

Foundational Skills

of

Algebra 1

In this unit we will see how key vocabulary words are connected

equation

variable

expression

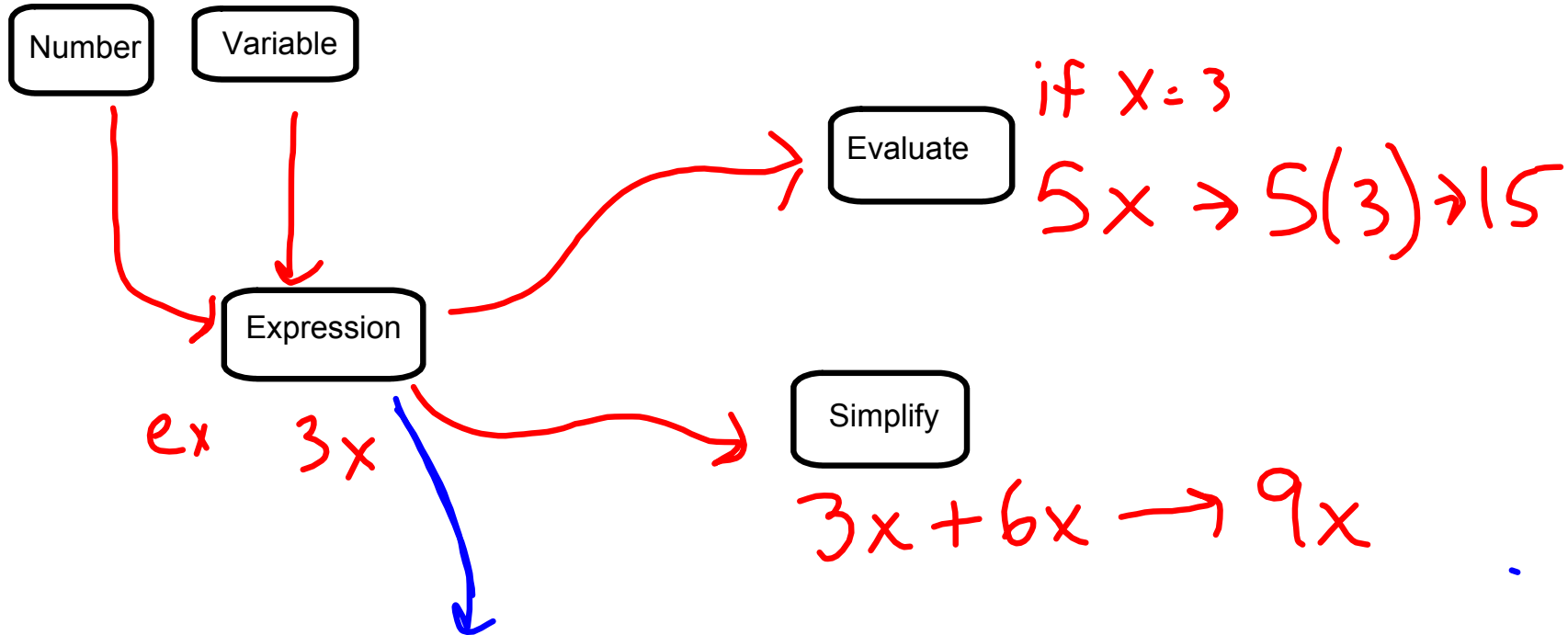
solving

evaluating

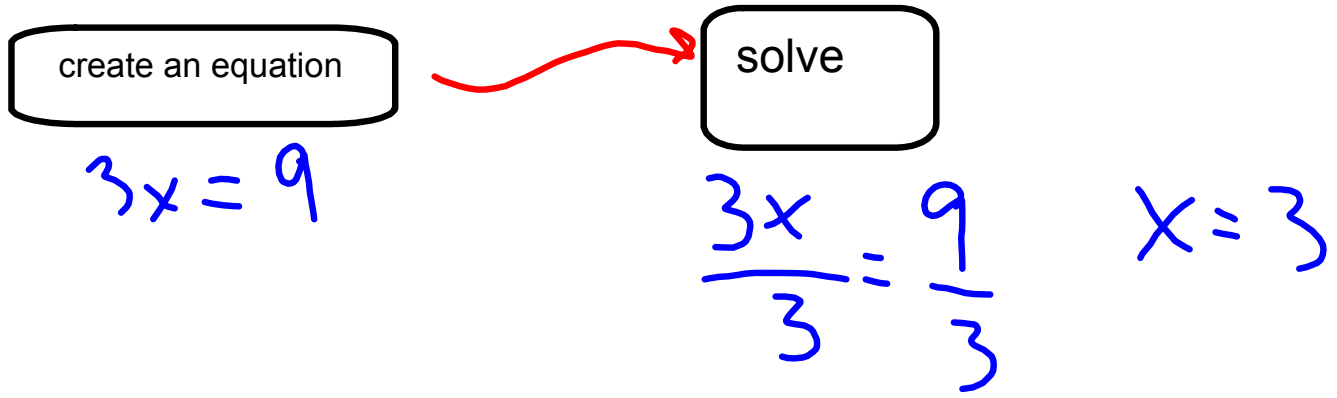
simplifying

Order of
operation

The next page is a concept map of the key vocabulary of algebra you should familiarize yourself with their meanings through kahn academy.



Two expressions may be equal to each other



Order of operations: applies to expressions on both sides of the equation

- 1) Evaluate any Exponents
- 2) Multiply and Divide from left to right
- 3) Add and Subtract from left to right

Note: Work within () first

Problem 1. Illustration of the order of operation importance.

Simplify the expression.

1) $10 \div 2 (3)$

Problem 1. Illustration of the order of operation importance.

Simplify the expression.

$$1) 10 \div 2 (3) \quad \text{wrong } 10 \div 6 \text{ -----} \rightarrow \frac{10}{6}$$

$$\text{correct } 5(3) \text{ -----} \rightarrow 15$$

Rewrite these in expanded form and then simplify.

Exponents Illustrated

2) $2^3 =$

3) $3^4 =$

4) $(-5)^3 =$

5) $(-10)^4 =$

Get this in foundational skills section

Exponents

Expanded Form

$$2^3 = \underline{(2)(2)(2)} = 8$$

$$3^4 = \underline{(3)(3)(3)(3)} = 81$$

$$(-5)^3 =$$

$$(-10)^4 =$$

Solutions

$$2) 2^3 = (2)(2)(2) = 8$$

$$3) 3^4 = (3)(3)(3)(3) = 81$$

$$4) (-5)^3 = (-5)(-5)(-5) = -125$$

$$5) (-10)^4 = (-10)(-10)(-10)(-10) = 10000$$

Grouping symbols (). They indicate which work should be done first. When certain symbols are used:

division bars $\frac{5+3}{4}$

exponents 5^2

absolute value bars $|7-9|$

and radical signs. $\sqrt{3+6}$

Grouping symbols are implied rather than written

Hidden () parenthesis

Case 1
division bars

$$\frac{10 \cdot 2}{3 + 2} \rightarrow \frac{(10 \cdot 2)}{(3 + 2)} \rightarrow \frac{20}{5} \rightarrow 4$$

case 2
exponents

$$-3^4 \rightarrow -(3^4) \rightarrow -(3)(3)(3)(3) \\ -81$$

Case 3
Absolute values

Absolute value bars ask you how far the value inside the bars are from zero

$$|5| \rightarrow 5$$

$$|-3| \rightarrow 3$$

$$|5 - 9| \rightarrow |(5 - 9)| \rightarrow |-4| \rightarrow 4$$

case 4
radical sign

$$\sqrt{4} \rightarrow 2$$

$$\sqrt{4 + 5} \rightarrow \sqrt{(4 + 5)} \rightarrow \sqrt{9} \rightarrow 3$$

Simplify the following expressions:

$$6) 7 + 3(4) - 2(4)$$

$$7) 3\sqrt{42+7}$$

$$8) 5|8-12|$$

$$9) \frac{5-3}{4(2)}$$

Solutions

$$6) 7 + 3(4) - 2(4) = 7 + 12 - 8 = 11$$

$$7) 3\sqrt{42+7} = 3\sqrt{49} = 3(7) = 21$$

$$8) 5|8-12| = 5|-4| = 5(4) = 20$$

$$9) \frac{5-3}{4(2)} = \frac{2}{8} = \frac{1}{4}$$

Simplify the following.

10) -7^2

11) $(-4)^3$

12) $5-6\div 3(2)+32$

13) $3+5|2-10|$

14) $2+4\sqrt{10-1}$

5) What's the problem with $\sqrt{-4}$?

No number multiplied by itself will result in a negative number, therefore you can't have a square root of a negative number.



Functions

A relationship between an input
and an output

If we look at the
expression: $2x$

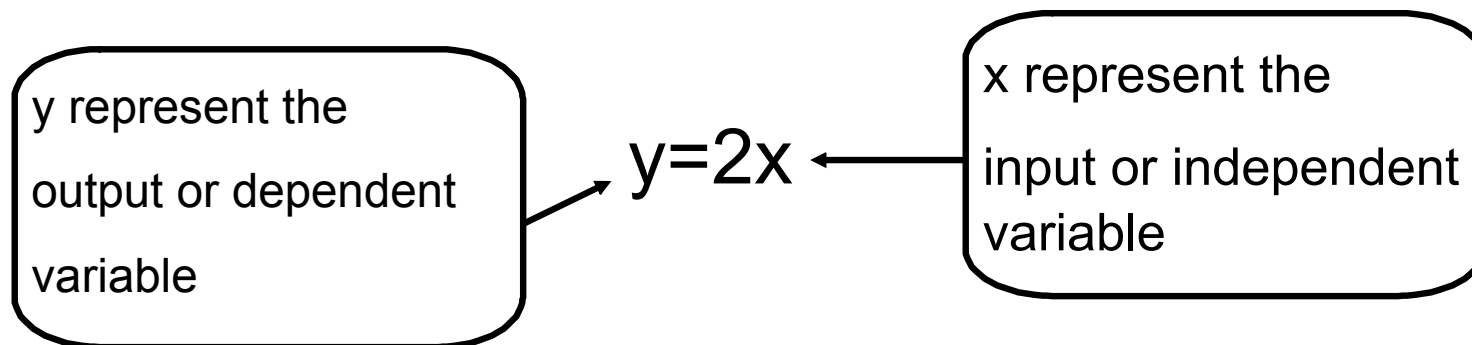
The variable x can be any real number.

This number is an **input** into the expression.

In this expression you would have to multiply it by two to get an **output**.

This output is a second variable, dependant and the original chosen independent variable. Lest call the dependent output variable y .

These are all important vocabulary words you should become familiar with through kahn academy.



15) Short sentence response. Write a sentence for a, b, c.

a) Whats the function of a refridgerator?

b) Whats the function of a car?

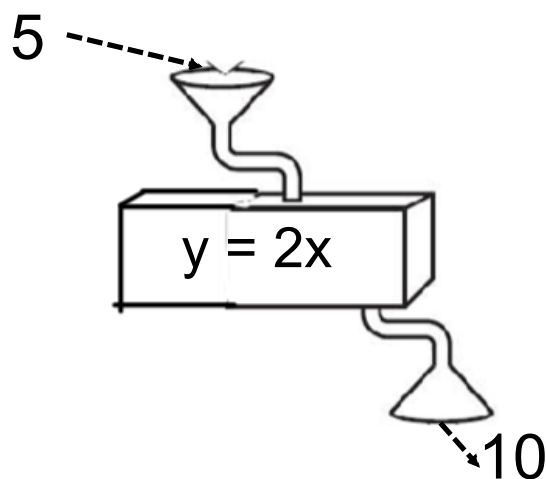
c) Whats the function of the expression

$2x$?

its common to think of this type of function as a machine and in many textbooks illustrated as follows

An input value for x is chosen. For example

5. Then 5 goes into the machine

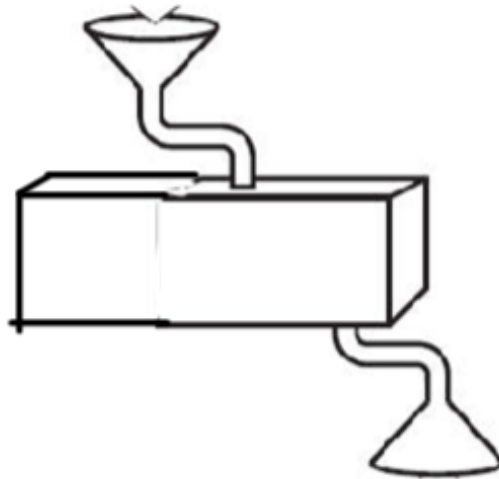


The 5 gets multiplied by 2. And y as it is shown in the equation is equal to that. 10.

10 is the output .

16) come up with your own function machine. Come up with three input (x values), and the corresponding outputs (y values)

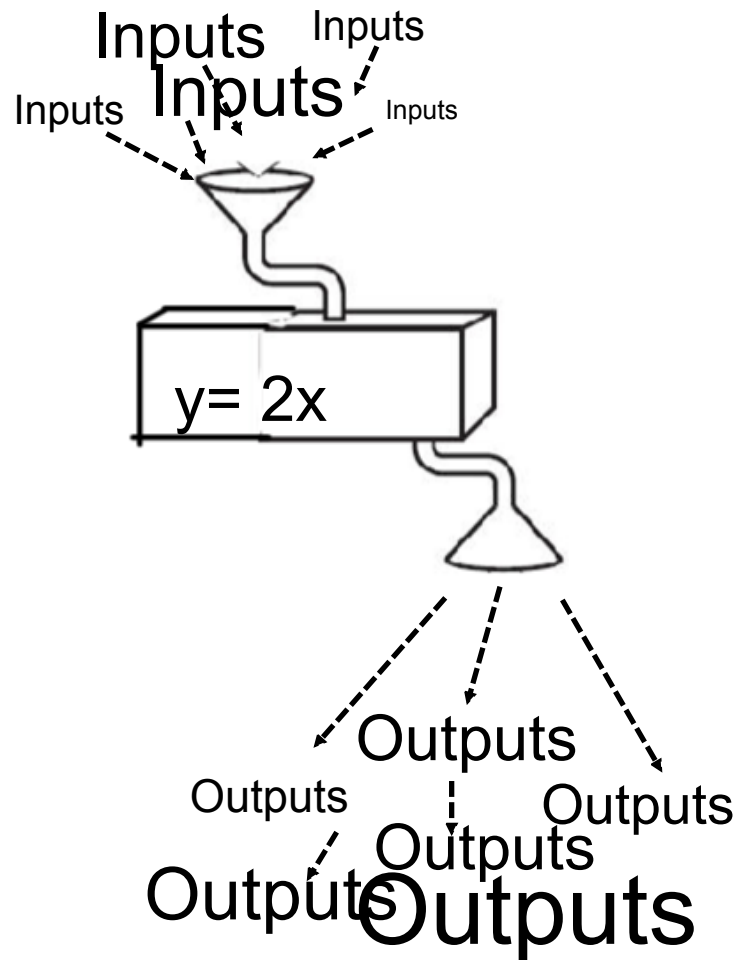
16)



(x,y)

a) (,) b) (,) c) (,)

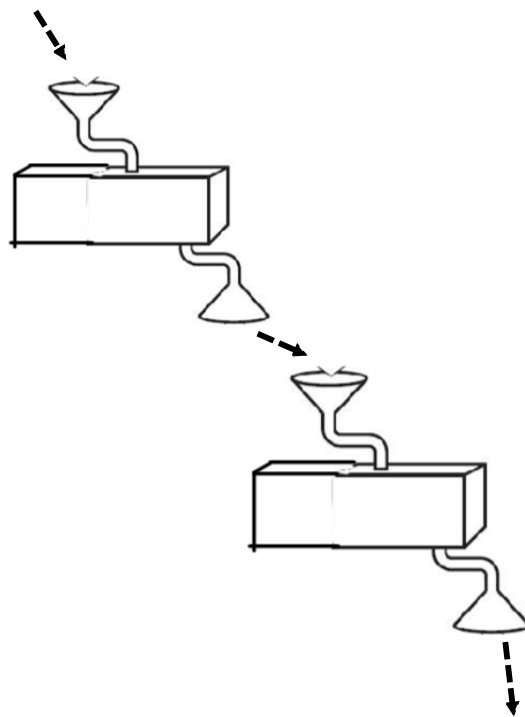
A list of inputs is a domain, the outputs that go with the inputs are called the range.



17) a range is given
in a table find the
domain

x	y
-2	
0	
1/2	
.75	
3/2	

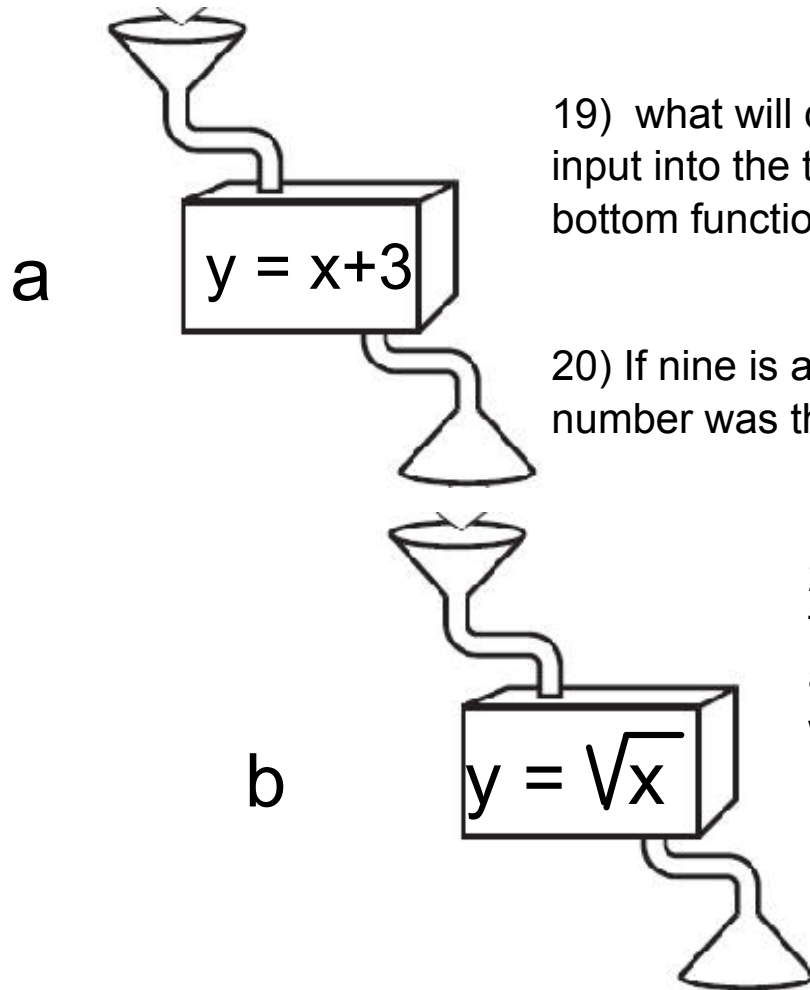
When one function machine has an output that feeds into a second function machine. It is called a composite function.



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Concider the Composite Function

18) what will come out of both function machines if 9 is the input. A output _____ B output _____

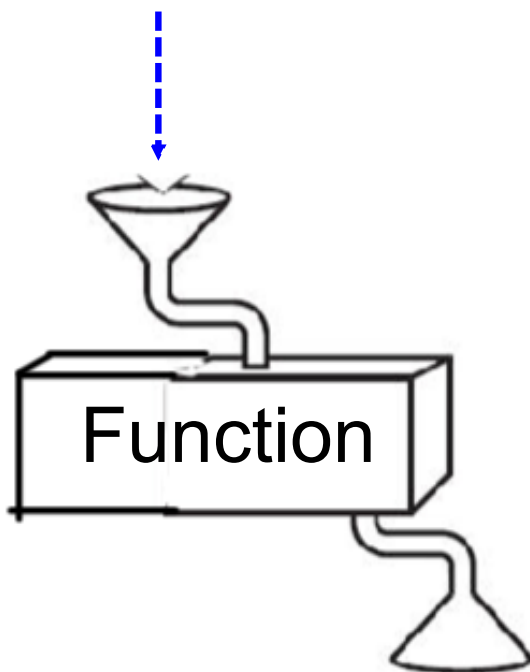


19) what will come out of the bottom function if 22 is input into the top function and its output feeds into the bottom function machine

20) If nine is an output if the bottom function, what number was the input into the top function?

21) Critical testing idea. Sometimes functions don't work. Will there ever be an output from top function that will not work as an input for the lower function?

Independent input



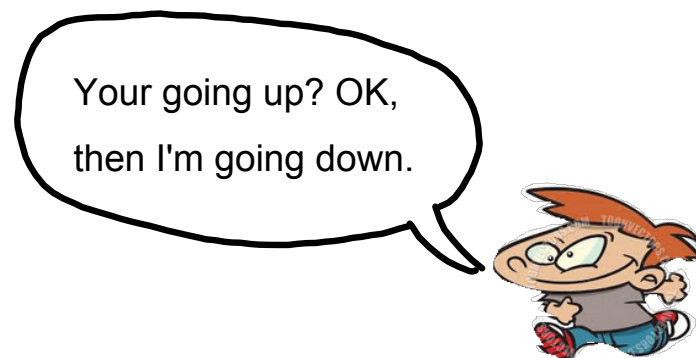
Dependent output

x	y
All input are the domain	All outputs are the range

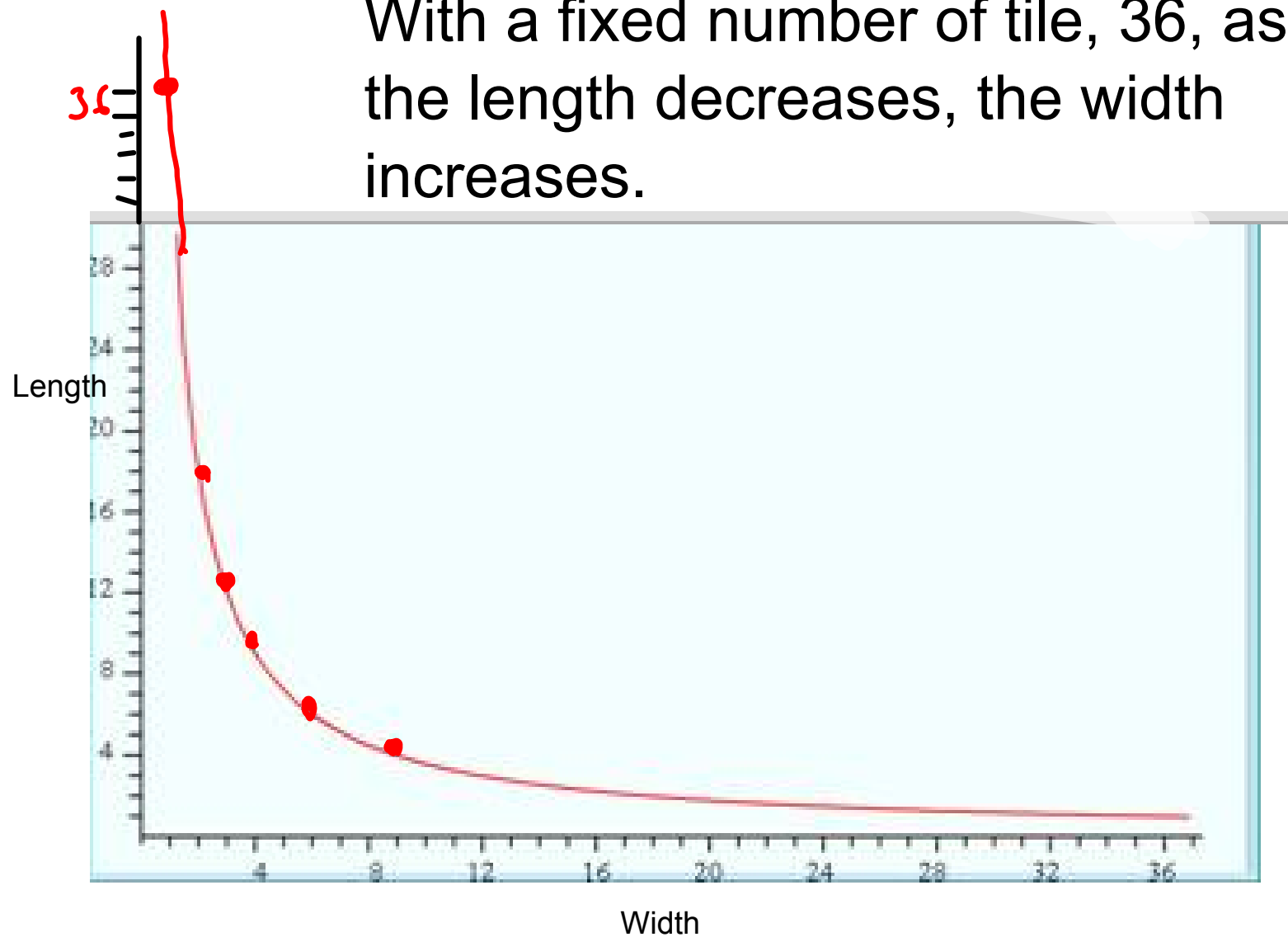
Functions can be placed in families based on their characteristics.

