

Unit 3a

Beaumont Middle School

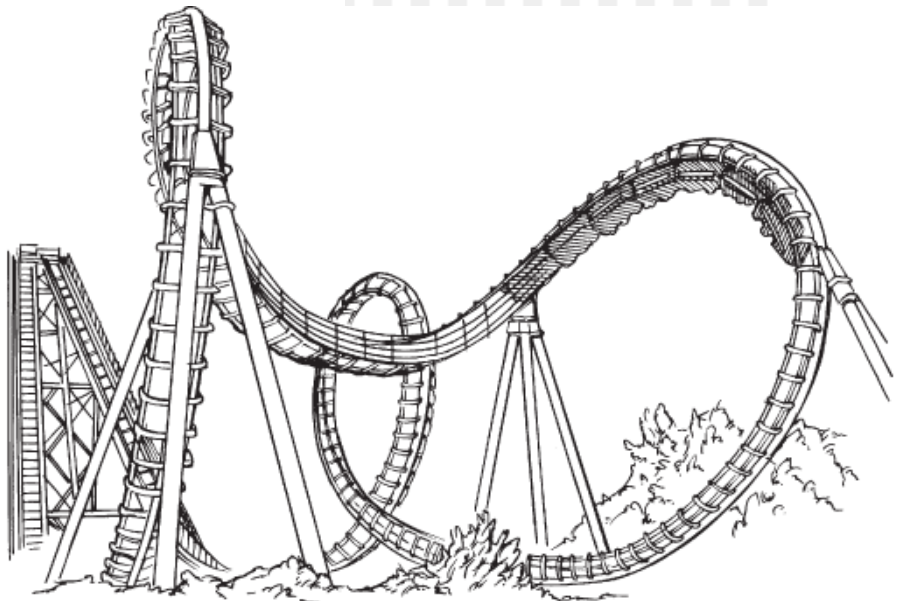
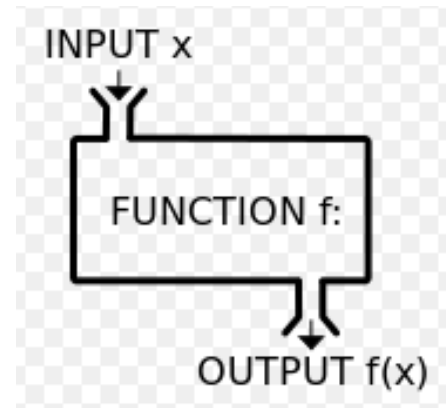
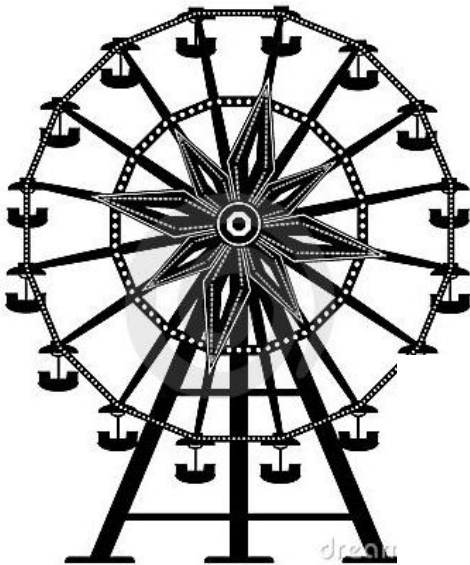
8th Grade, 2016-2017

Introduction to Algebra

Name: _____

Introduction to Functions

- I can model a life situation with a graph.
- I can distinguish between a function and a relation.
- I can represent ordered pairs as a list, a map, a table, and a graph.
- I can identify the domain and range.



Graphs to Model Real-Life Situations

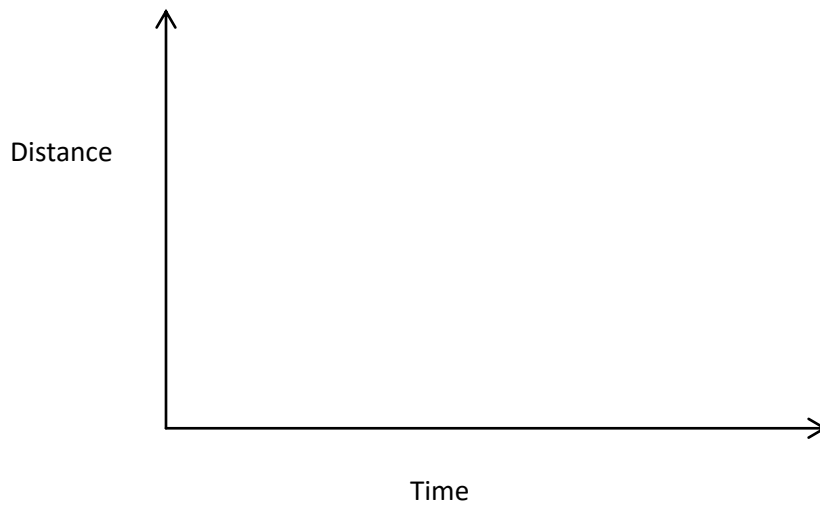
This assignment will be completed in class as an activity for more than one day.

A. CHOOSE THE CORRECT GRAPH THAT DEPICTS THE SITUATION.

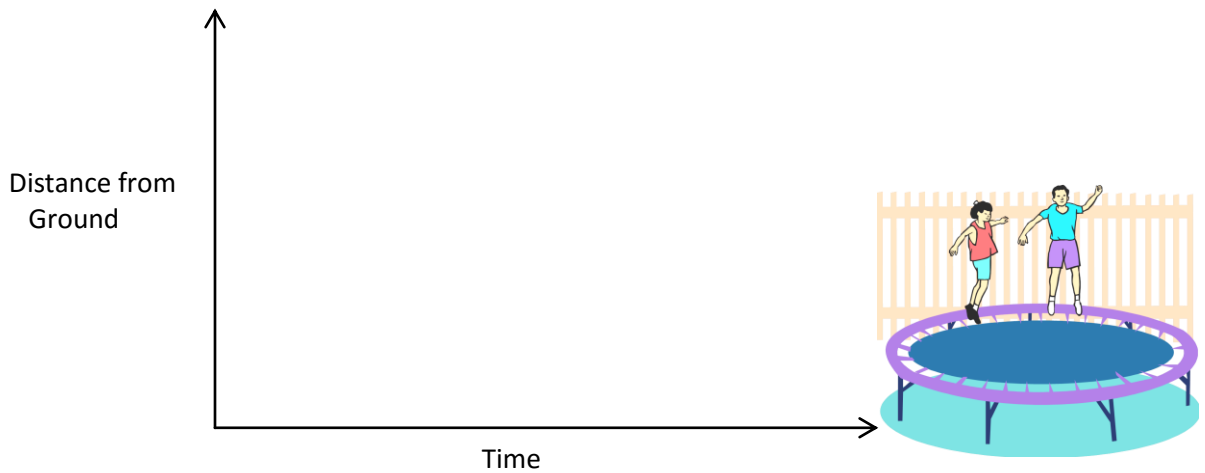
1. _____ Train Station 2. _____ Ferris Wheel 3. _____ Hill Climbing
4. _____ Child Swinging 5. _____ Child on Slide

