Name: KEY!

Hour: ______

Chapter 1:

Functions & Equations

"Do the best you can until you know better.
Then when you know better, do better." - Maya Angelou

Lesson 1-1: Translating Verbal Expressions

Vocabulary

Order of Operations:

Parenthesis

Exponents

Multiplication

Division

Addition

Subtraction

Operation Words:

+	−	×	÷	=
sum	take away	times	quotient	same
add (up)	less than*	product	divided by	equals
more (than)	decreased	of	per	is
increased	minus	per	distribute	(was, are)
plus	discount	multiply	split	
and	subtract	double	fraction	
combine	fewer (than)*	triple	disperse	
put together	withdraw		half, third, etc...	
gain	difference			
deposit	lose			
	remove			
	drop			
	separate			

Lesson 1-2: Identifying FUNctions

Vocabulary

Function: a correspondence between two sets such that each value of the first (independent) set corresponds to exactly one value of the second (dependent) set.

Example:

Each Student is mapped to their 3rd Hr teacher

Non-example:

Every teacher is mapped to their 3rd Hr student.

Domain: all of the possible values for the independent variable (x) ; INPUT

Range: all of the possible values for the dependent variable (y) ; OUTPUT

Types of Numbers: (from smallest set to largest set)

Natural Numbers: 1, 2, 3, 4, 5, ...

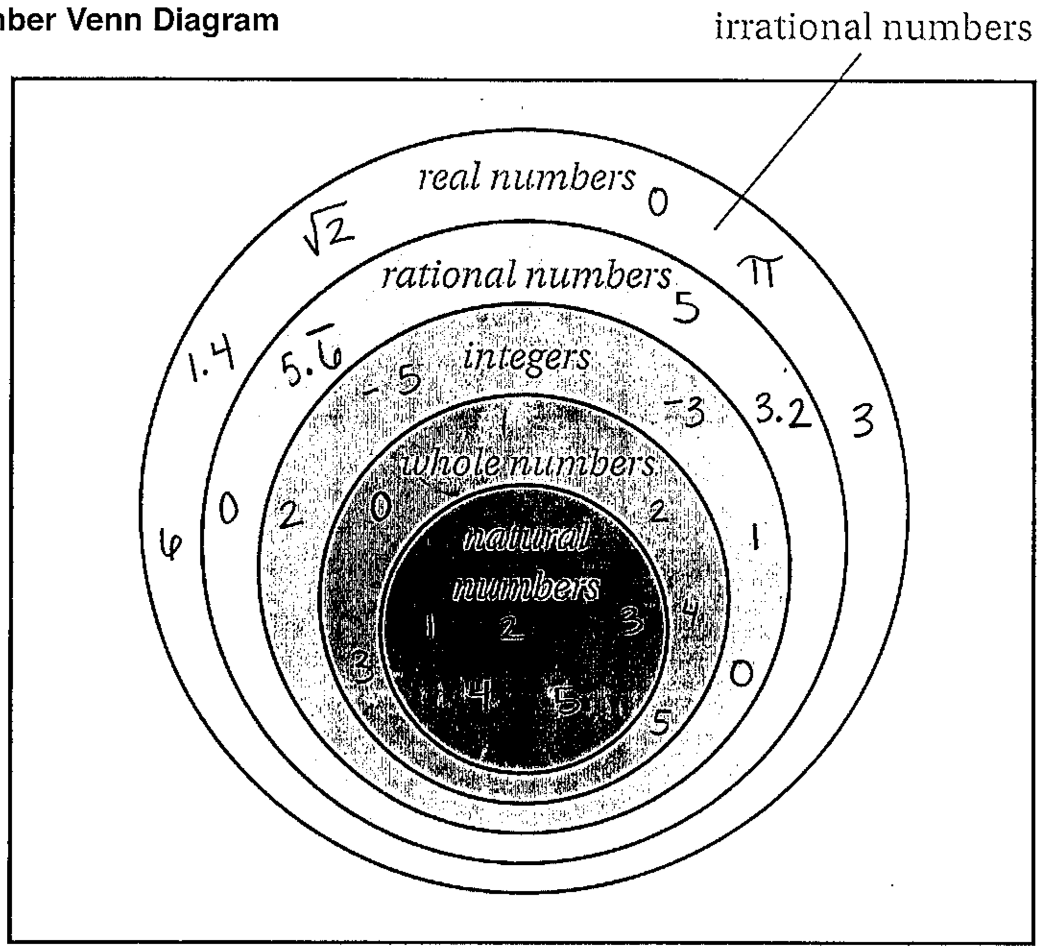
Whole Numbers: 0, 1, 2, 3, 4, 5, ...

