Pre-Algebra Skills

Fractions

$$\frac{7}{2} \qquad \frac{12}{5}$$

Common Denominator Needed	Any Denominator
Addition (sum)	Multiplication (product)
Subtraction (difference)	Divide (quotient)

Order of Operations & Integers

$$32 - 5 \bullet (2+1) + 4$$

G: ( ), [ ], ...
E: $5^2, \sqrt{8}$
M: $\bullet, \div$ (L to R)
A: +, - (L to R)

$$32 - 5 \bullet (3) + 4$$
$$32 - 15 + 4$$
$$17 + 4$$
$$\boxed{21}$$

Linear Equations

$$3(x-2) = 10$$
$$3x - 6 = 10$$
$$\underline{+6 \quad +6}$$
$$\frac{3x}{3} = \frac{16}{3}$$
$$\boxed{X = \frac{16}{3}}$$

Summary:

Week 1 Lesson 4

Variables and Expressions

Independent Variable vs Dependent Variable:

In an experiment, the _independent variable_ is something being manipulated or changed and the _dependent variable_ is the result of the independent variable being manipulated.

What is the difference between an independent variable and a dependent variable?

For example:
Does listening to ear buds for long periods of time make you go deaf?

It can. It depends on the Volume

In the Walter the Walker problem, what is the *independent variable* and what is the *dependent variable*?

IV: weeks

DV: distance

Expression:

A combination of symbols (letters and numbers) and operations (such as addition, multiplication, raising to a power) that are executed in a precise order.

What does an expression look like?

An example of this looks like:

$$7x + 3$$

An example of this does NOT look like:

$$7x + 3 = 4$$

What is the difference between a numerical expression and an algebraic expression?

Numerical expression: only has numbers

Algebraic expression: has numbers & letters

Summary:

Notes

Writing Expressions w/ Addition

Standard A-CED.1

You are traveling east along an interstate highway. When you enter the highway, you are at mile marker 8. Mile marker signs always start numbering at the western border of a state for east/west interstate highways. What mile marker will you be at when you have traveled 84 miles?
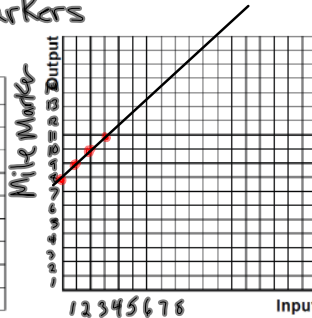
Draw a picture: *84 miles*
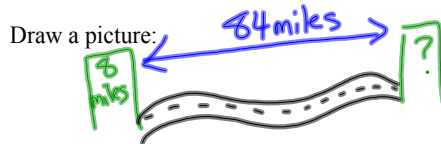
8 miles ... *?*

What is the *independent variable?* **Miles**

What is the *dependent variable?* **Mile Markers**

Input	Output
0	8
1	9
2	10
3	11
m	m+8

(Graph: Mile Marker vs Miles, Output vs Input, line through origin region; x-axis labeled 1 2 3 4 5 6 7 8 Miles)

Expression: **m+8**

Summary:

Notes

Write Expressions w/ Multiplication

Standard A-CED.2

Jovan earns $8 an hour at his after school job. Write an expression to model how much Jovan will make after *h* hours.
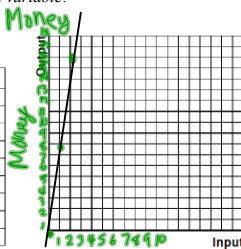
What is the *independent variable?* **Hours**

What is the *dependent variable?* **Money**

Input	Output
0	0
1	8
2	16
3	24
4	32

(Graph: Money (Output) vs Hours (Input), line; x-axis labeled 1 2 3 4 5 6 7 8 9 10 Hours)

Expression: **8h**

Commutative Property of Multiplication:

Is "*h* times 8" the same thing as "8 times *h*"?

