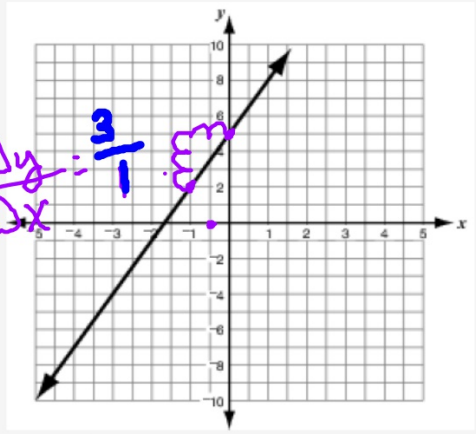
11. The graph of function 1 and the equation of function 2 are shown below



slope

$m = \frac{\Delta y}{\Delta x} = \frac{3}{1}$

Function 1:

Function 2: $y = -4x - 1$

$m = -4$

Which statement is **true** of function 1 and function 2?

A. Function 2 has a greater rate of change because the slope of function 1 is -1 and the slope of function 2 is 5.

B. Function 1 has a greater rate of change because the slope of function 1 is 5 and the slope of function 2 is -1.

C. Function 2 has a greater rate of change because the slope of function 1 is -4 and the slope of function 2 is 3.

D. Function 1 has a greater rate of change because the slope of function 1 is 3 and the slope of function 2 is -4.

12. Which equation represents a linear function?

A. $y = \frac{1}{x}$ denominator

B. $y = x$

C. $y = \frac{1}{x^2}$

D. $y = x^2$

13. If the coordinates from each table are graphed, which will form a linear pattern?

Constant rate of change

A.

x	y
−1	2
0	4
1	8
2	16

+1, +1, +2, +4

B.

x	y
2	2
3	1
4	2
5	3

+1, +1, +1, −1, +1

C.

x	y
3	7
5	8
6	10
8	13

+2, +1, +1, +2, +2, +3

D.

x	y
2	5
4	6
6	7
8	8

+2, +1, +2, +1, +2, +1

14. Which equation represents a linear function?

A. $y = -3x^2 + 9$

B. $y = (3x^2)9$

C. $y = 3x + 9$

D. $y = \frac{3}{x} + 9$

denominator

15. In which table is y a nonlinear function of x?

not a constant rate

A.

x	y
3	-2
3	0
3	4
3	5
3	8

not a function

C.

x	y
6	4
4	2
2	0
4	-2
6	-4

B.

x	y
6	4
4	2
2	0
0	2
-2	4

-2 -2 -2 -2

-2 -2 +2 +2

constant

D.

x	y
-3	4
-2	5
-1	6
0	7
1	8

+1 +1 +1 +1

+1 +1 +1 +1

16. Which is a nonlinear function?

A. $f(x) = \frac{x}{3} + 5$

B. $f(x) = \sqrt{x}$

C. $f(x) = x + 2$

D. $f(x) = 3x - \frac{2}{3}$

17. In which table is y a linear function of x?

constant rate of change

A.

x	y
0	10
2	6
4	4
6	2

B.

x	y
-2	-2
0	4
2	10
4	16

+2, +2, +2 ; +6, +6, +6

C.

x	y
-4	2
-2	5
0	7
2	12

18. Which of the following tables represents a linear relationship between x and y?

A.

x	2	5	8	11
y	1	2	4	8

B.

x	2	5	8	11
y	–1	0	2	5

C.

x	2	5	8	11
y	–4	1	2	3

+3 +3 +3

D.

x	2	5	8	11
y	–4	–2	0	2

+2 +2 +2

$m = \frac{y_2 - y_1}{x_2 - x_1}$

19. What is the slope of the line that passes through the points (2, −3) and (−2, 5)?

$-(-2, 5)$

$4 \quad -8$

A. 2

B. $\frac{1}{2}$

C. $-\frac{1}{2}$

D. −2

$m = \frac{-8}{4}$

$m = -2$

b

20. Barry collects comic books. He currently has 350 comic books and plans to buy 10 comic books each month. Which equation represents the total number of comic books, c, that Barry will have after m months?

