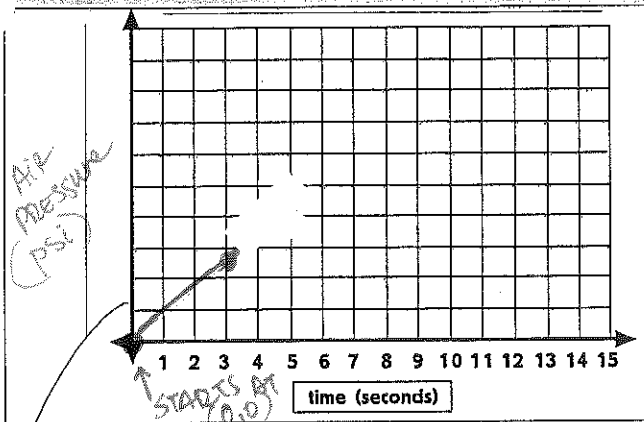
Algebra 1: Unit 5, lesson 1 Notes: Functions and relations

Part 1: graphingstories.com

Video 1: Air Pressure



In order to tell the story in the graph, what questions do you have to get answered?

* HOW MANY PUMPS INFLATED THE BALL?

Describe your process in creating the graph.

* AT WHAT TIMES DID HE DECOMPRESS THE AIR PUMP?

Based on the graph, identify three ordered pairs:

X			
Y			

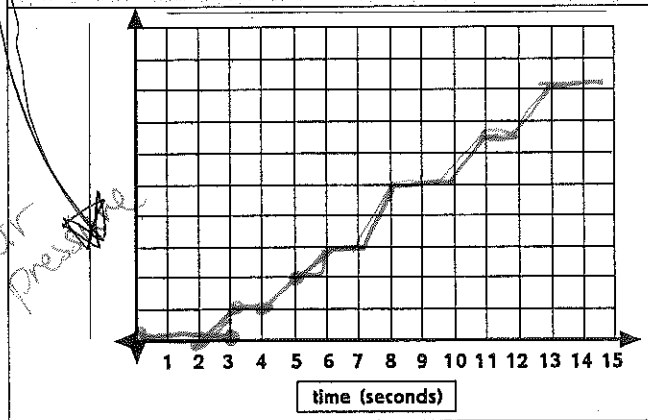
Identify the domain:

Identify the range:

What about this story makes it a function?

Identify:
Independent variable:
Dependent variable:

Video 2: Height of waist off ground



In order to tell the story in the graph, what questions do you have to get answered?

Describe your process in creating the graph.

Based on the graph, identify three ordered pairs:

X			
Y			

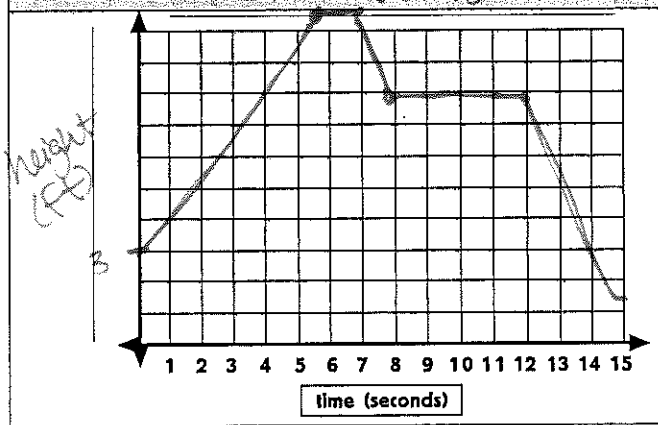
Identify the domain: {0-15 seconds}

Identify the range: {0-8 psi}

What about this story makes it a function?

Identify:
Independent variable: Time (seconds)
Dependent variable: AIR PRESSURE

Video 3: Water Volume WAIST



In order to tell the story in the graph, what questions do you have to get answered?

Describe your process in creating the graph.

