Relationships in Functions

There are two types of variables associated with functions.

The INDEPENDENT X variable changes the DEPENDENT Y variable.

IN A FUNCTION, THE DEPENDENT VARIABLE Y IS A FUNCTION OF THE INDEPENDENT VARIABLE X.

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. *Dependent:* ELECTRICITY *Independent:* TEMPERATURE	***In the winter, more electricity is used when the outside temperature goes down, and less is used when the temperature rises.*** *Dependent:* *Independent:*

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

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.

(y) Dependent Variable: Money

X Independent Variable: Number of tickets sold

Function $40 + 5x = f(x)$

Domain: $\{0, 1, 2, 3, 4, 5\}$

Range: $\{40, 45, 50, 55, 60, 65\}$

$f(0) = \$40$
$f(1) = \$45$
$f(2) = \$50$
$f(3) = \$55$
$f(4) = \$60$
$f(5) = \$65$

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

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

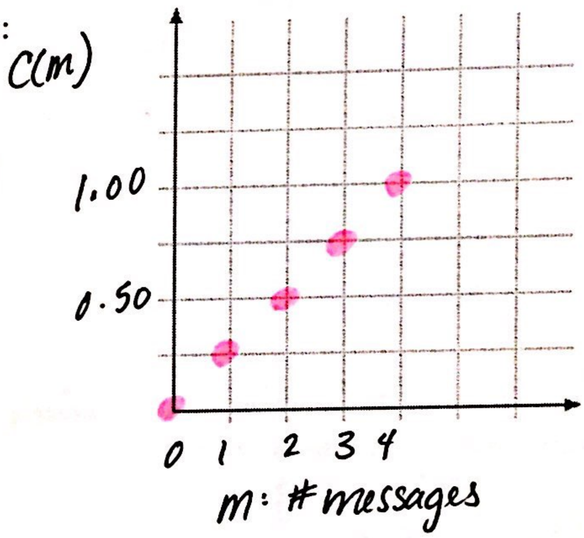
$C(m) = 0.25(m)$

b. Identify the independent variable: messages sent = m

c. Identify the dependent variable: C(m) = cost of sending messages

d. Complete the table for the given domain values:

Independent Variable, m	Dependent Variable, C(m)	As an ordered pair
0	$0.25(0) = 0$	$(0, 0)$
1	$0.25(1) = 0.25$	$(1, 0.25)$
2	$0.25(2) = 0.50$	$(2, 0.50)$
3	$0.25(3) = 0.75$	$(3, 0.75)$
4	$0.25(4) = 1.00$	$(4, 1.00)$



e. Graph; label your axes.

f. Describe the pattern.

- For every message sent, the cost increases (specifically by \$0.25 per message)

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

Algebra 1: Unit 5 Notes

Lesson 2 Notes: Writing function:

Part 1: Use your smart phone/computer to answer the following in the table

		
a. How many US dollars is 50 British pounds worth right now, today?	£50	$= \$65.29$
b. How many British pounds is \$50 worth right now, today?	£38.29	\$50
$\frac{\textbf{dollar}}{\textbf{pound}} = \frac{1}{0.77}$ $\frac{d}{p} = \frac{1}{0.77}$ $p = 0.77d$	Express the exchange rate for pounds for any amount of US dollars: $p = 0.77d$ Dependent variable: pounds Independent variable: dollars	Express the exchange rate for US dollars for any amount of British pounds: $\frac{p}{0.77} = \frac{0.77d}{0.77}$ $d = \frac{p}{0.77}$ Dependent variable: dollars Independent variable: pounds

What relationship(s) (if any) do you see between the two equations in function notation?

- Same numbers: d, p, 0.77
- multiplication vs. division

inverses

These functions represent inverse functions Functions that undo each other

Inverse function notation: $f^{-1}(x)$

Inverse should also make you think about... THE OPPOSITE

a. Predict: If $f(x)$ has the following ordered pairs, complete the table for $f^{-1}(x)$.

x	2	-3	0
$f(x)$	5	6	2

THE INVERSE FLIPS x & $f(x)$ VALUES

x	5	6	2
$f^{-1}(x)$	2	-3	0

How to find the inverse of a function

Since the inverse of a function is the computational "opposite" of a given function, then to find its equation, all the operations of the original must be undone.

The easiest way to find the equation that represents the inverse is to...

• Switch x & y, and Solve for y.

Ex 1: Find the inverse of

$\cancel{f(x)} = \frac{1}{2}x - 1$

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

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

$+1 \qquad +1$

$\frac{2}{1}(x+1) = \frac{1}{2}y \cdot \frac{2}{1}$

$2x + 2 = y$

$2x+2 = f^{-1}(x)$

1. ***Cross out f(x) and write y instead.***

2. ***Switch the y with x.***

3. ***Solve for y.***

4. ***Rewrite; instead of y, write*** $f^{-1}(x)$.

(Try alone):

$\cancel{g(x)} = 2x + 6$

$y = 2x + 6$

$x = 2y + 6$

$-6 \qquad -6$

$\frac{x-6}{2} = \frac{2y}{2}$

$y = \frac{x-6}{2}$ or $y = \frac{x}{2} - \frac{6}{2}$

$g^{-1}(x) = \frac{x-6}{2}$ or $g^{-1}(x) = \frac{1x}{2} - 3$

Ex 2: Find the inverse of:

$\cancel{f(x)} = 3x - \frac{3}{4}$

$y = 3x - \frac{3}{4}$

$x = 3y - \frac{3}{4}$

$+\frac{3}{4} \qquad +\frac{3}{4}$

$\frac{x+\frac{3}{4}}{3} = \frac{3y}{3}$

$\frac{x+\frac{3}{4}}{3} = y$

or

$(x+\frac{3}{4}) \div 3 = f^{-1}(x)$

$(x+\frac{3}{4}) \cdot \frac{1}{3} = f^{-1}(x)$

$f^{-1}(x) = \frac{1}{3}x + \frac{3}{12}$

Ex 3: Find the inverse of:

$\cancel{f(x)} = -4x + 3$

$y = -4x + 3$

$x = -4y + 3$

$-3 \qquad -3$

$\frac{x-3}{-4} = \frac{-4y}{-4}$

$y = \frac{x-3}{-4}$

$f^{-1}(x) = \frac{x-3}{-4}$