slope

A. $c = 350m + 10$

B. $c = 10(m) + 350$

C. $c = 350(10) + m$

D. $c = 350 + 10$

21. Which equation represents the relationship between m and d on the chart below?

x	m	2	4	6	8
y	d	$\frac{1}{3}$	$\frac{2}{3}$	1	$1\frac{1}{3}$

+2 +2 +2

$+\frac{1}{3}$ $+\frac{1}{3}$ $+\frac{1}{3}$

$m = \frac{\Delta y}{\Delta x} = \frac{\frac{1}{3}}{2} = \frac{1}{3} \div \frac{2}{1}$

$= \frac{1}{3} \cdot \frac{1}{2}$

$= \frac{1}{6}$

A. $d = 0.06m$

B. $d = \frac{1}{6}m$

C. $d = 0.6m$

D. $d = 6m$

22. The equation $y = 50x + 30$ represents the amount of money, y, in Amy's savings account over time, x. The equation $y = 30x + 50$ represents the amount in Sally's savings account. How does the graph of Sally's account differ from the graph of Amy's account?

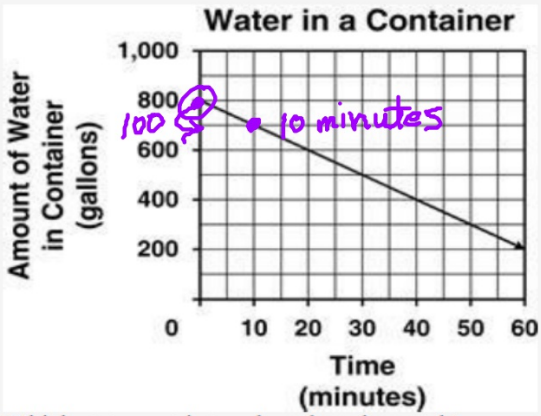
A. The graph representing Sally's account starts lower on the y-axis.

B. The graph representing Sally's account starts closer to the origin.

C. The graph representing Sally's account is steeper.

D. The graph representing Sally's account is flatter.

23. The graph models the amount of water in a container that is being pumped out at a constant rate.



Which statement is true based on the graph?

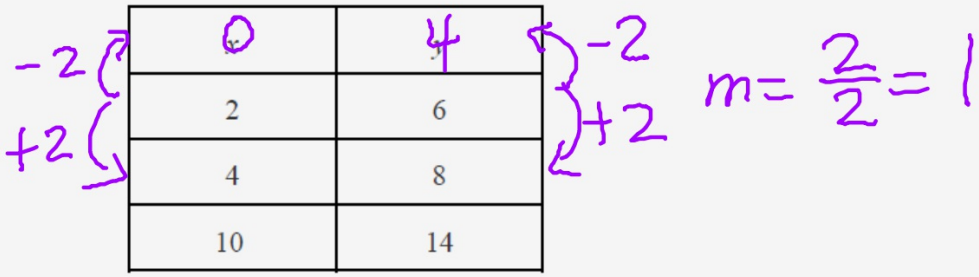
A. There are 200 gallons of water in the container at the start, and the water is being pumped from the container at a rate of 30 gallons per minute.

B. There are 200 gallons of water in the container at the start, and the water is being pumped from the container at a rate of 100 gallons per minute.

C. There are 800 gallons of water in the container at the start, and the water is being pumped from the container at a rate of one gallon every 6 minutes.

D. There are 800 gallons of water in the container at the start, and the water is being pumped from the container at a rate of 100 gallons every 10 minutes.