Inverse variation function.

As the input (independent variable) gets larger or smaller, the output (dependent variable) does the opposite.

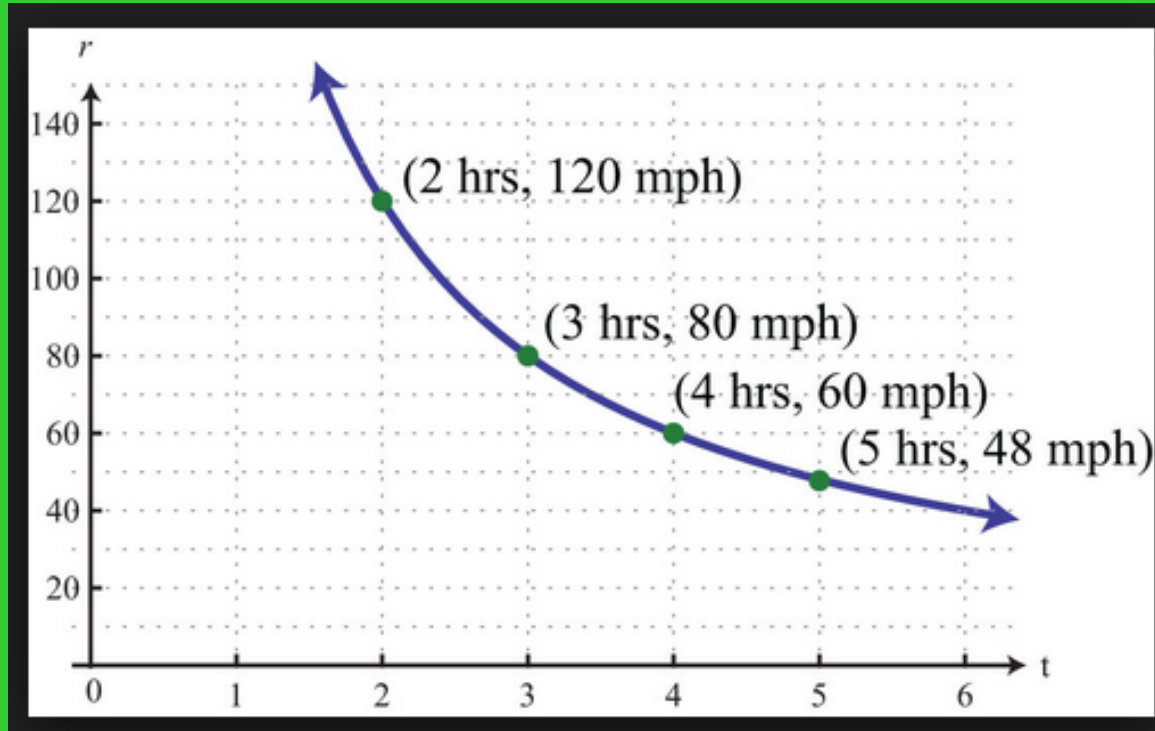


With a fixed number of tile, 36, as the length decreases, the width increases.



Sep 11-9:07 AM

Another inverse variation is the relationship between time and speed over a fixed distance. In the graph you can see as the mph goes down, the hrs goes up.



18) write a sentence explaining an inverse variation relationship.

Direct variation in a function mean when the input gets bigger, then the output gets bigger. Or when the input gets smaller, the output gets smaller.

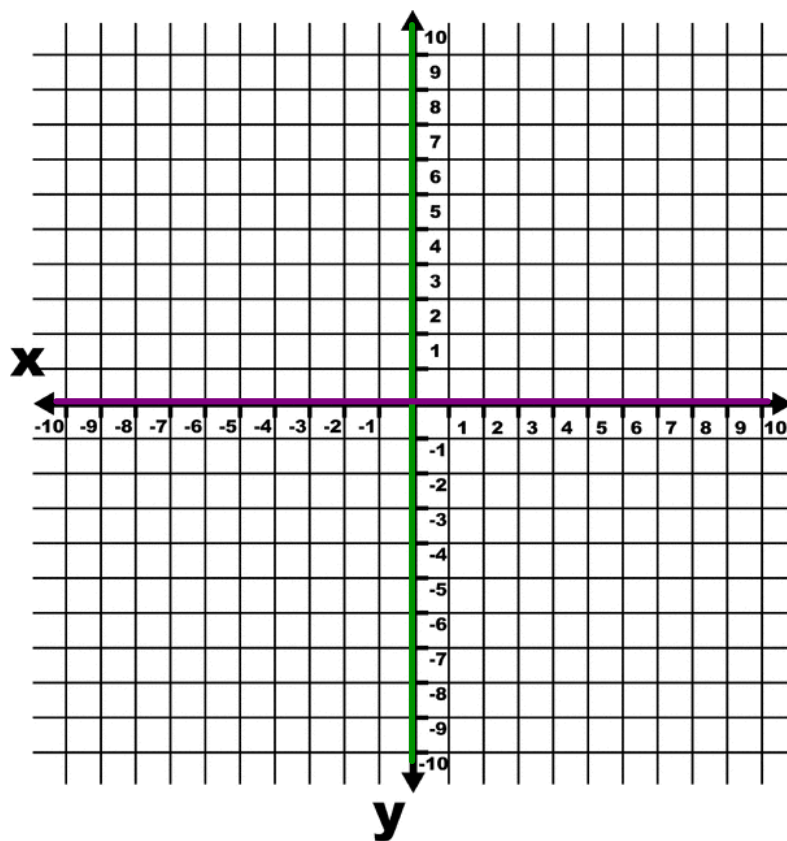
Inverse variation: the larger the number of days I've lived, the fewer days of my life remain.

Direct variation: The larger the number of days I've lived, the larger the accumulation on knowledge I have.

19) write a sentence explaining a direct variation relationship.

the coordinate plane

y-axis



x-axis

Notes for plotting points

 (x, y)

Ordered pairs: instructions for plotting a point

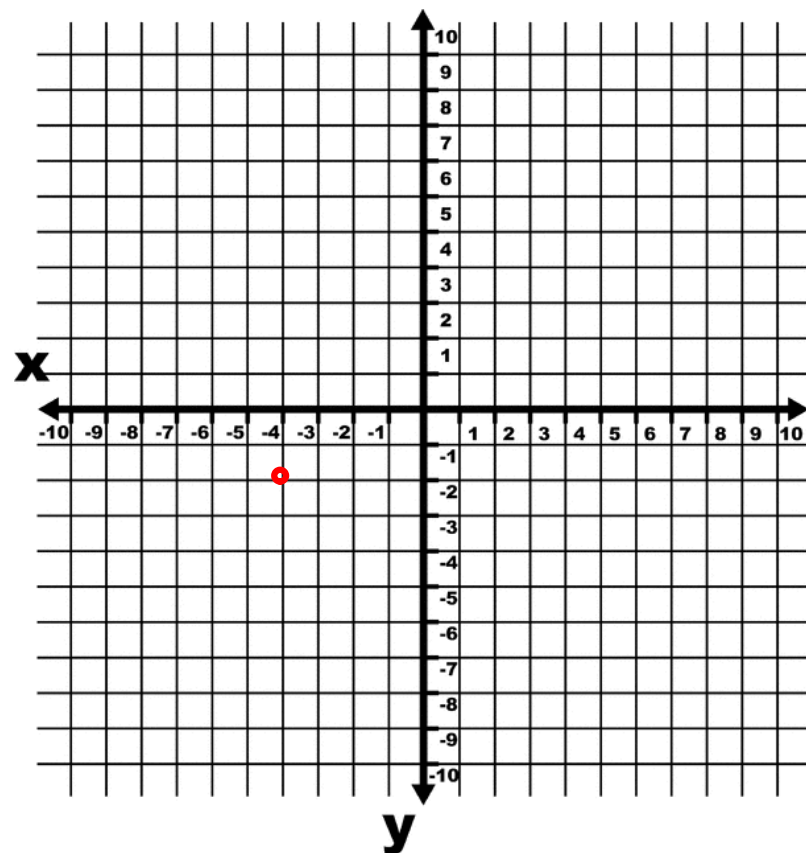
 $(2, 3)$

x
input
independent value

gets plotted first and goes left to right

y
output
dependent variable

gets plotted second with up and down movement



Make a small coordinate plane

20) What is the ordered pair for the red coordinate?

21) Plot the point (2,3)

22) Circle the x axis.

Simplify the following

Expressions

PEMDAS
→ →

$$1) -7 | (2 - 3^2) |$$

$$-7 | 2 - 9 |$$

~~$$-7 | -7 |$$~~

$$-7(7) = -49$$

$$2) \sqrt{59 - (2)5^2}$$

$$\sqrt{59 - 2(25)}$$

$$\sqrt{9} = 3$$

Simplify the expression using the order of operations

$$23) \quad -3|7 - 12| + 3$$

$$24) \quad 4\sqrt{6 + (3)5^2}$$

Correct student responses

23)

$$-3 \mid 7 - 12 \mid + 3 \quad \text{---} \quad (-12)$$
$$-3(5) + 3$$

24)

$$4 \sqrt{6 + (3)5^2} \quad \text{---} \quad (36)$$

-

There are four basic operation in math.
What are they?

adding, subtracting, division, multiplication

Its important to know what undoes one of these operations. It will help you solve an equation.

As far as math book equations go, a teacher or writer started with a variable and gave it a value.

I'm starting with $x=2$. I'm going to multiply both sides by 3. $3x=2(3)$ or $3x=6$.

$3x=6$ is a basic equation that a teacher may ask a student to solve.

To make it harder a teacher may add 2 to both sides.

$$3x+2=6+2 \quad \text{or} \quad 3x+2=8$$

Maybe its not hard enough. Maybe a teacher would now multiply both sides by 12. What would that look like.

You need to be able to undo this. This process is called solving an equation.

Solving **and verifying** equations. Since these are equations, they can be solved by performing the same operation (remember this operation undoes something) to both sides of the equation and in doing so maintaining equality. Verify your answer.

$$25) x+3 = -10$$



Many students
like to draw a
line down the middle

$$26) -5x = -15$$

$$27) x-10 = -13$$

$$28) \frac{x}{3} = 4$$

Correct student responses

25) $x+3 = -10$

$$\begin{array}{r} x+3 = -10 \\ -3 \quad -3 \\ \hline \end{array}$$

$$x = -13$$

26) $-5x = -15$

$$\begin{array}{r} -5x = -15 \\ -5 \quad -5 \\ \hline \end{array}$$

$$x = 3$$

Answers
boxed. Yours
should be to.

26) $x-10 = -13$

$$\begin{array}{r} x-10 = -13 \\ +10 \quad +10 \\ \hline \end{array}$$

$$x = -3$$

27) $\frac{x}{3} = 4(3)$

$$\frac{x}{3} = 4(3)$$

$$x = 12$$

Now to verify the solutions

When solving equations we use properties of equality; which simply mean what you do to one side of the equation you must do to the other. You must verify your answer in order to get full credit.

$$25) \begin{array}{r} x+3=-10 \\ -3 \quad -3 \\ \hline x = -13 \end{array}$$

Verify by plugging identified x value into original equation. You must do this step

original eq. $x + 3 = -10$
 substitute $-13 + 3 = -10$
 CLT $-10 = -10$
 If true its verified

Verify
 (A) $x - 10 = -13$
 $-3 - 10 = -13$
 $-13 = -13$

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

Solving and verifying

With $-10 = -10$ coming from the verification you know you solved the problem correctly. More importantly your getting better at making substitutions.

Had you gotten something untrue like $5 = -4$, you either made a mistake or there is a possibility there is no solution.

The previous two slides are about verifying a solution.

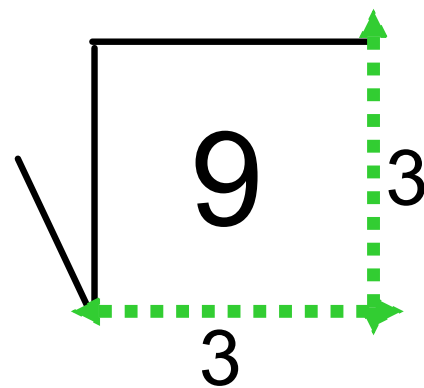
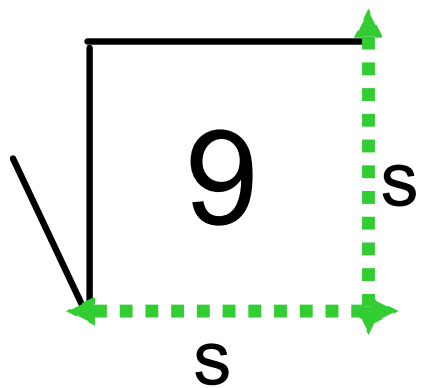
29) If have not already done so, verify your solutions now.

Square Roots

$$\sqrt{9} = 3$$

because we
know 3 times
3 is nine

can be remembered by the area properties of
a square: $\text{area} = \text{side length}^2$ ($A=s^2$)



Visually
seeing 3
times 3 is
nine

Simplify the square roots

30) $\sqrt{9}$

32) $\sqrt{36}$

33) $\sqrt{1}$

34) $\sqrt{0}$

35) $\sqrt{-4}$

Simplify the square roots

30) $\sqrt{9}$; 3 times 3 is 9, 3 is the square root

32) $\sqrt{36}$; 6 times 6 is 36, 6 is the square root

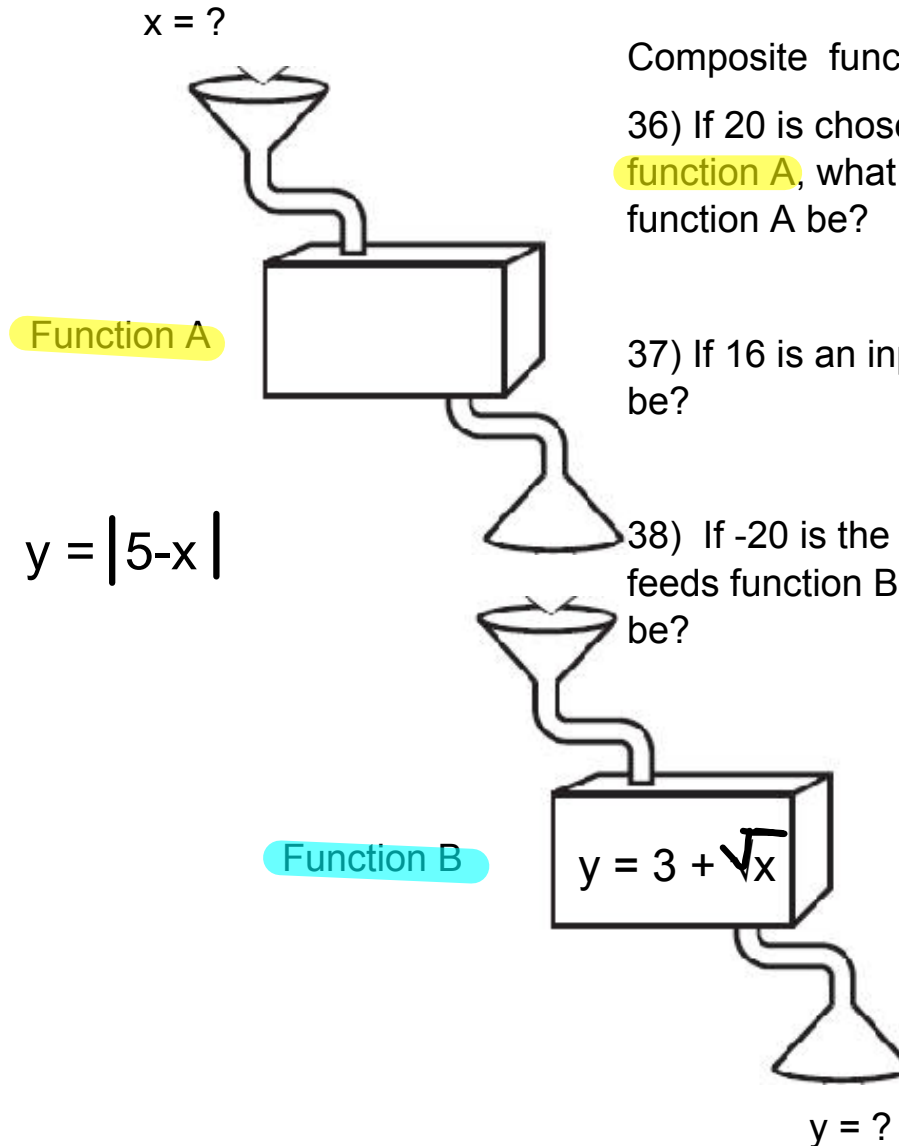
33) $\sqrt{1}$

34) $\sqrt{0}$

35) $\sqrt{-4}$ If you got an answer here theres a problem

Testing curve ball. You may be asked to find the square root of a negative number.

When this happens your really being tested on your awareness of the impossibility of taking the square root of a negative number.



Composite function machines

36) If 20 is chosen as an independent variable for function A, what will the dependent variable for function A be?

37) If 16 is an input for function B, what will its output be?

38) If -20 is the x value for function A and its output feeds function B, what will the output of function B be?

39) Will function A ever have an output that does not work as an input with function B.

x = ?

Function A

$$y = |5 - x|$$

Warm up in journal

36) If 20 is chosen as an independent variable for function A, what will the dependent variable for function A be?

$$y = |5 - 20| \rightarrow y = |-15| \rightarrow \boxed{y = 15}$$

37) If 16 is an input for function B, what will its output be?

$$y = 3 + \sqrt{16} \rightarrow y = 3 + 4 \quad \boxed{y = 7}$$

38) If -20 is the x value for function A and its output feeds function B, what will the output of function B be?

38)

$$y = |5 - (-20)|$$

$$y = |25|$$

$$y = 25$$



$$y = 3 + \sqrt{25}$$

$$y = 3 + 5$$

$$\boxed{y = 8}$$

Function B

$$y = 3 + \sqrt{x}$$

y = ?

39) Will function A ever have an output that does not work with function B.

Because every output from function A will be positive due to the absolute value bars. We can be sure every input to Function B will work. Negative numbers will not work as inputs to function B because of the Square root.

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group hstbr⁹

HW 9 grade

Do this is 4 minutes

Simplify

$$40) 3|2-4(3^2)|$$

$$41) 3\sqrt{49} + 3(7)$$

Solve

$$42) 2x = 14$$

$$43) x-11 = 19$$

Verify the previous two

$$44)$$

$$45)$$

Correct student responses

$$40) \quad 3|2-4(3^2)|$$

$$3|2-36|$$

$$3|-34|$$

$$3(34)$$

$$\boxed{102}$$

$$42) \quad \frac{2x=14}{\frac{2}{2} \quad \frac{2}{2}}$$

$$x=7$$

$$44) \quad 2(7)=14$$

$$\boxed{14=14}$$

$$41) \quad 3\sqrt{49} + 3(7)$$

$$3(7) + 3(7)$$

$$21 + 21$$

$$\boxed{42}$$

Two step

$$43) \quad \begin{array}{l|l} 3x - 11 & = 19 \\ +11 & +11 \\ \hline 3x & = 30 \\ \hline x & = 10 \end{array}$$

$$45) \quad 3(10) - 11 = 19$$

$$30 - 11 = 19$$

$$\boxed{19=19}$$

Simplify

Solve and Verify in three minutes.

$$46) x + 2\sqrt{9} = 100$$

$$47) \frac{x}{3} + 4 = 13$$

$$48) 5x - \sqrt{25} = \sqrt{100}$$

Correst Student responses

$$46) x + 2\sqrt{9} = 100$$

$$x + 2(3) = 100$$

$$x + 6 = 100$$

$$\begin{array}{r} -6 \\ -6 \end{array}$$

$$x = 94$$

Verify $94 + 2\sqrt{9} = 100$

A $94 + 2(3) = 100$

$$94 + 6 = 100$$

$$100 = 100$$

$$48) 5x - \sqrt{25} = \sqrt{100}$$

$$5x - 5 = 10$$

$$\begin{array}{r} +5 \\ +5 \end{array}$$

$$\frac{5x}{5} = \frac{15}{5}$$

$$x = 3$$

$$5(3) - \sqrt{25} = \sqrt{100}$$

$$15 - 5 = 10$$

$$10 = 10$$

$$47) \frac{x}{3} + 4 = 13$$

$$\begin{array}{r} -4 \\ -4 \end{array}$$

$$\frac{x}{3} = 9$$

$$\frac{x}{3} \cdot 3 = 9 \cdot 3$$

$$x = 27$$

$$\frac{27}{3} + 4 = 13$$

$$9 + 4 = 13$$

$$13 = 13$$

$$x \sqrt{100}$$

$$x \sqrt{25}$$

Correct student responses continued

48) $5x - \sqrt{25} = \sqrt{100}$

$$\begin{array}{r} 5x - 5 = 10 \\ + 5 \quad + 5 \end{array}$$

$$\begin{array}{r} 5x \\ \hline 5 \end{array} \quad \left| \quad \frac{15}{5}$$

$$x = 3$$

$$5(3) - \sqrt{25} = \sqrt{100}$$

$$15 - 5 = 10$$

$$10 = 10$$

Verification

Sample Problems with solutions

49) $x + 3 = 10$

50) $\frac{x}{4} = 3$

51) $x - 2 = 19$

52) $7x = 21$

53) $3x - 7 = 32$

54) $\frac{x}{5} - 2 = -5$

Correct Student Solutions

$$\begin{array}{l} 49) \quad x + 3 = 10 \\ \quad \quad -3 \quad | \quad -3 \\ \quad \quad \quad \quad x = 7 \end{array}$$

$$\begin{array}{l} 50) \quad \cancel{4x} = 3 \cdot 4 \\ \quad \quad \quad \quad x = 12 \end{array}$$

$$\begin{array}{l} 51) \quad x - 2 = 19 \\ \quad \quad +2 \quad | \quad +2 \\ \quad \quad \quad \quad x = 17 \end{array}$$

$$\begin{array}{l} 52) \quad \cancel{7x} = \frac{21}{\cancel{7}} \\ \quad \quad \quad \quad x = 3 \end{array}$$

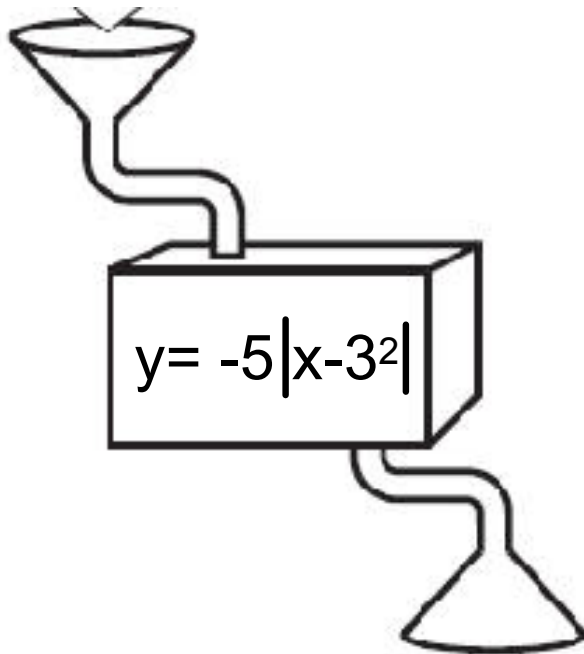
2 step equations

$$\begin{array}{l} 53) \quad 3x - 7 = 32 \\ \quad \quad \quad \quad \quad \quad (13) \end{array}$$

$$\begin{array}{l} 54) \quad \frac{x}{5} - 2 = -5 \\ \quad \quad \quad \quad \quad \quad (-15) \end{array}$$

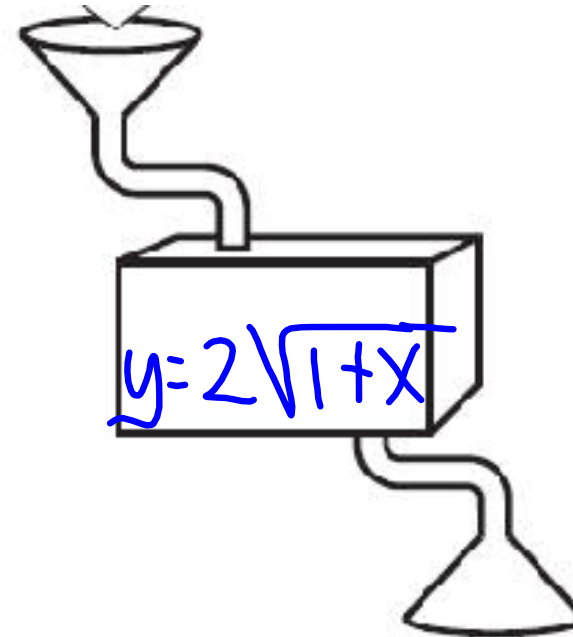
55)

Absolute value function. If the independent value is 7, what is the dependent value? Will there ever be a negative output?



