

# 4-2: Patterns & Linear Functions

Use a table, an equation, and a graph to represent each relationship:

Donald is 4 years older than Connie

C	D
1	5
2	6
3	7
4	8



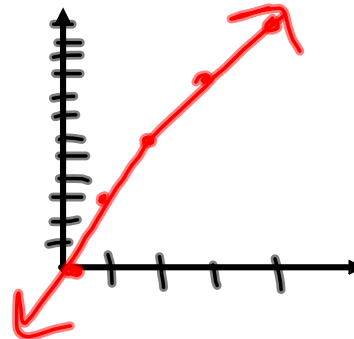
$$y = x + 4$$

$$x \geq 0$$

x      y

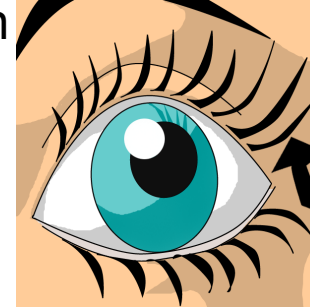
You make 3 greeting cards per hour.

H	C
1	3
2	6
3	9
4	12



$$y = 3x$$

$$x \geq 0$$



**Eye Opener**

## Essential Understandings

A **function** is a relationship that pairs independent variables (input values) with exactly one dependent variable (one output value).

A **linear function** is a function whose graph is a line or part of a line.

The value of one variable (dependent) may be uniquely determined by the value of another variable (independent).

Such relationships may be represented using words, tables, equations, and / or sets of ordered pairs and graphs.



Using the Graphing Calculator to Create Data Tables & Graph Them:

### Stat Plot

**Stat Plot** (2nd y=) - Graphs the data in lists you create using the Stat key

Turn STAT Plot 1 "ON"  
 Make sure "y=" is empty  
 Check settings WINDOW ( def: min -10 to max +10; scl = 1; res = 1)  
 Check settings for FORMAT (2nd-Zoom)(all left hand side on)

**Stat-Edit**- Let's you create lists (L1, L2, etc.) to graph using Stat Plot

Open STAT-Edit  
 Clear the contents of L1 & L2 (up arrow to L1/L2, CLEAR, ENTER)  
 Create two lists for these ordered pairs (L1 = domain; L2=range):  
 {(1,2) (6,7) (-2,-1) (11.5,12.5)}

**Graph** - Displays the graph of any ordered pairs created using Stat Plot

Create a Stat Plot of the data using GRAPH  
 How many points do you see? Why? What do we do about it?

**Window** - allows you to manually change the viewing range (size of the grid) on which to display the graph (min -10 to max 10 for x & y is default)

Adjust the WINDOW to accomodate the list values

**ZOOM** - allows you to change the WINDOW viewing range automatically

Experiment with various ZOOM settings  
 What does it do to the appearance of the graph?  
 Which ZOOM setting would be helpful when data points are missing?  
 Which ZOOM setting would be helpful when data points are barely visible?

**y =** Lets you enter a function rule into the calculator for it to graph or create a data table for

Let's create a function rule for a graph that will hit the points on the Stat Plot  
 Go to "y=" and enter a reasonable equation into Y1  
 Move over to the \ to the left of Y1 and press ENTER to get "--o"

**Graph** - Displays the graph of any function you enter into the "y ="

Press GRAPH to see the results of your function rule  
 Modify "y=" until you get the correct function rule

**Table** (2nd-graph) - Displays the ordered pair values created by the function rule entered into the "y =" key (does NOT display the values in Stat Plot)

Prove that your function rule actually passes through the points given  
 Press TABLE  
 Where is (11.5, 12.5)