B. SKETCH A GRAPH OF THE FOLLOWING SITUATIONS.

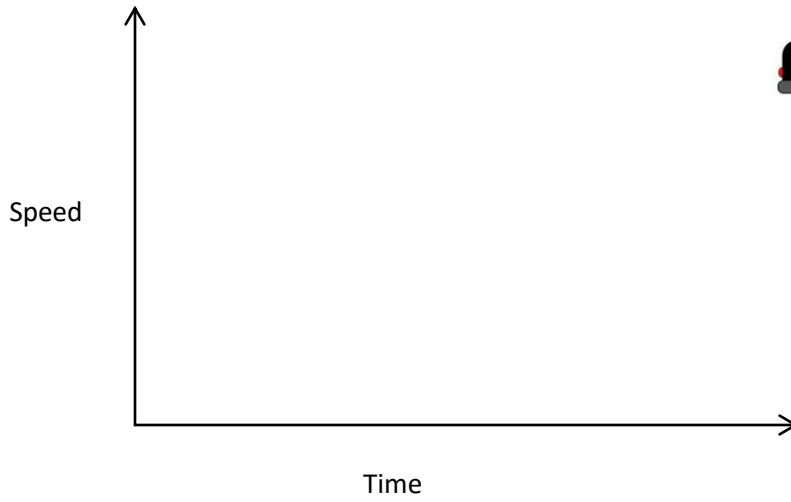
1. Sara



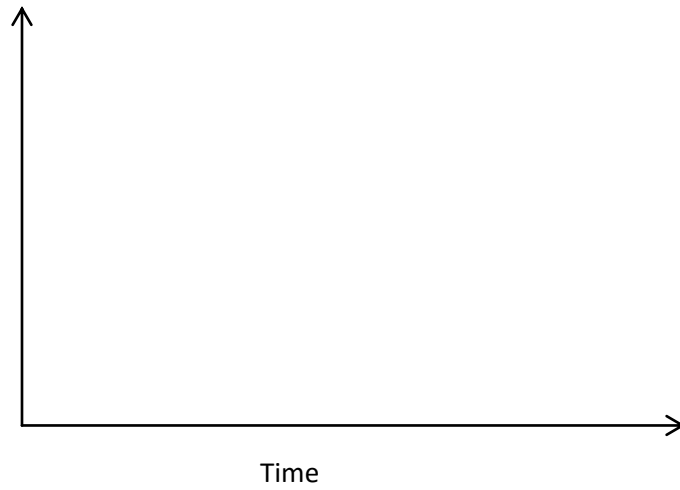
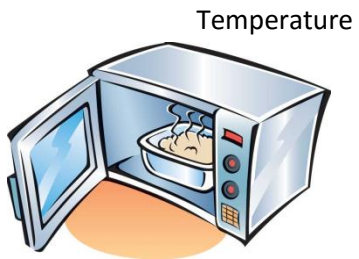
2. Rashid



