Algebra I
5-1: Rate of Change and Slope

Name ______________________________
Date ____________ Class Period _______

Learning Target: Today you will be able to FIND RATES OF CHANGE FROM TABLES AND FIND SLOPE

Question/Main Ideas:	Notes:
Definition: Rate of Change	Shows the relationship between two quantities. $\text{rate of change} = \dfrac{\text{change in dependent variable}}{\text{change in independent variable}}$

Example 1: Finding Rate of Change Using a Table

The table shows the distance a band marches over time. Is the rate of change in distance with respect to time constant? What does the rate of change represent?

Time (min)	Distance (ft)
1	260
2	520
3	780
4	1040

+1 +1 +1

+260 +260 +260

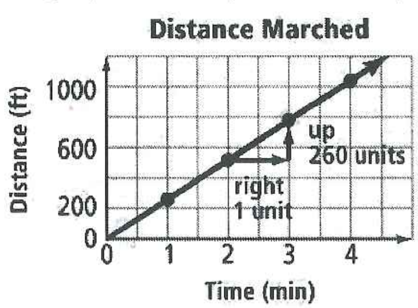
Time - independent
Distance - dependent

$\text{rate of change} = \dfrac{260 \text{ ft}}{1 \text{ min}}$

The band marches 260 ft every minute.

Definition of Slope

That graph below represents the points from Example 1.



$\frac{260}{1}$

$\text{Slope } (m) = \dfrac{\text{vertical change}}{\text{horizontal change}}$

$= \dfrac{\Delta y}{\Delta x}$

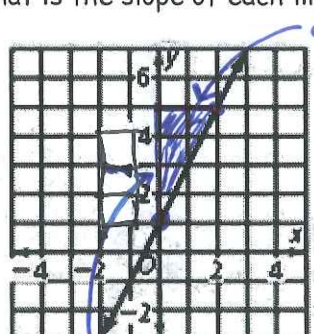
$= \dfrac{\text{rise}}{\text{run}}$

Example 2: Finding Slope Using Graphs

What is the slope of each line?

a.

over 2



up 4

$m = \dfrac{\text{rise}}{\text{run}}$

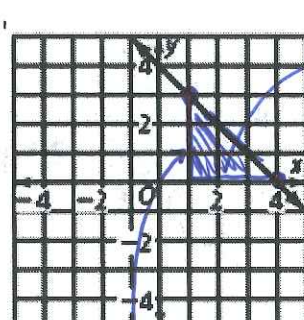
$= \dfrac{4}{2}$

$= \dfrac{2}{1}$

$= 2$

b.

over 3



down 3

$m = -\dfrac{3}{3}$

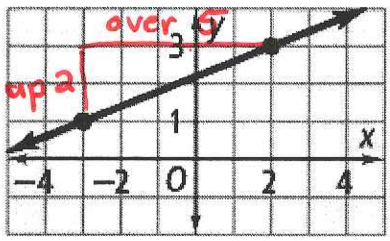
$= -\dfrac{1}{1}$

$= -1$

Now It's Your Turn

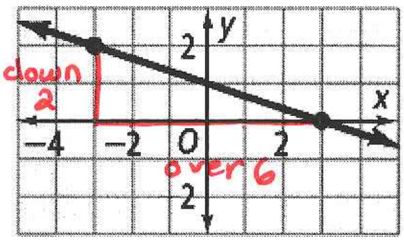
What is the slope of each line?

a.



$m = \frac{2}{5}$

b.



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

Key Concept: The Slope Formula

$$\text{slope } (m) = \frac{y_2 - y_1}{x_2 - x_1} \qquad (x_1, y_1) \quad (x_2, y_2)$$

Example 3: Finding the Slope Using Points

Find the slope of the line that passes through the given points.

a. (-1, 0) and (3, -2)

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{-2-0}{3+1} = \frac{-2}{4} = -\frac{1}{2}$$

b. (-2, -2) and (-2, 1)

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{1+2}{-2+2} = \frac{3}{0} = \text{undefined}$$

Now It's Your Turn

Find the slope of the line that passes through the given points.

a. (-3, 2) and (2, 2)

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{2-2}{2+3} = \frac{0}{5} = 0$$

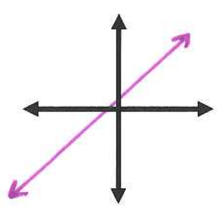
b. (1, 3) and (4, -1)

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{-1-3}{4-1} = \frac{-4}{3}$$

Concept Summary: Slopes of Lines

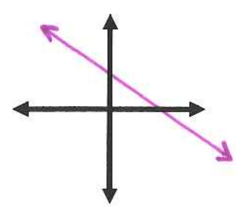
Positive Slope

slants upward left to right



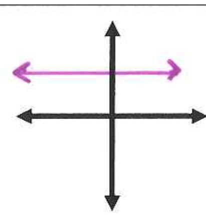
Negative Slope

slants downward left to right



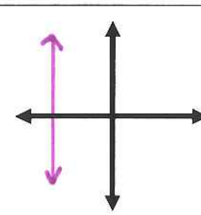
Zero Slope

Horizontal Line



Undefined Slope

Vertical Line



Summary: ____

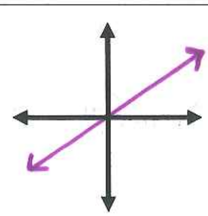
____

____

Algebra I
5-2: Direct Variation

Name ______________________
Date ______________ Class Period _______

Learning Target: Today you will be able to WRITE AND GRAPH AN EQUATION OF DIRECT VARIATION