Integers: ..., -3, -2, -1, 0, 1, 2, 3, ...

Rational Numbers: any # that can be written as a fraction (whole #'s, negative #'s, terminating/repea decimal

Real Numbers: any # that can be written as a decimal (ALL #'s, except "imaginary numbers")

Real Number Venn Diagram



Practice

1. The table shows a relation between the year Y and percent P of public high schools in the United States with desktop computers available for student use.

Y	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
P	42.7	57.8	86.1	94.6	97.4	98.7	99.0	99.1	99.1	98.8	99.4

Is P a function of Y? Explain...

Yes, no Y values are paired w/ more than one P value

Give the domain and range.

Domain: 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991

Range: 42.7, 57.8, 86.1, 94.6, 97.4, 98.7, 99.0, 99.1, 99.1, 98.8, 99.4

2. Use the equation $y = x^2$ for the following.

A. Is it a function? Explain...

Yes, for each x (input) value there will only be one corresponding y value.

B. Identify the domain and range if it is a function. If not, write "not applicable."

D: all real #'s

R: all real #'s ≥ 2

3. Use the equation $y = \sqrt{x}$ for the following.

A. Is it a function? Explain...

No, every possible input has a positive & negative answer.

B. Identify the domain and range if it is a function. If not, write "not applicable."

Not applicable.

4. Use the equation $y = \dfrac{25}{x^2 - 36}$ for the following.

A. Is it a function? Explain...

Yes, for each x value there is only one corresponding y value.

B. Identify the domain and range if it is a function. If not, write "not applicable."

D: all real #'s except 6 & -6

R: all real #'s except 0.

Lesson 1-3: FUNction Notation

Vocabulary

f(x): "f of x" or "the function of x"

*Note: the parentheses do NOT mean multiplication!

This notation was created by a Swiss mathematician by the name of Leonhard Euler. He lived from 1707 to 1783 and wrote some of the most influential algebra books of all time!

T(x) = x is read as "T of x equals x"

B(x) = $\frac{x^2}{20}$ is read as "B of x equals $x^2/20$"

Practice

1. Use the function B(x) = $\frac{x^2}{20}$ for the following:

   A. Evaluate B(45). ← plug 45 in for x!

   $$\frac{(45)^2}{20} = \boxed{101.25}$$

   B. Evaluate B(-10).

   $$\frac{(-10)^2}{20} = \boxed{5}$$

2. If f(x) = $\frac{24+x}{2x^2}$, evaluate each of the following:

   A. f(4) $\frac{24+(4)}{2(4)^2} = \boxed{.875}$

   B. f(-8) $\frac{24+(-8)}{2(-8)^2} = \boxed{.125}$

   C. f(z) $\boxed{\frac{24+(z)}{2(z)^2}}$

   D. f(3z) $\frac{24+(3z)}{2(3z)^2} = \frac{24+3z}{2\cdot 9\cdot z^2} = \boxed{\frac{24+3z}{18z^2}}$

Lesson 1-4: Graphs of FUNctions

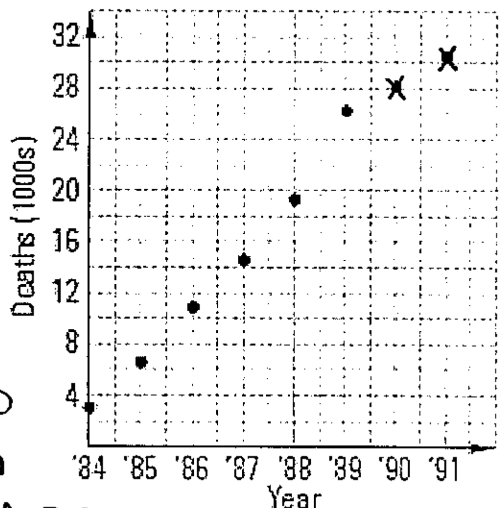
Vocabulary

Function: a relation in which no two different ordered pairs have the same first coordinate.

Vertical Line Test (VLT): NO vertical line intersects the graph of a function in more than one point.

