

4-1

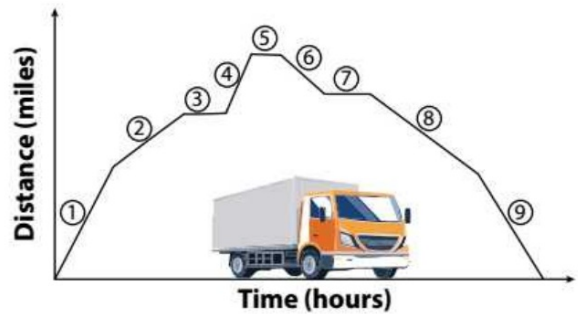
Graphs, Patterns and Linear Functions

OBJECTIVE: I can represent mathematical relationships using graphs to identify patterns that describe linear functions



Warm-Up

The distance a delivery van is from the warehouse varies throughout the day. The graph shows the distance from the warehouse for a day from 8:00 am to 5:00 pm. Tell a story of what you think it is happening at each numbered stage of the graph.



- ① Sped away from warehouse fast
- ② Slowing down maybe due to traffic
- ③ Stopped to make a delivery
- ④ Driving fast to another delivery
- ⑤ Stopped to make a delivery
- ⑥ Driving back to warehouse slowly due to traffic
- ⑦ Stopped for lunch/gas
- ⑧ Driving back to warehouse slowly
- ⑨ Speeding up back to warehouse

Essential Understanding

Essential Understanding You can use graphs to visually represent the relationship between two variable quantities as they both change.

The value of one variable may be uniquely determined by the value of another variable. Such relationships may be represented using tables, words, equations, sets of ordered pairs, and graphs.

In a relationship between variables, the dependent variable changes in response to another variable, the independent variable. Values of the independent variable are called inputs. Values of the dependent variable are called outputs.



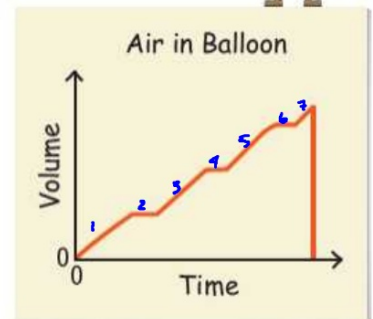
Example

#1 Analyzing a Graph



The graph shows the volume of air in a balloon as you blow it up, until it pops. What are the variables? Describe how the variables are related at various points on the graph.

Stages 1, 3, 5 the balloon is being inflated
stages 2, 4, 6 you are recovering and breathing
stage 7 balloon was being inflated then it burst



1



3



5



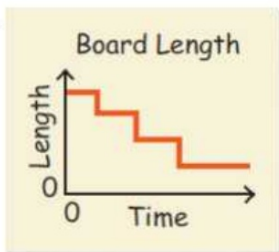
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Your Turn to Work it Out

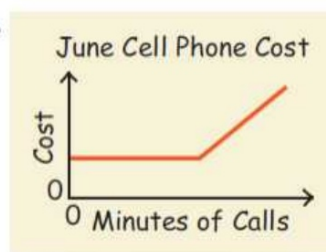


1. What are the variables in each graph? Describe how the variables are related at various points on the graph.

a.



b.



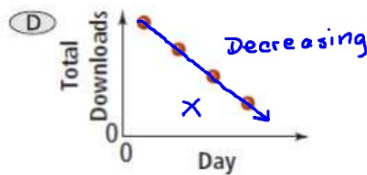
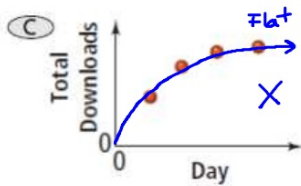
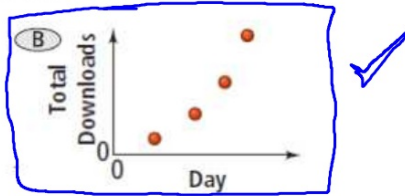
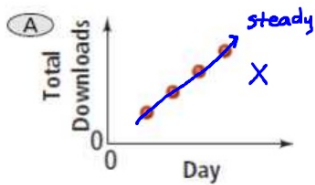
Example

#2 Matching a Table and a Graph



Multiple Choice A band allowed fans to download its new video from its Web site. The table shows the total number of downloads after 1, 2, 3, and 4 days. Which graph could represent the data shown in the table?

Day	Total Downloads
1	346
2	1,011
3	3,455
4	10,426

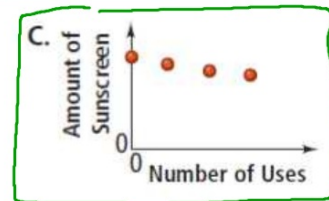
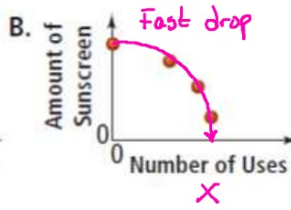
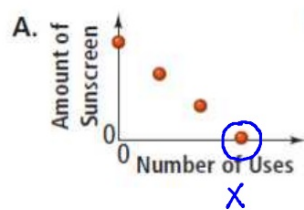


Your Turn to Work it Out



2. The table shows the amount of sunscreen left in a can based on the number of times the sunscreen has been used. Which graph could represent the data shown in the table?