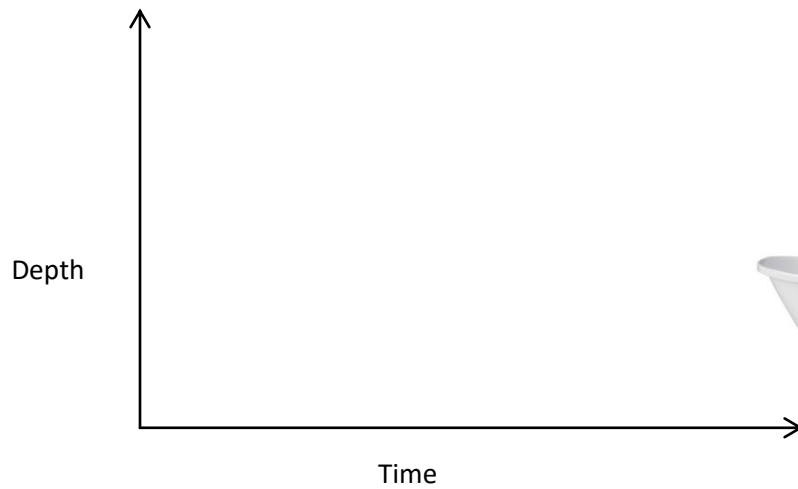
3. Kendra



4. Frozen Dinners



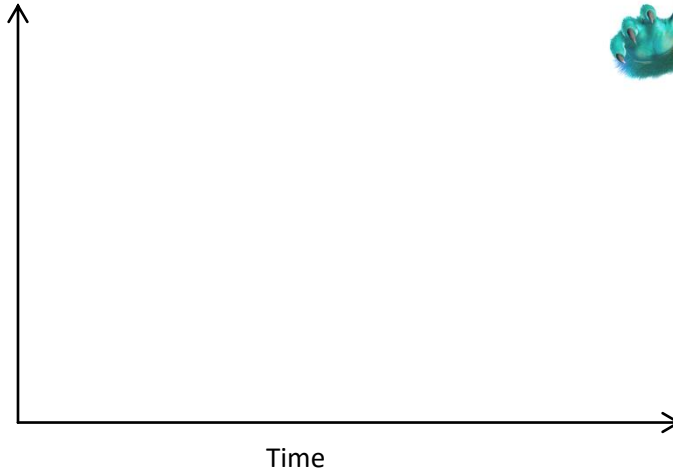
5. Water Level



C. SKETCH A GRAPH OF THE ACTION IN EACH MOVIE CLIP.

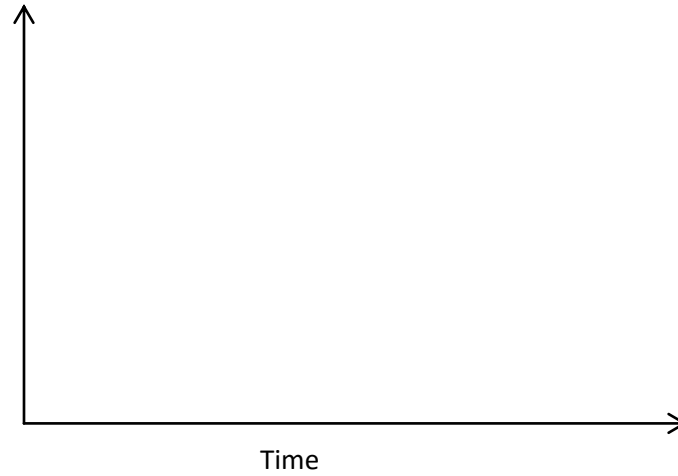
1. Sully

Distance
from door



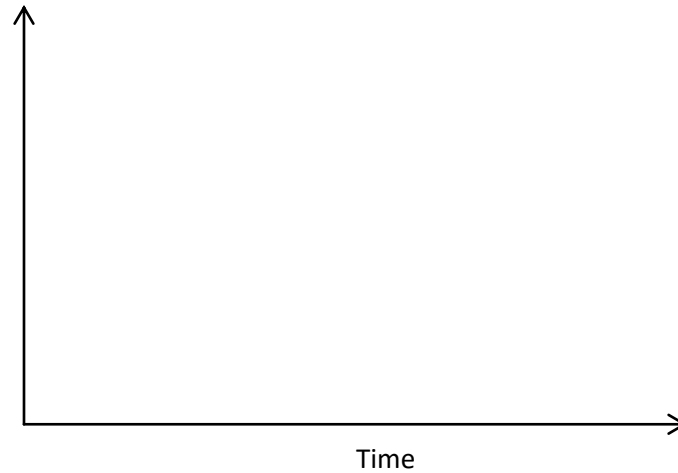
2. Dash

Speed

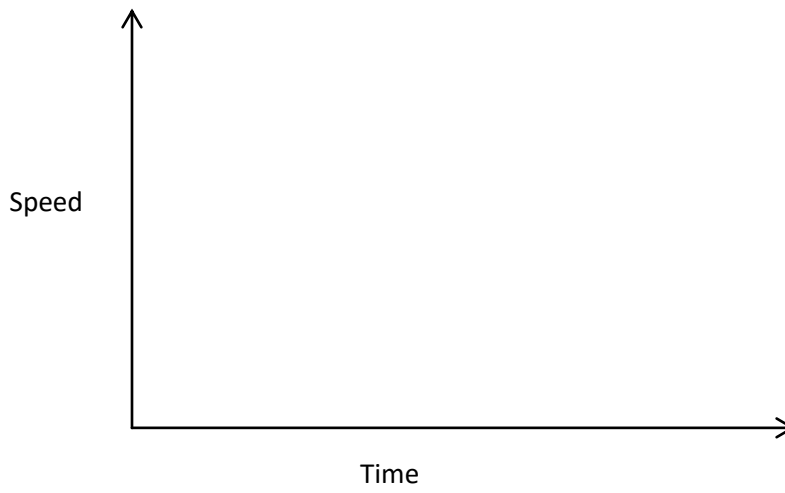
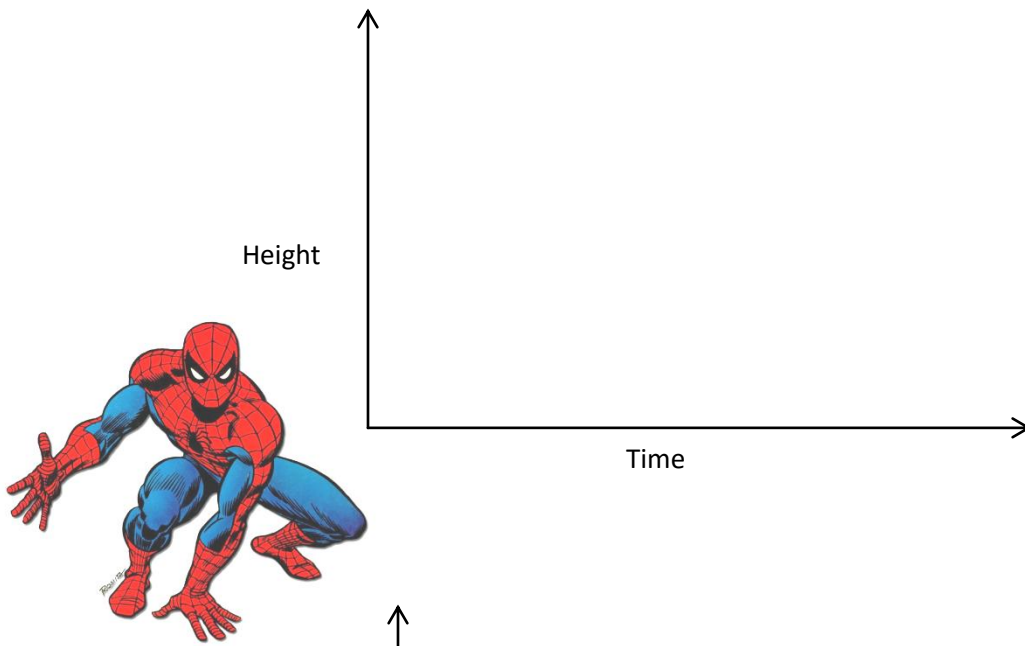


3. Wesley

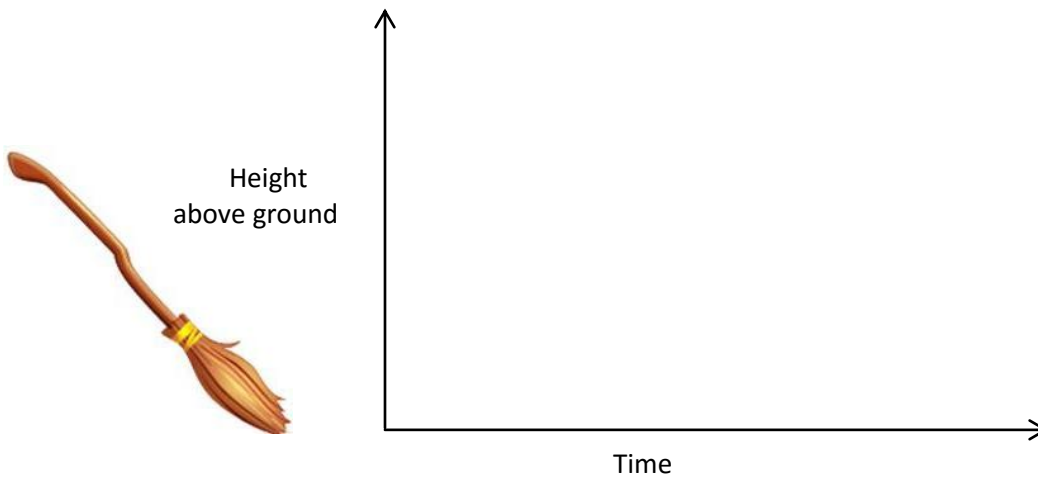
Height of Wesley's
feet from the
ground



4. Spiderman



5. Neville

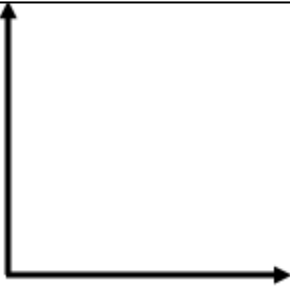


Graphing Situations Practice #1

Choose the best graph for the given situation. Copy the graph and label the axes with the variables given in parentheses. The first variable named goes on the x-axis, the second goes on the y-axis.

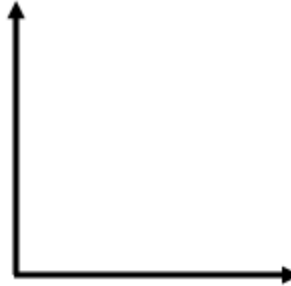
1) Katrina walked from home to the library, did some homework, then walked back.

(Variables: **time** and **distance from home**)

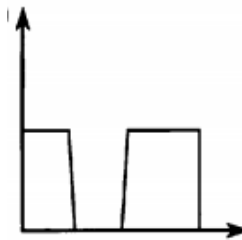
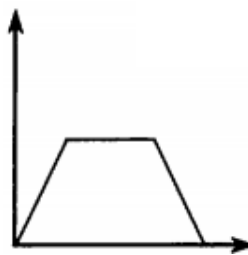
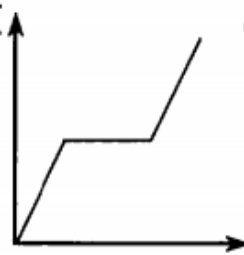


2) Katrina walked from home to the library, did some homework, then walked back.

(Variables: **time** and **speed**)

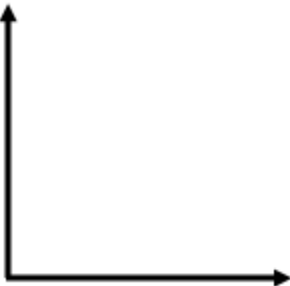


Choices for #1 and #2:



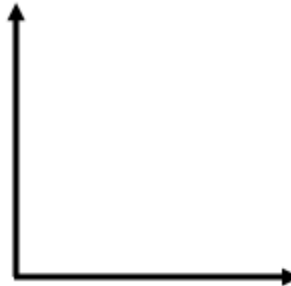
3) When jogging, Winston starts slowly, builds up to a comfortable speed, then slows down near the end.

(Variables: **time** and **distance**)

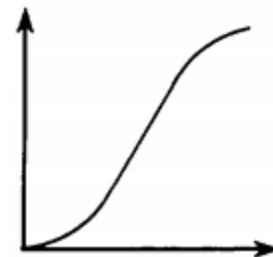
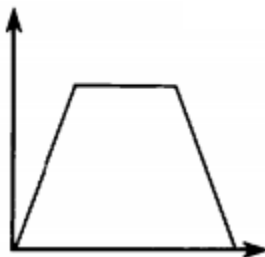


4) When jogging, Winston starts slowly, builds up to a comfortable speed, then slows down near the end.

