150$$

\$195.56

The table shows the rate  $r$  (in miles per hour) that a vehicle is traveling after  $t$  seconds

$t$	5	10	15	20	25	30
$r$	57	74	85	84	61	43

- Plot the data by hand and connect adjacent points with a line segment
- Use the slope of each line segment to determine the interval when the vehicle's rate changed most rapidly. How did the rate change?

### Homework

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