Practice

1. The graph gives the numbers of deaths due to AIDS from 1984 to 1991 in the U.S.



A. Estimate D(1988).

≈ 19,000 deaths

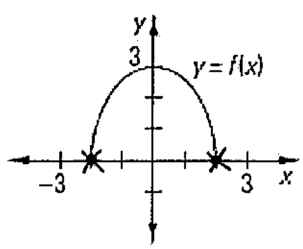
B. Estimate D(1991) - D(1990) and write a sentence that describes what this result means.

31 − 28 = 3,000

3,000 more people died in 1991 than 1990 from AIDS.

In #2 & 3 a function is graphed.

2.

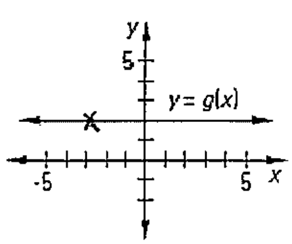


a. Give the range. (y's) 0 to 3

b. Give the domain. (x's) -2 to 2

c. For what values of x is f(x) = 0? -2 & 2

3.



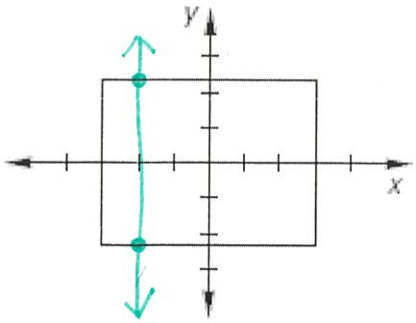
a. Give the range. (y's) 2

b. Give the domain. (x's) all real #'s

c. Find g(-3). 2

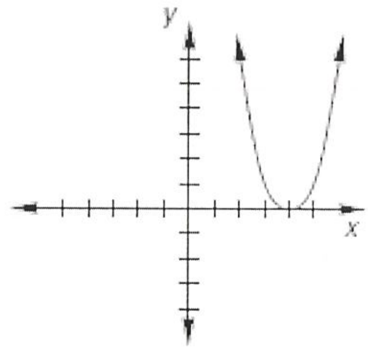
Determine whether or not the graph represents a function. Explain...

4.



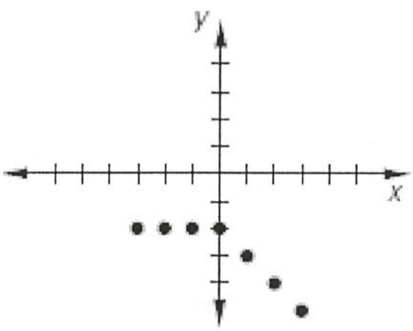
No, does not pass VLT

5.



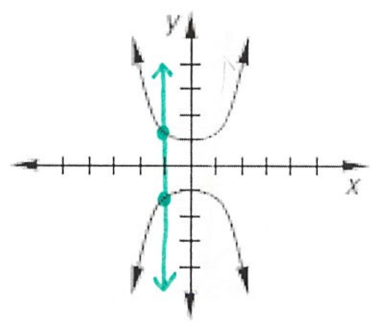
Yes, passes VLT

6.



Yes, passes VLT

7.



No, doesn't pass VLT

Lesson 1-5: Solving Equations

1. If there are parentheses, distribute!
2. If there are "like terms" on the left side, combine! If there are "like terms" on the right side, combine!
3. If there are "like terms" on opposite sides, move one over to combine! (Any time you are moving to the other side, remember to "un-do" the operation)
4. Get your variable all alone, using reverse PEMDAS!

