Lesson 8-1

1/25/12 # Functions (p 395-399)

Independent Variable: a variable subject to choice in a function

Dependent Variable: a variable who's value depends on the independent variable's value

Example of a Function

input: Domain → output: Range

Domain	Range
1	$30
2	$60
3	$90
4	$120

* This is a function because each domain value is paired with exactly one range value.

Non-Example of a Function

Domain	Range
1	$30
	$60
3	$90
4	$120

*This is not a function because "1" in the domain is paired with two range values, "$30" and "$60."

ex: { (54,112) (56,130) (55,145) (54,123) (56,128) }

* This is not a function because "54" and "56" are paired with two range values each... "112 & 123" and "130 & 128."

54	112, 123
56	130, 128
55	145

ex:

X	4	7	6	3	5	2
Y	6	10	11	8	4	9

(x) Domain → (y) Range

4 → 6
7 → 10
6 → 11
3 → 8
5 → 4
2 → 9

* This is a function because each domain value is paired with exactly one range value.

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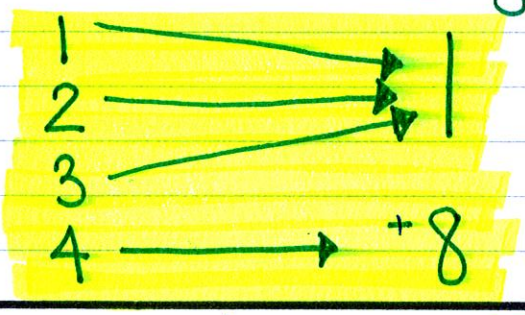
ex: Domain Range

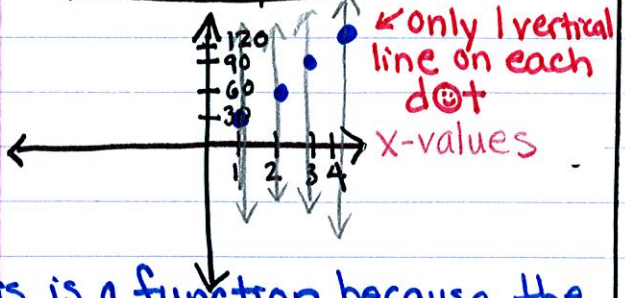


* This is a function... because each domain value is paired with exactly one range value.

Vertical Line Test: another way to determine whether a relation is a function.

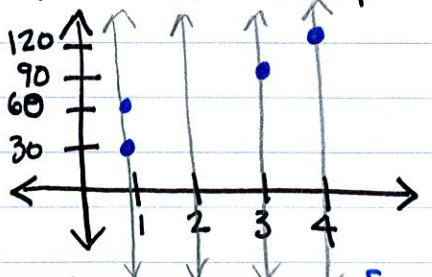
Test: If for each x-value (domain), a vertical line can pass through only one point on the graph, then it is a function.

Example



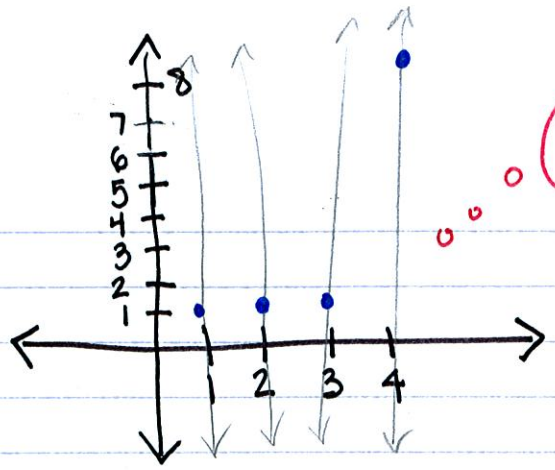
* This is a function because the vertical line test shows that it passes through only one point on the graph for each value of x.

Non-Example



* This is NOT a function because it does not pass the vertical line test. At least one x-value has more than one y-value.

ex:



Passes the vertical line test

Function Notation: a function that is written as an equation

Equation	vs.	Function Notation
$y = 2x + 3$		$f(x) = 2x + 3$
$x = 8$		$f(5)$
$y = 2(8) + 3$		$f(5) = 2(5) + 3$
$y = 16 + 3$		$f(5) = 10 + 3$
$y = 19$		$f(5) = 13$

ex: If $f(x) = 4x - 7$, find $f(2)$

$x = 2$ (11) So solve

Lesson 8-2

1/30/12 Sequences & Equations (p401-405)

Sequence: an ordered list of numbers

* Write an equation that describes each sequence:

ex1: 6, 7, 8, 9....