Yes because no matter the order we get the same answer.
Example: 8·2 =16 & 2·8=16

Is this true for addition, subtraction and division?

$$2+8 = 8+2 \qquad 8-2 : 2-8 \qquad 8÷2 : 2÷8$$
$$10 \qquad 10 \qquad 6 \qquad -6 \qquad 4 \qquad \tfrac{1}{4}$$
Yes!   **No!**   **No!**

Coefficient:
     the number in front of a variable

Summary:

Notes

Writing Expressions w/ Mult. & Add.

Standard
A-CED.2

Michael is getting a membership to L.A. Fitness. He has to pay a sign up fee of $20, then it is $10 per month after that. Write an expression that represents the overall cost of the membership for *m* months.
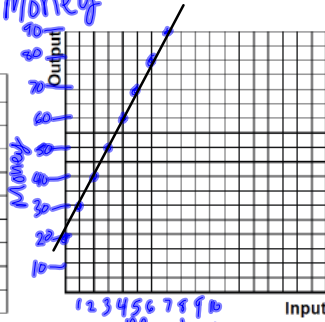
What is the *independent variable?* Months

What is the *dependent variable?* Money

Input	Output
0	20
1	30
2	40
3	50
4	60

Expression: $10m + 20$

How much will Michael have spent after 12 months?

$10(12) + 20$
$120 + 20$
$\boxed{\$140}$

Summary:

Notes

Solving Equations

Standard
A-REI.3

2 step equations:

$-6x + 4 = -8$
$-4 -4$
$-6x = -12$
$\overline{-6} \overline{-6}$
$\boxed{x = 2}$

$16 = 8 - 2x$
$-8 -8$
$8 = -2x$
$\overline{-2} \overline{-2}$
$\boxed{-4 = x}$

Distributive Property:

$-4(x - 3) = 4$
$-4x + 12 = 4$
$-12 -12$
$-4x = -8$
$\overline{-4} \overline{-4}$
$\boxed{x = 2}$

$2(4x - 2) = 12$
$8x - 4 = 12$
$+4 +4$
$8x = 16$
$\overline{8} \overline{8}$
$\boxed{x = 2}$

$7(x - 1) + 4 = 18$
$7x - 7 + 4 = 18$
$7x - 3 = 18$
$+3 +3$
$7x = 21$
$\overline{7} \overline{7}$
$\boxed{x = 3}$

Summary:

Notes

Solving Equations and Inequalities

Vocabulary:

Like Terms: Numbers with the Same Variables.

Example: $3x$ & $7x$ or $2y$ & $4y$

Combining Like Terms

$3x + 5 + 6x = 32$

$9x + 5 = 32$

Justification

① Combining Like Terms
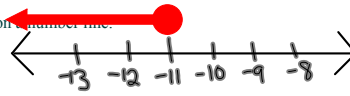
$14 - 2x - 4 \geq 32$

$10 - 2x \geq 32$

$-10 \quad\quad -10$

$-2x \geq 22$

$\dfrac{-2x}{-2} \quad \dfrac{22}{-2}$

$x \leq -11$

$\leq \; >$

$< \; >$

$\bigcirc$

Graph on a number line:

-13 -12 -11 -10 -9 -8

Summary:

Week 4 Lesson 1

Solving Equations and Inequalities

Distributive Property

$-2(3x + 4) = 22$

Justification

(1) Distributive Property

(2) Addition Property of Equality

(3) Division Property of Equality

$-6x - 8 = 22$

$+8 \quad +8$

$-6x = 30$

$\dfrac{-6x}{-6} \quad \dfrac{30}{-6}$

$X = -5$

$5(x + 8) > 50$

$5x + 40 > 50$

$-40 \quad -40$

$\dfrac{5x}{5} > \dfrac{10}{5}$

$x > 2$

Graph on a number line:

-1 0 1 2 3 4 5

Summary:

Week 4 Lesson 1

Solving Equations

Standard
A-REI.3

Variables on same side	Variables on opposite sides

$5x + 3 + 3x = 27$ ***vs.*** $5x + 3 = 3x + 27$

$$8x + 3 = 27$$
$$-3 \quad -3$$
$$\frac{8x}{8} = \frac{24}{8}$$
$$\boxed{X = 3}$$

$$-3 \quad -3$$
$$5x = 3x + 24$$
$$-3x \quad -3x$$
$$\frac{2x}{2} = \frac{24}{2}$$
$$\boxed{X = 12}$$

Summary:

Week 4 Lesson 2

Setting Up Equations and Inequalities

**Standard
A-CED.1**

Example 1: Leroy works part time for a moving company. One day he had to move 34 boxes from a truck to inside a house. After moving some boxes, he took a break and told his boss that he has only 15 more boxes to move. Write an equation that can be used to find how many boxes Leroy moved before his break?

Way 1: $34 - X = 15$
Way 2: $X + 15 = 34$
Way 3: $34 - 15 = X$

Example 2: During a sale, customers receive an extra discount if they spend $200 or more. So far, Erin's purchases total $135. Which inequality can be solved to show how many more dollars d she must spend to receive the extra discount?

Way 1: $200 \leq 135 + d$
Way 2: $135 + d \geq 200$

Summary:

Notes

Writing Equations and Inequalities

During the summer Josh cleans houses. He charges $25 every time he cleans a house. Josh spends $5 on cleaning supplies per house. Josh wants to go on trip to Disneyland at the end of the summer. The trip will cost Josh $1100.

Part A: Write an inequality representing the number of houses that Josh needs to clean to earn at least $1100.

$$25h - 5h \geq 1100$$
$$20h \geq 1100$$

Part B: Now assume Josh saves all of the money he earns. Determine how many houses Josh must clean to reach her savings goal for the trip. Show your work.

$$\frac{20h}{20} \geq \frac{1100}{20}$$
$$h \geq 55$$

Josh needs to clean at least 55 houses.

Part C: If Josh cleans 42 houses this summer but spends money on 2 D-Backs tickets that cost $38 each, determine if he has saved enough money to go on the trip. Show your work

$$20(42) - 2(38) \geq 1100$$
$$840 - 56 \geq 1100$$
$$784 \geq 1100$$

Josh has only made $784. That is Not enough to go on his Trip.

Summary:

Notes

Rearranging Formulas

In the following equation, how do you move the 2 to the other side?

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

What Justification do you use with it?

Division Property of equality

What happens if the 2 changes into a "y", how do you move that to the other side?

$$\frac{yx}{y} = \frac{8}{y}$$

What Justification do you use with it?

Division Property of equality

Now what if there were no numbers and we were given a formula?

bh=A

Solve for "b".

$$\frac{bh}{h} = \frac{A}{h}$$
$$b = \frac{A}{h}$$

What Justification do you use with it?

Division Property of equality

Solve for "h".

$$\frac{bh}{b} = \frac{A}{b}$$
$$h = \frac{A}{b}$$

What Justification do you use with it?

Division Property of equality

V=lwh

Solve for "l".

$$\frac{V}{wh} = \frac{lwh}{wh}$$
$$\frac{V}{wh} = l$$

Solve for "w".

$$\frac{V}{lh} = \frac{lwh}{lh}$$
$$\frac{V}{lh} = w$$
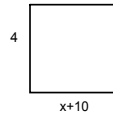
Solve for "h".

$$\frac{V}{lw} = \frac{lwh}{lw}$$
$$\frac{V}{lw} = h$$

Summary:

Notes

Review

The area of the rectangle shown is more than 64 square inches. Write and inequality that can be used to find x then solve for x.

4

x+10

Jane is hired as an intern at a school. She gets a $50 up front and makes $20 an hour. If h represents the total number of hours that Jane works and t represents the total amount of money she will make, does the equation $t=(20+50)h$ model the scenario? Why or why not?

Tell me in words what this says:

$$4b<58$$

Martin could travel 68 miles in 4 hours.

What is his speed?

At the same speed, how long would it take him to travel 170 miles?

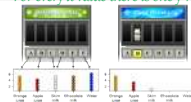At the same speed, how far can he travel in 5 hours?