56)

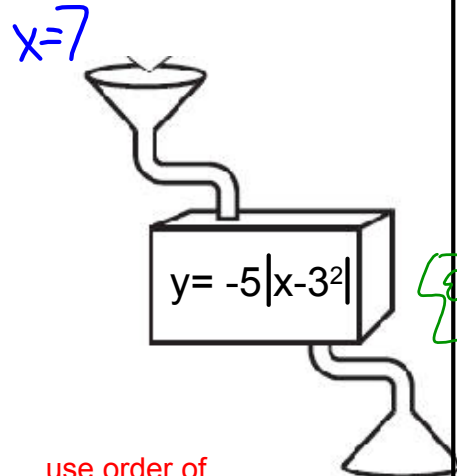
Square root function. If the dependent value is 6, what must the independent value have been? Will negative one work as an input?



$$y = 2\sqrt{1+x}$$

55) solution

Absolute value function If the independent value is 7, what is the dependent value? Will there ever be a negative output?

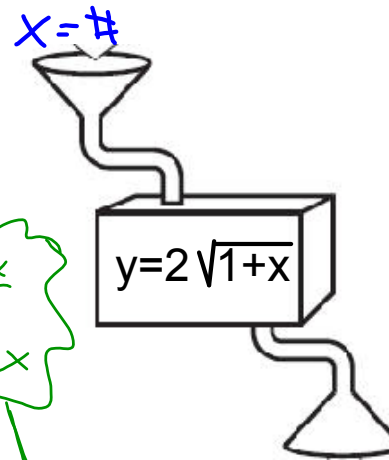


use order of operations

$$\begin{aligned}
 & -5|7-3| \\
 & -5|7-9| \\
 & -5|-2| \\
 & -5(2) \\
 & \boxed{y=-10}
 \end{aligned}$$

56) solution

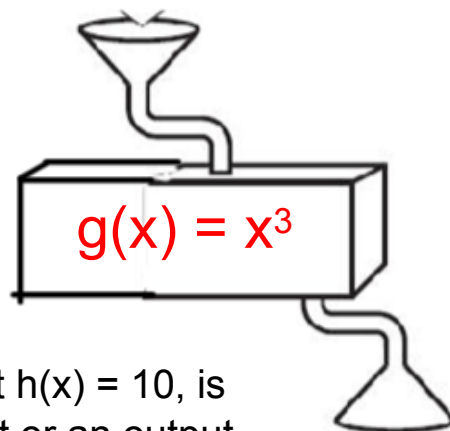
Square root function If the dependent value is 6, what must the independent value have been? will negative one work as an input?



$$\begin{aligned}
 & y=6 \\
 & 6 = 2\sqrt{1+x} \\
 & \frac{6}{2} = \frac{2\sqrt{1+x}}{2} \\
 & 3 = \sqrt{1+x} \\
 & \boxed{3} \quad \boxed{9} \quad \boxed{3} \\
 & 1+x=9 \\
 & \boxed{x=8}
 \end{aligned}$$

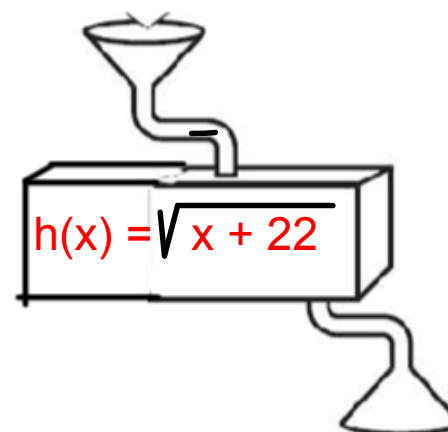
Function Machines

57) Find $g(3)$ for function g and use the output as the input for function h , what will the output of function h be?



58) Will function g ever have an output that does not work as an input for function h ?

59) In the statement $h(x) = 10$, is the variable an input or an output. Figure out what value of the variable would make the statement true. We are only looking at function h in this part.



Function machine

Function Machines

57) Find $g(3)$ for function g and use the output as the input for function h , what will the output of function h be?

$g(3) = 3^3$

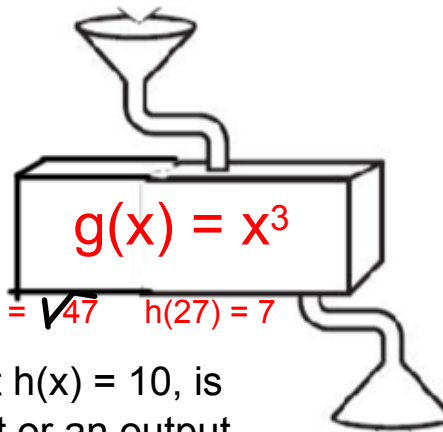
$g(3) = 27$

therefore

$h(x) = x + 22$

becomes

$h(27) = \sqrt{27 + 22}$ $h(27) = \sqrt{47}$ $h(27) = 7$

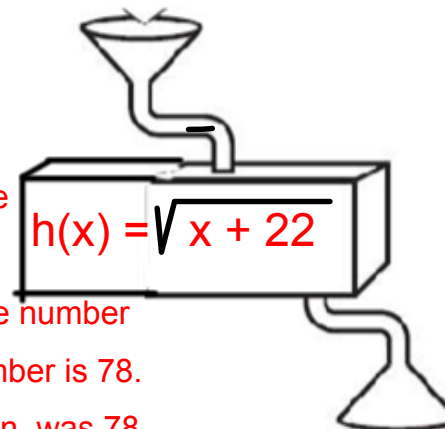


58) Will function g ever have an output that does not work as an input for function h ?

Yes, because function h can not accept numbers less than -22 . Function g can put out numbers less than -22 .

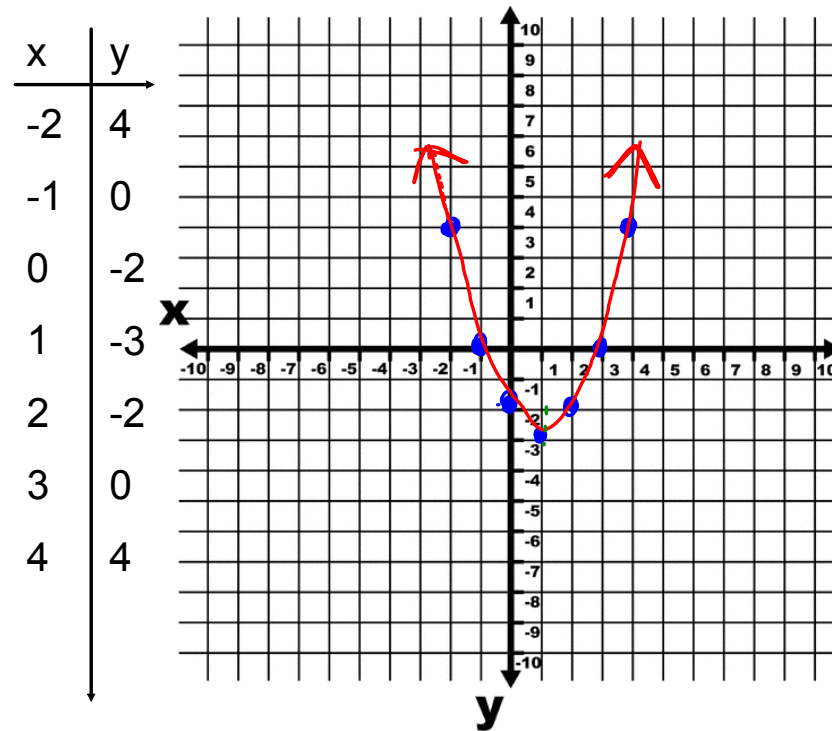
59) In the statement $h(x) = 10$, is the variable an input or an output. Figure out what value of the variable would make the statement true. We are only looking at function h in this part.

In $h(x) = 10$, we know the output is 10, we don't know what input created 10. 10 is the square root of 100, so x has to be the number that 22 was added to to get 100, that number is 78. $78 + 22$ is 100. x , the input to the function, was 78.



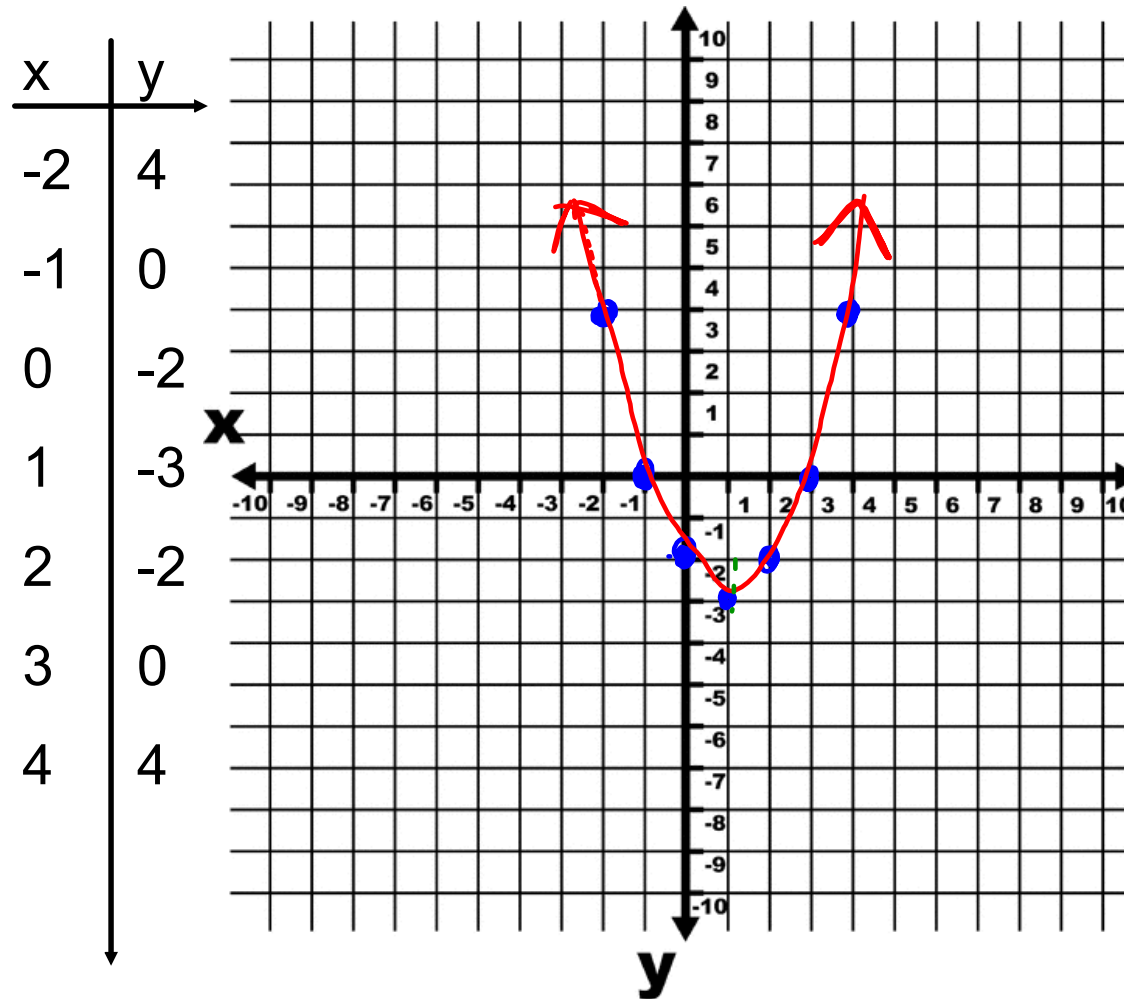
Function machine

Problem 60. Describe the shape, line of symmetry, vertex, x-intercepts, y-intercept, when is the function increasing and decreasing, domain and range, maximum or minimum. You will need to know how to apply these vocabulary words for the test.



graphing definitions

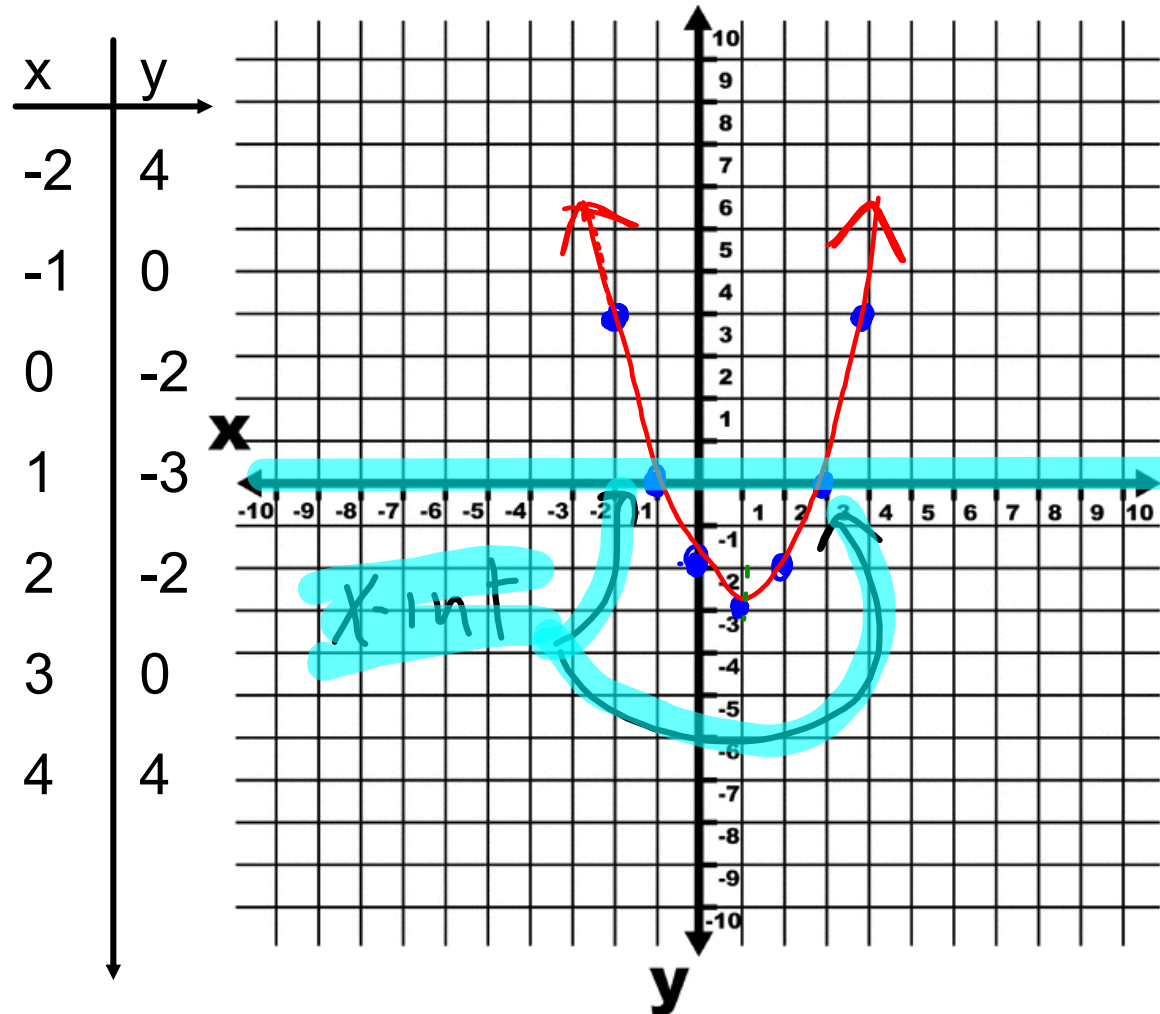
Shape: this type of shape is parabolic



Oct 1-8:36 AM

X-intercepts

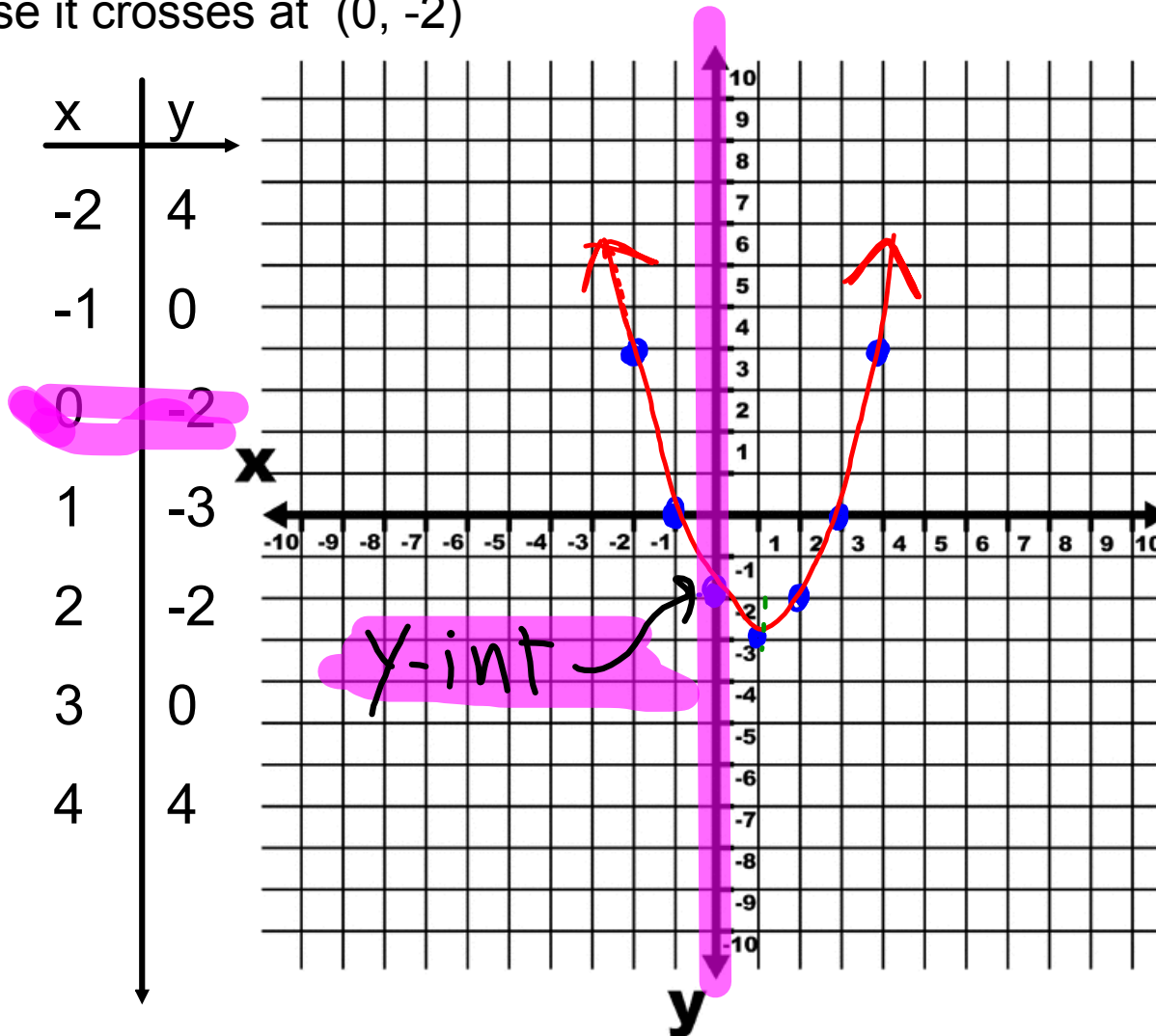
The x intercept is the ordered pair (x,y) where the graph crosses the x-axis. In this case there are two of them $(-1,0)$ and $(3,0)$



Oct 1-8:38 AM

Y-intercept

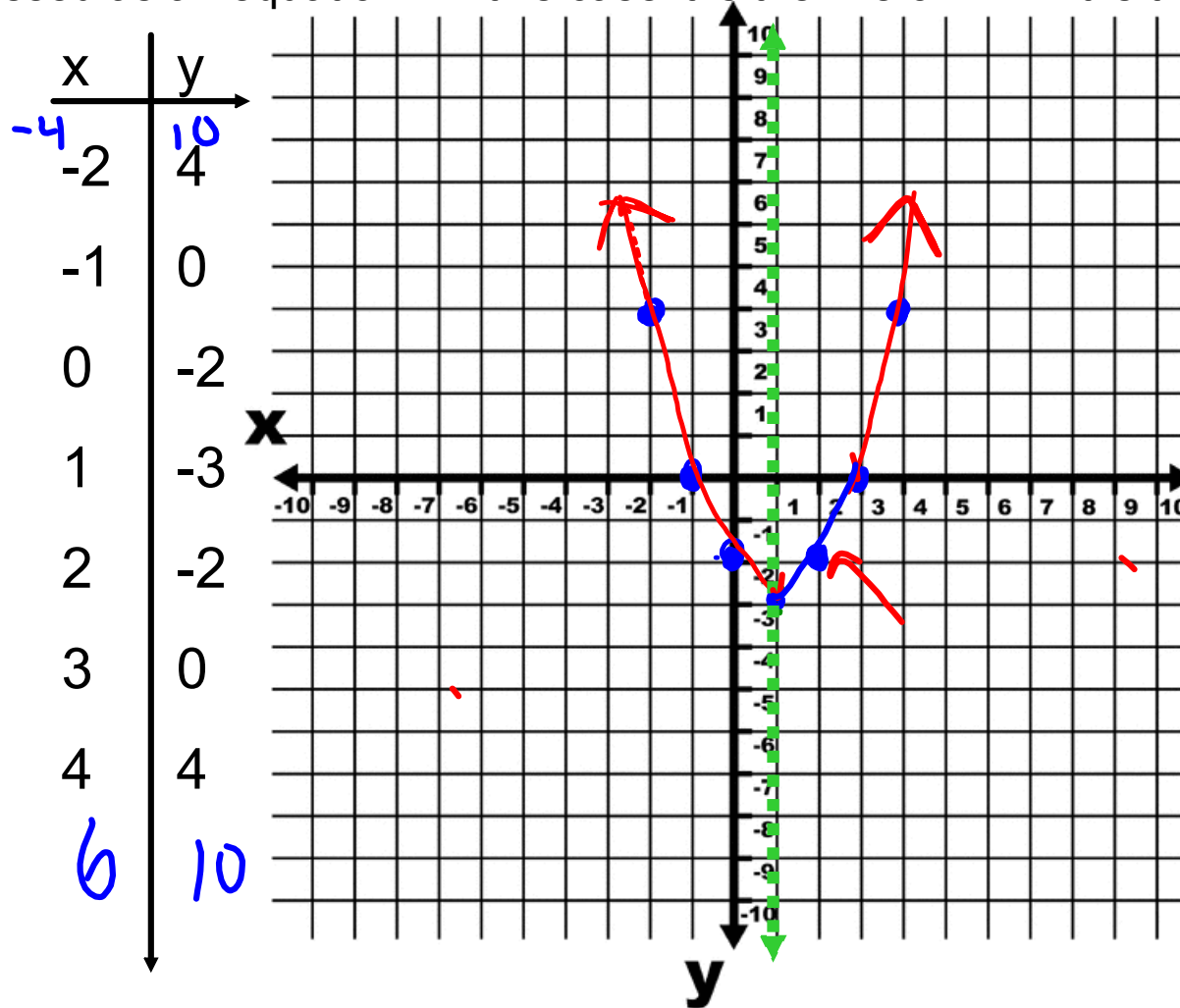
The **y-intercept** is the point where the parabola crosses the y-axis. In this case it crosses at $(0, -2)$