Sunscreen				
Number of Uses	0	1	2	3
Amount of Sunscreen (oz)	5	4.8	4.6	4.4

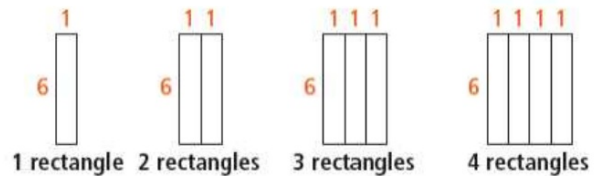


Example

#3 Representing a Geometric Relationship



In the diagram on the right, what is the relationship between the number of rectangles and the perimeter of the figure they form? Represent this relationship using a table, words, an equation, and a graph.



Step 1 Make a table

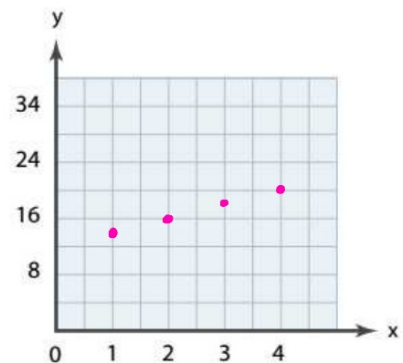
Perimeter
 $2w + 2l$

Number of Rectangles (x)	Perimeter (y)	Order pair (x,y)
1	$2(1) + 2(6) = 14$	(1, 14)
2	$2(2) + 2(6) = 16$	(2, 16)
3	$2(3) + 2(6) = 18$	(3, 18)
4	$2(4) + 2(6) = 20$	(4, 20)

Step 2 Find a pattern

$\underbrace{\hspace{1cm}}$ varies \downarrow
 $\underbrace{\hspace{1cm}}$ constant \downarrow
 $\underbrace{\hspace{1cm}}$ output \downarrow
 $2x + 12 = y$

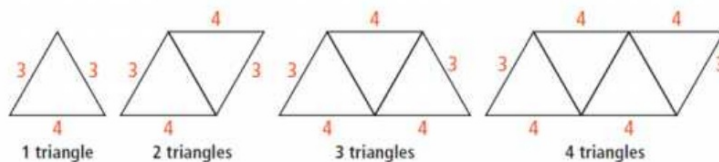
Step 3 Use the table to make a graph.



Your Turn to Work it Out



3. In the diagram below, what is the relationship between the number of triangles and the perimeter of the figure they form? Represent this relationship using a table, words, an equation, and a graph.



Step 1 Make a table

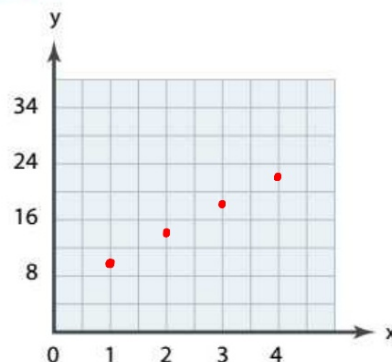
Number of Triangles (x)	Perimeter (y)	Order pair (x,y)
1	$3(2) + 4(1) = 10$	$(1, 10)$
2	$3(2) + 4(2) = 14$	$(2, 14)$
3	$3(2) + 4(3) = 18$	$(3, 18)$
4	$3(2) + 4(4) = 22$	$(4, 22)$

Step 2 Find a pattern

Constant
Varies
output

$$6x + 4x = y$$

Step 3 Use the table to make a graph.



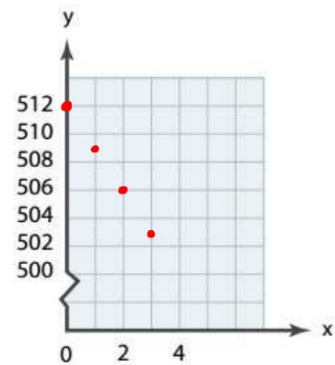
Example

#4 Representing a Linear Function



Photography The table shows the relationship between the number of photos x you take and the amount of memory y in megabytes (MB) left on your camera's memory chip. Is the relationship a linear function? Describe the relationship using words, an equation, and a graph.

Number of Photos, x	Memory (MB), y
0	512
+1	-3
1	509
+1	-3
2	506
+1	-3
3	503



Start Rate (input)
↓
 $512 - 3(x) = y$

Your Turn to Work it Out



4. Is the relationship in the table below a linear function? Describe the relationship using words, an equation, and a graph.

Input, x	0	1	2	3
Output, y	8	10	12	14

$\text{start} \rightarrow 8 + 2x = y$
Rate (input)

