What's Going On?

Checking In   F.F.M.

Minds on   Putting it Together

Action!   Some Old Friends

Consolidation   Group Problems

Learning Goal - I will be review Grade 9 Linear Equations.

F.F.M.

Find the mid-point of the line segment with end points (4, -6) and (-6, -9).

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$M = \left(\frac{4 + (-6)}{2}, \frac{(-6) + (-9)}{2} \right)$$

$$M = \left(\frac{-2}{2}, \frac{-15}{2} \right)$$

$$M = (-1, -7.5)$$

Minds on

Putting it Together

A line segment has endpoints (8, -2) and (-6, -8).

Find the midpoint and the length of the line segment.

$$\ell = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\ell = \sqrt{(-6-8)^2 + (-8 - (-2))^2}$$

$$\ell = \sqrt{(-14)^2 + (-6)^2}$$

$$\ell = \sqrt{196 + 36}$$

$$\ell = \sqrt{232}$$

Action!

Some Old Friends

Point-Slope Form Equation

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

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

Standard Form Equation

$$Ax + By + C = 0$$

| **Action!**

Some Old Friends

Example 1: Write an equation in standard form

for the line through A(3, -4) with slope $-\frac{1}{2}$.

$$A_x + B_y + C = 0$$

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

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

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

$$2y + 8 = -\frac{2}{2}x + \frac{6}{2}$$

$$2y + 8 = -x + 3$$

$$+x - 3 \quad +x \quad +3$$

$$x + 2y + 5 = 0$$

Action!

Some Old Friends

Example 2: Write an equation in standard form
for a line through A (-3, -2) and B (1, 6).

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

$$m = \frac{6 - (-2)}{1 - (-3)}$$

$$m = \frac{8}{4}$$

$$m = 2$$

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

$$y - 6 = 2(x - 1)$$

$$y - 6 = 2x - 2$$
$$-y + 6 \quad -y + 6$$

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

$$0 = 0$$

Action!

Some Old Friends

Slope y-Intercept Form Equation

$$y = mx + b$$

$$b = y - mx$$

Action!

Some Old Friends

Example 1: Find the slope and *y*-intercept of the line $2x + 3y - 6 = 0$.

$$2x + 3y - 6 = 0$$
$$-2x \qquad +6 \qquad -2x + 6$$
$$\frac{3y}{3} = \frac{-2x}{3} + \frac{6}{3}$$
$$y = \frac{-2}{3}x + 2$$

Action!

Some Old Friends

Example 2: Find the slope and y-intercept
of the line through F (3, -1) and G (5, 7).

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \frac{-8}{-2}$$

$$m = \frac{7+1}{5-3}$$

$$m = \frac{8}{2}$$

$$m = 4$$

$$b = y - mx$$

$$b = (-1) - (4)(3)$$

$$b = -1 - 12$$

$$b = -13$$

Action!

Some Old Friends

Parallel Lines

Two lines are parallel if _____they never meet (if distinct)_____.
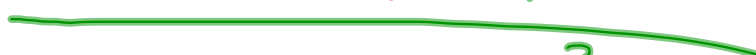they have the same slope

Perpendicular Lines

Two lines are perpendicular if _____their slopes are the_____
negative reciprocal of one another_____.

$$m = 1 \quad \frac{1}{1}$$

$$\perp m = -1 \quad \frac{-1}{1}$$

$$m = 3 \quad \frac{3}{1}$$

$$\perp m = -\frac{1}{3}$$

$$m = \frac{1}{5}$$

$$\perp m = -\frac{5}{1}$$

Action!

Some Old Friends

Example: Write an equation of the line perpendicular

to $3x + y - 6 = 0$ through the point $(5, 2)$.

1. Rearrange the given equation into $y = mx + b$ form.

2. Find the slope of our line by finding the negative reciprocal of the slope of the given line.

3. a) Plug our slope and point in to the point slope form equation, simplify and rearrange.

b) Find the x-intercept using $b = y - mx$.

1. $3x + y - 6 = 0$

$-3x \qquad +6 \qquad -3x + 6$

$y = -3x + 6$

2. $m = -3, \quad \perp m = \frac{1}{3}$

3.a) $y - y_1 = m(x - x_1)$

$y - 2 = \frac{1}{3}(x - 5)$

$y - 2 = \frac{1}{3}x - \frac{5}{3}$

$+2$

$y = \frac{1}{3}x - \frac{5}{3} + \frac{6}{3}$

$\frac{+2}{\frac{6}{3}}$

1. ✓

2. ✓

3. b) $b = y - mx$

$b = (2) - \left(\frac{1}{3}\right)(5)$

$b = 2 - \frac{5}{3}$

$b = \frac{6}{3} - \frac{5}{3}$

$b = \frac{1}{3}$

Consolidation

Group Problems

Get in groups of 3.

Each group will have one problem.

Solve the problem on rough paper.

Have me check it.

Transfer COMPLETE solution (with explanation) to coloured page.

Consolidation

Homework

Page 84: 1,2,3(ahi)

Page 85: 1,2(aei)

Page 87: 1,2

Bonus question: **Prove** that if two lines are perpendicular, the product of their slopes is always -1.