24. Which equation fits the data in the table below?



x	y
0	4
2	6
4	8
10	14

-2 $+2$ -2 $+2$ $m = \frac{2}{2} = 1$

A. $y = 3x$

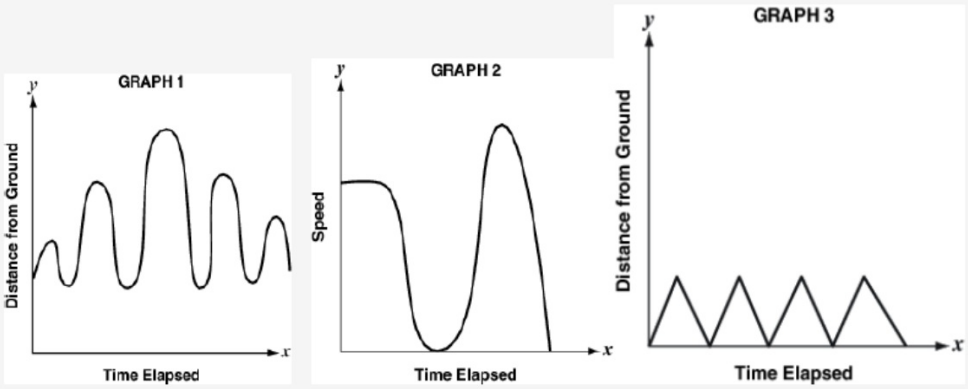
B. $y = 2x + 2$

C. $y = x + 4$

25. Samantha takes her sister Bethany to the playground. While they are there, they do the following activities:

- Bethany rides on the seesaw.
- Samantha pushes Bethany on the swing.
- Bethany climbs up the ladder and slides down the slide.

When they get home, Samantha and her dad make qualitative graphs to show the activities Bethany did. The graphs are shown below.



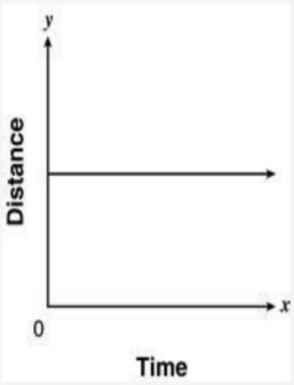
Part A. Which graph represents Bethany's ride on the seesaw? Explain or show your reasoning. Graph 3

Part B. Which graph represents Bethany's ride on the swing? Explain or show your reasoning. Graph 1

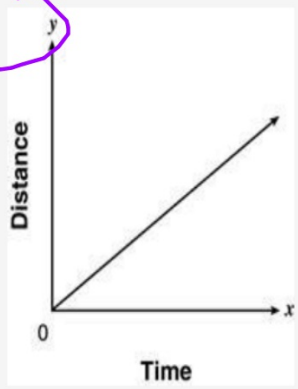
Part C. Which graph represents Bethany's ride on the slide? Explain or show your reasoning. Graph 2

26. Which graph represents the movement of a train whose distance from a starting point changes at a constant rate?

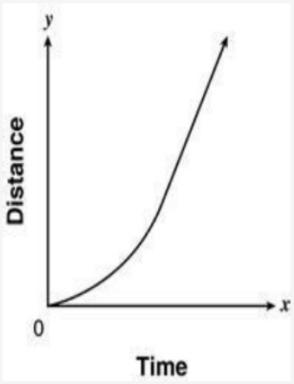
A.



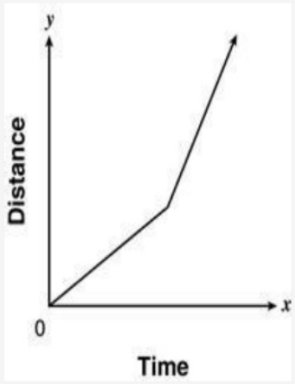
C.