(Variables: **time** and **speed**)

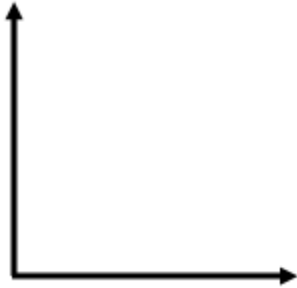


Choices for #3 and #4:



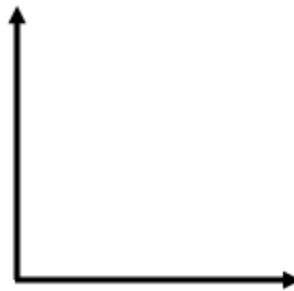
5) Mr. Overbey walked to the subway station, waited a few minutes, then got on a train.

(Variables: **time** and **distance**)

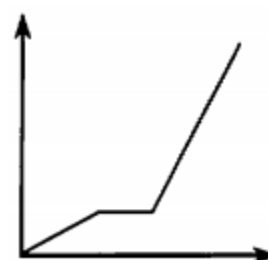
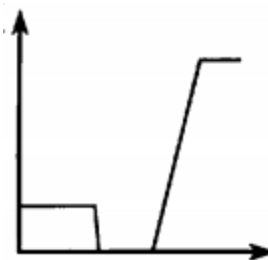
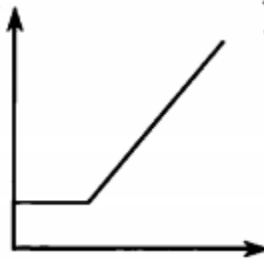


6) Mr. Overbey walked to the subway station, waited a few minutes, then got on a train.

(Variables: **time** and **speed**)

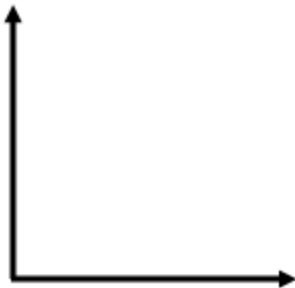


Choices for #5 and #6:



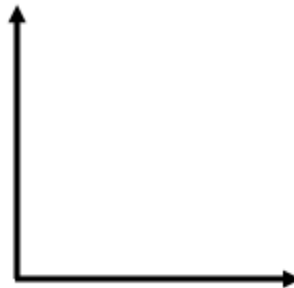
7) Mr. Neal carried a box of yearbooks from the office to his classroom.

(Variables: **# of books in box** and **weight of box**)

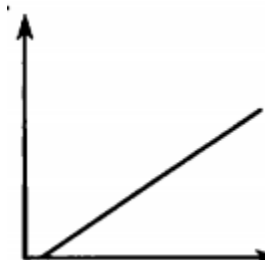
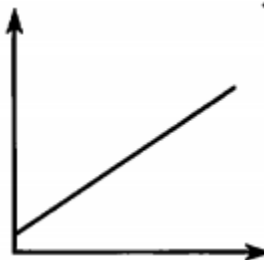
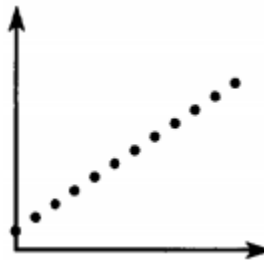


8) Every week the plant in our classroom is taller than the week before.

(Variables: **# of weeks** and **height of plant**)



Choices for #7 and #8:

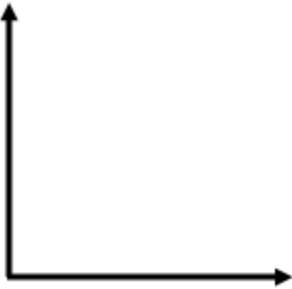


Graphing Situations Practice #2

Choose the best graph for the given situation. Copy the graph and label the axes with the variables given in parentheses. The first variable named goes on the x-axis, the second goes on the y-axis.

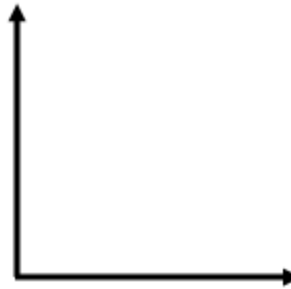
1) Each month the baby hippo weighed twice as much as it had weighed the month before.

(Variables: **time** and **weight**)

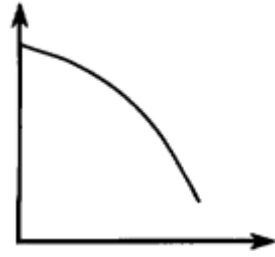
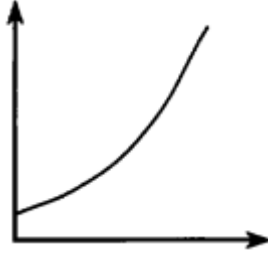
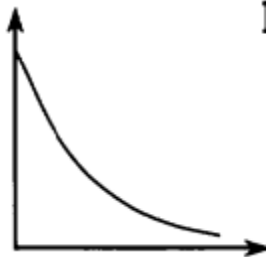


2) Each hour there was half as much medication in the blood as there had been an hour before.

(Variables: **time** and **medication**)

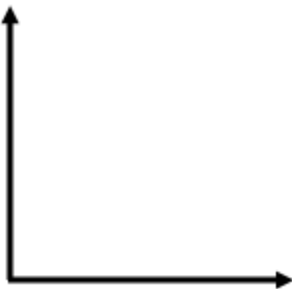


Choices for #1 and #2:



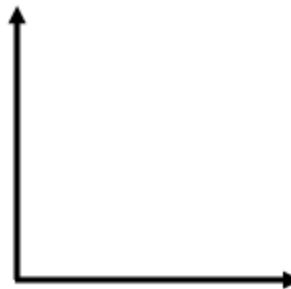
3) Erica walked from home to a friend's house, watched TV for a while, then walked back home.

(Variables: **time** and **Erica's distance from home**)

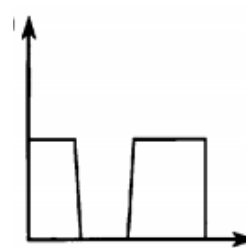
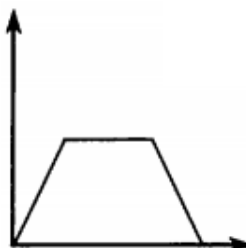
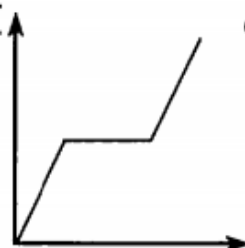


4) Erica walked from home to a friend's house, watched TV for a while, then walked back home.

(Variables: **time** and **Erica's speed**)

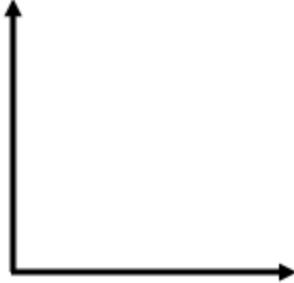


Choices for #3 and #4:



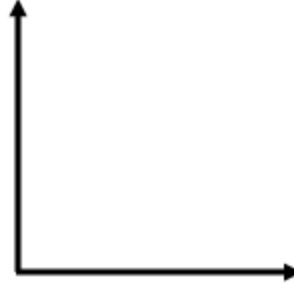
5) As our subway train leaves Station A, it accelerates to top speed, then maintains this speed until it begins to slow down and finally stops at Station B.

(Variables: **time** and **distance from Station A**)

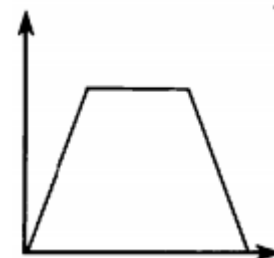
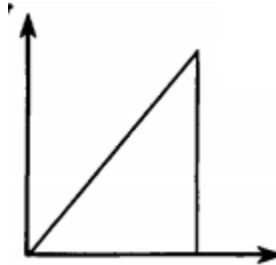
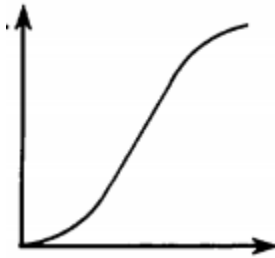


6) As our subway train leaves Station A, it accelerates to top speed, then maintains this speed until it begins to slow down and finally stops at Station B.