Oct 1-8:42 AM

Line of symmetry

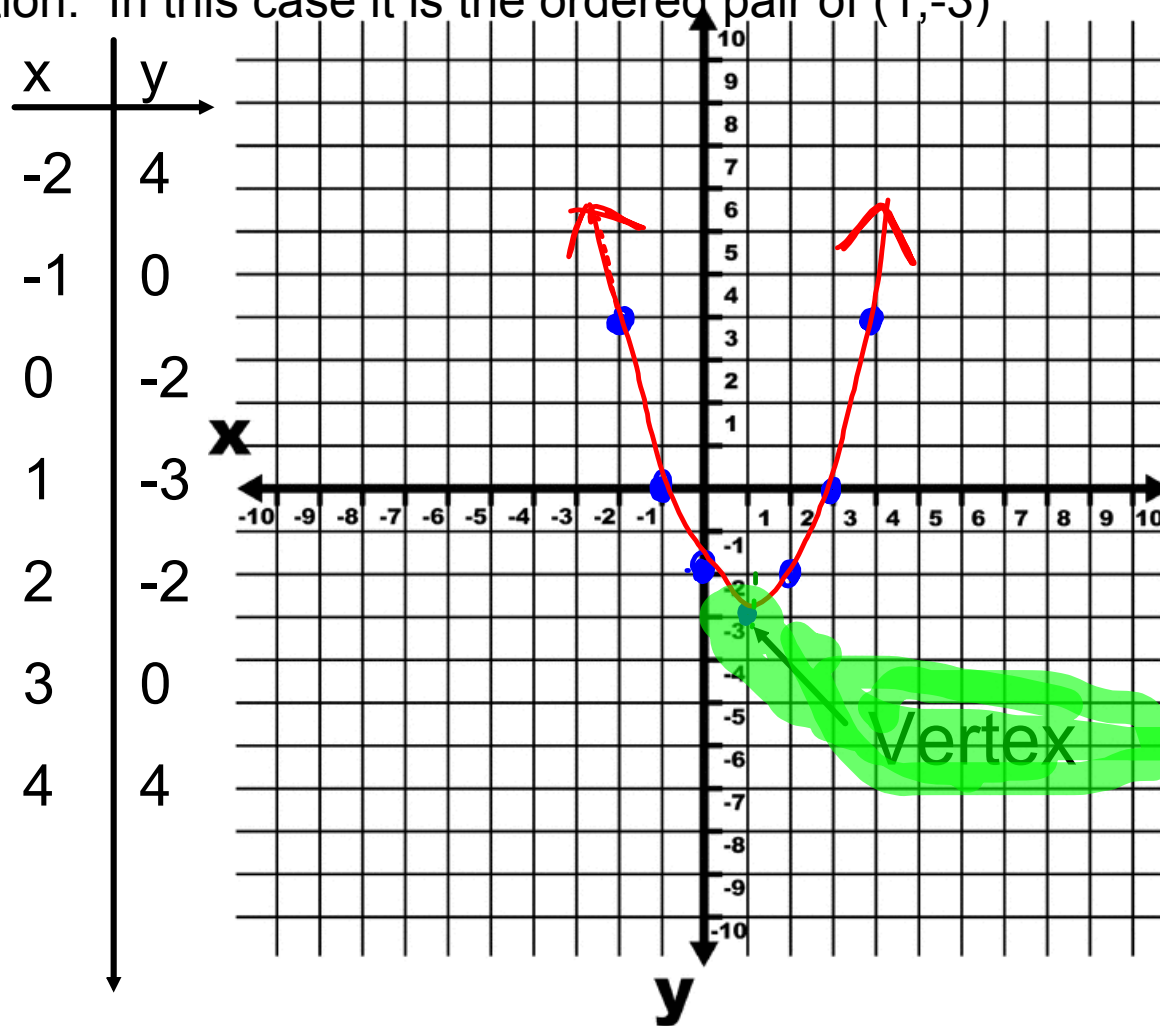
A line of symmetry is a line where the graph has a reflection. The line is expressed as an equation. In this case it is the line of $x=1$. It is the dotted line.



Oct 1-8:46 AM

Vertex

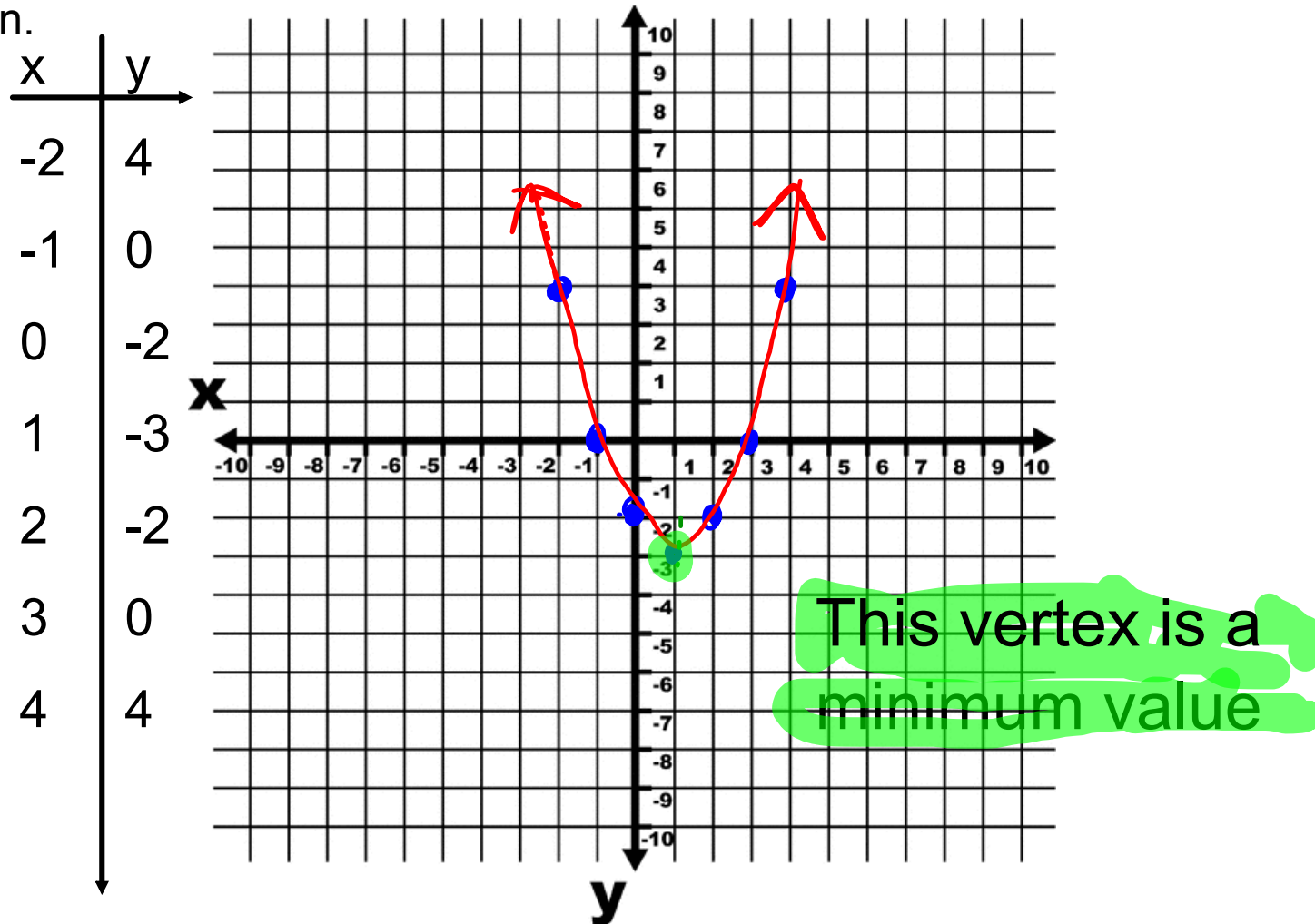
The vertex is a point where the parabola shifts its up and down direction. In this case it is the ordered pair of $(1, -3)$



Oct 1-8:50 AM

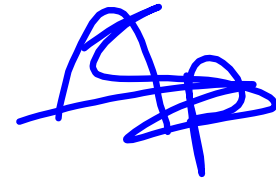
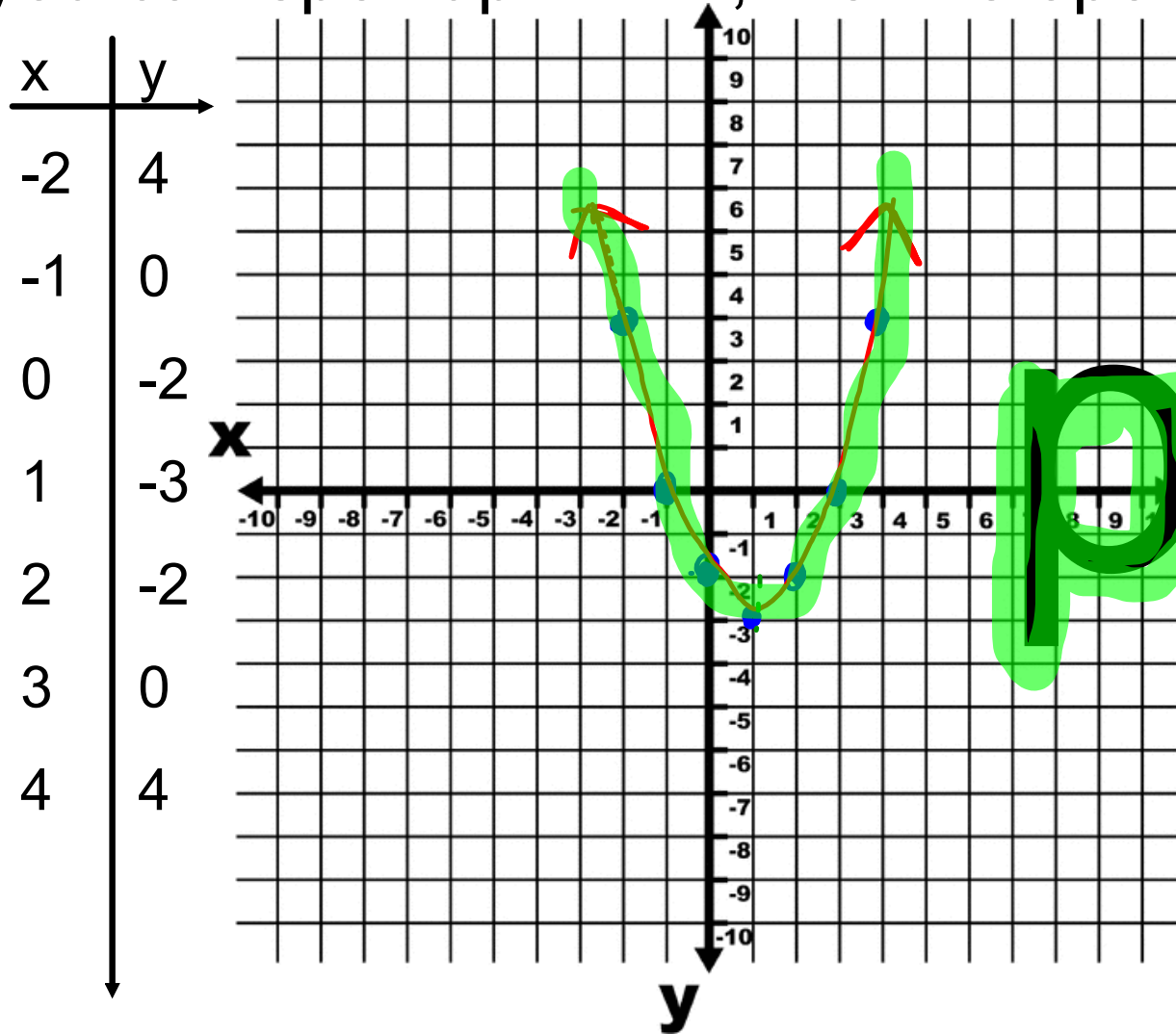
Min or max

Min or max relates to the highest or lowest point in a graph. In parabolas this point will be on the vertex, and in this case we have a min.



Up or down

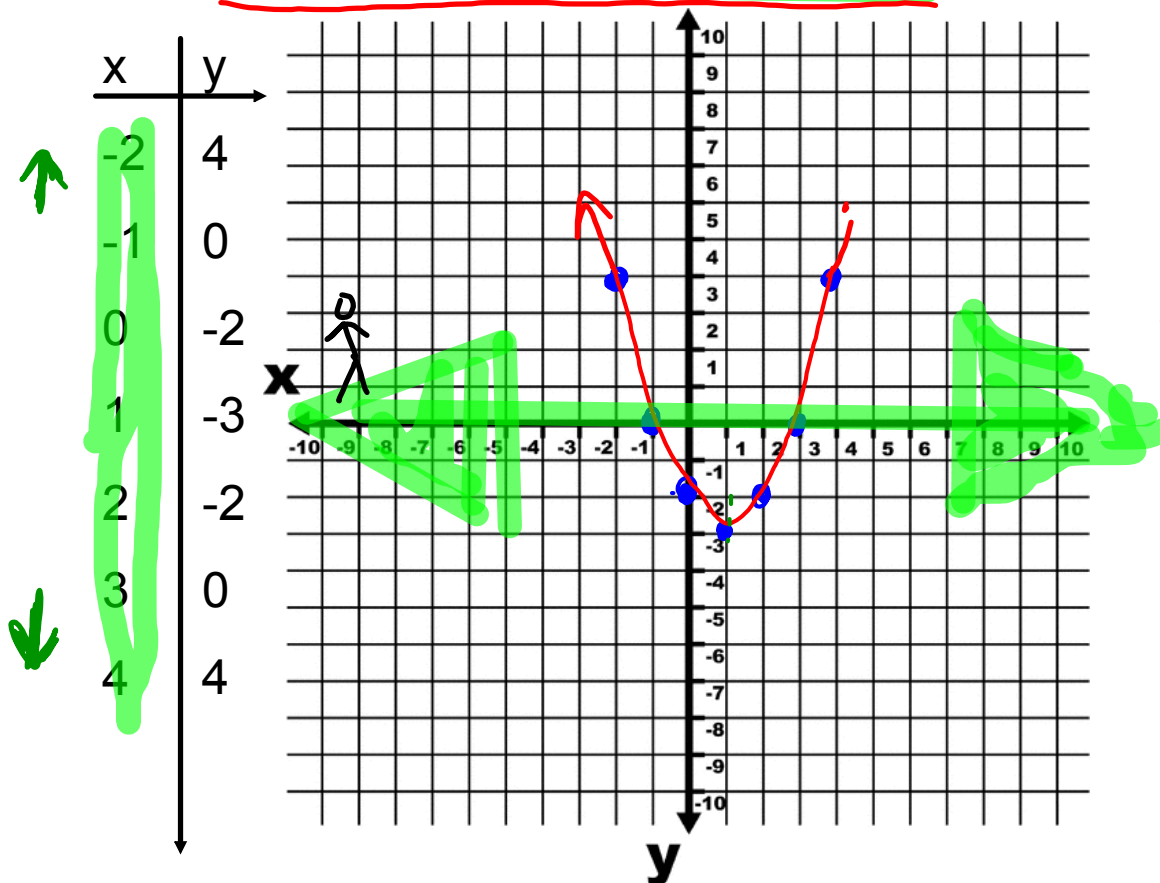
If you can spell up with it, then its opening up!



Domain

The domain is the x values that work in a function. On a graph, if you look up or down from the x -axis and the parabola is in your eyesight, that value is part of the domain.

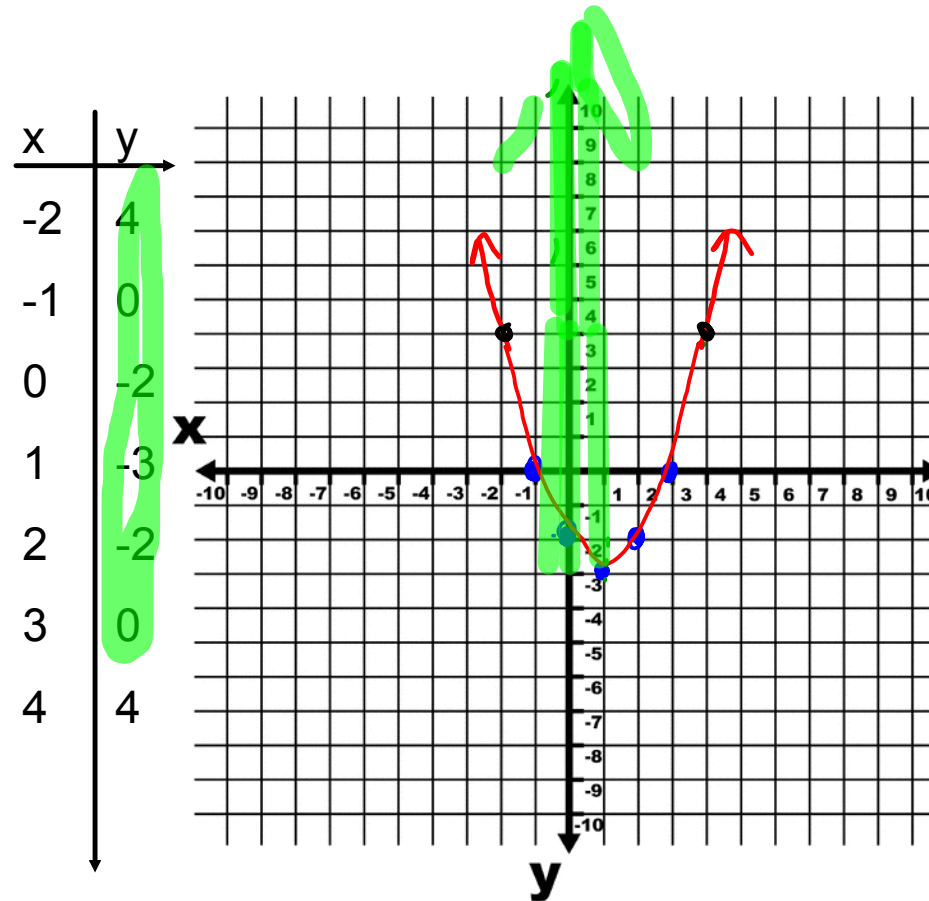
If you notice the arrows on top of the function, they indicate the graph goes on forever in the upward and outward directions. So this graph is forever wide, so the domain is infinite including all values of x .



Oct 1-8:58 AM

RANGE

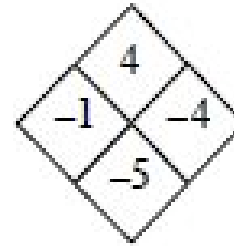
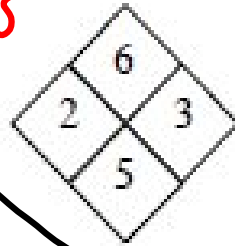
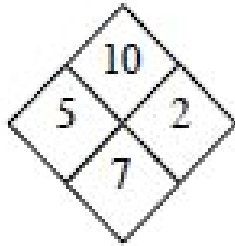
The range is all the values that are outputs of a function. This is the y column of a table of values to the left or right of y axis. Parabolas have a min or max y value in this case we have a min value of $y = -3$. However the graph opens upward forever. So the range is the values of y greater and including negative three.



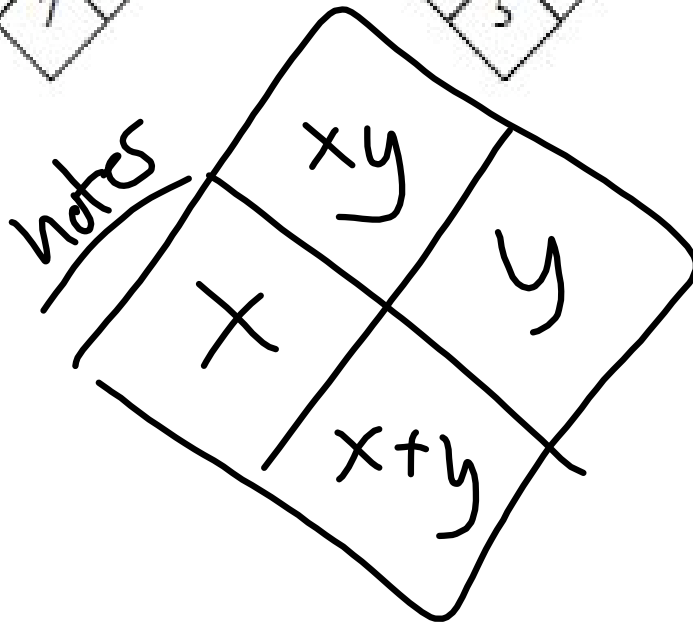
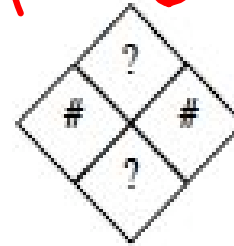
Oct 1-9:07 AM

Look closely at the first 3 diamond problems, and see if you can find a patten for using the left and the right and finding the top and the bottem part.