Question/Main Ideas:	Notes:
Definition: Direct Variation	A relationship that can be represented by a function in the form $y = kx$, where $k \neq 0$
Definition: Constant of Variation for Direct Variation	The k in $y = kx$ represents the constant of variation. You can find k... $k = \frac{y}{x}$
Example 1: Identifying a Direct Variation	Does the equation represent a direct variation? Is so, find the constant of variation. a. $\frac{7y}{7} = \frac{2x}{7}$ Yes; $k = \frac{2}{7}$ $y = \frac{2}{7}x$ b. $3y + 4x = 8$ $-4x \quad -4x$ $\frac{3y}{3} = \frac{-4x + 8}{3}$ $y = -\frac{4}{3}x + \frac{8}{3}$ No
Example 2: Writing a Direct Variation Equation	Suppose y varies directly with x, and y = 35 when x = 5. What direct variation equation relates x and y? What is the value of y when x = 9? $k = \frac{y}{x} = \frac{35}{5} = 7$ $y = 7x$ $y = 7(9)$ $y = 63$
Now It's Your Turn	Suppose y varies directly with x, and y = 10 when x = -2. What direct variation equation relates x and y? What is the value of y when x = -15? $k = \frac{y}{x} = \frac{10}{-2} = -5$ $y = -5x$ $y = -5(-15)$ $y = 75$
Concept: Direct Variation Graphs	The graph of $y = kx$ is a line that goes through (0,0) and a slope that is k. 

Summary: ____

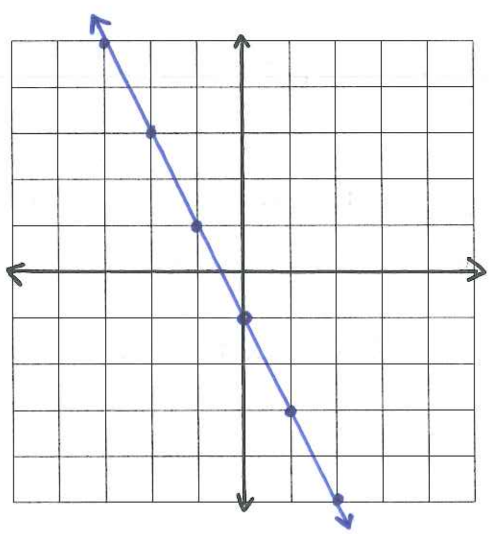
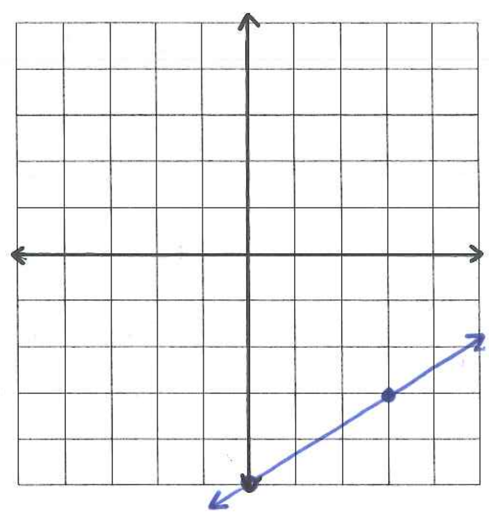
____

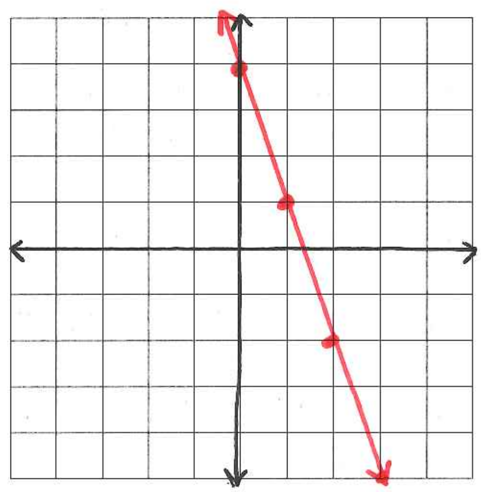
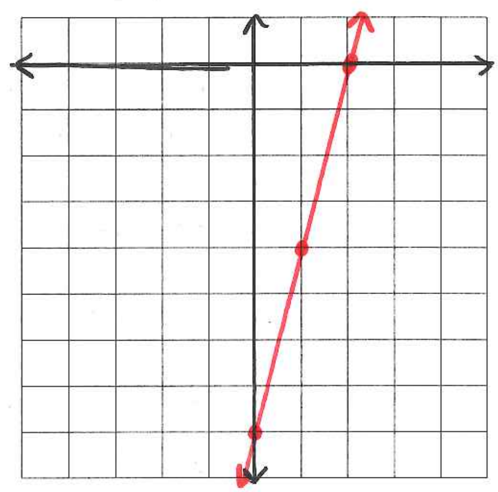
____