Summary:

Notes

Domain, Range, and A Function

Standard F-IF.1

Vocabulary:

Domain: *x Value, In-Put, Independent Variable*

Range: *y Value, Out-Put, Dependent Variable*

Function: *For every x value there is one y value*

Vertical line test: *a | placed on the graph and located*

where it touches the graph if it touches more than 1

point at a time it is not a function

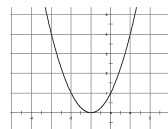**Given the following set of ordered pairs, find the domain and range.**

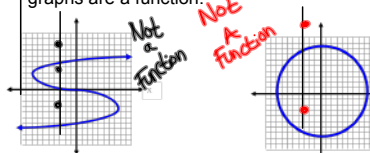Ex: $\{(2,3),(-1,0),(2,-5),(0,-3)\}$

~~Domain~~ x (-1,0,3)

~~Range~~ y (-5,-3,0,3)

The set of ordered pairs may be an _infinite number of points_, described by a graph.

Given the following graph, find the domain and range.

Domain: (-∞,∞)

Range: (0,∞)

Use the Vertical Line test to see if these graphs are a function:

Not a Function

Not A Function

Summary:

Notes

Values of Functions Algebraically
and Graphically

Finding the Value of a function:

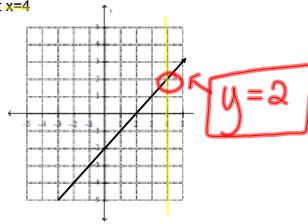What is the value of the function f(x)=5x+2

a) When x= 10 $5(10)+2$
$$50+2$$
$$\boxed{52}$$

b) When x= 9 $5(9)+2$
$$45+2$$
$$\boxed{47}$$

c) When x=6 $5(6)+2$
$$30+2$$
$$\boxed{32}$$

d) When x=56 $5(56)+2$
$$280+2$$
$$\boxed{282}$$

Finding the Value of a function on a graph:
   Use the graph of the function: f(x)=x-2 to find the value of the function at x=4

$y=2$

Summary:

Notes

Graphs

Vocabulary-

Slope: *rate of change* $\dfrac{rise}{run}$ $\updownarrow$ $\leftrightarrow$

y-intercept:— *where the line crosses the y-axis*

Slope-intercept form:
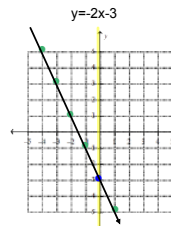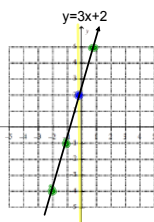
$$y=mx+b$$

m is the _slope_   b is the _y-intercept_
How we Move   *Where we Begin*

Identify the slope and the y intercept in the following equations:

y=3x+2   y=-2x-3

slope:3= $\dfrac{3}{1}$ slope:-2= $\dfrac{-2}{1}$

y intercept:2   y intercept: -3

Now let's try graphing the following equations:

y=3x+2   y=-2x-3

Summary:

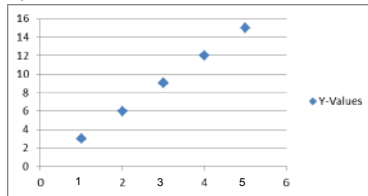## Notes

Identifying Domain

Review: What is domain? Use 3 examples.

Domain is the x Value, Input, and the Independent Value

A hiker walks 10 miles per day for 5 days. The function
f(x) = 10x give the distance the hiker travels in x days. What is
the appropriate domain of the function?

$$0<x<5$$

Identify the situation that represents the domain shown in the
graph:

a) The temperature in the winter decreases by 2 degrees per hour
b) The average biker speed is 10 miles per hour
c) Jake has a job mowing lawns. He makes $3 per hour
d) Harkins charges $8 per person to see a movie

Summary:

Notes

Slope

Find the slope given 2 points using the **Slope Formula**:

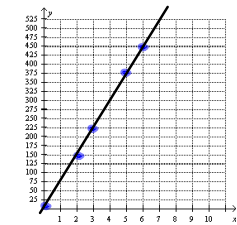$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{rise}{run}$$, using (x_1,y_1) and (x_2,y_2)

<u>Example</u>: Find the slope of the line that contains the given points.

a. (2, 3) & (1, 2)   b. (4, 3) & (0, -5)   c. (-1, -2) & (5, -4)

1. Jim drove for several hours, recording the
distance he had traveled in miles. Graph the data
and find the rate of change.