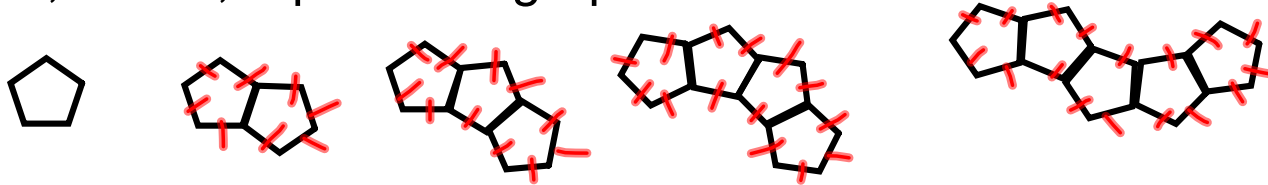
**Table-Set** (2nd-Window) - allows you to determine the numeric increment of the table (ones, tenths, hundredths, tens, hundreds, etc.) and the starting value of the table

Adjust the TABLE settings so that decimal values are visible

**Trace** - Allows you to move about on a graph displaying ordered pair values as you move

Use TRACE to find ordered pairs on the graph.  
 Change your ZOOM setting  
 How does this effect your TRACE values?  
 What ZOOM values might be beneficial when using TRACE?

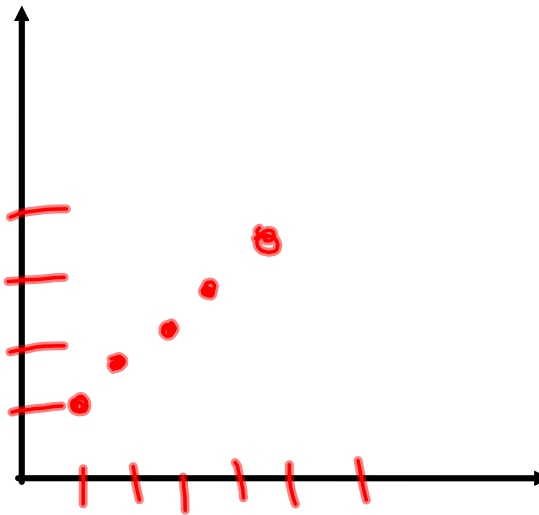
Find the relationship between the number of pentagons and the perimeter of the figure they form. Represent the data using a table, words, equation & graph



# Pentagons Perimeter

1	5
2	8
3	11
4	14
5	17
6	

1 ( ) + 3  
 1 ( ) + 3  
 1 ( ) + 3  
 1 ( ) + 3



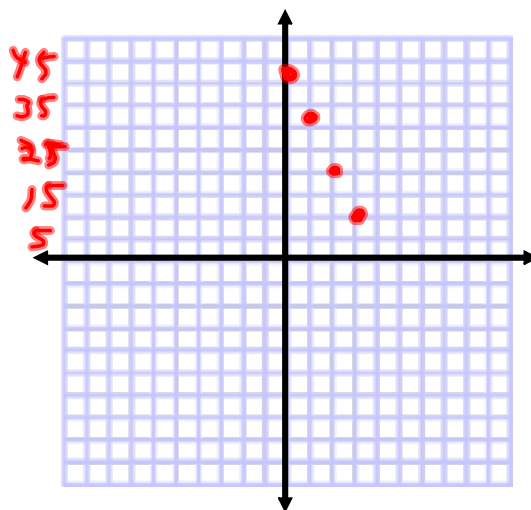
Is the table of values below a function?

yes

If so, is it linear or non-linear?