Algebra I
5-3 Day 1: Quick Graphs in the form y = mx + b

Name ______________________________
Date _____________ Class Period _______

Learning Target: Today you will be able to GRAPH LINES QUICKLY IN THE FORM Y = MX + B

Question/Main Ideas:	Notes:
Concept: Slope-Intercept Form	$y = mx + b$ m = slope b = y-intercept
Definition: Linear Parent Function	Parent Function - simplest function in a family of functions. Linear Parent Function: $y = x$
Changing the Slope	Positive - slants upward; Negative - slants downward $\lvert m\rvert > 1$ - steeper; $0 < \lvert m\rvert < 1$ - less steep
Changing the Y-Intercept	The y-intercept shifts the graph up if positive and down if negative
Example 2: Graphing a Linear Equation WITHOUT a table of values	Graph the following. Find the slope and y-intercept. a. $y = -2x - 1$ Slope = -2 y - intercept = -1  b. $y = \frac{2}{3}x - 5$ Slope = $\frac{2}{3}$ y - intercept = -5 

Now It's Your Turn	Graph the following. Find the slope and y-intercept. a. $y = -3x + 4$ Slope = -3 y - intercept = 4  b. $y = 4x - 8$ Slope = 4 y - intercept = -8 
Steps to Quick Graphing	Identify the slope and y-intercept.
	Plot the y-intercept on the y-axis
	Use the slope, from the y-intercept, to find a second point
	Connect the dots, extend the line, add arrows.

Summary: ______________________________

____

____

Algebra I

5-3 Day 2: Slope - Intercept Form

Name ______________________

Date ______________ Class Period ________

Learning Target: Today you will be able to WRITE LINEAR EQUATIONS USING SLOPE-INTERCEPT FORM

Question/Main Ideas:	Notes:

Reminder: Slope-Intercept Form

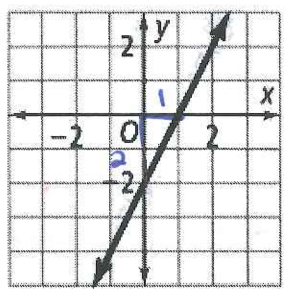
$y = mx + b$

m = slope

b = y-intercept

Example 1: Writing a Linear Equations from a Graph

Write an equation for each line show below.

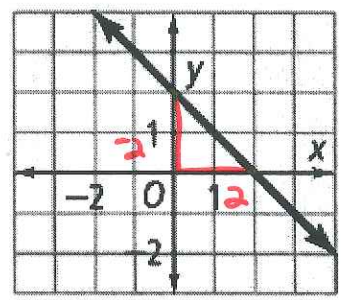


$m = \frac{2}{1}$

$b = -2$

$y = 2x - 2$

Your Turn:



$m = \frac{-2}{2} = -1$

$b = 2$

$y = -x + 2$

Example 2: Writing an equation from a Point and the Slope

Write an equation for the line with the given slope and goes through the given point.

Slope = -2; Point = (4, 5)

$y = mx + b$

$m = -2,\ x = 4,\ y = 5$

$5 = -2(4) + b$

$5 = -8 + b$

$13 = b$

$y = -2x + 13$

Now It's Your Turn

Write an equation for the line with the given slope and goes through the given point.

Slope = $-\frac{6}{7}$; Point = (14, 2)

$y = mx + b$

$m = -\frac{6}{7},\ x = 14,\ y = 2$

$2 = -\frac{6}{7}(14) + b$

$2 = -12 + b$

$14 = b$

$y = -\frac{6}{7}x + 14$

Example 3: Writing an equation from Two Points	Write an equation for the line that passes through the given points. (2, 1) and (5, -8) $m = \frac{-8-1}{5-2}$ $= \frac{-9}{3}$ $= -3$ use either point for x and y $x = 2$ $y = 1$ $1 = -3(2) + b$ $1 = -6 + b$ $7 = b$ $y = -3x + 7$
Now It's Your Turn	Write an equation for the line that passes through the given points. (3, -2) and (1, -3) $m = \frac{-3 - -2}{1-3}$ $= \frac{-1}{-2}$ $= \frac{1}{2}$ $x = 3$ $y = -2$ $-2 = \frac{1}{2}(3) + b$ $-2 = 1.5 + b$ $-3.5 = b$ $y = \frac{1}{2}x - 3.5$
Steps to Writing Equations of Lines Given at Least One Point	Start with $y = mx + b$ Find m $\left(\frac{y_2 - y_1}{x_2 - x_1}\right)$ and plug it into $y = mx + b$ Plug in (x, y) for x and y in the equation. Solve for b. Plug m and b into $y = mx + b$