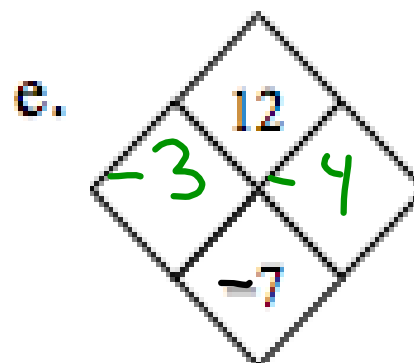
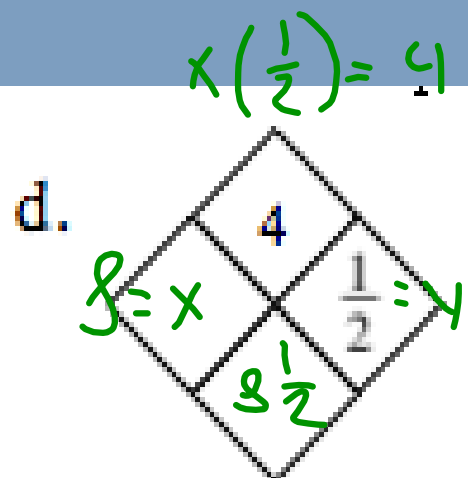
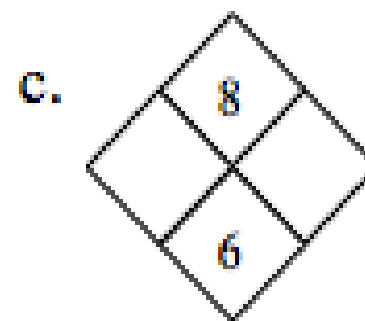
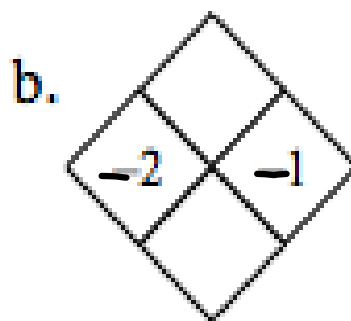
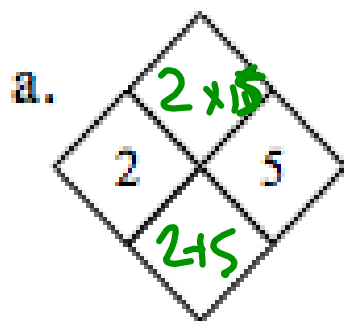
Diamond Problems Pg 7-8



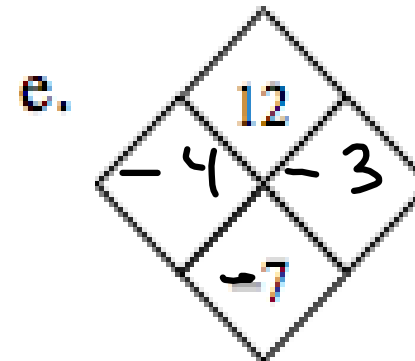
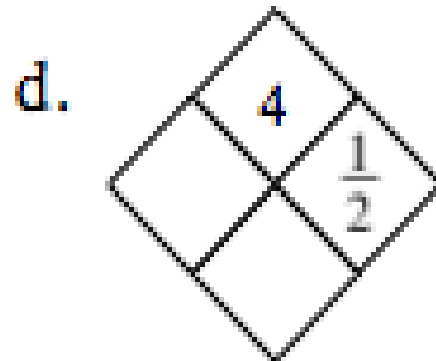
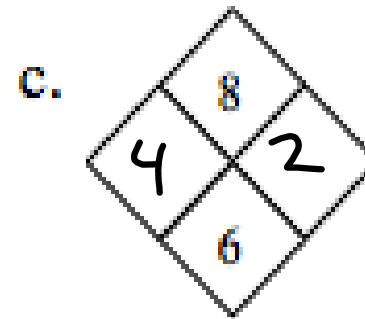
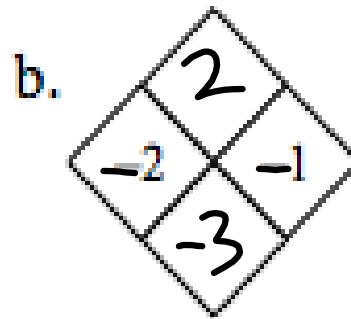
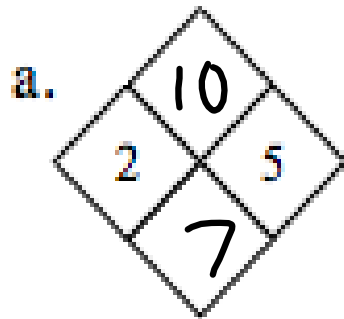
Express that rule



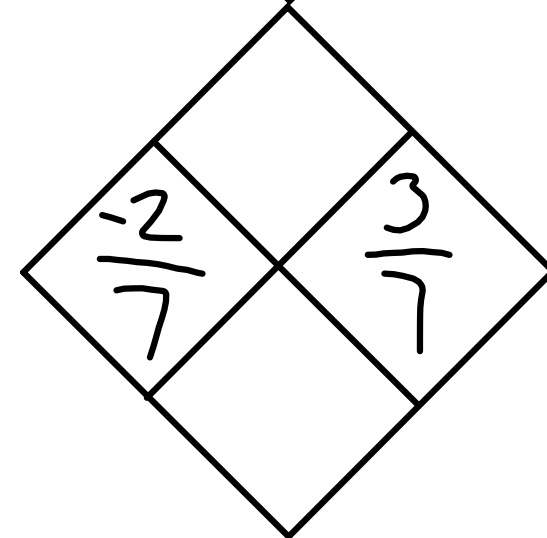
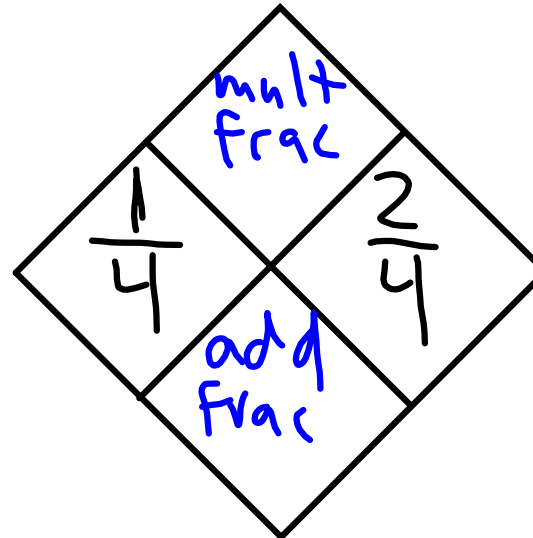
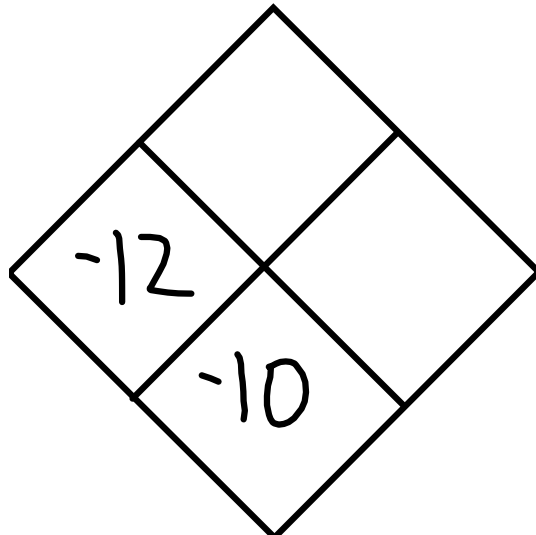
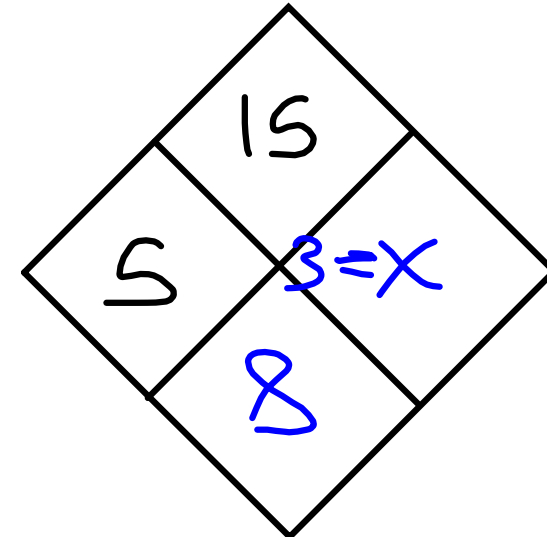
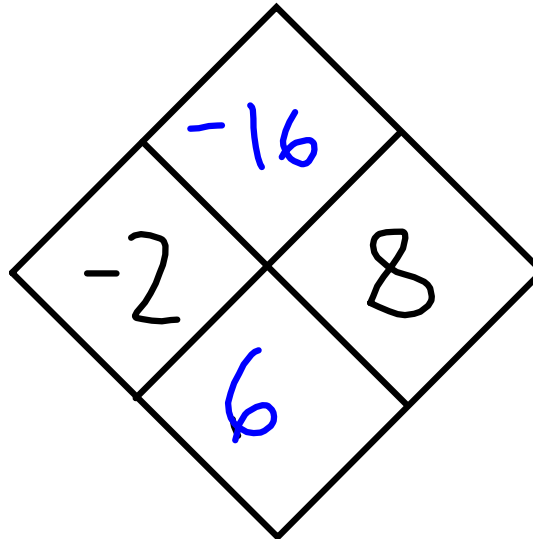
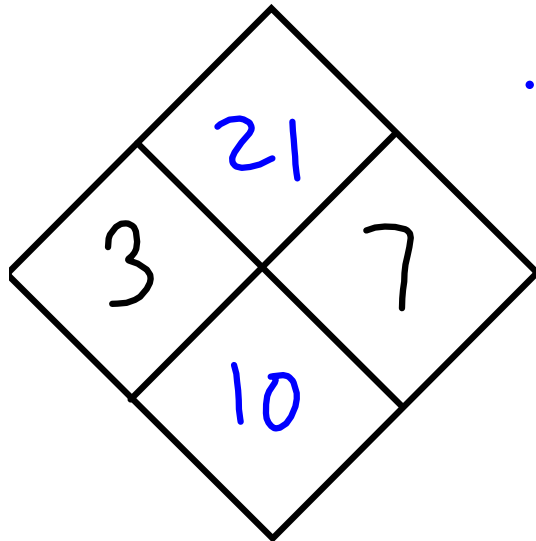
Try using the pattern on these diamond problems



Try using the pattern on these diamond problems

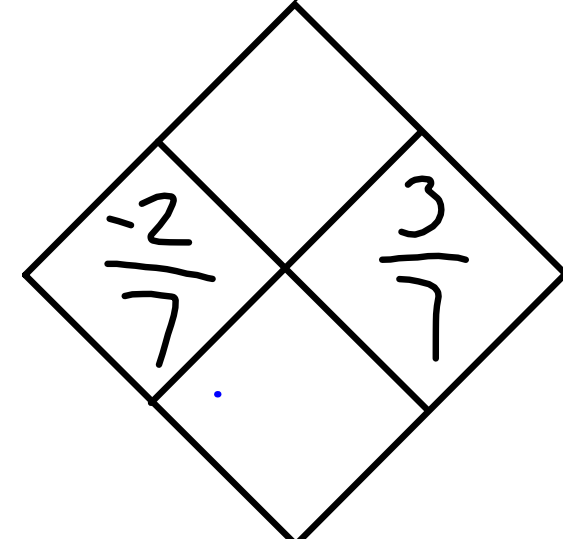
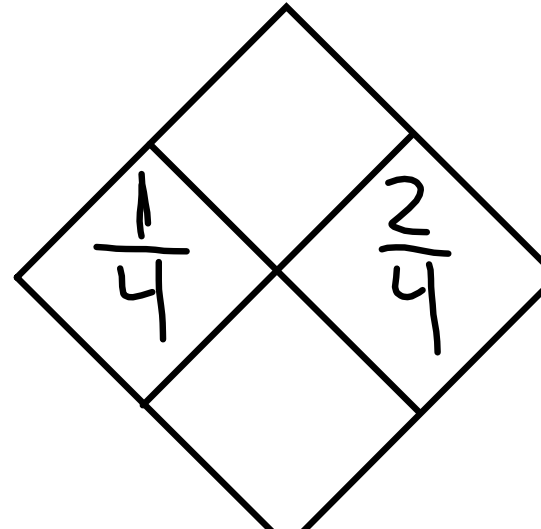
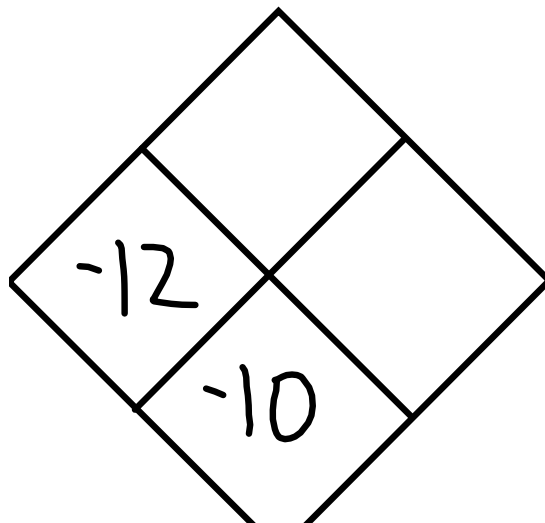
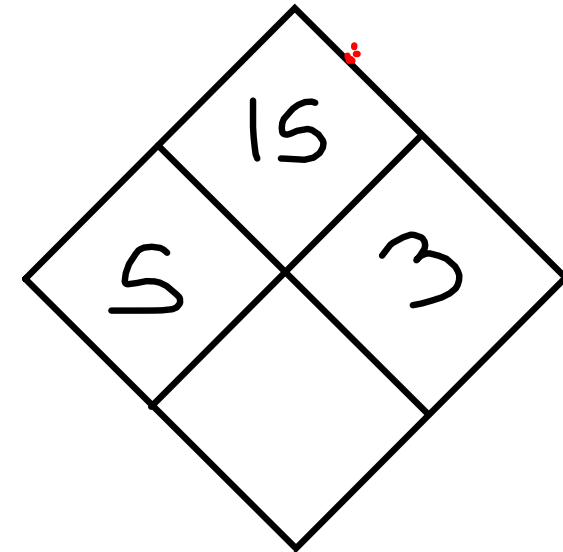
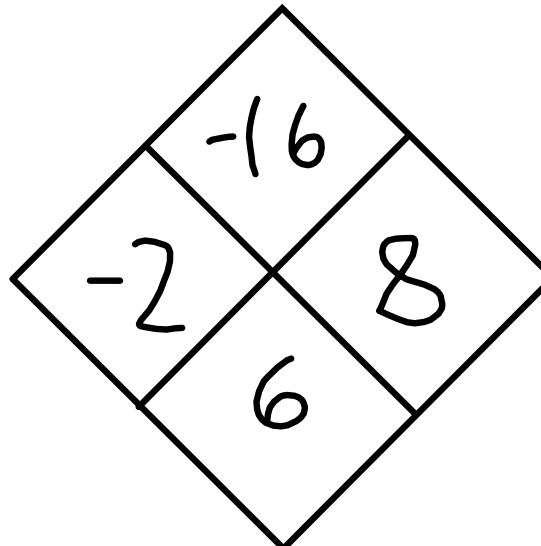
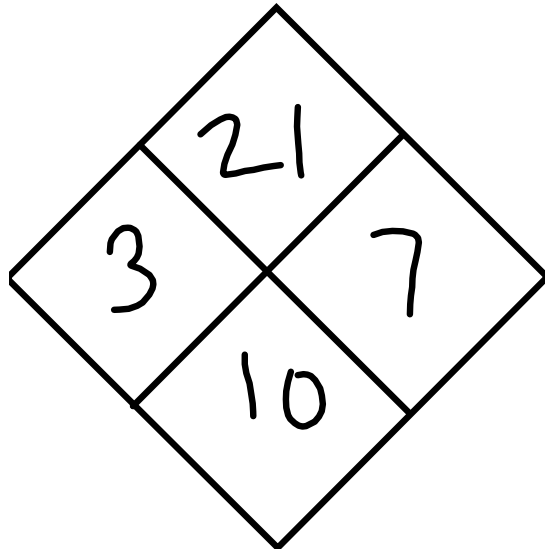


Do these problems in the Diamond problem's section.



Sep 17-7:28 AM

Do these problems in the Diamond problem's section.



Sep 17-7:28 AM

For complicated ones involving fractions

Adding fractions

$$\frac{1}{2} + \frac{1}{3}$$

Handwritten work for finding a common denominator:

$$\frac{3}{6} + \frac{2}{6} = \frac{3+2}{6} = \frac{5}{6}$$

The work shows the process of finding the least common denominator (6) by listing multiples of 2 (2, 4, 6) and 3 (3, 6) and identifying 6 as the common denominator. Arrows indicate the conversion of $\frac{1}{2}$ to $\frac{3}{6}$ and $\frac{1}{3}$ to $\frac{2}{6}$.

Multiplying
Fractions

$$\frac{1}{3} \cdot \frac{2}{4} = \frac{2}{12}$$

reduces to

$$\frac{1}{6}$$

Dividing
fractions

$$\frac{2}{7} \div \frac{1}{3}$$

Invert & multiply

$$\frac{2}{7} \cdot \frac{3}{1} = \frac{6}{7}$$

You need to know how to process fractions

For complicated ones involving fractions

Adding fractions

$$\frac{1}{2} + \frac{1}{3}$$

$$\frac{1}{2} = \frac{3}{6} \quad \frac{1}{3} = \frac{2}{6}$$

$$\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$$

Multiplying
Fractions

$$\frac{1}{3} \times \frac{2}{4} = \frac{2}{12}$$

Dividing
fractions

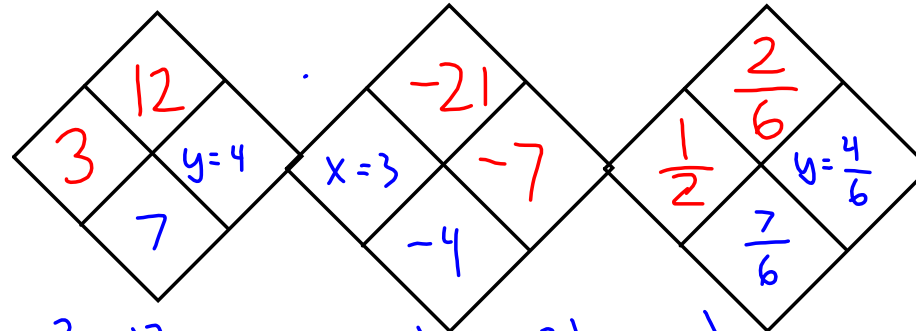
$$\frac{2}{7} \div \frac{1}{3}$$

Invert and
multiply

$$\frac{2}{7} \cdot \frac{3}{1} = \frac{6}{7}$$

You need to know how to process fractions

Learning objective. Create one step equations from diamond problems.



$$\frac{3y}{3} = \frac{12}{3}$$

$$y = 4$$

$$\frac{x(-7)}{-7} = \frac{-21}{-7}$$

$$x = 3$$

$$\frac{y(\frac{1}{2})}{\frac{1}{2}} = \frac{\frac{2}{6}}{\frac{1}{2}}$$

The bottom is

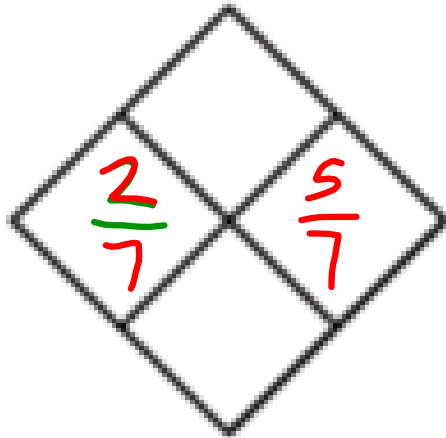
$$\frac{1}{2} + \frac{4}{6}$$

$$\frac{1}{2} \quad \frac{2}{4} \quad \frac{3}{6} + \frac{4}{6}$$

$$\frac{3+4}{6} = \frac{7}{6}$$

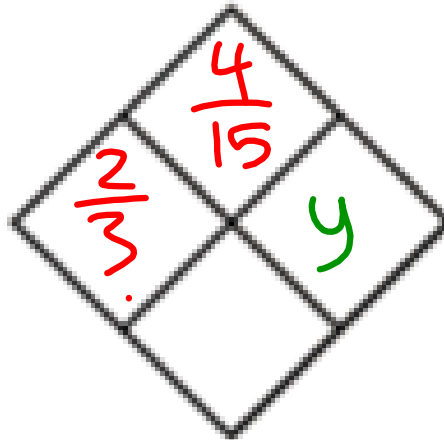
Now that we have reviewed multiplying and dividing fractions..these are easy. You must write an equation for the last two.

product



SUM

product

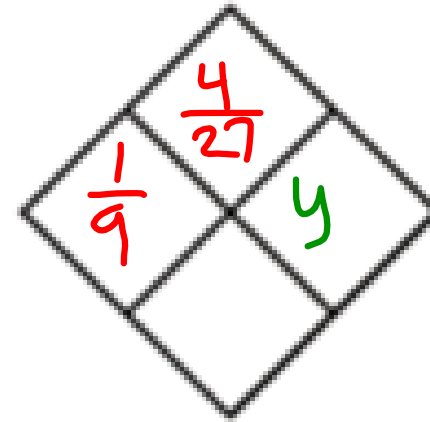


SUM

equation



product



SUM

Equation

Now that we have reviewed multiplying and dividing fractions..these are easy. You must write an equation for the last two.

product

sum

$$\frac{20}{30} + \frac{12}{30}$$

$$\frac{20+12}{30}$$

$$\frac{32}{30}$$

$(\frac{2}{3})y = \frac{4}{15}$

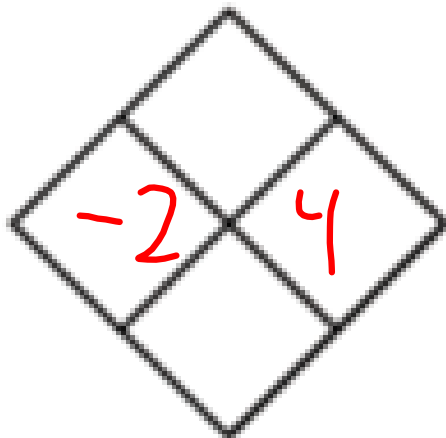
$(\frac{2}{3})y = \frac{4}{15}$ ← division Bar

divide and cancel → ~~$(\frac{2}{3})y = \frac{4}{15}$~~ = $\frac{4}{15}$ } This side is $\frac{4}{15} \div \frac{2}{3}$

Invert & multiply $y = \frac{4}{15} \cdot \frac{3}{2} = \frac{12}{30}$ } Put in Diamond

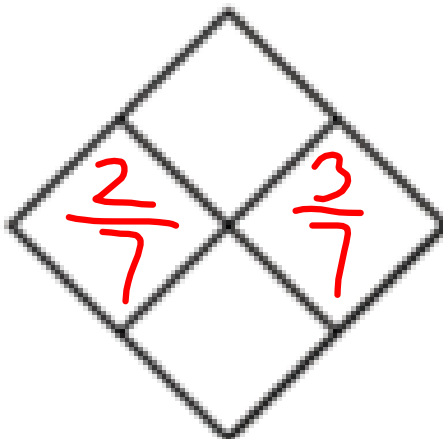
Now that we have reviewed multiplying and dividing fractions..these are easy

product



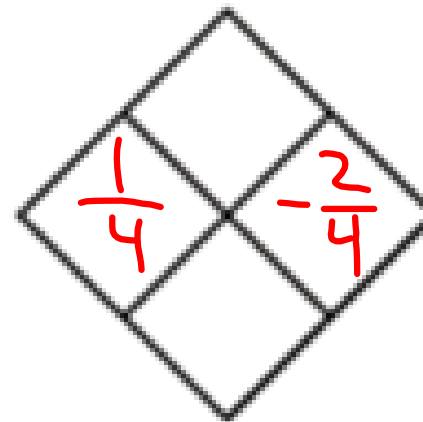
SUM

product



SUM

product



SUM

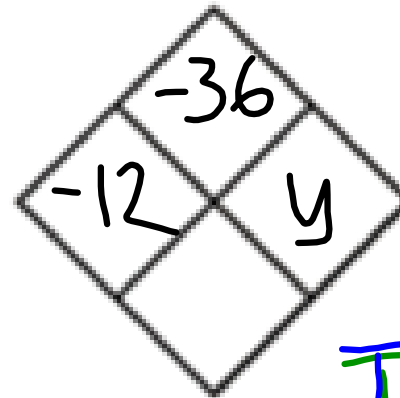
Using divisional property of equation on diamond problems.

$$5x = 35$$

Do we know that

product

-12 times



y is
equal
to -3?

IF so write

sum

the equation.

Learning objective. Create one step equations from diamond problems.

$$\begin{array}{|c|c|c|} \hline & 12 & \\ \hline 3 & & 4=y \\ \hline & 7 & \\ \hline \end{array}$$

$$\cancel{3y = 12}$$

$$y = 4$$

$$\begin{array}{|c|c|c|} \hline & -21 & \\ \hline x & & -7 \\ \hline & & \\ \hline \end{array}$$

$$\cancel{x(-7) = -21}$$

$$x = 3$$

$$\begin{array}{|c|c|c|} \hline & 2 & \\ \hline \frac{1}{2} & & 6 \\ \hline & & \\ \hline \end{array}$$

$$\cancel{\frac{1}{2}(y) = 2}$$

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

**Thank you for putting
away your phone and
head phones. You're
doing a good job at
keeping them out of sight.**

This warm will be in the absolute value and square root function section.