Term Number (n)	1	2	3	4	...20
TERM (T)	6	7	8	9	25

(+5 from each term number to its term; +1, +1 between terms)

$T = 1n + 5$

Each number in the sequence

What is the 20th TERM?

ex2: 4, 8, 12, 16...

Term (n) Number	1	2	3	4
TERM (T)	4	8	12	16

(×4 from each term number to its term; +4, +4 between terms)

$T = 4n + 0$

ex3: 7, 10, 13, 16...

Term Number (n)	1	2	3	4
Term (T)	7	10	13	16

(+4 from 1 to 7 — This is the constant. Decided after multiplying the coefficient by n)

(+3, +3, +3 between terms — This is the coefficient... determine first)

$T = 3n + 4$

ex 4: 46, 52, 58, 64...

Term (n) Number	1	2	3	4
Term (T)	46	52	58	64

+6 +6 +6

$T = 6n + 40$

* The increase from "term" to "term" gives me the coefficient for n.
* Then, multiply a term number by this coefficient to figure out the constant.

For example: 46 → 52 is +6 (the coefficient)

So, $+6 \cdot 1^{st}\ term = 6$
Thus, ? + 6 = 46... 40 + 6 = 46,
so 40 is the constant.

OR

So, $+6 \cdot 2^{nd}\ term = 12$
Thus, ? + 12 = 52... 40 + 12 = 52,
so 40 is the constant.

OR

So, $+6 \cdot 3^{rd}\ term = 18$
Thus, ? + 18 = 58.... 40 + 18 = 58.
So 40 is the constant.

OR

So, $+6 \cdot 4^{th}\ term = 24$
Thus, ? + 24 = 64... 40 + 18 = 64
So, 40 is the constant.

Lesson 8-4

1/31/12 Rate of Change (p412-417)

Rate of Change: a rate that describes how one quantity changes in relation to another

ex:

Time (h) (independent) x	Income ($) (dependent) y
8	$76
9	$85.50

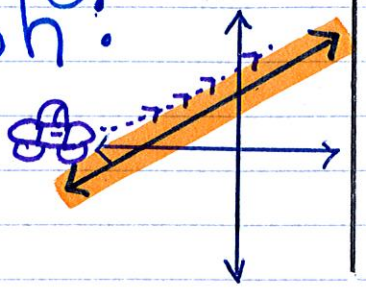
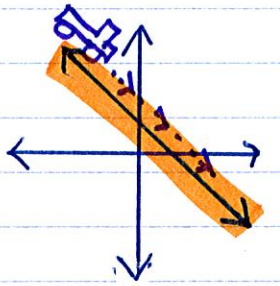
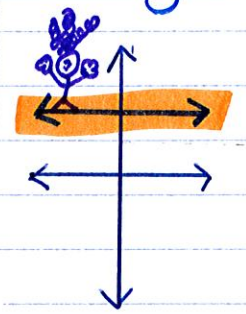
Find the rate of change:

$$\frac{\$85.50-76}{9-8} = \frac{\$9.50}{1\,h} =$$

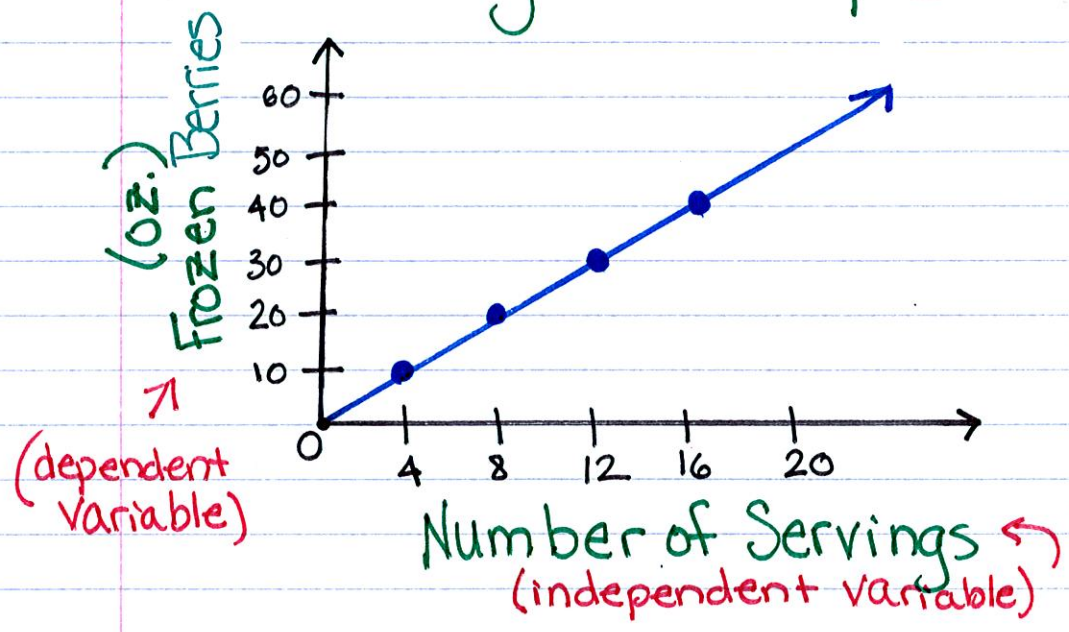
$9.50 per hour

FORMULA

$$\frac{\text{change of dependent variable}}{\text{change of independent variable}}$$

Rate of Change:	Positive	Negative	Zero
Real-life Meaning:	increase	decrease	No change
Graph:			

ex: Frozen Yogurt Recipe



$$\frac{\text{change in oz}}{\text{change in servings}}$$

$$\frac{10}{4} = 2\frac{1}{2}$$

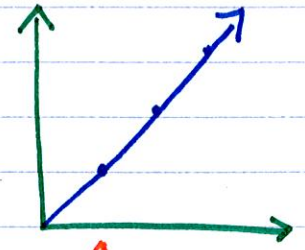
2.5 oz per serving

Lesson 8-5 (p418-424)

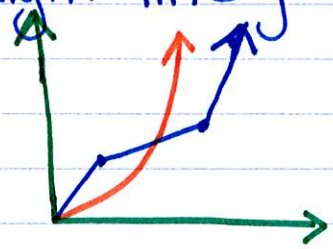
2/2/12 Constant Rate of Change & Direct Variation

Linear Relationship: a relationship that has a straight-line graph

ex:



non-ex:



Constant Rate of Change: In a linear relationship, the rates of change between any two data points are the same. (constant)

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ex:

Gallons (independent)	Quarts (dependent)
1	4
2	8
3	12
4	16

+1, +1, +1 (Gallons) ; +4, +4, +4 (Quarts)

$$\frac{\Delta y}{\Delta x} \begin{matrix}(dep)\\(indep)\end{matrix} = \frac{\text{Quarts}}{\text{Gallons}} = \frac{4}{1}$$

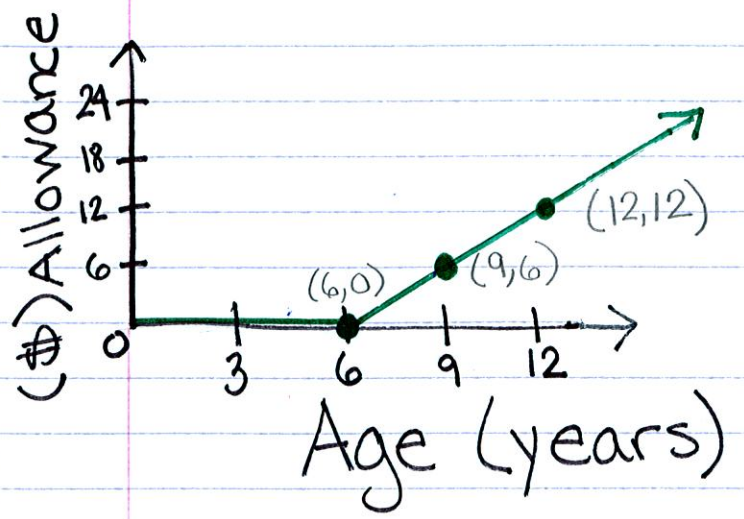
4 quarts per gallon

Interpret its meaning:
For every gallon, there are 4 quarts.

Direct Variation: When the ratio of two variables is constant, their relationship is a direct variation.

Yes! The ratio $\frac{\text{Quarts}}{\text{gallons}}$ is the same for pair of values.

ex: Allowance



$\frac{\Delta y}{\Delta x} = \frac{\$}{yrs} = \frac{6}{3} \overset{\div 3}{=} \frac{2}{1}$

$2 per year

Interpret: For every year, the allowance increases by $2.

No; the ratio $\frac{\text{allowance}}{\text{age}}$ is Not the same for every pair of values.