Summary: ____

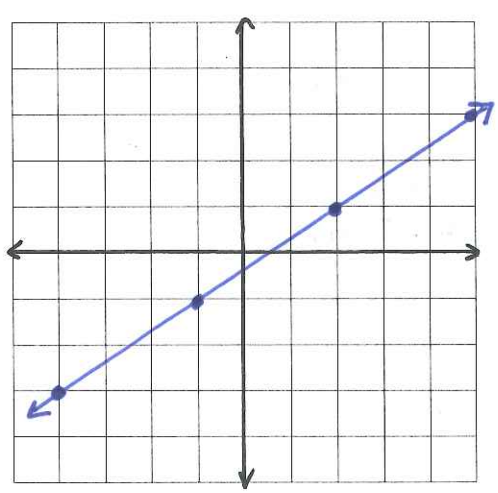
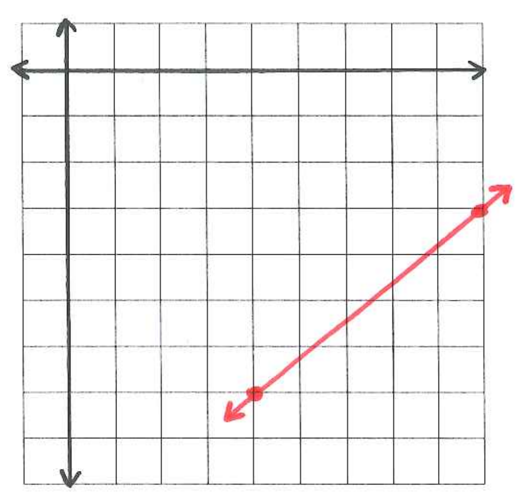
____

____

Algebra I
5-4: Point - Slope Form

Name ______________________
Date ____________ Class Period ______

Learning Target: Today you will be able to WRITE AND GRAPH EQUATIONS USING POINT-SLOPE FORM

Question/Main Ideas:	Notes:
Concept: Point-Slope Form	$y - y_1 = m(x - x_1)$ m = slope (x_1, y_1)
Example 1: Writing an Equation in Point-Slope Form	Write an equation in point-slope form for the line with a slope of -5 and passes through the point (-3, 6). $y - 6 = -5(x - -3)$ $y - 6 = -5(x + 3)$
Now It's Your Turn	Write an equation in point-slope form for the line with a slope of $\frac{2}{3}$ and passes through the point (8, -4). $y - -4 = \frac{2}{3}(x - 8)$ $y + 4 = \frac{2}{3}(x - 8)$
Example 2: Graphing Using Point-Slope Form	Graph $y - 1 = \frac{2}{3}(x - 2)$. Slope = $\frac{2}{3}$ Point = (2 , 1)  Your Turn: Graph $y + 7 = \frac{4}{5}(x - 4)$ Slope = $\frac{4}{5}$ Point = (4 , -7) 

Example 3: Using Two Points to Write an Equation in Point-Slope Form	Write an equation in point-slope form of the line that passes through (-2, -3) and (1, 3). $m = \frac{3 + +3}{1 + +2} = \frac{6}{3} = 2$ $y + 3 = 2(x + 2)$ OR $y - 3 = 2(x - 1)$
Now It's Your Turn	Write an equation in point-slope form of the line that passes through (4, 0) and (-2, 6). $m = \frac{6 - 0}{-2 - 4} = \frac{6}{-6} = -1$ $y = -1(x - 4)$ OR $y - 6 = -1(x + 2)$
Example 4: Using a Table to Write an Equation	The table shows the altitude of a hot-air balloon during its linear descent. What equation in slope-intercept form gives the balloons' altitude at any time? What do the slope and y-intercept represent?

Time, x (sec)	Altitude, y (m)
10	640
30	590
70	490
90	440

20   -50

$m = \frac{\text{rise}}{\text{run}} = \frac{-50}{20} = -2.5$

$y = -2.5x + b$

$640 = -2.5(10) + b$

$640 = -25 + b$

$665 = b$

$y = -2.5x + 665$

• slope means the balloon falls 2.5 m/sec.

• b means the balloon starts at 665 m

Summary: ______________________________

Algebra I
5-5 Day 1: Standard Form

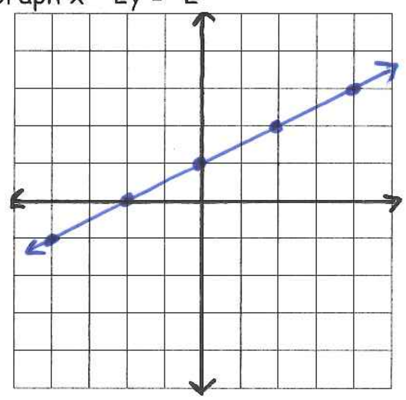
Name ______________________
Date ____________ Class Period ______

Learning Target: Today you will be able to GRAPH LINEAR EQUATIONS USING INTERCEPTS

Question/Main Ideas:	Notes:
Definition: y - intercept	when the graph crosses the y-axis occurs when $x = 0$
Definition: x - intercept	when the graph crosses the x-axis Occurs when $y = 0$
Concept: Standard Form of a Linear Equation	$Ax + By = C$ • A, B, C are integers • Some define $A > 0$
Example 1: Finding x- and y- intercepts	What are the x- and y- intercepts of the graph of 3x + 4y = 24? x-intercept: $3x + 4(0) = 24$, $3x = 24$, $x = 8$ y-intercept: $3(0) + 4y = 24$, $4y = 24$, $y = 6$
Now It's Your Turn	What are the x- and y- intercepts of the graph of 5x - 6y = 60? x-intercept: $5x - 6(0) = 60$, $5x = 60$, $x = 12$ y-intercept: $5(0) - 6y = 60$, $-6y = 60$, $y = -10$
Steps to Graphing in Standard Form	Find the x-intercept using $y = 0$
	Find the y-intercept using $x = 0$
	Plot the intercepts
	Connect the dots and extend.