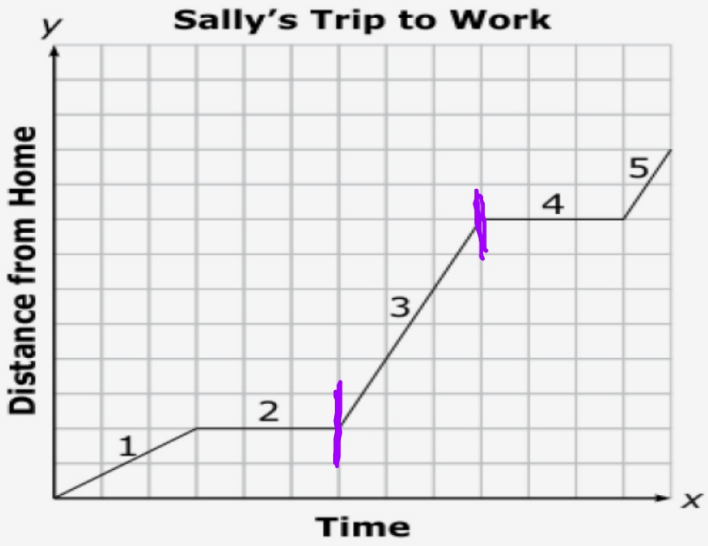
B.



D.



27. The graph below details Sally's daily trip to work.



Which is the *best* scenario for part 3 on the graph?

A. Sally is waiting at a stop light.

B. Sally is driving on an incline at a constant rate.

C. Sally is driving on a highway at a constant rate.

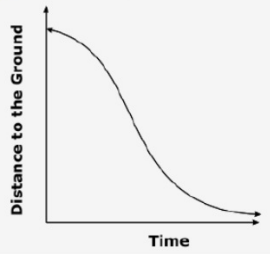
D. Sally is speeding up then slowing down through a neighborhood.

28. A parachutist will be jumping out of a plane that is in the air at a high altitude. Which graph *best* displays the journey of a parachutist to the ground?

A.

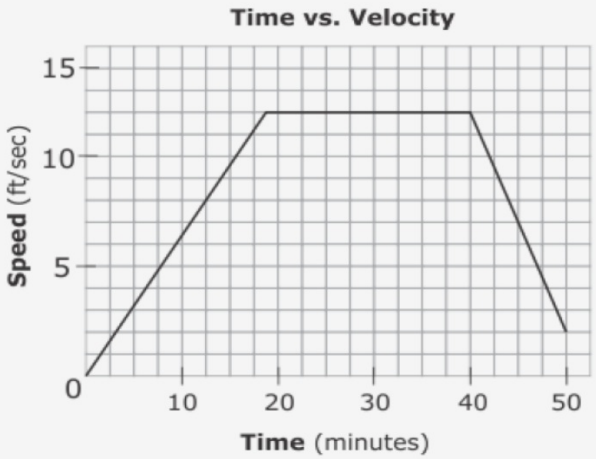
C.

B.



D.

29. The graph below shows time vs. velocity over a 50-minute period of time.



D

Which scenario would be *best* represented on the graph?

A. An object increases speed and then loses speed.

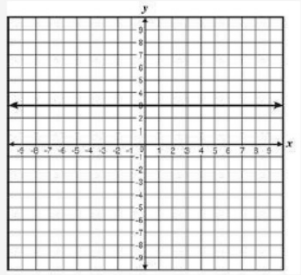
B. An object continues to move away from a starting point.

C. An object moves away from a starting point and then begins to come back.

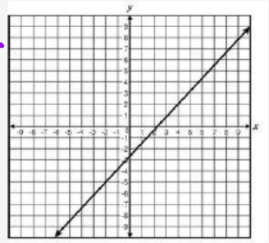
D. An object increases speed, then moves at a constant rate, and then loses speed.

30. Which graph best represents a nonlinear function?

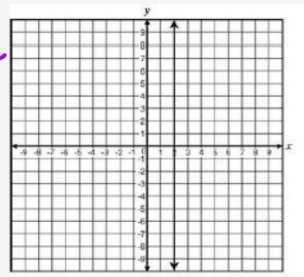
A.



C.

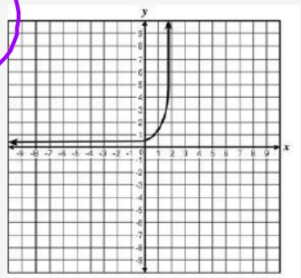


B.



not a function

D.