Hours	0	2	3	5	6
Miles	0	150	225	375	450

Rate of change: 75 miles per hour

2. Sue creates a budget for her weekly savings.
The graph shows how much money is in the
account at different times. Find the slope of the
line. Then tell what rate the slope represents.

(12, 2200)
(4, 1400)
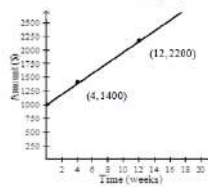
A. The slope is -100. The slope means that the
amount of money in the account is
decreasing at a rate of $100 every week.

B. The slope is 100. The slope means that the
amount of money in the account is
increasing at a rate of $100 every week.

C. The slope is 0.01. The slope means that the
amount of money in the account is
increasing at a rate of $0.01 every week.

D. The slope is -100. The slope means that the
amount of money in the account is
decreasing at a rate of $100 every 2 weeks.

Summary:

Notes

Graphing Inequalities

Standard
A-REI.12

$$y = 2x \qquad vs. \qquad y \geq 2x$$

$$5x - 4y > 20$$
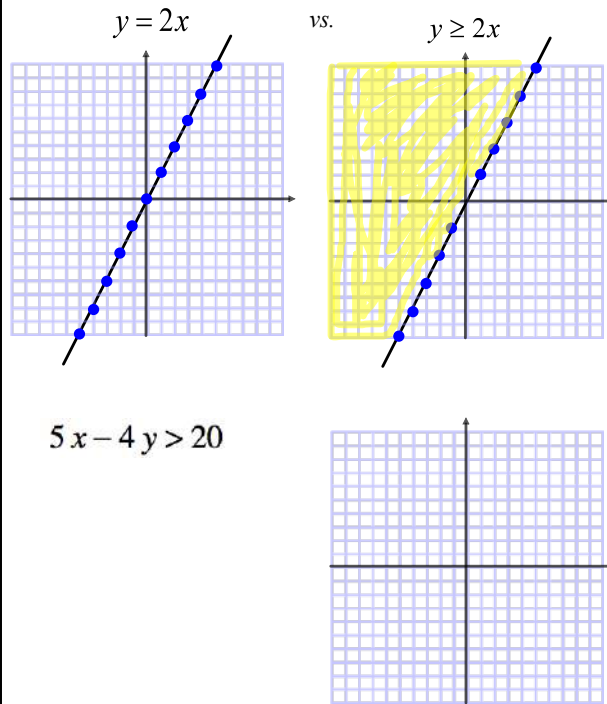
Summary:

Notes

---

x- and y-intercept

Standard
F-IF.7a

x-Intercept

y-Intercept

Identify the x and y- intercepts.

1.

y-Intercept

x-Intercept

x-Intercept: (2,0)
y-Intercept: (0,3)

2.

y-Intercept

x-Intercept

x-Intercept: (4,0)
y-Intercept: (0,-5)

Graph the line and label the x and y intercepts.

Thumb
Rule

$4x + 2y = 8$

$\dfrac{4x=8}{4 \quad 4} \qquad \dfrac{2y=8}{2 \quad 2}$

$x=2 \qquad\qquad y=4$

x-intercept: (2,0)

y-intercept: (0,4)

What are the x and y intercepts of the function?

x	-2	-1	0	1	2	3
y	-4	-3	-2	-1	0	1

x-intercept (when y is 0): (2,0)

y-intercept (when x is 0): (0,-2)

Summary:

Notes

Dec 6-5:47 PM