Example 2: Graphing a Line Using Intercepts

Graph x - 2y = -2



x-intercept

$x - 2(0) = -2$

$x = -2$

y-intercept

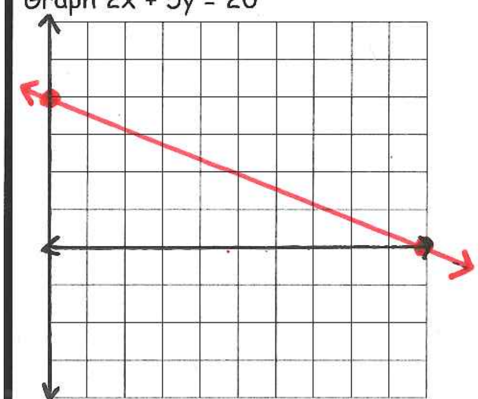
$(0) - 2y = -2$

$-2y = -2$

$y = 1$

Now It's Your Turn

Graph 2x + 5y = 20



x-intercept

$2x + 5(0) = 20$

$2x = 20$

$x = 10$

y-intercept

$2(0) + 5y = 20$

$5y = 20$

$y = 4$

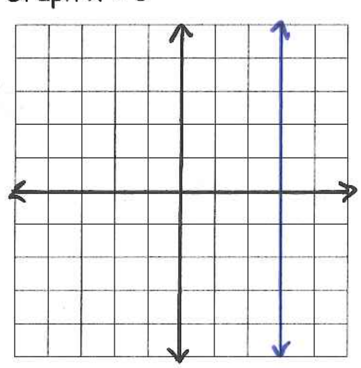
Concept: Horizontal and Vertical Lines

Horizontal Lines	Vertical Lines
written as $y = b$, where b is a constant	written as $x = a$, where a is a constant

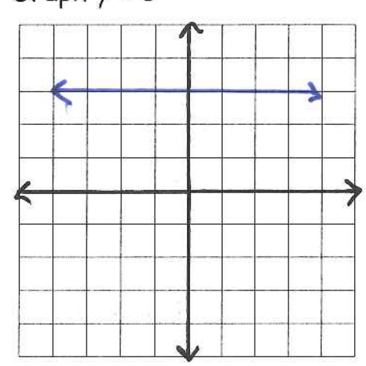
---

Example 3: Graphing Horizontal and Vertical Lines

a. Graph x = 3



b. Graph y = 3



Summary: ____

____

____

Algebra I
5-5 Day 2: Converting Between Forms

Name ______________________
Date ____________ Class Period ______

Learning Target: Today you will be able to CONVERT BETWEEN FORMS OF LINEAR EQUATIONS (SLOPE-INTERCEPT, POINT-SLOPE, AND STANDARD)

Question/Main Ideas:	Notes:	
Definition: Slope-Intercept Form	$y = mx + b$	$m =$ slope $b =$ y-intercept
Definition: Point-Slope Form	$y - y_1 = m(x - x_1)$	$m =$ slope (x_1, y_1)
Definition: Standard Form	$Ax + By = C$	A, B, C are integers
Concept: Converting to Slope-Intercept Form	**From Point-Slope Form**	**From Standard Form**
	Distribute m	Add / subtract the x-term
	Add / subtract y_1	Divide by coefficient of y.

Example 1: Converting to Slope-Intercept Form

Rewrite each of the following linear equations in slope-intercept form.

a. y – 6 = -3(x + 3)

$$y - 6 = -3x - 9$$
$$+6 \qquad +6$$
$$y = -3x - 3$$

b. 3x – 5y = 17

$$-3x \qquad -3x$$
$$\frac{-5y}{-5} = \frac{-3x}{-5} + \frac{17}{-5}$$
$$y = \frac{3}{5}x - 3.4$$

Now It's Your Turn

Rewrite each of the following linear equations in slope-intercept form.

a. y + 3 = -3(x - 1)

$$y + 3 = -3x + 3$$
$$-3 \qquad -3$$
$$y = -3x$$

b. 7x + 3y = -12

$$-7x \qquad -7x$$
$$\frac{3y}{3} = \frac{-7x}{3} - \frac{12}{3}$$
$$y = -\frac{7}{3}x - 4$$

	From Point-Slope Form	From Slope-Intercept Form
Concept: Converting to Standard Form	Distribute m	Use fraction busters - Multiply by common denom.
	Use fraction busters - mult. by the common denom.	Add/subtract the x-term so both variables are on the same side
	Add/subtract the x-term	Optional: Multiply the equation by -1 so A is positive.
	Add/subtract y_1	

Example 2: Converting to Standard Form

Rewrite each of the following linear equations in standard form.

a. $y-3=-\frac{2}{3}(x+6)$

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

$3y-9=-2x-12$

$+2x \qquad +2x$

$2x+3y-9=-12$

$+9 \qquad +9$

$2x+3y=-3$

b. $\left(y=\frac{1}{2}x-\frac{5}{6}\right)6$

$6y=3x-5$

$-3x \qquad -3x$

$-3x+6y=-5$

OR

$3x-6y=5$

Now It's Your Turn

Rewrite each of the following linear equations in standard form.