Homework:
Signed note from parents

~~Word Problems~~ 15 problems

3 each from

1. Linear vs. Non-Linear
2. Function vs. Not a function
3. Comparing Functions (m or b)
4. Interpreting Graphs
5. Writing Equations (two points, point & m)

Word Problems

Example 1:
"Mark is purchasing a new computer. The cost of the computer is $2400 after tax. He will make monthly payments of $150. Write an equation which describes the balance on the account after any given number of months"

Example 2:
"Mr. Fellow bought a refrigerator that cost $1200 including tax. The cost of electricity to run the refrigerator is estimated at $63 per year. Write an equation which represents the total cost of operation".

Example 3:
"Vicki works as a sales associate in a department store. She earns $6 per hour, plus a commission of 3% on her sales. Write an equation which describes her total earnings".

Example 4:
"Passengers on a commercial flight are able to make in-flight calls using the built-in telephone system. The calls cost $3 to connect plus $1.85 each minutes. Write an equation the represents the total cost t, to make a call which lasts n number of minutes."

Name _____ Date _____

Word problems involving rate of change

1. When the dependent variable increases when the independent variable increases, the rate of change is (Positive, negative, zero, undefined) circle one.

2. When the dependent variable stays the same as the independent variable increases, the rate of change is (Positive, negative, zero, undefined) circle one.

3. When the dependent variable decreases as the independent variable increase, the rate of change is (Positive, negative, zero, undefined) circle one.

4. When the dependent variable increase as the independent variable stays the same, the rate of change is (Positive, negative, zero, undefined) circle one.

Find the slope of a line that has these points

14. (8,2) and (11,3)

15. (8,0) and (8, 6)

Find the rate of change
(Hint: word problems are $\frac{\text{units}}{\text{time}}$ Identify what you are given and determine the unit and the time.)
Write the ordered pair (time, units).

5.

X	Y
20	35
25	40

6. A climber is on a hike. After 2 hours he is at an altitude of 400 feet. After 6 hours, he is at an altitude of 700 feet. What is the average rate of change?

7. A scuba diver is 30 feet below the surface of the water 10 seconds after he entered the water and 100 feet below the surface after 40 seconds. What is the scuba divers rate of change?

8. A rocket is 1 mile above the earth in 30 **seconds** and 5 miles above the earth in 2.5 **minutes.** What is the rockets rate of change in miles per second? What about miles per minute.

