MA 15200   Lesson 23   Parts of Sections 2.3 and 2.4

I   Review of Equations of Lines

In the last lesson we found two forms for equations of lines
- **Point-Slope Form:** $y - y_1 = m(x - x_1)$
- **Slope-Intercept Form:** $y = mx + b$

Any non-vertical line can be written in both of the forms.

Point-Slope Form
An equation of a form $y - y_1 = m(x - x_1)$ is an equation for a line in point-slope form. The value of *m* is the slope of the line and the ordered pair, (x_1, y_1), is an indicated point of the line.

Slope-Intercept Form
An equation of the form $y = mx + b$ is an equation for a line in slope-intercept form. The value of *m* is the slope of the line and *b* or point (0, *b*) is the *y*-intercept of the line.

Ex 1:   Write an equation in point-slope form for the line shown. Convert to slope-intercept form.
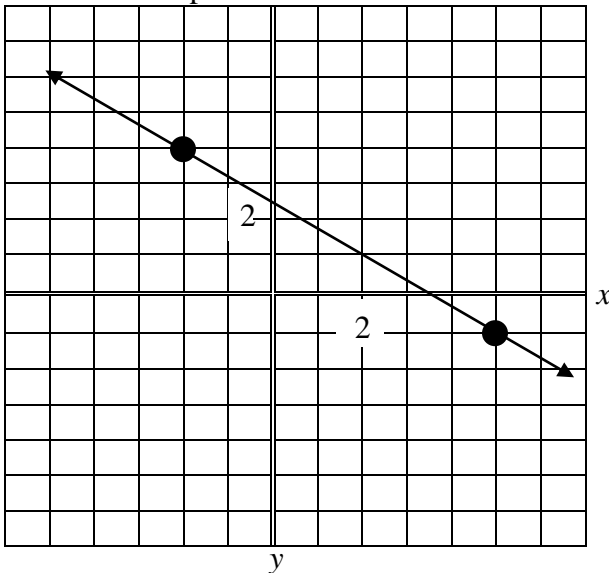
II   General Form and Standard Forms for of an Equation of a Line

The **General Form of the Equation of a Line is** $Ax + By + C = 0$, where *A, B,* and *C* are integers and *A* is positive. Some textbooks, have **Standard form** as $Ax + By = C$. Note: **Some problems on coursecompass or MyMathLab want the equations of the lines in general form and some problems want the equations in standard form.**

<u>Ex 2:</u>   Find an equation of the line containing points (2, -3) and (-4, -8) in general form and in standard form.

III   Parallel and Perpendicular Lines
<u>**Parallel Lines:**</u> Two lines that are parallel will have the **same slope** or two lines with the same slope will be parallel.

1

2

$$m_1 = m_2$$
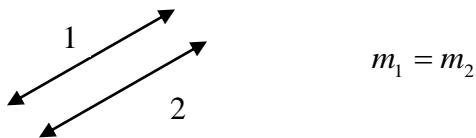
<u>**Perpendicular lines:**</u> Two lines that are perpendicular will have **slopes with a product of -1 (opposite reciprocals or negative reciprocals)**. Two lines whose slopes of negative reciprocals will be perpendicular.

1

2

$$m_1 = -\frac{1}{m_2} \text{ or } m_2 = -\frac{1}{m_1}$$
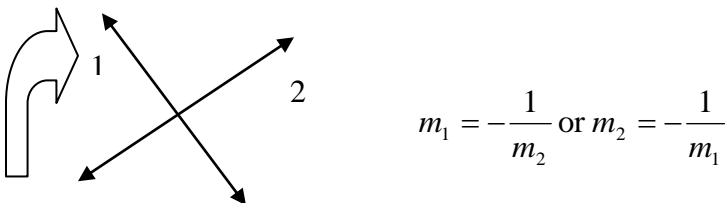
Ex 3: Determine is the lines with given slopes or given pairs of points are parallel, perpendicular, or neither (simply intersect).

a) $m_1 = -\dfrac{4}{3},\ m_2 = \dfrac{4}{3}$

b) $m_1 = -3,\ m_2 = \dfrac{1}{3}$

Ex 4: Find the equation in slope-intercept form and general form for each line described.

a) $P(12,15)$, parallel to $4x - y = 9$

b) $P(6,4)$, perpendicular to $y = -3x - 4$

IV   Applied Problems

Ex 5: Steven has an antique watch that has appreciated in value from the time he purchased it. He bought the watch for $900. After 6 years, it was worth $1150. The graph of the ordered pairs representing (years, value of watch) form a straight line.

a)   Write an equation of its value after t years in the form $V = mt + b$.

b)   Use your equation to predict the value of the watch after 10 years.

Ex 6: In 2000 in a certain town, 38% of children from ages 12 to 18 had their own computer. This has been increasing by 2.8% per year since then. Find a linear function P(x) in slope-intercept form, to find the percent of children of those ages who have their own computer for years since 2000.