Identify:
Independent variable: TIME (sec)
Dependent variable: HEIGHT (ft)

Based on the graph, identify three ordered pairs:

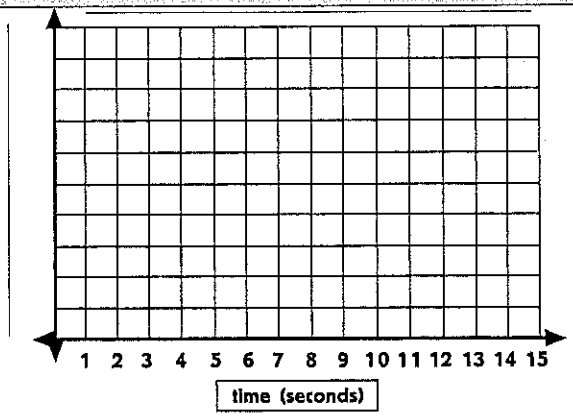
X			
Y			

Identify the domain: {0-15 sec}

Identify the range: {1.5-11 ft}

What about this story makes it a function?

Video 4: Distance from bench



In order to tell the story in the graph, what questions do you have to get answered?

Describe your process in creating the graph.

Identify:
Independent variable:
Dependent variable:

Based on the graph, identify three ordered pairs:

X			
Y			

Identify the domain:

Identify the range:

What about this story makes it a function?

Part 2

All four of these exercises are considered **functions.** Knowing this, predict some traits of functions.

2 • COMPARING 2 AMOUNTS

• EXAMINING HOW ONE AMOUNT CHANGED IN TERMS OF THE OTHER

Relation:

EVERY SET OF ORDERED PAIRS, (x, y), WHERE x IS INPUT AND y IS OUTPUT

Another word for the input is DOMAIN: ALL THE POSSIBLE VALUES OF INPUT/x

The outputs are also called the RANGE: ALL THE POSSIBLE VALUES OF OUTPUT/y

A FUNCTION is a specific type of relation, IN A FUNCTION, EVERY INPUT IS PAIRED WITH ONLY ONE OUTPUT.

Any relation can be organized in a table listing the inputs and outputs.

Ex 1: From the given tables, determine if it suggests a function or a relation. If it's a function, identify the domain and range; if it's a relation, identify what keeps it from being a function.

Function? Explain if not.

YES: every x had only one y.

INPUT

X	Y
6	2
7	2
8	2

Domain: {6, 7, 8}

Range: {2}

Function? Explain if not.

NO: x had more than one y.

X	Y
4	2
4	3
4	7

Domain:

Range:

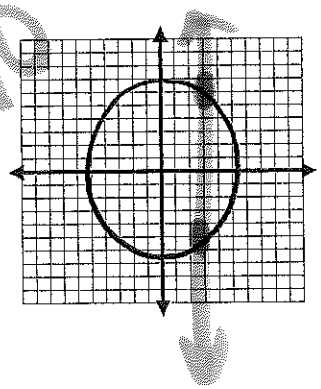
Any relation can be organized in a coordinate plane.

In order to be a function, it must pass the vertical line test meaning

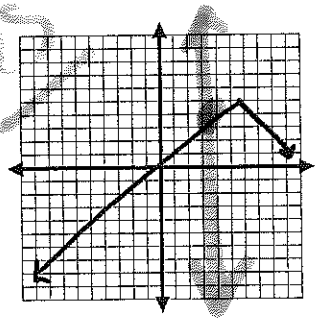
A FUNCTION IS IDENTIFIED GRAPHICALLY WHEN A VERTICAL LINE DRAWN THROUGH THE GRAPH AT ANY POINT SHOULD INTERSECT ONCE.

Ex 2: From the graph below, determine if it represents a function.

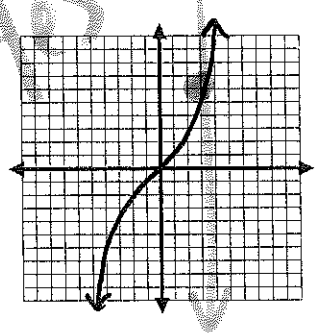
NO



YES



YES



Ex 3: Any relation can also be organized in a table.

Complete the table with values that would indicate a function.

X	Y
2	7
4	8
2	7

one y for each x.

Complete the table with values that would indicate a relation.

X	Y
2	7
4	8
2	49

Same x had diff. y

There are two types of variables associated with functions.

- INDEPENDENT: INPUT OF A FUNCTION
  X-VALUES
- DEPENDENT: OUTPUT OF A FUNCTION
  Y-VALUES

Ex 4: Identify the dependent and independent variable from each statement.

In the winter, more electricity is used when the outside temperature goes down, and less is used when the temperature rises.