If it is linear, express the relationship in words, an equation and a graph

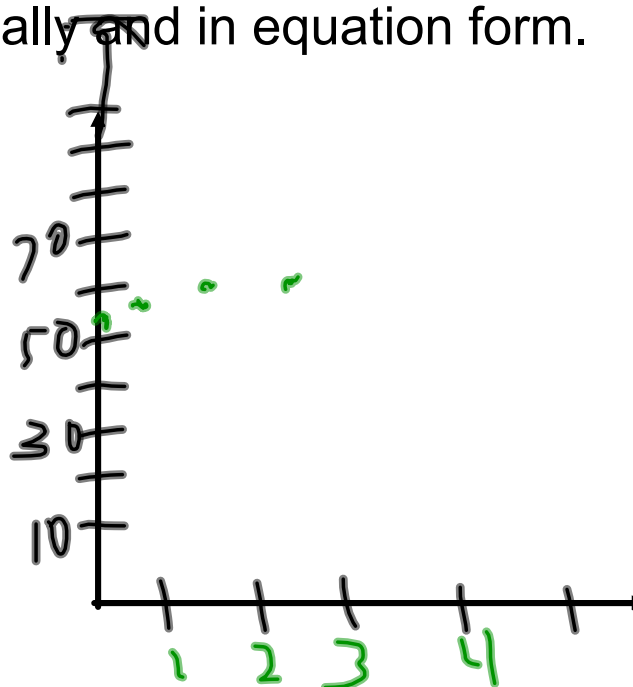
x	y
0	43
1	32
2	21
3	10



$$y = -11x + 43$$

Define the relationship between the variables in the chart below, graphically, verbally and in equation form.

X (# of cans of soup)	y (Total Bill)
0	\$52.07
1	\$53.36
2	\$54.65
3	\$55.94



$$y = 1.29x + 52.07$$

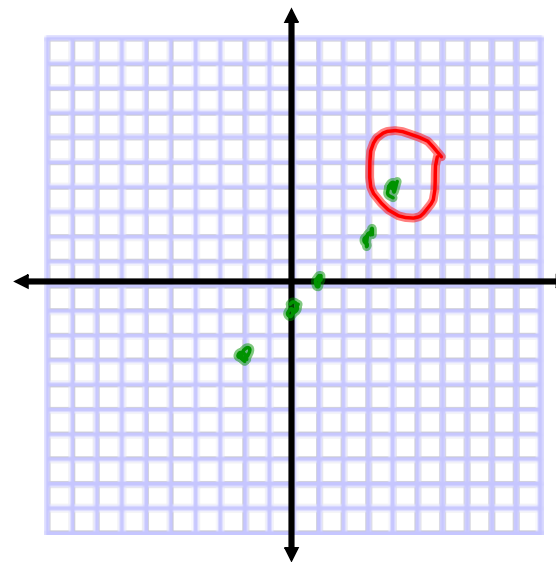
Bill had a cart of food that cost him \$52.07 and he added cans of soup costing \$1.29 per can

Graph the following ordered pairs:  $(-2,-3)$ ,  $(0,-1)$ ,  $(1,0)$ ,  $(3,2)$ ,  $(4,4)$

Is the relationship linear?

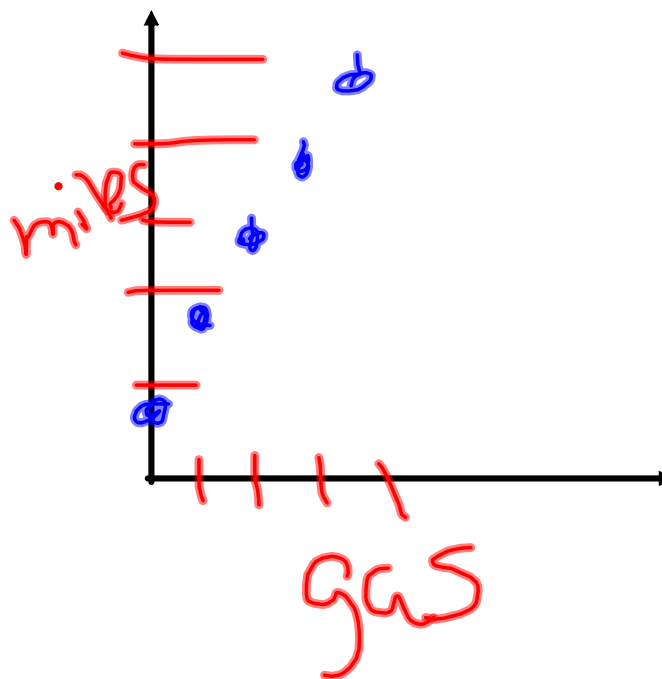
No

If so, write an equation defining the relationship between  $x$  &  $y$ .

An electric car can travel 40 miles on a charged battery. Then it switches over to gas where it gets 50 miles per gallon. Represent the relationship between the gas used and the distance travelled using a table, equation and graph.

dist	gas
40	0
90	1
140	2
190	3
240	4



$$y = 50x + 40$$