(Variables: **time** and **speed from Station A**)

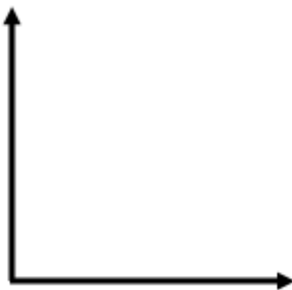


Choices for #5 and #6:



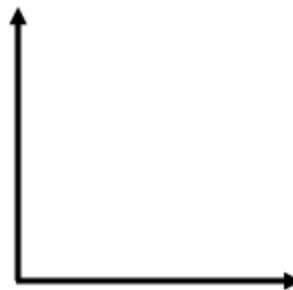
7) A backpacker hikes toward a campsite at a steady rate until he stops for a while to rest. Then he continues at the original rate until he stops at the campsite.

(Variables: **time** and **distance from campsite**)

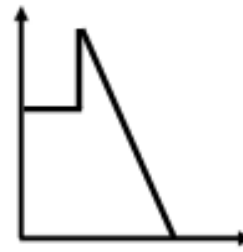
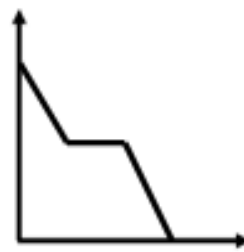
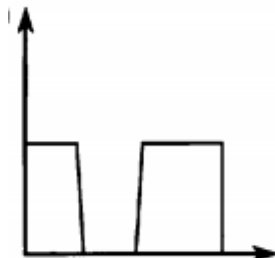


8) A backpacker hikes toward a campsite at a steady rate until he stops for a while to rest. Then he continues at the original rate until he stops at the campsite.

(Variables: **time** and **speed**)

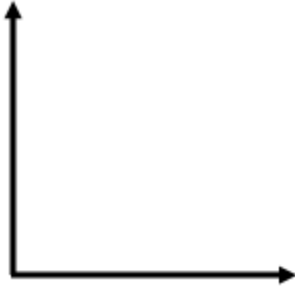


Choices for #7 and #8:



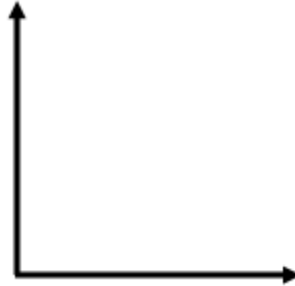
9) The roller coaster goes slower and slower as it rolls uphill. Then it goes faster and faster as we roll down the other side.

(Variables: **time** and **distance travelled**)

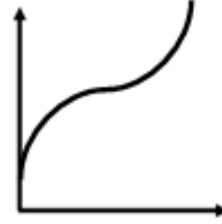
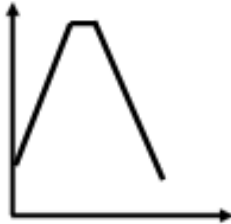


10) The roller coaster goes slower and slower as it rolls uphill. Then it goes faster and faster as we roll down the other side.

(Variables: **time** and **speed of the coaster**)



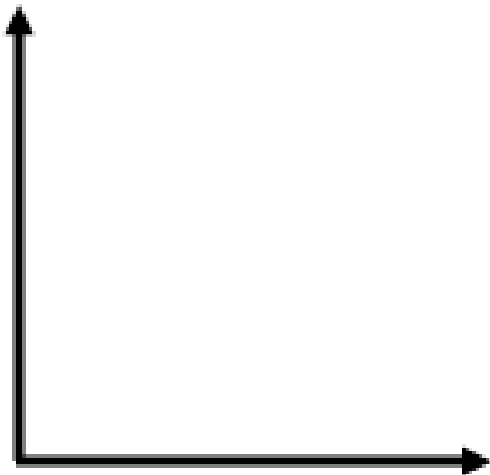
Choices for # 9 and 10:



Sketch a graph for each situation. Label each axis as indicated.

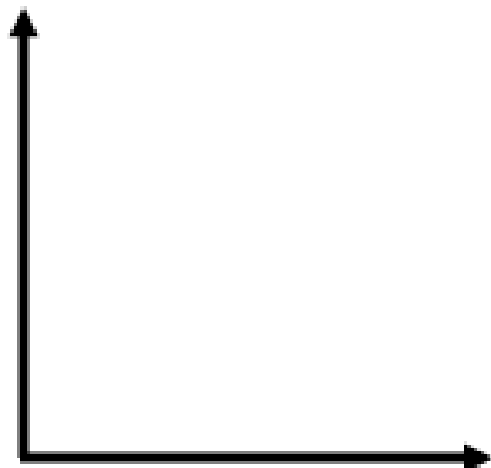
11) Katie walked to school from home at a steady rate, then realized she was late and ran the rest of the way at top speed.

(Variables: **time** and **distance from home**)



12) Ray rode his bike up a hill at a slow but steady speed, then went faster and faster as he rode down the other side.

(Variables: **time** and **speed**)



Relations and Functions

A relation is a set of ordered pairs.

$\{(2,3), (-1,5), (4,-2), (9,9), (0,-6)\}$ This is a relation

The **domain** is the set of all x values in the relation

$\{(2,3), (-1,5), (4,-2), (9,9), (0,-6)\}$

These are the x values written in a set from smallest to largest
domain = $\{-1,0,2,4,9\}$

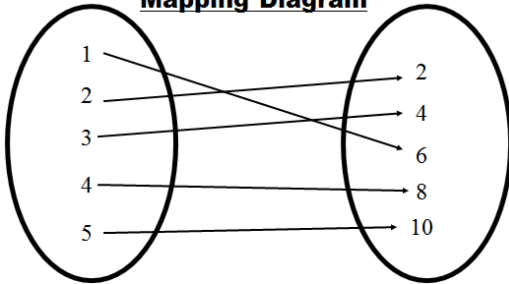
The **range** is the set of all y values in the relation

$\{(2,3), (-1,5), (4,-2), (9,9), (0,-6)\}$

These are the y values written in a set from smallest to largest
range = $\{-6,-2,3,5,9\}$

A relation assigns the x's with y's

Mapping Diagram

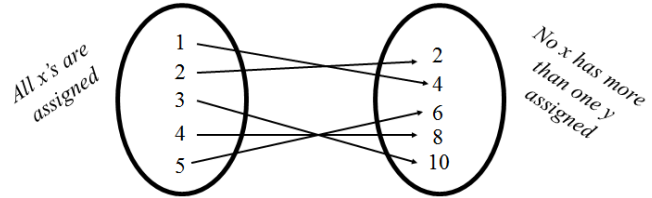


Domain (set of all x's)

Range (set of all y's)

This relation can be written $\{(1,6), (2,2), (3,4), (4,8), (5,10)\}$

A function f from set A to set B is a rule of correspondence that assigns to each element x in the set A **exactly** one element y in the set B.



Set A is the domain

Set B is the range

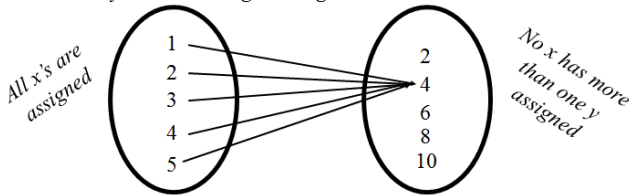
This is a function --it meets our conditions

Must use all the x's

The x value can only be assigned to one y

Let's look at another relation and decide if it is a function.

The second condition says each x can have only one y , but it **CAN** be the same y as another x gets assigned to.