Simplify

$$1) |-3-7|$$

$$2) 3\sqrt{16}$$

$$3) 9^2$$

$$4) -4^2$$

Solve

$$5) x-3=5$$

$$6) x-\frac{1}{4}=\frac{2}{4}$$

If $x=3$

what is y
for

$$7) y=7x$$

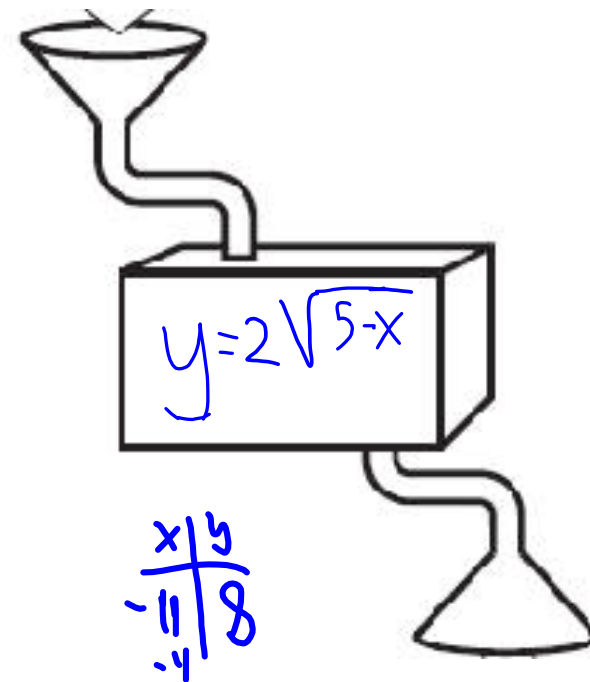
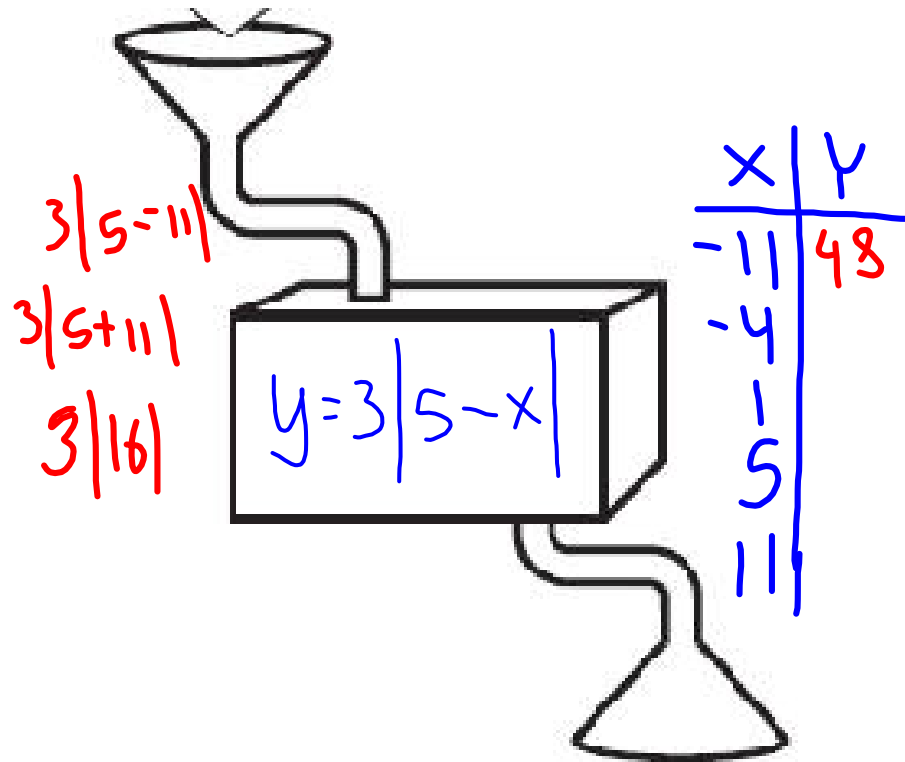
$$8) y=-3\sqrt{3x}$$

$$9) y=|-12+x|$$

$$10) y=x^2+3x+2$$

Work in your groups. Work should be in the absolute and square root function section of chapter 1 (where your warm up was) .

For each function make a t-table for the following inputs: -11, -4, 1, 5, and 11. Is there an input that does not work for one of the functions.



Domain and Range of function

Continued

absolute value function

$$y = 3|5-x|$$

x	y	from
-11	48	3 16
-4	27	3 9
1	12	3 4
5	0	3 0
11	18	3 6

Square root function

$$y = 2\sqrt{5-x}$$

x	y	from
-11	8	$2\sqrt{16}$
-4	6	$2\sqrt{9}$
1	4	$2\sqrt{4}$
5	0	$2\sqrt{0}$
11	undefined	$2\sqrt{-6}$

Get this in your square root function notes section.

$$\sqrt{n} = x \text{ if } x \begin{array}{|c|} \hline n \\ \hline x \\ \hline \end{array}$$

$$\text{ex } \sqrt{36} = 6 \text{ if } 6 \begin{array}{|c|} \hline 36 \\ \hline 6 \\ \hline \end{array}$$

Do this

$$\sqrt{81} = \underline{\quad} \text{ if } \begin{array}{|c|} \hline 81 \\ \hline \end{array}$$

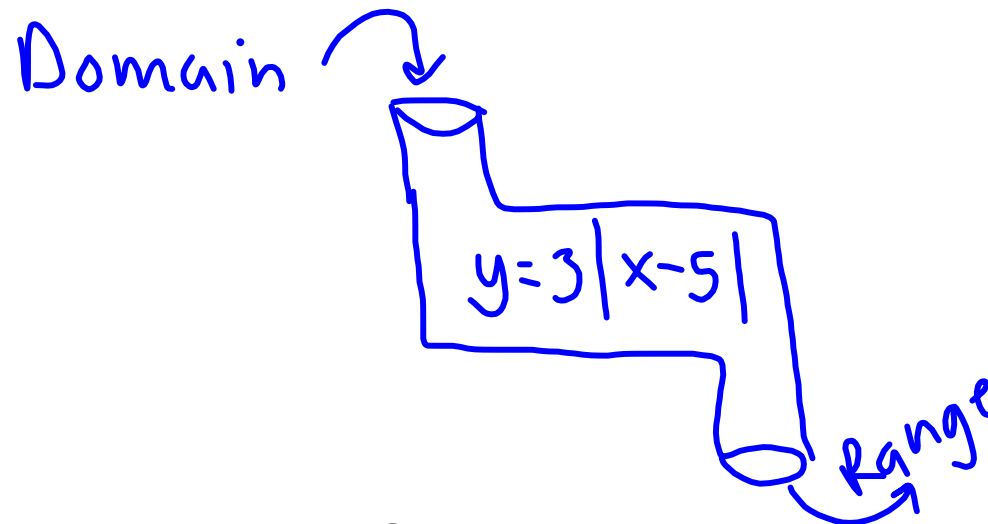
Is this true?

$$\sqrt{144} = 11 \text{ because } 11 \begin{array}{|c|} \hline 144 \\ \hline 11 \\ \hline \end{array}$$

no! $11 \times 11 = 121$

Vocabulary for page 3, related to warm up.
Please get in your notes.

Domain: A group or set of numbers that are the input to a function.



Range: A group or set of numbers that are the output to a function.

So here is the first table you created from the absolute value function in the warm up.

x	y
-11	48
-4	27
1	12
5	0
11	18

So here is the first table you created from the absolute value function in the warm up.

x	y
-11	48
-4	27
-1	12
5	0
11	18

The domain would include all the x values that were put into the function

So here is the first table you created from the absolute value function in the warm up.

x	y
-11	48
-4	27
1	12
5	0
11	18

The range would include all the numbers that are outputs to the function.

kdmj

Thank you for putting
away your phone and
head phones. You're
doing a good job at
keeping them out of sight.

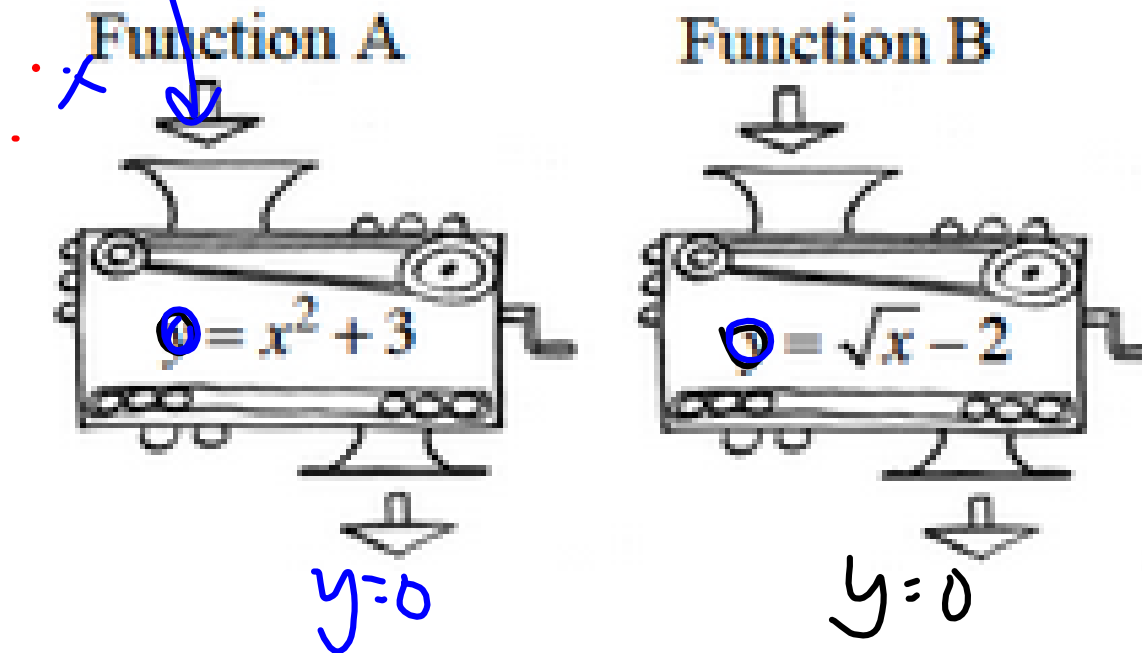
Sep 18-11:40 AM

This will be the first page after Diamond problems. This section will be titled function machines. For most of you this will be page 9

- > If an input of -9 is put into each of the machines at right, what is each output?

Eric wants to get an output of 0. Can he do this with each machine?

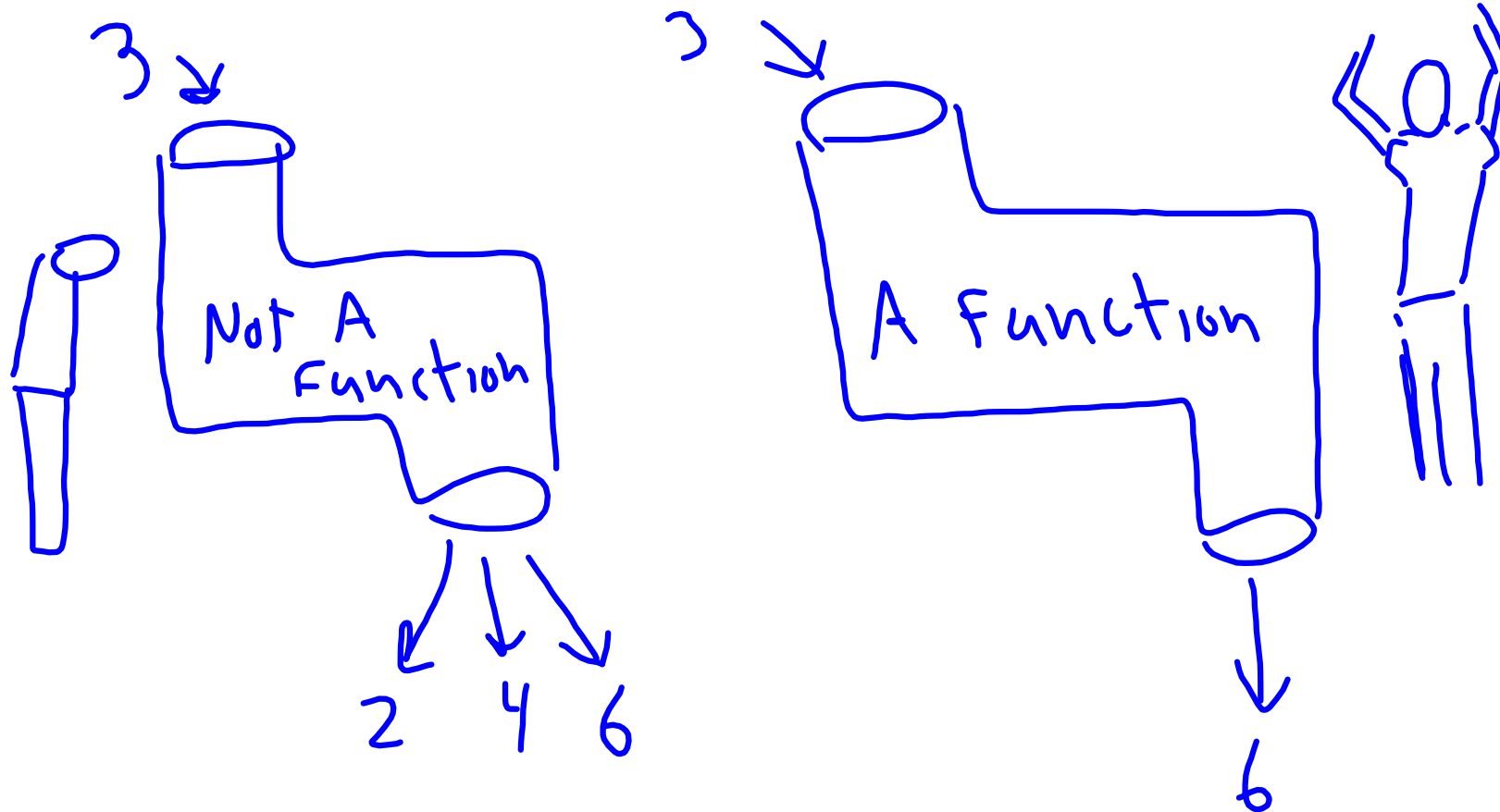
If so, how? If not, why not?



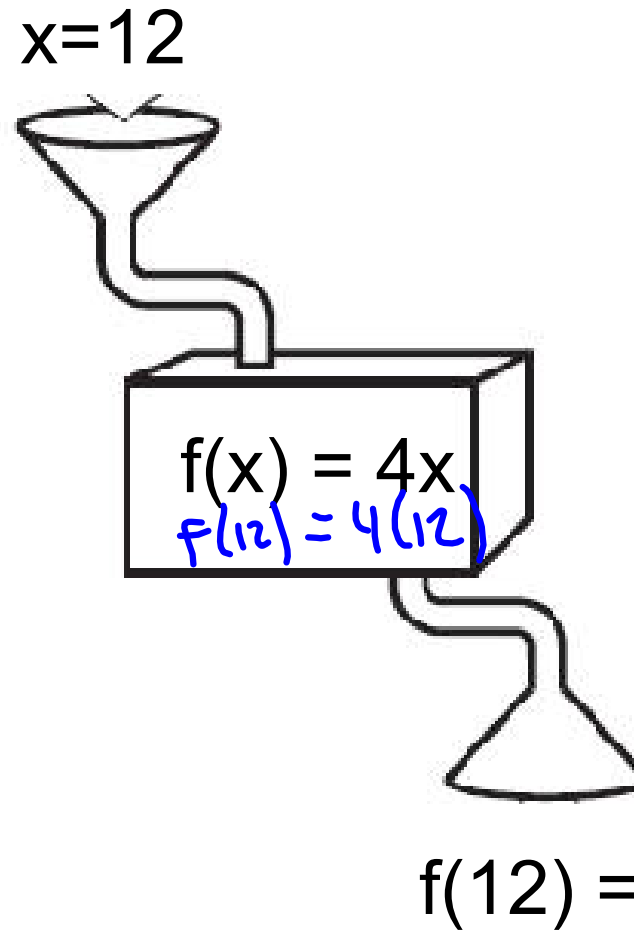
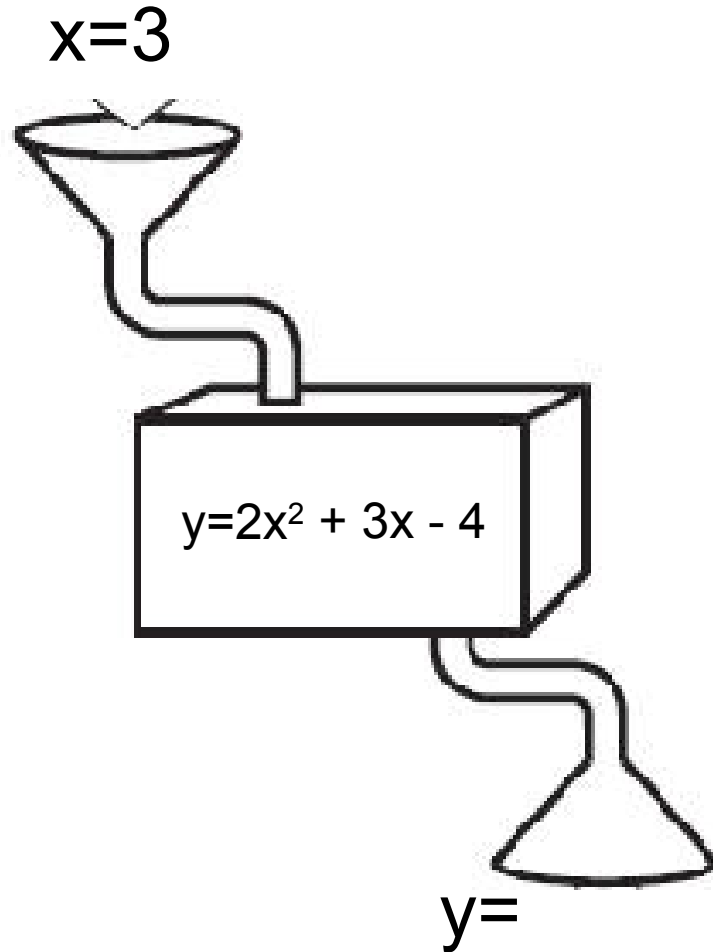
Function machine

Vocabulary word for page 3

Function. A mathematical equation where for every input there is one and only one output.. Leave some space



Function Notation: new symbols for input and output.



$$x=3$$

$$y = 2x^2 + 3x - 4$$

$$y = 2(3)^2 + 3(3) - 4$$

$$y = 2(9) + 9 - 4$$

$$y = 18 + 9 - 4$$

$$y = 23$$

$$x=12$$

$$f(x) = 4x$$

$$f(12) = 4(12)$$

$$f(12) = 48$$

Get this in your notes:

pg 9

$$f(x) = 3(x)$$

Get this in your notes:

$$f(x) = 3(x)$$

f is the name of the function and identifies the expression on the right $3(x)$.

Get this in your notes:

$$x =$$
$$f(x) = 3(x)$$

x is still the input of the function

Get this in your notes: $(10, 303)$

$$f(x) = 3(x)$$

$$f(x) =$$

input of 101

$$x = 101$$

$$f(x) = 3(x)$$

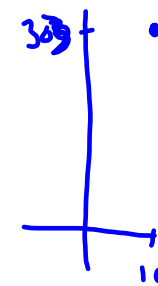
$$f(10) = 3(101)$$

$$f(10) = 303$$

which function

input

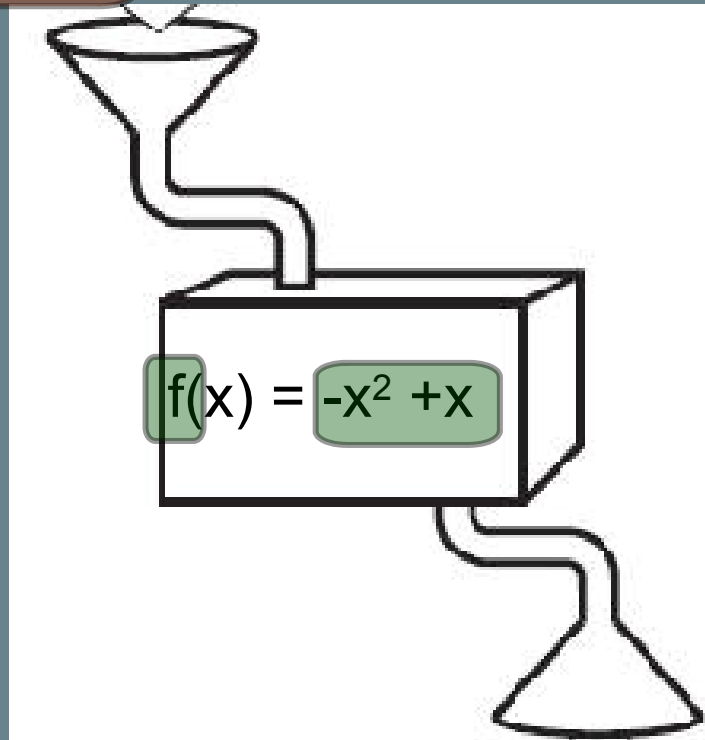
output



$F(x)$ is the output of the equation and is pronounced f of x.

Do this in the functions section. As you doing it be sure to think of the x value as an input, and the $f(x)$ value as an output.

$$x=6$$



x is the input

f is the expression

$$-x^2 + x$$

$f(x)$ is expression
calculated to an
output

$$f(6) =$$

using function notation

$$x=6 \rightarrow f(x) = -x^2 + x$$

$$f(6) = -6^2 + 6$$

$$= -(6)(6) + 6$$

$$= -36 + 6$$

$$f(6) = -30$$

$$-6^2$$

Find the corresponding outputs of:

$$h(7) = \boxed{56} \quad f(-3) = \boxed{} \quad g(62) = \boxed{} \quad f(6) = \boxed{} \quad g(-6) = \boxed{}$$

$$f(x) = |x - 6|$$

$$g(x) = \sqrt{x + 2}$$

$$h(x) = x^2 + x$$

$$h(7) =$$

$$h(x) = x^2 + x$$

$$h(7) = 7^2 + 7$$

$$h(7) = 49 + 7$$

$$\boxed{h(7) = 56}$$

...

a These are in your book page 26

a. $x = -3$

$$f(x) = -2x + 4$$

$f(x) = ?$

b. $x = -2$

$$f(x) = \sqrt{x+3}$$

$f(x) = ?$

c. $x = 5$

$$f(x) = x^3$$

$f(x) = ?$

d. $x = -2$

$$f(x) = \sqrt{x} + 1$$

$f(x) = ?$

e. $x = 2$

$$f(x) = \frac{x+3}{2x-5}$$

$f(x) = ?$

f. $x = ?$

$$f(x) = x^2 - 1$$

$f(x) = 99$

g. $x = ?$

$$f(x) = |x|$$

$f(x) = -3$

h. $x = -4$

$$f(x) = |x-2|$$

$f(x) = ?$

i. $x = -4$

$$f(x) = |x| - 2$$

$f(x) = ?$

Name

Per #

Kuhn

Alg 1 Sem 1 Pretest

- ① show work
answer
- ② show work
answer

Please do your best, there may be things you have not seen before, don't worry. We will use this to show growth in things you need to learn this year at a conference with your guardians

In diamond problem section.

1. Simplify $(5 - -5)$

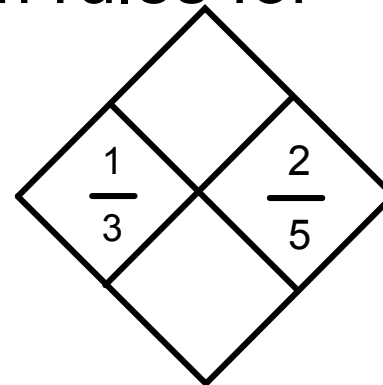
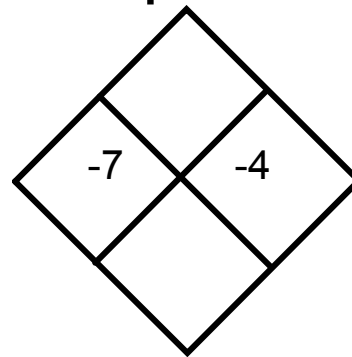
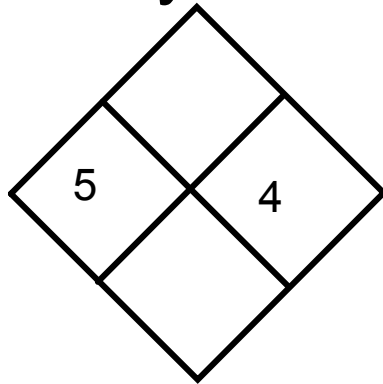
2. Simplify $3|7 - -2|$

3. Simplify $3\sqrt{8 - -17}$

4. Evaluate $2x^2 - 4x + 7$ when $x = -5$

5 plot the points $(3,5)$ and $(-3,-5)$

6. use your diamond problem rules for



In diamond problem section.