a. $y+\frac{3}{4}=2(x-2)$

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

$4y+3=8x-16$

$-8x \qquad -8x$

$-8x+4y+3=-16$

$-8x+4y=-19$

b. $\left(y=-\frac{1}{5}x-8\right)5$

$5y=-x-40$

$+x \qquad +x$

$x+5y=-40$

Summary: ______________________________

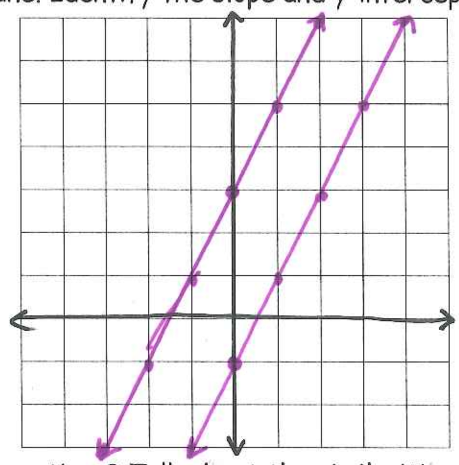
____

____

Algebra I
5-6 Day 1: Parallel and Perpendicular Lines

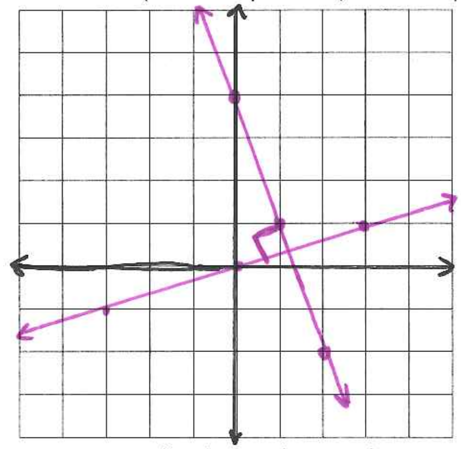
Name ______________________________
Date ______________ Class Period _______

Learning Target: Today you will be able to DETERMINE WHETHER LINES ARE PARALLEL, PERPENDICULAR, OR NEITHER

Question/Main Ideas:	Notes:
Exploration of Lines Part 1	Graph both lines below on the same coordinate plane. Identify the slope and y-intercept for each. Then answer the following questions. Equation 1: $y = 2x + 3$ Slope = 2 y-intercept = 3 Equation 2: $y = 2x - 1$ Slope = 2 y-intercept = -1  1. What do you notice about the graphs of both equations? Talk about the similarities between the slopes and y-intercepts. • The lines are parallel • The slopes are the same
Concept: Parallel Lines	Lines that never intersect. Slopes are equal
Example 1: Identifying Parallel Lines	Which line is parallel to the line through (13, 5) and (1, 20)? Line 1: through (4, -2) and (-4, -12) Line 2: through (-13, 14) and (7, -11) Original $\frac{20-5}{1-13} = \frac{15}{-12} = -\frac{5}{4}$ Line 1: $\frac{-12++2}{-4-4} = \frac{-10}{-8} = \frac{5}{4}$ Line 2: $\frac{-11-14}{7--13} = \frac{-25}{20} = -\frac{5}{4}$ $\boxed{\text{Line 2}}$
Now It's Your Turn	Which line is parallel to the line through (12, -4) and (8, -7)? Line 1: through (-2, -6) and (10, 3) Line 2: through (6, -9) and (-2, -3) Original $\frac{-7+-4}{8-12} = \frac{-3}{-4} = \frac{3}{4}$ Line 1 $\frac{3++6}{10++2} = \frac{9}{12} = \frac{3}{4}$ Line 2 $\frac{-3++9}{-2-6} = \frac{6}{-8} = -\frac{3}{4}$ $\boxed{\text{Line 1}}$

Exploration of Lines Part 2

Graph both lines below on the same coordinate plane. Identify the slope and y-intercept for each. Then answer the following questions.



Equation 1: $y = -3x + 4$

Slope = -3 y-intercept = 4

Equation 2: $y = \frac{1}{3}x$

Slope = $1/3$ y-intercept = 0

1. What do you notice about the graphs of both equations? Talk about the similarities between the slopes and y-intercepts.

- The lines are perpendicular
- slopes - one neg. / one pos. "flipped"

Concept: Perpendicular Lines

Lines that intersect at a 90° angle.

Slopes are opposite reciprocals $\left(\frac{2}{3}, -\frac{3}{2}\right)$

Example 2: Classifying Lines

Are the graphs of $\frac{4y}{4} = \frac{-5x}{4} + \frac{12}{4}$ and $y = \frac{4}{5}x - 8$ *parallel, perpendicular, or neither?*

$y = -\frac{5}{4}x + 3$

Perpendicular

$\left(-\frac{5}{4}, \frac{4}{5}\right)$

Now It's Your Turn

a. Are the graphs of $y = \frac{3}{4}x + 7$ and $4x - 3y = 9$ *parallel, perpendicular, or neither?*

$4x - 3y = 9$
$-4x \quad\quad -4x$

$\frac{-3y}{-3} = \frac{-4x + 9}{-3}$

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

Neither
- not opposites

b. Are the graphs of $6y = -x + 6$ and $y = -\frac{1}{6}x + 6$ *parallel, perpendicular, or neither?*