Set A is the domain

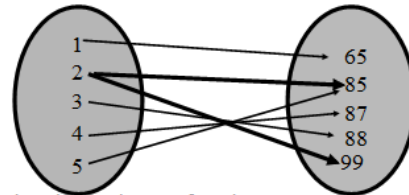
Set B is the range

This is a function --it meets our conditions

Must use all the x's

The x value can only be assigned to one y

A good example that you can "relate" to is students in our maths class this semester are set A. The grade they earn out of the class is set B. Each student must be assigned a grade and **can only be assigned ONE grade**, but more than one student can get the same grade (we hope so--we want lots of A's). The example shown on the previous screen had each student getting the same grade. That's okay.



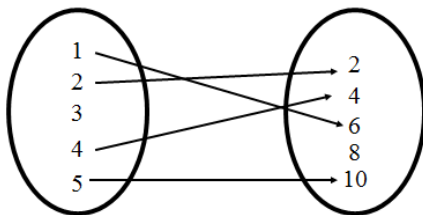
Is the relation shown above a function?

NO

Why not???

Student #2 was assigned both 85 and 99

Check this relation out to determine if it is a function.



Set A is the domain

Set B is the range

This is not a function--it doesn't assign each x with a y

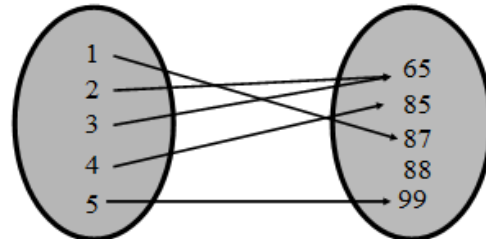
Must use all the x's

The x value can only be assigned to one y

It is not--3 didn't get assigned to anything
Comparing to our example, a student in math must receive a grade

Check this relation out to determine if it is a function.

This is fine--each student gets only one grade. More than one can get an A and I don't have to give any D's (so all y's don't need to be used).



Set A is the domain

Set B is the range

This is a function

Must use all the x's

The x value can only be assigned to one y

Notes: Function or Not a Function????

Determine which of the relations below are functions. Circle the correct answer.

Sets of Coordinates:

1) $\{(-2, 7), (-1, 5), (0, 3), (1, 1), (2, 1)\}$

Function or Not a Function

2) $\{(-7, 20), (3, 5), (0, 5), (-2, 0), (6, -4), (-6, -9), (4, 4)\}$

Function or Not a Function

3) $\{(4, 8), (-3, -2), (9, 6), (2, -1), (-4, -5), (2, 7), (-8, 0)\}$

Function or Not a Function

Tables of Values:

4)

x	y
0	-19
1	-12
2	-4
3	3
4	13
5	27

5)

x	y
-5	8
-3	8
-1	-2
1	-2
3	11
5	23

6)

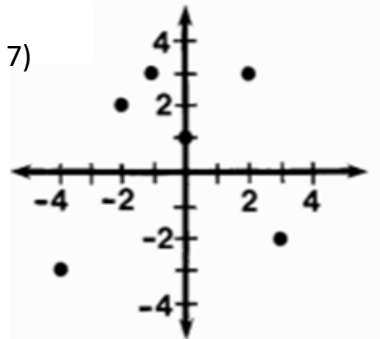
x	y
-2	-7
-2	5
0	-16
2	0
2	6

Function or Not a Function

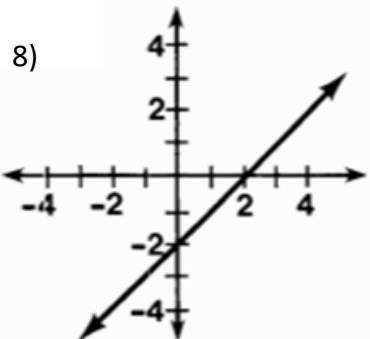
Function or Not a Function

Function or Not a Function

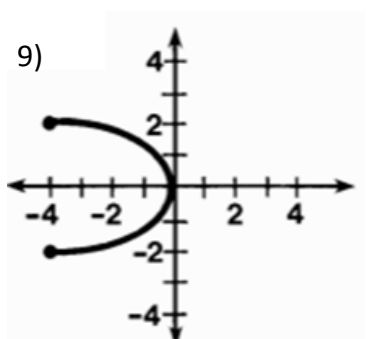
Graphs:



Function or Not a Function

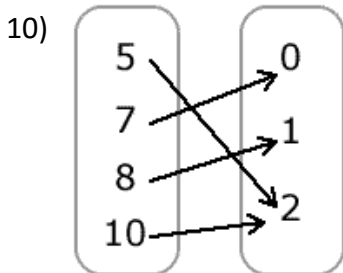


Function or Not a Function

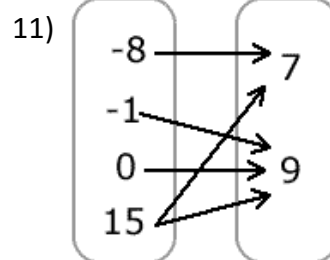


Function or Not a Function

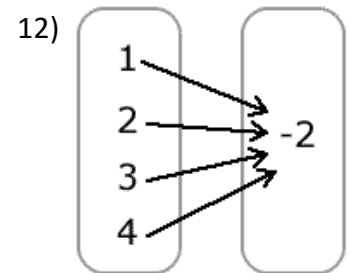
Mapping Diagrams:



Function or Not a Function



Function or Not a Function



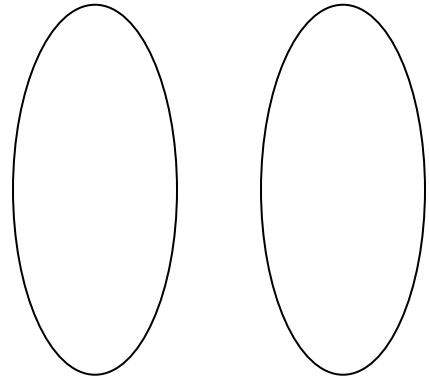
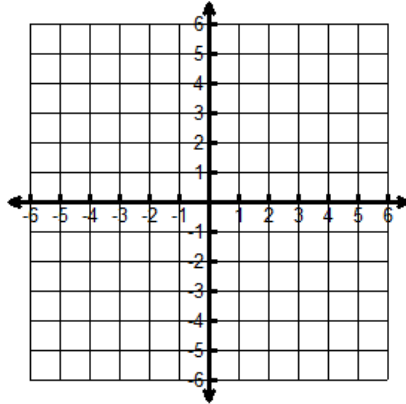
Function or Not a Function

More Notes: Representing Relations

Express the relation as a table, a graph, and a mapping. Then determine the domain and range. Determine whether each relation is a function.

13) $\{(-1, -1), (1, 1), (2, 5), (3, 2)\}$

x	y



Domain: _____ Range: _____ Function? _____

Homework: Function or Not a Function???

Determine which of the relations below are functions. Circle the correct answer.