(The ELECTRICITY *depends on* TEMPERATURE*)*

Dependent: ELECTRICITY USED

Independent: OUTSIDE TEMPERATURE

The faster Tom walks, the quicker he gets home.

(The TIME *depends on* SPEED*)*

Dependent: TIME IT TAKES TO GET HOME

Independent: SPEED AT WHICH HE WALKS

Write an example where temperature is the dependent variable and time is the independent variable.

FUNCTION NOTATION **is used to express the relationship between the two types of variables, where**

X IS THE INDEPENDENT & y, or f(x), IS DEPENDENT.

It's just another way of writing an equation.

Relation (what you're used to)	Function	Translation	Evaluation Example where x = 4
$y = 3x$	$f(x) = 3x$	*"f of x is 3x"* f(4) ≠ f times 4 → it means x=4, use the rule	*If* $f(x) = 3x$, *then* $f(4) = 3 \cdot 4$, *so* $f(4) = 12$
$y = 5x - 3$	*Write as a function* $f(x) = 5x - 3$	*Translate it* "f of x is 5x - 3"	*Evaluate when x=4* $f(4) = 5(4) - 3$ $= 20 - 3$ $f(4) = 17$
$3x + 2y = 12$ *y = First*	*Write as a function* $3x + 2y = 12$ $-3x \quad -3x$ $\frac{2y}{2} = \frac{-3x+12}{2}$ $y = \frac{-3x+12}{2}$ → $f(x) = \frac{-3x+12}{2}$	*Translate it* "f of x is $\frac{-3x+12}{2}$"	*Evaluate when x=4* $f(4) = \frac{-3(4)+12}{2}$ $f(4) = \frac{-12+12}{2}$ $f(4) = 0$

Ex3: *write a function using function notation to describe each situation. Express the domain and range for each function in set notation.*

a. Elijah has already sold $40 worth of tickets for a local raffle.
He has 5 tickets left to sell at $5 per ticket.

Dependent Variable:

Independent Variable:

Function

Domain:

Range:

b. A law firm charges $100 per hour for the first 3 hours plus a $300 origination fee for its services.

Dependent Variable:

Independent Variable:

Function

Domain:

Range:

Ex 3: The cost of sending m text messages at $0.25 per message.

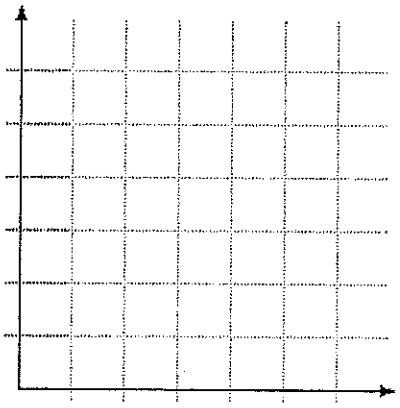
a. Represent the cost as a function of m messages.

b. Identify the independent variable:

c. Identify the dependent variable:

d. Complete the table for the given domain values:

Independent Variable, m	Dependent Variable, C(m)	As an ordered pair
0		
1		
2		
3		
4		



e. Graph; label your axes.

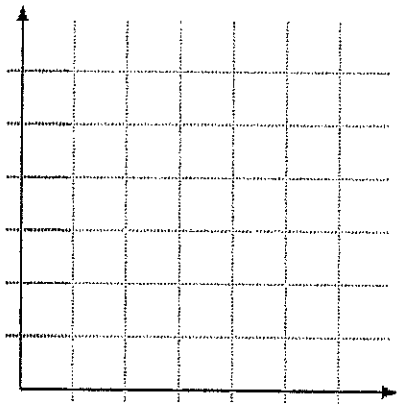
f. Describe the pattern.

Ex 4: You want to tile part of a floor 36 square tiles. The tiles come in whole number side lengths from 2-6 inches. If s is the side length of a tile, the area that he can cover is $A(s) = 36s^2$ inches.

a. In set notation, identify the domain.

b. Use the domain to complete the table; write the results as ordered pairs.

Independent Variable, s	Dependent Variable, A(s)	As an ordered pair
2		
3		
4		
5		
6		



c. Graph; label your axes.

d. Describe the pattern in the graph.

Exit Ticket: If you know an equation represents a function, what can you specifically deduct about that relationship?