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

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

Parallel

Summary: ______________________________

Algebra I
5-6 Day 2: Parallel and Perpendicular Lines

Name ______________________________
Date _____________ Class Period _______

Learning Target: Today you will be able to WRITE EQUATIONS OF PARALLEL & PERPENDICULAR LINES

Question/Main Ideas:	Notes:
Review Concept: Parallel Lines and Perpendicular Lines	Parallel Lines: Lines with the same slopes Perpendicular Lines: Lines with opposite reciprocal slopes
Example 1: Writing an equation of a Parallel Line	Write an equation of a line that passes through (12, 5) and is parallel to the graph $y = \frac{2}{3}x - 1$ $m = \frac{2}{3}$ $x = 12, y = 5$ $5 = \frac{2}{3}(12) + b$ $5 = 8 + b$ $-3 = b$ $y = \frac{2}{3}x - 3$
Now It's Your Turn	Write an equation of a line that passes through (-3, -1) and is parallel to the graph $y = 2x + 3$ $m = 2$ $x = -3$ $y = -1$ $-1 = 2(-3) + b$ $-1 = -6 + b$ $5 = b$ $y = -x + 5$
Example 2: Writing an equation of a Perpendicular Line	Write an equation of a line that passes through (2, 4) and is perpendicular to the graph $y = \frac{1}{3}x - 1$ $m = -3$ $x = 2$ $y = 4$ $4 = -3(2) + b$ $4 = -6 + b$ $10 = b$ $y = -3x + 10$
Now It's Your Turn	Write an equation of a line that passes through (1, 8) and is perpendicular to the graph $y = 2x + 1$ $m = -\frac{1}{2}$ $x = 1, y = 8$ $8 = -\frac{1}{2}(1) + b$ $8 = -\frac{1}{2} + b$ $8.5 = b$ $y = -\frac{1}{2}x + 8.5$

Summary: ____

____

____

Algebra I
5-7: Scatter Plots and Trend Lines

Name ____________________
Date ____________ Class Period ______

Learning Target: Today you will be able to WRITE AN EQUATION OF A TREND LINE AND OF A LINE OF BEST FIT AS WELL AS USE A TREND LINE AND A LINE OF BEST FIT TO MAKE PREDICTIONS

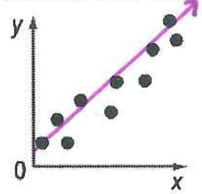
Question/Main Ideas:	Notes:

Definition: Scatter Plot

A graph that relates two different sets of data by displaying them as ordered pairs

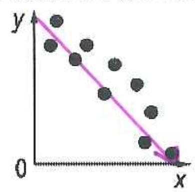
Definition: Correlation

Positive Correlation



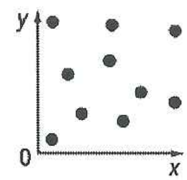
When y tends to increase as x increases, the two sets of data have a **positive correlation.**

Negative Correlation



When y tends to decrease as x increases, the two sets of data have a **negative correlation.**

No Correlation

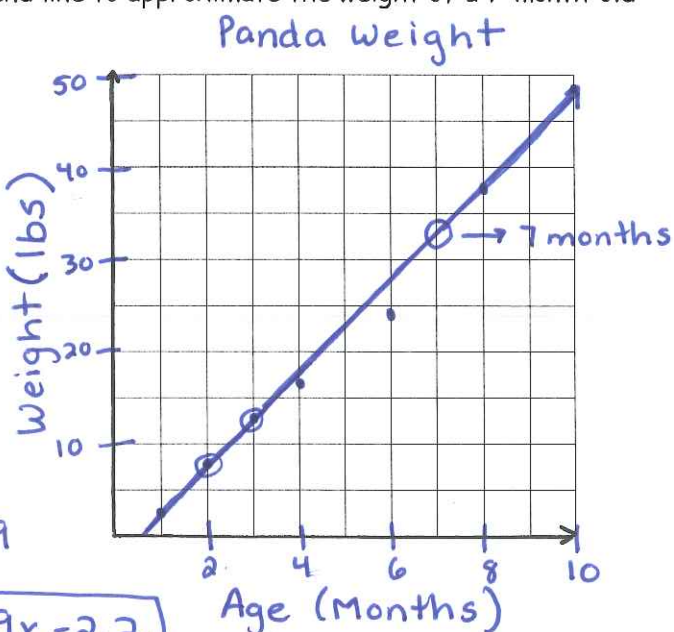


When x and y are not related, the two sets of data have **no correlation.**

Example 1: Writing an Equation of a Trend Line

Make a scatter plot of the data below. Draw in your trend line and find the equation of that trend line. Then use the trend line to approximate the weight of a 7-month-old panda.