1) $\{(1, -2), (-2, 0), (-1, 2), (1, 3)\}$ Function or Not a Function

2) $\{(1, 1), (2, 2), (3, 5), (4, 10), (5, 15)\}$ Function or Not a Function

3) $\left\{\left(17, \frac{15}{4}\right), \left(\frac{15}{4}, 17\right), \left(15, \frac{17}{4}\right), \left(\frac{17}{4}, 15\right)\right\}$ Function or Not a Function

4)

x	y
-5	-2
-4	-1
-3	0
-4	1
-5	2

5)

x	y
-5	-2
-4	-1
-3	0
-2	-1
-1	-2

6)

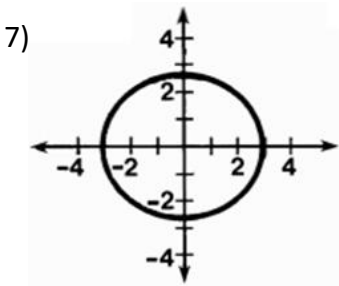
x	y
-5	-2
-4	-1
-3	0
-2	-1
-1	-2

Function or Not a Function

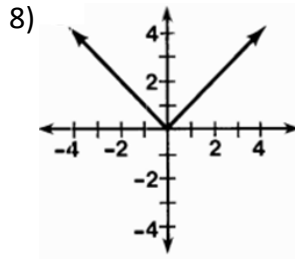
Function or Not a Function

Function or Not a Function

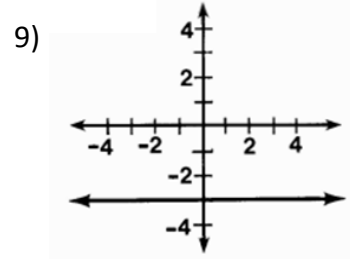
Homework is continued on the next page



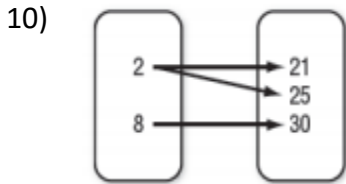
Function or Not a Function



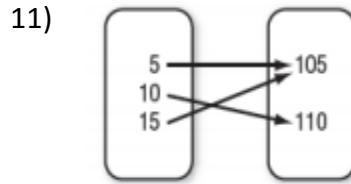
Function or Not a Function



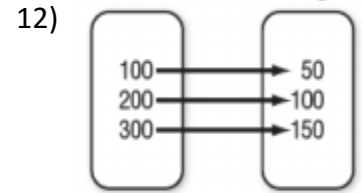
Function or Not a Function



Function or Not a Function



Function or Not a Function

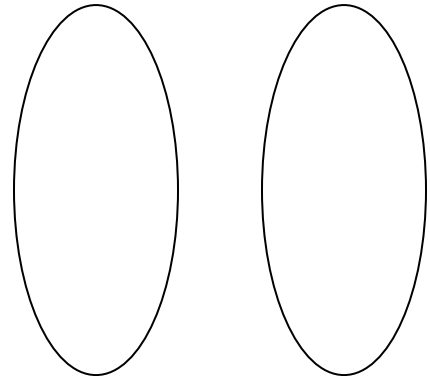
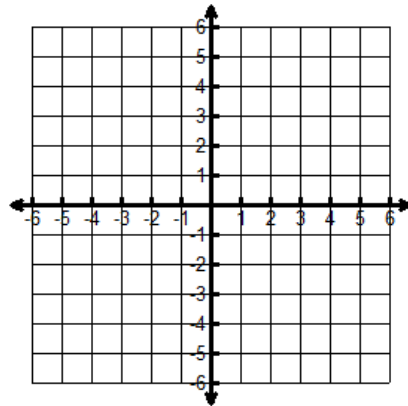


Function or Not a Function

Representing Relations: Express the relation as a table, a graph, and a mapping. Then determine the domain and range. Determine whether each relation is a function.

13) $\{(0, 4), (-4, -4), (-2, 3), (4, 0)\}$

x	y



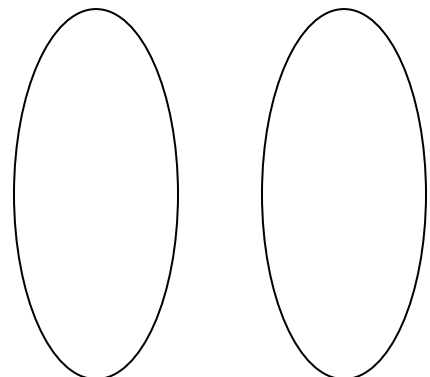
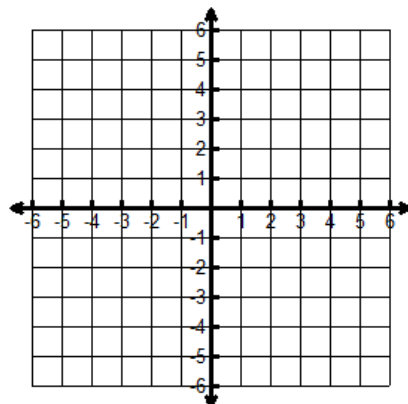
Domain: _____

Range: _____

Function? _____

14) $\{(3, -2), (1, 0), (-2, 4), (3, 1)\}$

x	y



Domain: _____

Range: _____

Function? _____

Definition of Function:
 A **function** is a relation in which each element of the domain is paired with exactly one element of the range.

Notes: Graphing Functions from an Equation

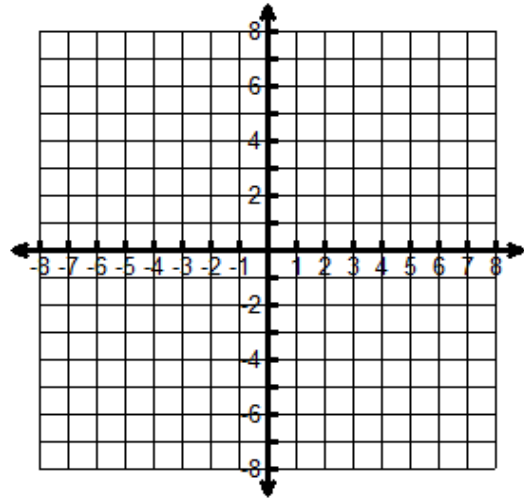
From a given rule for a relation, you can write a table of values.

Choose convenient x-values (domain or input).
 Evaluate for corresponding y-values (range or output).

1) Write a table of values and graph.

$y = 2x^2$

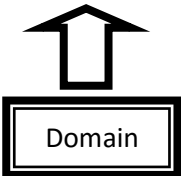
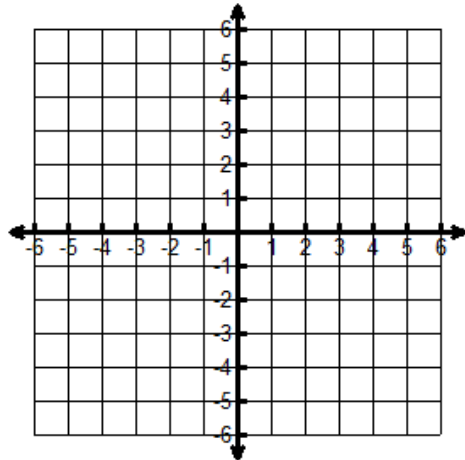
x	$2x^2$	y
-2	$2()^2 = 2() =$	
-1	$2()^2 = 2() =$	
0	$2()^2 = 2() =$	
1	$2()^2 = 2() =$	
2	$2()^2 = 2() =$	



2) Write a table of values and graph.

$y = -x^2$

x	$-x^2$	y
-2	$-()^2 =$	
-1	$-()^2 =$	
0	$-()^2 =$	
1	$-()^2 =$	
2	$-()^2 =$	

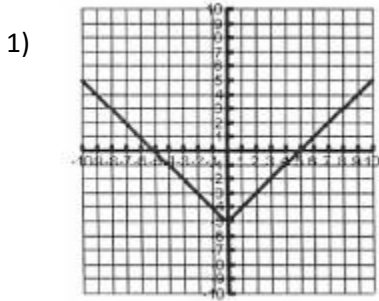


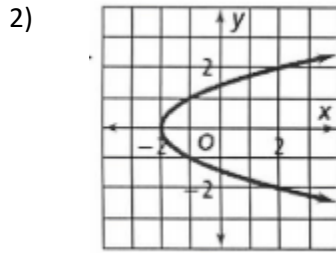
State the domain: _____

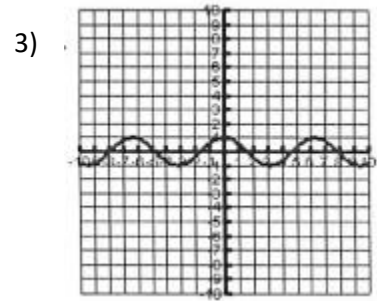
State the range: _____

Homework: Graphs of Functions:

Determine whether each relation is a function. (Write "function" or "not a function".)