1. Simplify $(5 - -5) = 5 + 5 = 10$

2. Simplify $3|7 - -2| = 3|7 + 2| = 3|9| = 3(9) = 27$

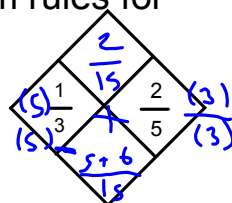
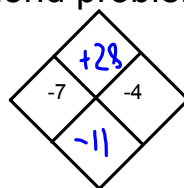
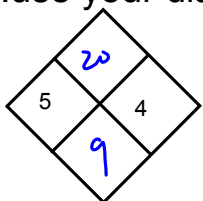
3. Simplify $3\sqrt{8 - -17} = 3\sqrt{8 + 17} = 3\sqrt{25} = 3(5) = 15$

4. Evaluate $2x^2 - 4x + 7$ when $x = -5$

$2(-5)^2 - 4(-5) + 7 = 2(25) + 20 + 7 = 77$

5 plot the points $(3,5)$ and $(-3,-5)$

6. use your diamond problem rules for \cdot



Top $\frac{1}{3} \times \frac{2}{5} = \frac{2}{15}$

Bottom Add $\frac{1}{3} + \frac{2}{5}$

$\frac{1}{3}$ $\frac{2}{6}$ $\frac{3}{9}$ $\frac{4}{12}$ $\frac{5}{15}$ $\frac{6}{15}$ $\frac{4}{10}$

$\frac{5 \cdot 1}{5 \cdot 3} + \frac{2 \cdot 3}{5 \cdot 3} = \frac{5+6}{15} = \frac{11}{15}$

$\frac{5+6}{15} = \frac{11}{15}$

recall that in

the equation was

$5y = 40$

Create the equations and complete the following diamond problems

Test Tomorrow

1)

2)

1. Write the equations

$y = \frac{1}{24}$ $y = \frac{3}{7}$

$y = \frac{1}{7}$

Solve the equations

$y = \frac{1}{24} \rightarrow y = \frac{1}{24} \cdot \frac{8}{3} = \frac{8}{72} = \frac{1}{9}$

$\frac{2}{7} + y = \frac{6}{14}$
 $+ y = \frac{3}{7} - \frac{2}{7}$
 $y = \frac{1}{7}$

Find the bottom

find the top

$\frac{3}{8} + \frac{1}{9}$ Keshwa

$(\frac{9}{9}) \frac{3}{8} + \frac{1}{9} (\frac{8}{8})$ common denominator

$\frac{27}{72} + \frac{8}{72}$

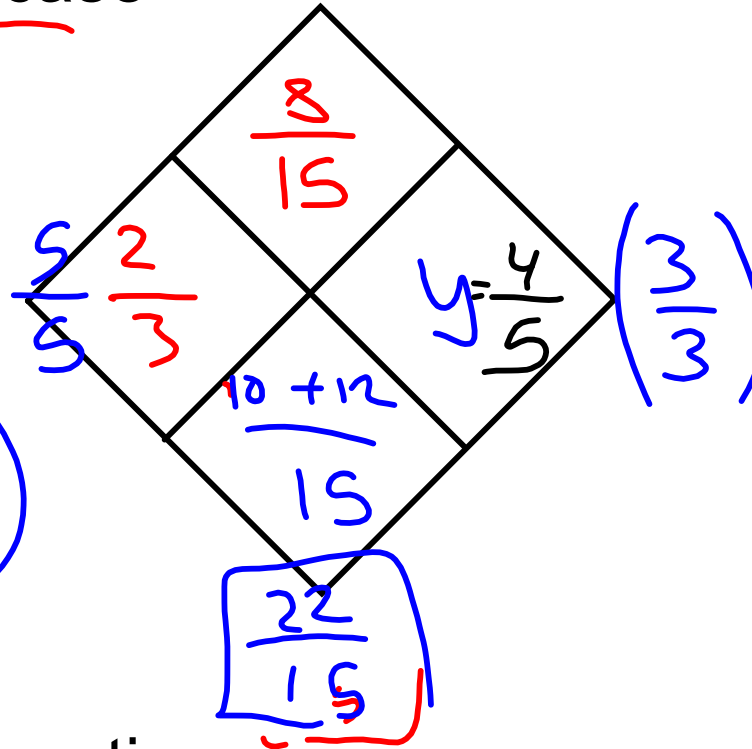
$\frac{35}{72}$ Bottom

$\frac{2}{7} \times \frac{1}{7} = \frac{2}{49}$ top

Special case

show eq

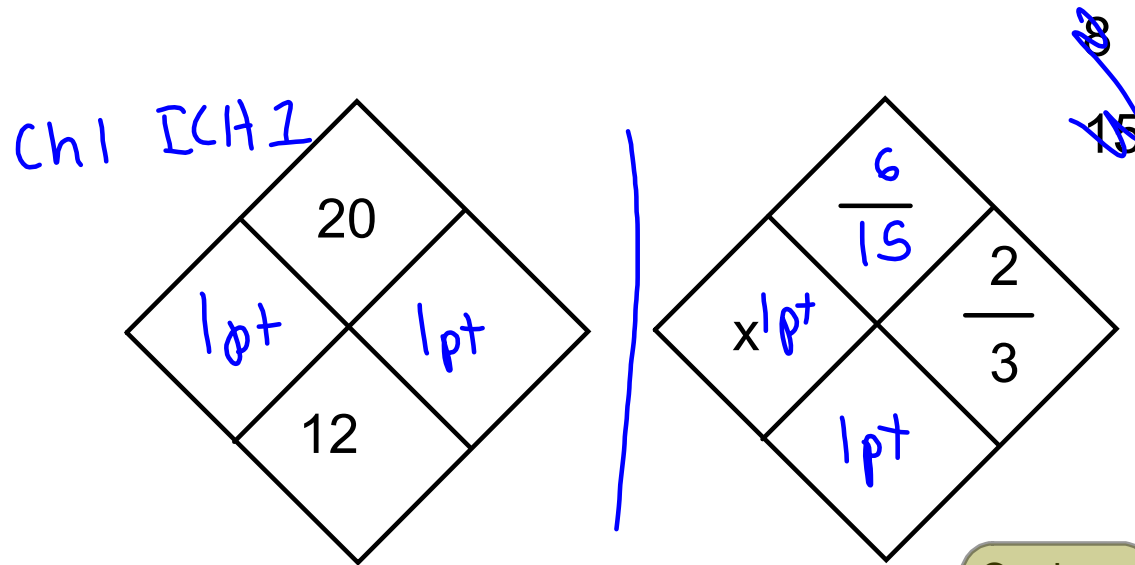
$$\frac{2}{3} \left(\frac{5}{5} \right) \frac{8}{5}$$



Write the equation



Homework quiz one. Put your name and period on the piece of paper provided and complete the diamond problems



Equation 1pt

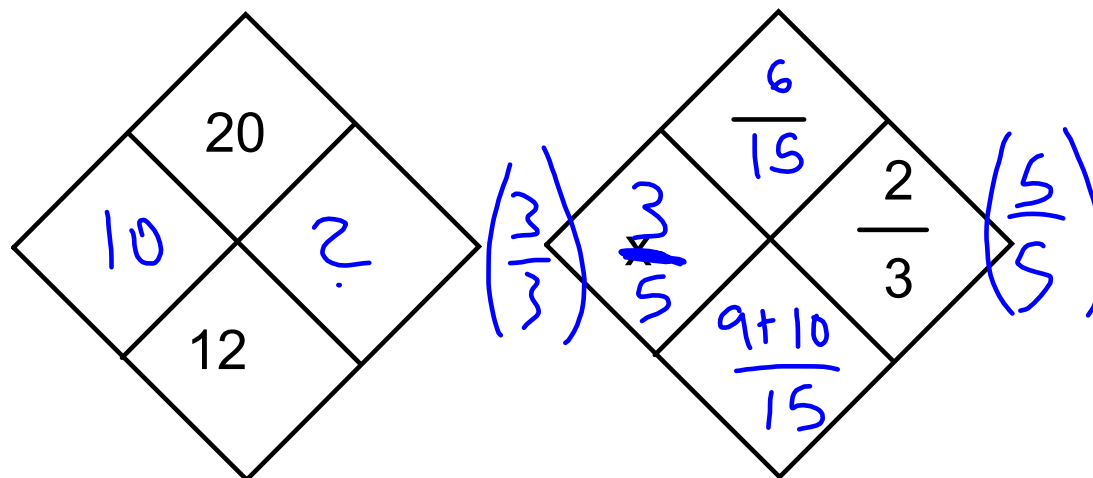
Canceling 1pt

Invert and mult 1pt

Common denominator
1pt

Or show
use of
short cut
for points

Homework quiz one. Answers

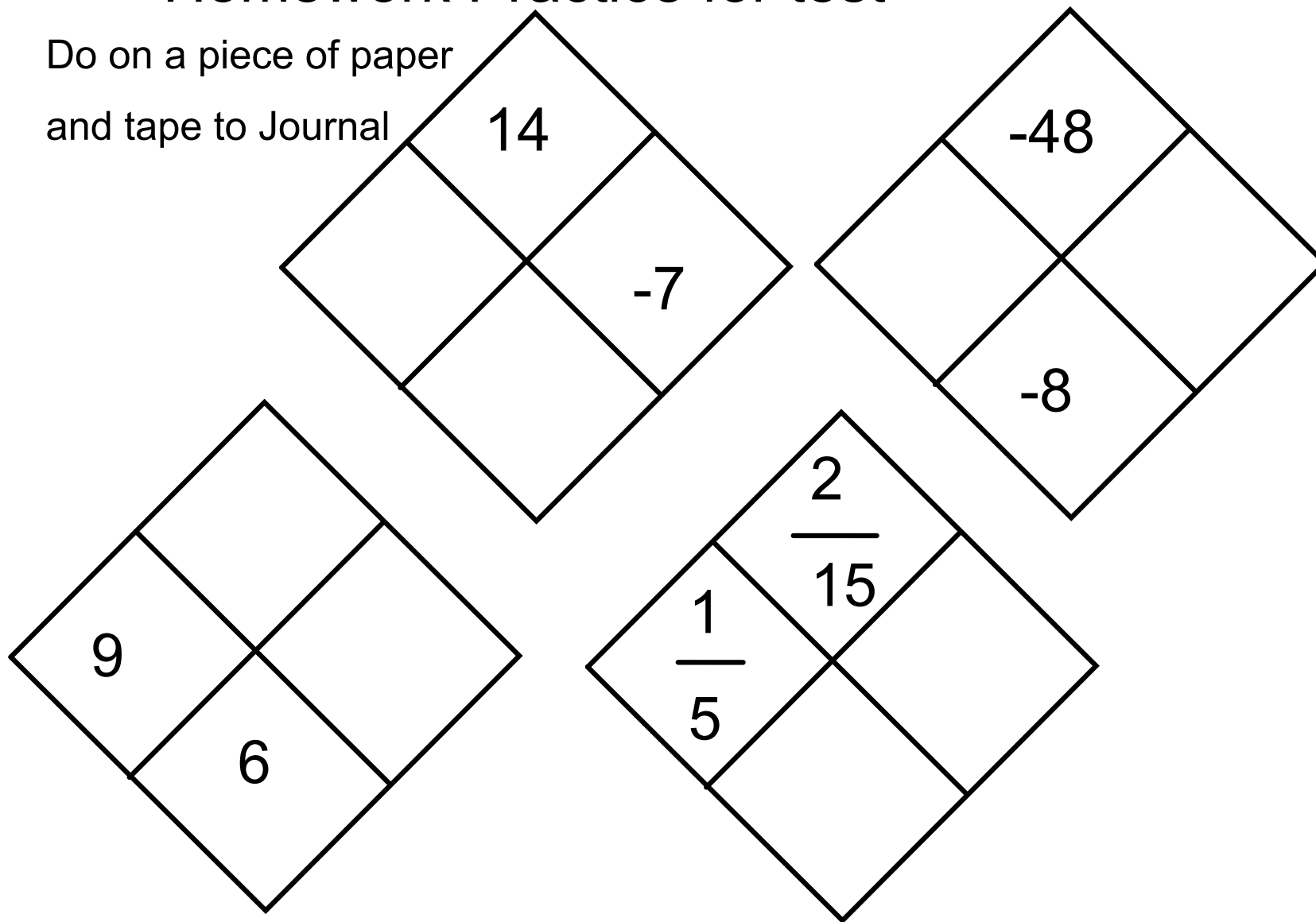


$$x \frac{2}{3} = \frac{6}{15}$$

$$\left(\frac{3}{5}\right)\left(\frac{2}{3}\right) = \frac{6}{15} \Rightarrow x = \frac{3}{5}$$

Homework Practice for test

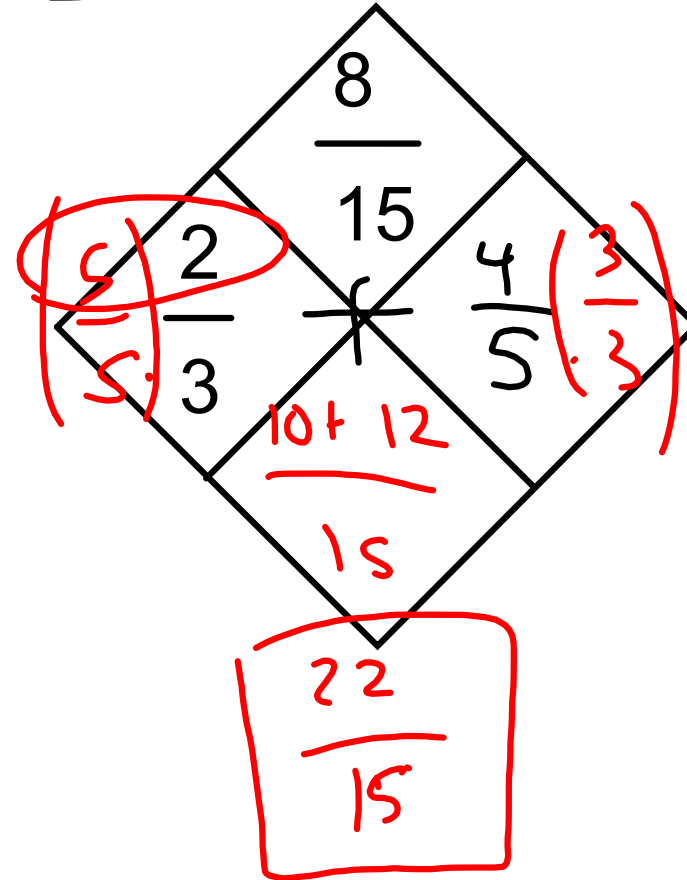
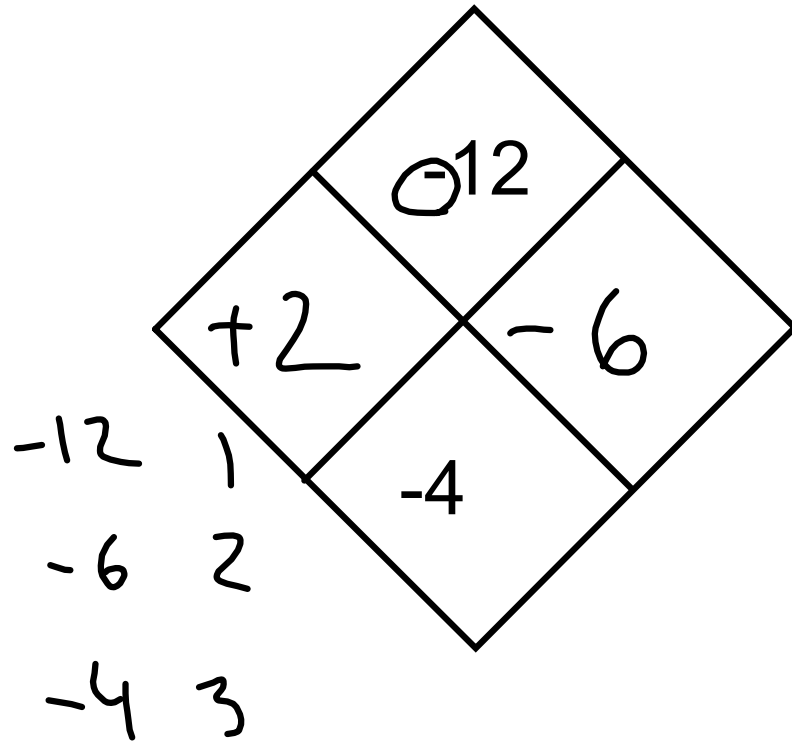
Do on a piece of paper
and tape to Journal

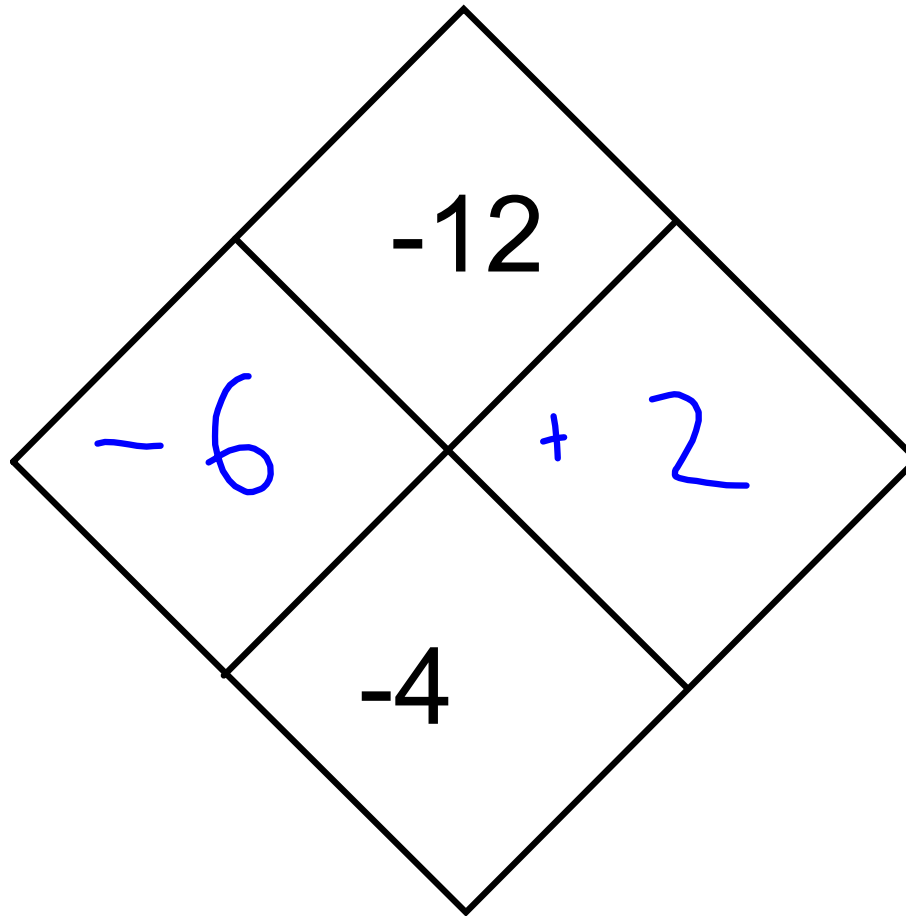


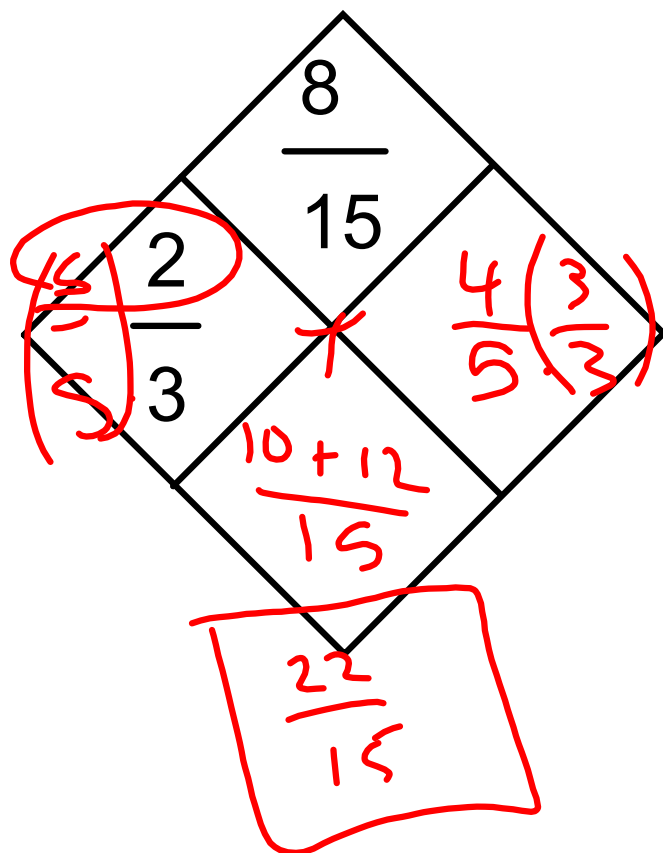
Diamond problems

Put this warm up in the Diamond problem section.

$$\frac{2}{3}y = \frac{8}{15}$$





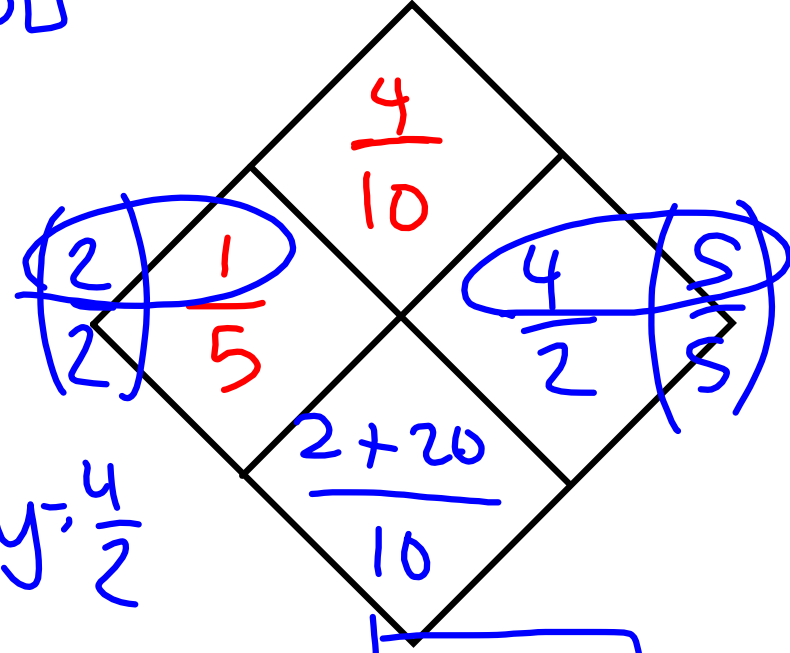
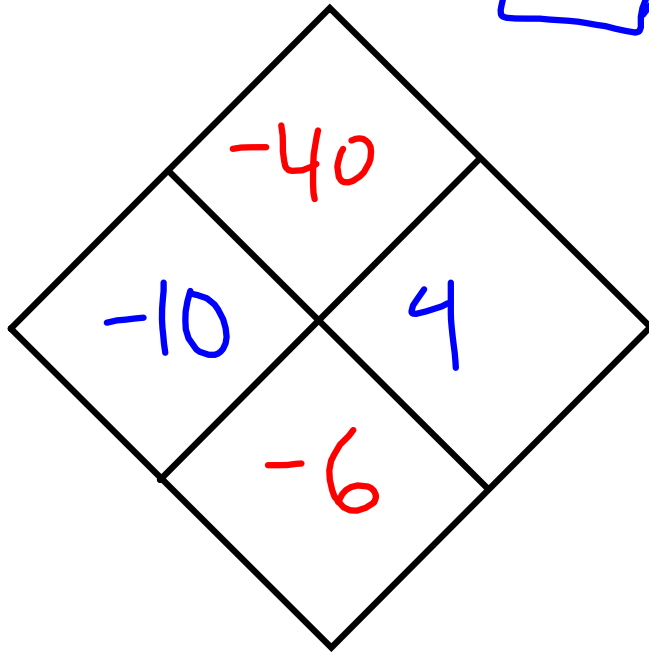