Age (Months)	Weight (lbs)
1	2.5
2	7.6
3	12.5
4	17.1
6	24.3
8	37.9
10	49.2



(2, 7.6) (3, 12.5)

$m = \frac{12.5 - 7.6}{3 - 2} = \frac{4.9}{1} = 4.9$

$7.6 = 4.9(2) + b$

$7.6 = 9.8 + b$

$-2.2 = b$

$\boxed{y = 4.9x - 2.2}$

$\boxed{\text{About 32 lbs at 7 months}}$

Summary: ____

____

____

Algebra I
5-8: Graphing Absolute Value Functions

Name ____________________
Date ____________ Class Period ________

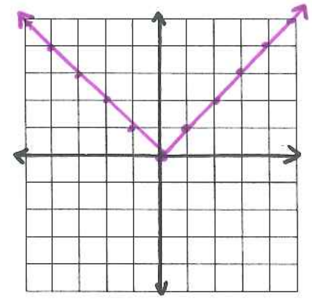
Learning Target: Today you will be able to GRAPH AN ABSOLUTE VALUE FUNCTION AND TRANSLATE THE GRAPH OF AN ABSOLUTE VALUE FUNCTION

Question/Main Ideas:	Notes:

Definition: Absolute Value Function

Teacher note: Add this before example 3 – not at beginning.

Parent Function: $y = |x|$



$y = a|x-h| + k$

a = "slope"
h = horizontal shift
k = vertical shift

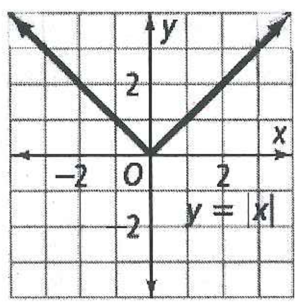
(h, k) = vertex

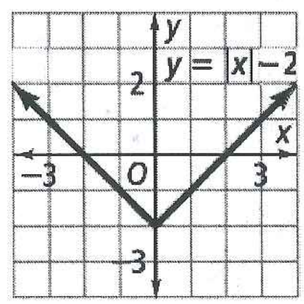
Definition: Translation

A shift of the graph horizontally (h), vertically (k) or a combination of both.

Example 1: Describing Translations

Below are the graphs of $y = |x|$ and $y = |x| - 2$. How are the graphs related?

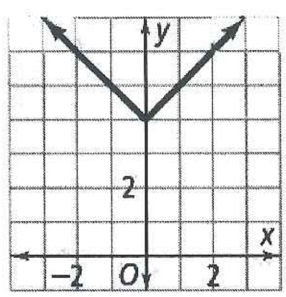




Same v-shape
The second graph is shifted down 2.

Now It's Your Turn

How is the graph below related to the graph of $y = |x|$? What is the equation of this graph?



The graph is shifted up 4

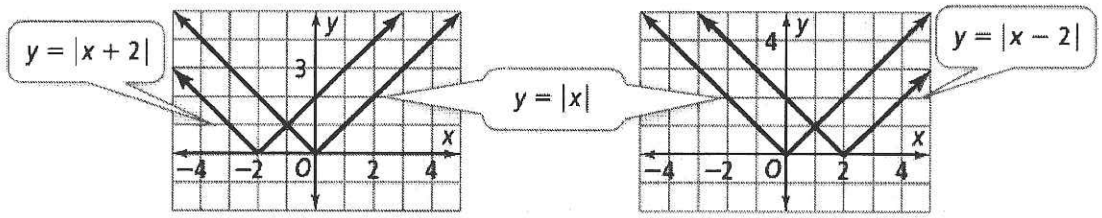
$y = |x| + 4$

Concept: Translating Absolute Value Graphs Vertically

The number added or subtracted outside the absolute value shifts the graph up or down respectively.

Example 2: More Describing Translations

Below are the graphs of $y = |x|$ and $y = |x - 2|$ drawn on the same graph and $y = |x|$ and $y = |x + 2|$ drawn on the same graph. How are the graphs of $y = |x - 2|$ and $y = |x + 2|$ related to $y = |x|$? Graphs are shifted horizontally



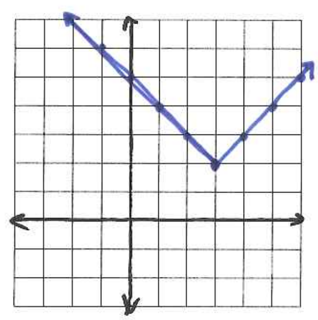
|x+2| - left 2 |x-2| - right 2   "backwards"

Concept: Translating Absolute Value Graphs Horizontally

The number added or subtracted inside the absolute value shifts the graph left(+) or right(−). Think opposite.

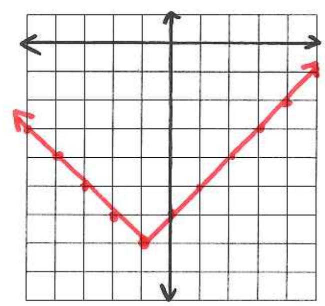
Example 3: Graphing a Vertical Translation

Graph $y = |x - 3| + 2$



right 3
up 2

Your Turn: Graph $y = |x + 1| - 7$



left 1
down 7

Example 4: Writing Equations of Absolute Value Equations

What is an equation for each translation of $y = |x|$?

a. 11 units up and 9 units right

$y = |x - 9| + 11$

b. 14 units down and 4 units left

$y = |x + 4| - 14$

Now It's Your Turn

What is an equation for each translation of $y = |x|$?

a. 8 units up and 6 units left

$y = |x + 6| + 8$

b. 5 units down and 8 units right

$y = |x - 8| - 5$

Summary: ______________________________

____

____