4) $\{(4, 2), (2, 3), (6, 1)\}$

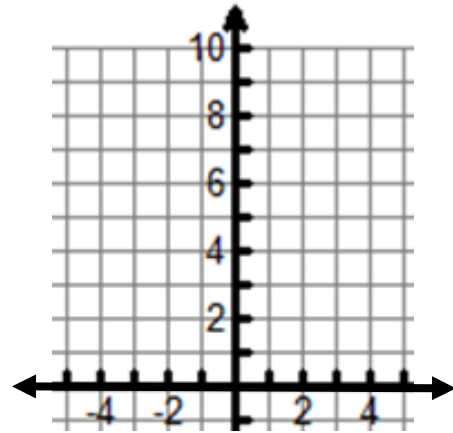
5) $\{(-3, -3), (-3, 4), (-2, 4)\}$

6) $\{(-1, 0), (1, 0), (3, 0)\}$

Complete the table and graph each function.

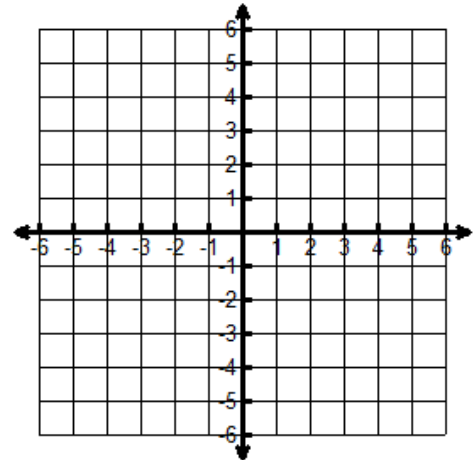
7) $y = -2x + 5$

x	$-2x + 5$	y
-2	$-2(-2) + 5 = 4 + 5 =$	9
-1		
0		
1		
2		

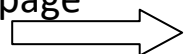


8) $y = x^2 - 4$

x	$x^2 - 4$	y
-2		
-1		
0		
1		
2		



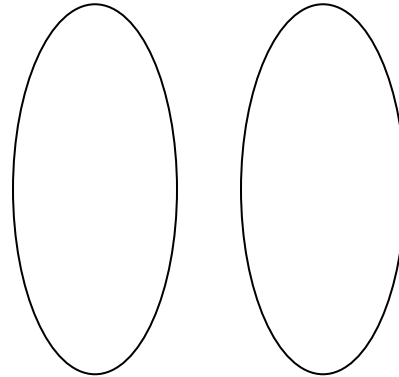
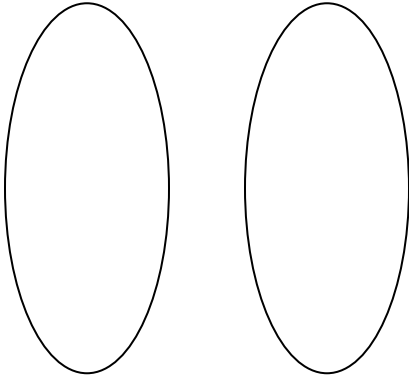
Homework is continued on the next page



Draw a mapping diagram of the set of ordered pairs.

9) $\{(1, 3), (5, 7), (8, 10), (14, 16)\}$

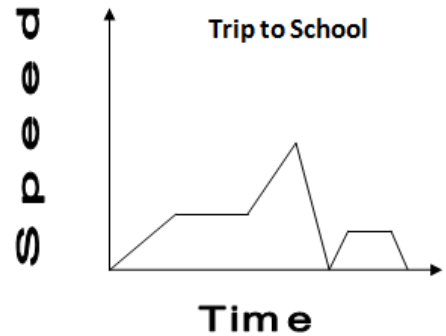
10) $\{(0, 10), (4, 6), (6, 4), (7, 3)\}$



11) The graph shows the speed a student travelled on the way to school.

a) What do the flat parts of the graph represent?

b) Circle the sections of the graph that show speed decreasing.



Review:

In Exercises 1-3, identify the domain and range of the relation.

Age (years)	Height (inches)
4	41
8	49
12	58
16	67

time (hours)	distance (miles)
0	60
4	120
8	240
12	480

time (years)	population
0	1000
5	1050
10	1100
15	1150

1. Domain: _____

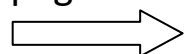
Range: _____

2. Domain: _____

Range: _____

3. Domain: _____

Range: _____

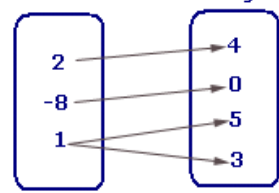


Determine whether each relation is a function. (Write "function" or "not a function".)

x	y
-1	10
-2	13
-3	16

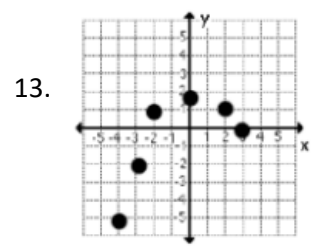
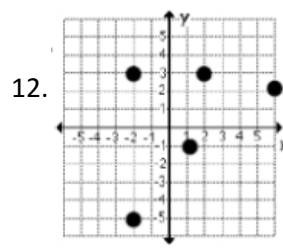
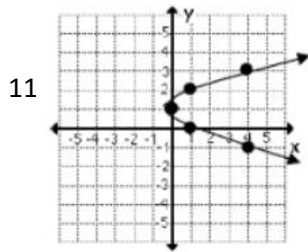
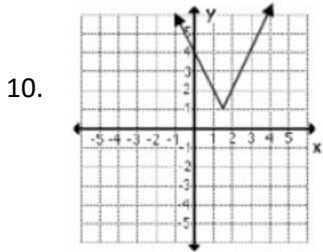
x	y
2	0
2	-1
3	-4

x	y
-1	1
-3	1
-5	1



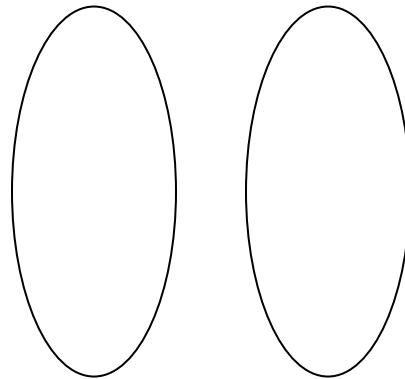
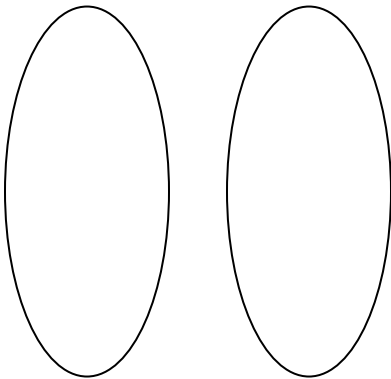
4. _____ 5. _____ 6. _____ 7. _____

8. $\{(7, 4), (6, 3), (5, 2)\}$ _____ 9. $\{(15, 0), (15, -2), (15, -4)\}$ _____



Complete a mapping diagram and then state if the relation is a function.

14. $\{(0, 11), (1, 8), (4, 15), (6, 19)\}$ _____ 15. $\{(1, 0), (2, 0), (3, 0), (4, 2), (5, 2)\}$ _____



16. The graph shows the relationship between time and total distance traveled by a teacher riding a bus.

a. What does the flat part of the graph represent?

b.) The first section of the graph is steeper than the last section. Was the bus traveling faster in the first part of the trip or the last?