Equation is

$$\frac{2}{3} x = \frac{8}{15}$$

$$x = \left(\frac{4}{5} \right)$$

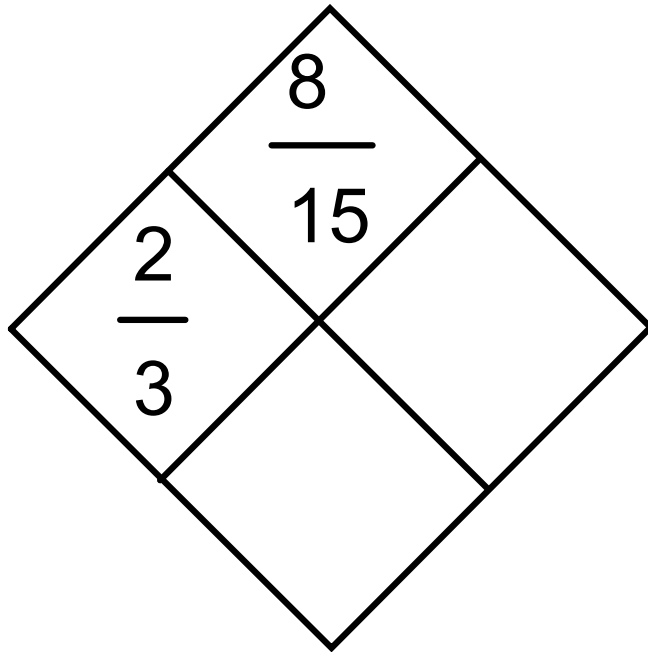
LAST Chance



$$y = \frac{4}{2}$$

$$\frac{1}{5}y = \frac{4}{10}$$

$$\frac{22}{10} = \frac{11}{5}$$

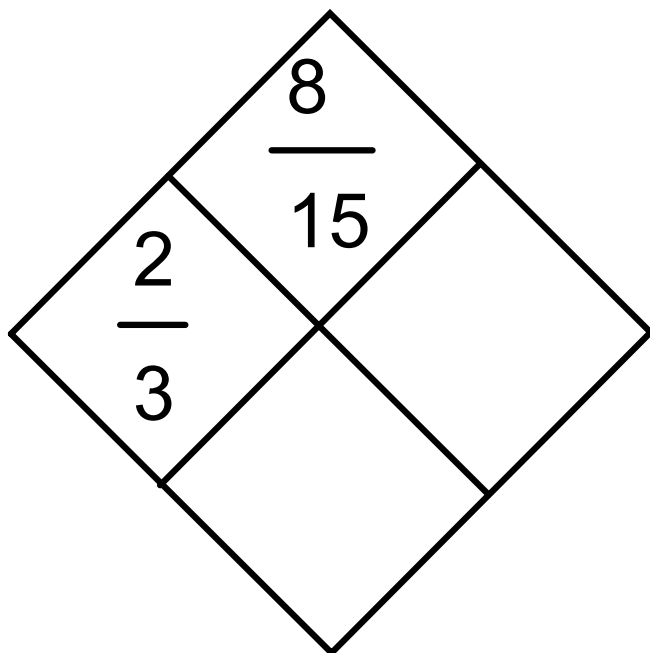


Equation is

$$\frac{2}{3} \times = \frac{8}{15}$$

$$\frac{2}{3} \quad \frac{2}{3}$$

Divide both
sides by $\frac{2}{3}$



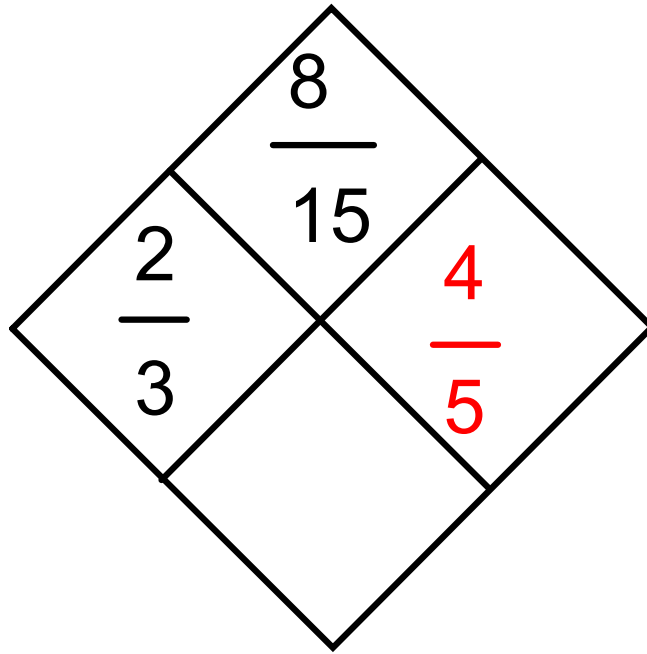
Equation is

$$\frac{\cancel{2}}{\cancel{3}} \times = \frac{8}{15}$$

$$\frac{\cancel{2}}{\cancel{3}}$$

Divide both
sides by $\frac{2}{3}$

Cancel



Equation is

$$\frac{2}{3}x = \frac{8}{15}$$

$$\frac{2}{3} \quad \frac{2}{3}$$

Divide both sides by $\frac{2}{3}$

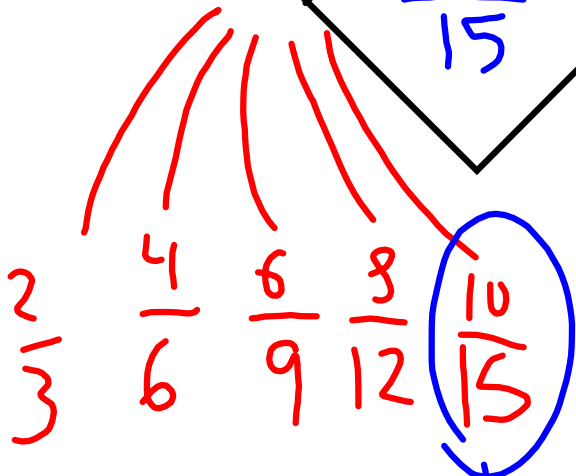
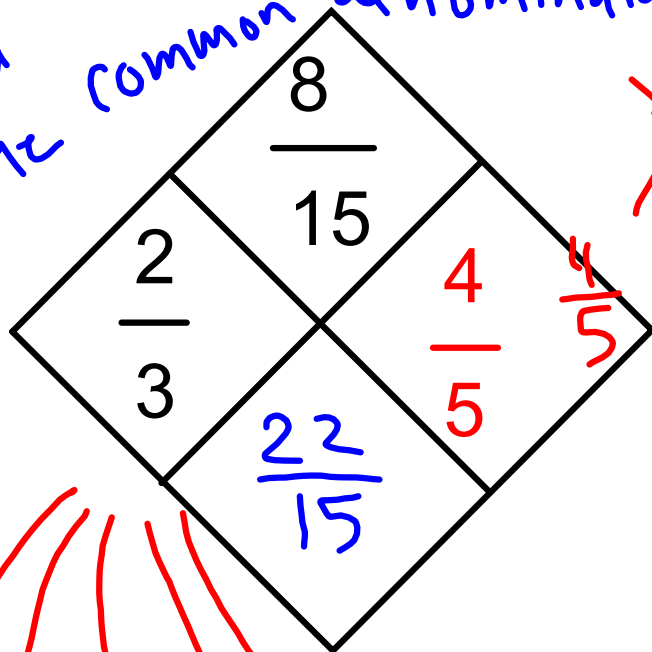
Cancel

$$x = \left(\frac{8}{15}\right)\left(\frac{3}{2}\right)$$

rewrite the problem showing invert and multiply

$$x = \frac{24}{30} \text{ or } \frac{4}{5}$$

Find the common denominator



$$\frac{10+12}{15} = \frac{22}{15}$$

Equation is

~~$$\frac{2}{3} x = \frac{8}{15}$$~~

Divide both sides by $\frac{2}{3}$

Cancel

$$x = \left(\frac{8}{15}\right) \left(\frac{3}{2}\right)$$

rewrite the problem showing invert and multiply

$$x = \frac{24}{30} \text{ or } \frac{4}{5}$$

Put a new section in your ch1 table of contents called : Solving equations pg 11-12

1) Combine like terms

$$3x - 5x - 8y - 3y$$

2) Distribute $4(3x - 2y)$

Solve and verify

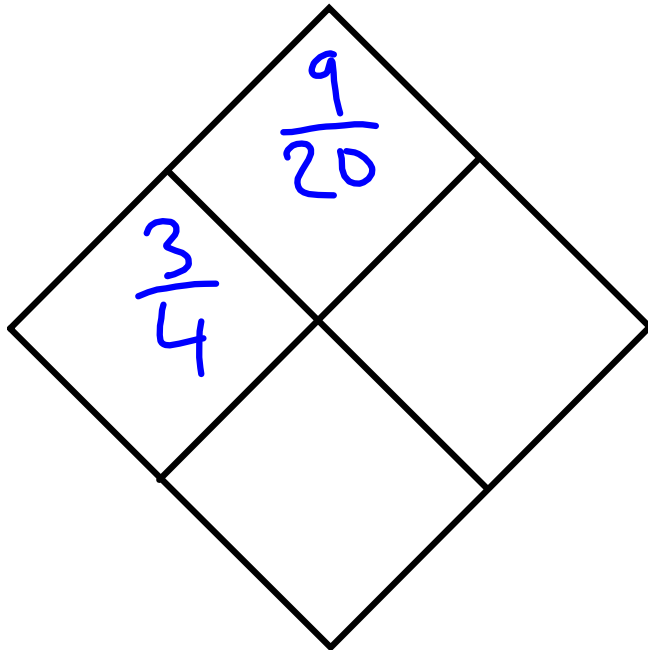
$$3) x - 3 = 12$$

$$4) -3x = 39$$

$$5) x = 3 + 27$$

$$6) \frac{x}{-12} = 4$$

- 1) Put your name on the test.
- 2) change the last diamond to:



3)

~~When done, put test in box at the back of teh class, find piece of paper with your name and glue to journal and return to seat to try and finish problems on the board.~~

Another way to ask the question is

$$h(g(-3))$$

$$g(x) = |x^3|$$

$$g(-3) = |(-3)^3|$$

$$|-27|$$

$$\underline{27}$$

$$\underline{g(-3)} = \underline{27}$$

$$h(x) = \sqrt{x+9}$$

$$h(27) = \sqrt{27+9}$$

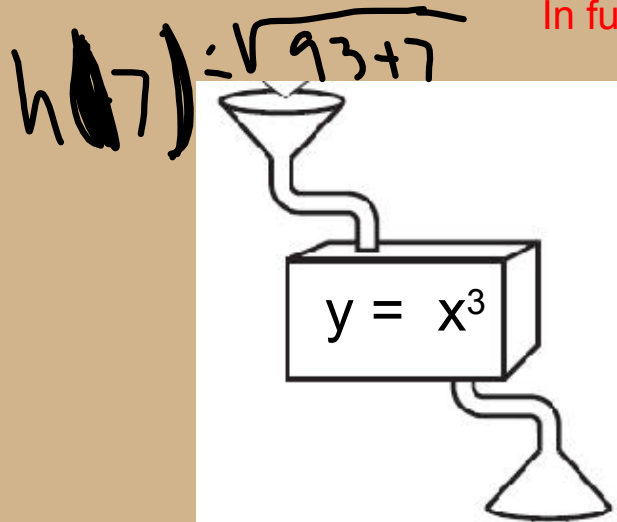
$$h(27) = \sqrt{36}$$

$$h(27) = 6$$

Thank you for putting
away your phones
and head phones

Warm up to help with Fridays test.

In function section of journal

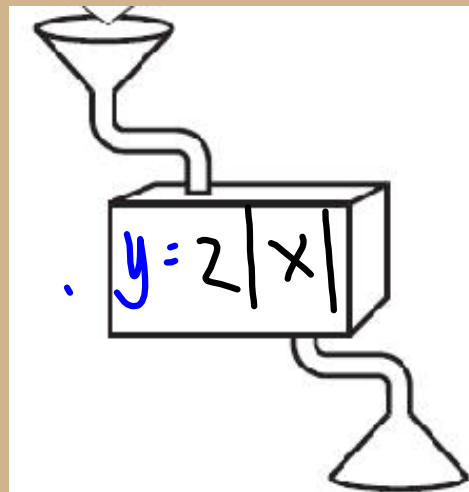


1) the input of the top machine is $x = -3$, if the top machine has an output that goes into the lower machine, what will the lower machines output be.

$h(x) = \sqrt{93+x}$

$g(x) = x + 9$

$g(12) = 12 + 9$



$g(12) = 21$

2) What is $g(12) = 21$

3) what is $h(7) = 10$

$$w(x) = x^2 - x + 2$$

$$w(-5) = (-5)^2 - (-5) + 2$$

$$= (-5)(-5) + 5 + 2$$

$$n(x) = |x - 23|$$

$$n(20) = |20 - 23| = |-3|$$

$$L(x) = 3\sqrt{100 - x}$$

$$L(64) = 3\sqrt{100 - 64}$$

$$3\sqrt{36}$$

$$3 \cdot 6$$

$$L(64) = \boxed{18}$$

$$n(20) = \boxed{3}$$

$$w(-5) = \boxed{32}$$

function input output

In solving equation section of Journal

With complicated equations you have to remind yourself that each side is an expression that should be simplified as much as possible before you try and solve the equation.

Simplify both sides of these equations before solving

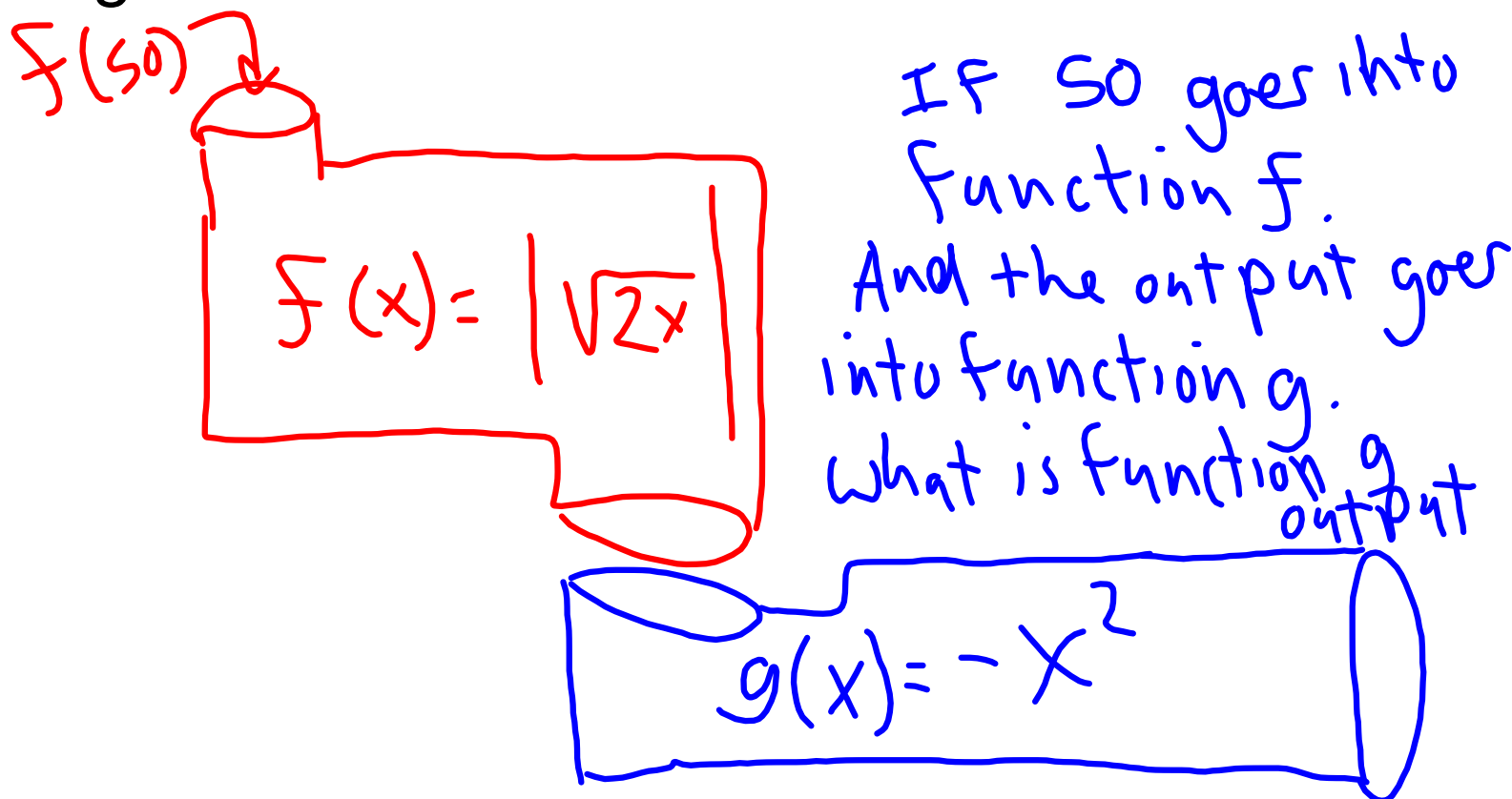
Combining like terms

Verify

$$1) \quad 3x + 2x = 10 + 15$$

$$2) \quad -3x + 6x = 2(-3)^2 + 2\sqrt{9}$$

Homework problem: Do this on a piece of paper and tape it to your notebook in the function section. Copy and do at home or get it from edmodo later.



Function machine

*Thank you for putting away
your phone and head phones*

Get this in your notes

Some equations require the combining of like terms *★ ultimate notes for next Tues.*

$$\underline{2x + 4x} - \underline{12 - 6} = -2x + \underline{10 - 4} \quad \text{Combine like terms}$$

Get this in your notes

Some equations require the combining of like terms

$$\begin{array}{l}
 \underline{2x + 4x} - \underline{12 - 6} = -2x + \underline{10 - 4} \\
 6x - 18 = -2x + 6 \\
 \text{Combine like terms} \\
 \underline{+2x} \quad \quad \quad \underline{+2x} \\
 \hline
 8x - 18 = 6 \\
 \text{Add the opposite of a value to move it to the other side of the equation} \\
 \quad \quad \quad \underline{+18} \quad \quad \quad \underline{+18} \\
 \hline
 8x = 24 \\
 \text{Solve as a one step eq}
 \end{array}$$

1) Solve the following equations

$$8x + 1 = -x - 1$$

$$-4x - 3 = 3x - 4 - 7x$$

$$4 - 5x = 1 + 6x$$

$$7 - x + 3 = 9x + 10$$

2) verify the solutions

1

Thank you for putting away your
electronic devices

Warm up in the equations section of your journal. Solve for x

$$3x - 5x = 10$$

$$5x + 7 + 2x = 42 - 7$$

$$12x + 3 = 4x - 21$$

$$2x + 3 + 4x = 3x + 27 + 6$$

Work on these as individuals, refer to last fridays notes. When time is up we will get into groups to go over work and then go over as a group

Warm up in the equations section of your journal. Solve for x

$$3x - 5x = 10$$

$$\frac{-2x}{-2} = \frac{10}{-2} \quad x = -5$$

$$5x + 7 + 2x = 42 - 7$$

$$\begin{array}{r} 7x + 7 = 35 \\ -7 \quad -7 \\ \hline 7x = 28 \end{array} \quad x = 4$$

$$\begin{array}{r} 7x + 7 = 35 \\ \hline 7x = 35 - 7 \\ 7x = 28 \end{array}$$

$$12x + 3 = 4x - 21$$

$$\begin{array}{r} 12x - 4x = -21 - 3 \\ 8x = -24 \end{array} \quad x = -3$$

Verify

$$2x + 3 + 4x = 3x + 27 + 6$$

$$\begin{array}{r} 2x + 4x - 3x = 27 + 6 - 3 \\ + 3x = 30 \\ + 3 \quad \div 3 \quad \boxed{x=10} \\ x=10 \\ 2(10) + 3 + 4(10) = 3(10) + 27 + 6 \\ 20 + 3 + 40 = 30 + 27 + 6 \\ \boxed{63 = 63} \end{array}$$

Name, period, as a reminder use number line

Now try this problem and self reflect on your growth in solving equation.

$$7x - 5 - 2x = -3x + 7 - 2x + 18$$

And Verify

Make a new section in your table of contents. This section will be quadratic equations and graphing which we will be testing on thursday. You may already have this section as quadratic functions, if thats the case just add the word graphs.

At the beginning of the year we created some data with tile for a hottub, an infectuos disease, and how long it took for you to sign your signiture.

In the quadratic and graphing section i would like you to make graphs for the 3 tables of data. If you can't find your data you can use the following tables.

A handwritten signature in black ink, appearing to be a stylized 'S' or 'N'.

Sep 29-7:30 AM

Work on these as individually, refer to last Fridays notes. When time is up we will get into groups to go over work and then go over as a class



away
Thank you
for
your
phones
putting

Sep 29-4:51 PM

Warm up

solve for x as you did in your notes. Make sure to verify

$$-4x + 2 - 6x = 5x - 8 - 20$$

What is y when x = 4 in the following

$$y = -5x^2 - 5x + 5$$

Circle the Error and $5x + 2x - 3 = 11$

explain what should $7x - 3 = 11$

have happened $7x = 8$

$$x = \frac{8}{7}$$

Warm up

solve for x as you did in your notes. Make sure to verify

$$\begin{array}{r} -4x + 2 - 6x = 5x - 8 - 20 \quad \text{CLT (Number Line)} \\ \hline 10x + 2 = 5x - 28 \\ +10x \quad +10x \\ \hline 2 = 15x - 28 \\ 28 \quad +28 \\ \hline 30 = 15x \quad \boxed{x=2} \\ 15 \quad 15 \end{array}$$

$$\boxed{18=18}$$

What is y when $x=4$ and what is y if $x=-3$ in the following

$$y = -5x^2 - 5x + 5$$

$$\begin{array}{ll} y = -5(4)^2 - 5(4) + 5 & y = -5(-3)^2 - 5(-3) + 5 \\ -5(16) - 5(4) + 5 & = -5(9) + 15 + 5 \\ -80 - 20 + 5 & = -45 + 15 + 5 \\ \boxed{y = -95} & = -25 \\ (4, -95) & (-3, -25) \end{array}$$

In your journal make a graph of the function $y=2x^2 - 2x - 5$ for the domain of -2 to 3.

1. This means you will have to run the numbers from -2 to 3 through the given function to make a t-table.
2. Then you will have to graph the ordered pairs from the table in your journal. I would like this part of your journal to look very good for grading and conferences.

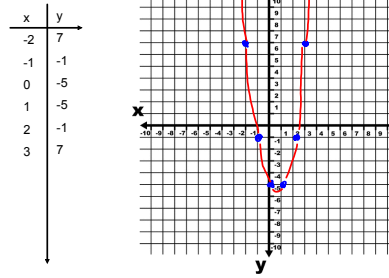
In your journal make a graph of the function $y=2x^2 - 2x - 5$ for the domain of -2 to 3.

1. This means you will have to run the numbers from -2 to 3 through the given function to make a t-table. (-2,7)

x	$y=2x^2 - 2x - 5$	y	ordered pair
-2	$2(-2)^2 - 2(-2) - 5$ $2(4) + 4 - 5$ $8 + 4 - 5$ $y = 7$	7	$(-2, 7)$
-1	$2(-1)^2 - 2(-1) - 5$ $2(1) + 2 - 5$ $2 + 2 - 5$ -1	-1	$(-1, -1)$
0	$2(0)^2 - 2(0) - 5$ $2(0) - 0 - 5$ $0 - 0 - 5$	-5	$(0, -5)$
1	$2(1)^2 - 2(1) - 5$ $2(1) - 2 - 5$ $2 - 2 - 5$	-5	$(1, -5)$
2	$2(2)^2 - 2(2) - 5$ $8 - 4 - 5$	-1	$(2, -1)$
3			$(3, 7)$ By Reflection

2. Then you will have to graph the ordered pairs from the table in your journal. I would like this part of your journal to look very good for grading and conferences.

Graphing your results shows the parabolic shape of a quadratic



Warm up. Leave room to finish
table you started yesterday.
find y when $x=3$ and $x=-3$
 $y=2(x)^2-3x-4$

Warm up. Leave room to finish
table you started yesterday.

find y when $x=3$ and $x=-3$

$$y = 2(x)^2 - 3x - 4$$

x	$2(x)^2 - 3x - 4$	y	(x, y)
3	$2(3)^2 - 3(3) - 4$ $2(9) - 3(3) - 4$ $18 - 9 - 4$	5	(3, 5)
-3	$2(-3)^2 - 3(-3) - 4$ $2(9) - 3(-3) - 4$ $18 - (-9) - 4$ $18 + 9 - 4$ $27 - 4$	23	(-3, 23)