

## Precalculus Unit 1: 1.1 Notes

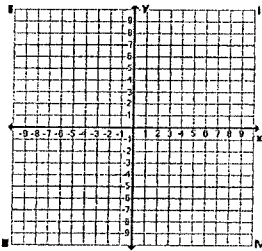
### Lines in the Plane

#### Slope: rate of change

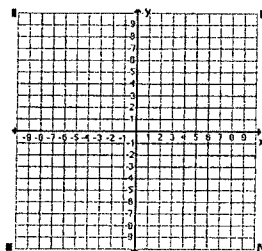
In the box below, complete the formula for finding the slope between two points.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

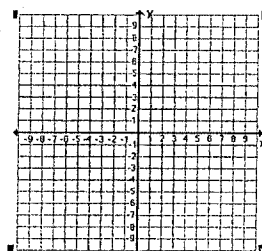
On the graphs below, draw an example of a line with the given slope.



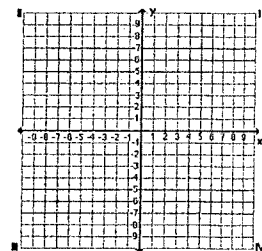
Positive Slope



Negative Slope



Zero Slope



Undefined Slope

Parallel lines always have the same slope.

Perpendicular lines always have opposite reciprocal slopes.

#### Linear Equations: always have a constant rate of change (slope)

In the boxes below, fill in the different forms that represent the equation of a line.

Slope-Intercept Form:

$$y = mx + b$$

Point-Slope Form:

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

Standard Form:

$$Ax + By = C$$

\*\* We will be working with slope intercept form most frequently in class, so the examples will focus on using that method.

**Examples:**

1. Write an equation for the line that passes through the points (4,7) and (-5,3).

$$m = \frac{7-3}{4-(-5)} = \frac{4}{9}$$

$$y = \frac{4}{9}x + \frac{47}{9}$$

$$y = mx + b$$

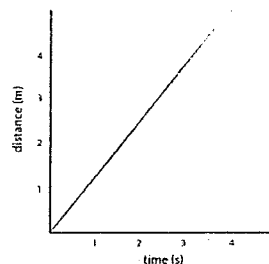
$$7 = \frac{4}{9}(4) + b$$

$$\frac{47}{9} = b$$

**Slope-Intercept Form**  
 $y = mx + b$   
 slope    y-intercept

2. In the time distance graph on the right, what information does the slope give you about the object that is moving? Make sure to include units.

The speed or velocity (which is constant) in meters/second.



3. Write an equation for the line that passes through the point (2, -7) and is:  
 a. Parallel to the line  $4x + 2y = 7$ .

find the slope of this line  
 $2y = -4x + 7$   
 $y = -2x + \frac{7}{2}$   
 ↑ slope

$$y = mx + b$$

$$-7 = (-2)(2) + b$$

$$-7 = -4 + b$$

$$-3 = b$$

$$y = -2x - 3$$

- b. Perpendicular to the line  $4x + 2y = 7$ .

$$y = mx + b$$

$$-7 = \left(\frac{1}{2}\right)(2) + b$$

$$-7 = 1 + b$$

$$-8 = b$$

$$y = \frac{1}{2}x - 8$$

4. Joe's Warehouse has banquet facilities to accommodate a maximum of 250 people. When the manager quotes a price for a banquet she is including the cost of renting the room plus the cost of the meal. A banquet for 70 people costs \$1300. For 120 people, the price is \$2200.

- a. Determine the slope of the line. What quantity does the slope of the line represent?

$$\begin{matrix} (70, \$1300) \\ (120, \$2200) \end{matrix} \quad m = \frac{\$900}{50} = \$18/\text{person} \quad \text{Cost per person}$$

- b. Write an equation to model this situation and use it to estimate the cost of a banquet for 250 people.

$$y = mx + b$$

$$1300 = (18)(70) + b$$

$$1300 = 1260 + b$$

$$40 = b$$

$$y = 18x + 40$$

$$\$4540 \leftarrow \text{for 250 people}$$