Practice

1. $5t - \cancel{8} = -28$

$+\cancel{8} \quad +8$

$\frac{\cancel{5}t}{\cancel{5}} = \frac{-20}{5}$

$\boxed{t = -4}$

2. $3(c - 2) = 15$

$3c - \cancel{6} = 15$

$+\cancel{6} \quad +6$

$\frac{\cancel{3}c}{\cancel{3}} = \frac{21}{3}$

$\boxed{c = 7}$

3. $\frac{m}{3} - 7 = -10$

$+7 \quad +7$

$\cancel{3} \cdot \frac{m}{\cancel{3}} = -3 \cdot 3$

$\boxed{m = -9}$

4. $20c \cdot 40 = \frac{10}{\cancel{20c}} \cdot \cancel{20c}$

$\frac{800c}{800} = \frac{10}{800}$

$\boxed{c = .0125}$

5. $0.4(k - 20) - 0.2k = 36$

$0.4k - 8 - 0.2k = 36$

$0.2k - \cancel{8} = 36$

$+\cancel{8} \quad +8$

$\frac{0.2k}{0.2} = \frac{44}{0.2}$

$\boxed{k = 220}$

6. $7y + 3 = \cancel{4y} - 18$

$-4y \quad -\cancel{4y}$

$3y + \cancel{3} = -18$

$-\cancel{3} \quad -3$

$\frac{\cancel{3}y}{\cancel{3}} = \frac{-21}{3}$

$\boxed{y = -7}$

7. $3(x + 2) = -5 - 2(x - 3)$

$3x + 6 = -5 - 2x + 6$

$3x + 6 = 1 - \cancel{2x}$

$+2x \quad +\cancel{2x}$

$5x + \cancel{6} = 1$

$-\cancel{6} \quad -6$

$\frac{\cancel{5}x}{\cancel{5}} = \frac{-5}{5}$

$\boxed{x = -1}$

8. $\frac{1}{6}(12 - 6x) = 5(x + 4)$

$2 - \cancel{1x} = 5x + 20$

$+\cancel{1x} \quad +1x$

$2 = 6x + \cancel{20}$

$-20 \quad -\cancel{20}$

$\frac{-18}{6} = \frac{\cancel{6}x}{\cancel{6}}$

$\boxed{x = -3}$

Lesson 1-6: Solving for a Variable

Vocabulary

To "solve for a variable," means you should isolate the given variable.

"isolate" means to get the variable alone - it's just like equation solving!

Practice

1. Solve for x.

A. $3x + \cancel{1} = 25$

$\quad\;\; -\cancel{1} \;\; -1$

$\frac{\cancel{3}x}{\cancel{3}} = \frac{24}{3}$

$\boxed{x = 8}$

B. $3x + \cancel{y} = z$

$\quad\;\; -\cancel{y} \;\; -y$

$\frac{\cancel{3}x}{\cancel{3}} = \frac{z-y}{3}$

$\boxed{x = \frac{z-y}{3}}$

2. Pierre lives in New Orleans, where he measures temperature using the Fahrenheit scale. When he visited his cousin Rae in Montreal, Canada, he found that temperature was reported in degrees Celsius. Because Celsius temperature readings didn't mean much to him, Pierre converted temperatures in Celsius C to Fahrenheit F using this formula: F = 32 + 1.8C.

Rae visited Pierre the following summer. Rewrite the formula so she can use it to convert degrees Fahrenheit to Celsius.

$F = \cancel{32} + 1.8C$

$-32 \quad -\cancel{32}$

$\frac{F-32}{1.8} = \frac{\cancel{1.8}C}{\cancel{1.8}}$

$C = \frac{F-32}{1.8}$

3. Scuba divers use the formula $t = \dfrac{33v}{x+33}$ to determine the time t (in minutes) they can dive with a given volume v of air compressed into tanks (in cubic feet) to a depth of x feet below sea level. Rewrite the formula for v in terms of x and t.

$(x+33) \cdot t = \cancel{\frac{33v}{x+33} \cdot (x+33)}$

$(x+33) \cdot t = 33v$

$\frac{tx+33t}{33} = \frac{\cancel{33}v}{\cancel{33}}$

$V = \frac{tx}{33} + \frac{\cancel{33}t}{\cancel{33}}$

$\boxed{V = \frac{tx}{33} + t}$

4. Solve $A = \frac{1}{2}bh$ for b.

$$2 \cdot A = \cancel{\tfrac{1}{2}} \cdot b \cdot h \cdot \cancel{2}$$

$$\frac{2A}{h} = \frac{b \cdot \cancel{h}}{\cancel{h}} \qquad \boxed{b = \frac{2A}{h}}$$

5. Solve $L = \frac{2A}{z-x}$ for x.

$$(z-x) \cdot L = \frac{2A}{\cancel{z-x}} \cdot \cancel{(z-x)}$$

$$(z-x) \cdot L = 2A$$

$$\cancel{Lz} - Lx = 2A$$
$$\cancel{-Lz} \qquad\qquad -Lz$$

$$\frac{-\cancel{L}x}{-\cancel{L}} = \frac{2A}{-L} \frac{-\cancel{L}z}{-\cancel{L}}$$

$$\boxed{x = -\frac{2A}{L} + z}$$