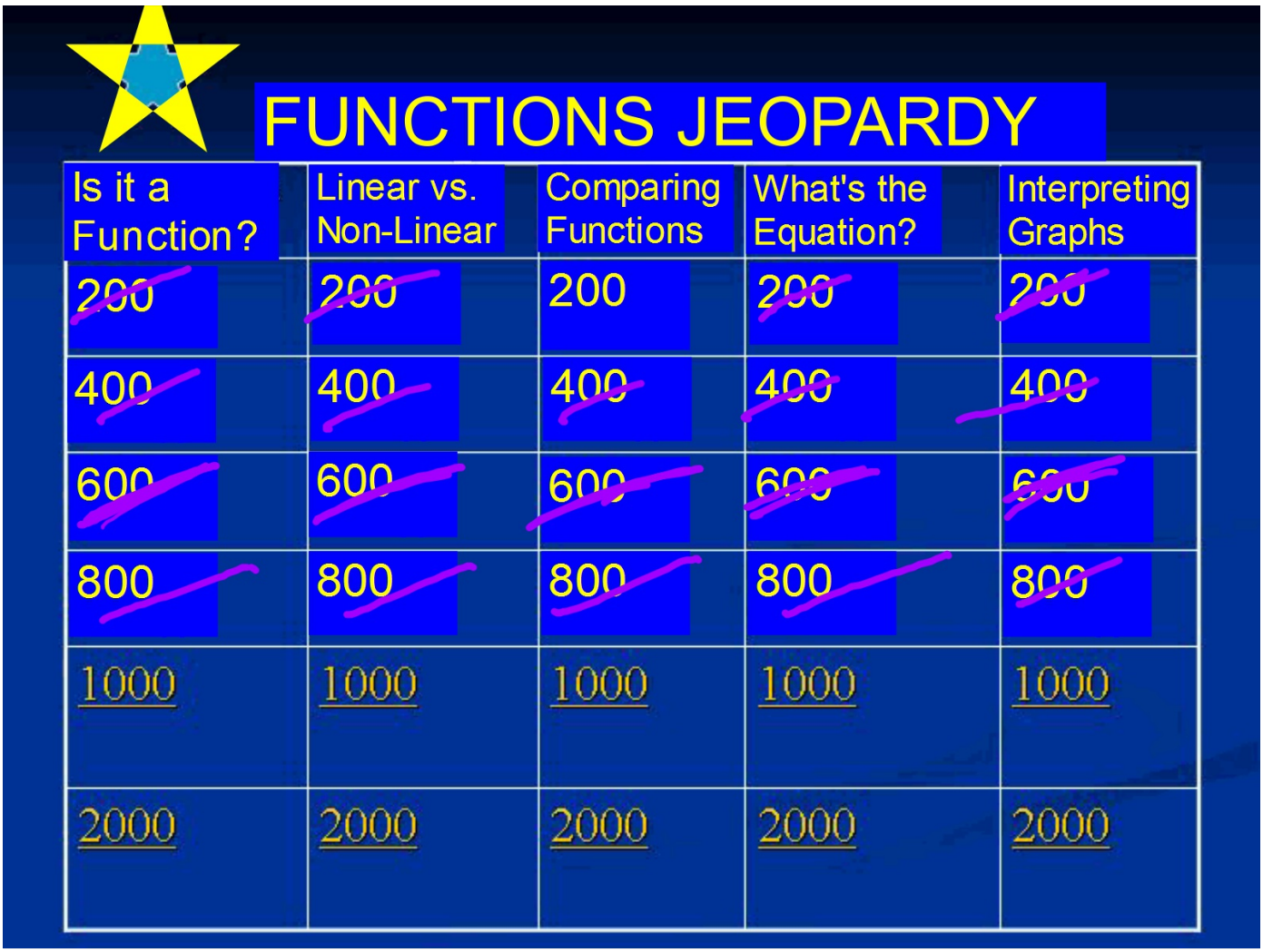
9. A teacher weighed 145 lbs in 1986 and weighs 190 lbs in 2007. What was the rate of change in weight?

10. Over the last 50 years, the average temperature has increased by 2.5 degrees worldwide (I made this up). What is the rate of change in worldwide temperatures per year?

11. Michael started a savings account with $300. After 4 weeks, he had $350 dollars, and after 9 weeks, he had $400. What is the rate of change of money in his savings account per week?

12. A plane left Chicago at 8:00 A.M. At 1: P.M., the plane landed in Los Angeles, which is 1500 miles away. What was the average speed of the plane for the trip?

13. After 30 baseball games, A-Rod had 25 hits. If after 100 games he had 80 hits, what is his average hits per baseball game.


FUNCTIONS JEOPARDY
Is it a Function?
Linear vs. Non-Linear
Comparing Functions
What's the Equation?
Interpreting Graphs
200
400
600
800
1000
2000

Category 1
200

Which of the following relations is a function?

A. $\{(-1, -4), (-1, 0), (-1, 5), (-1, 7), (-1, 9)\}$

B. $\{(-2, -4), (-1, 7), (1, -1), (1, 1), (3, 9)\}$

C. $\{(-4, 9), (-3, 1), (-2, 3), (-2, 12), (0, 6)\}$

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

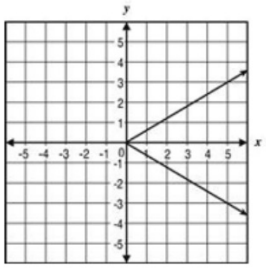
Category 1
200

D

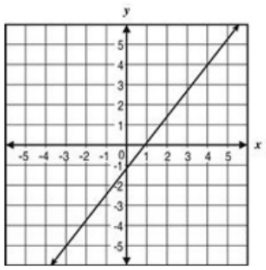
Category 1
400

Which relation is a function?

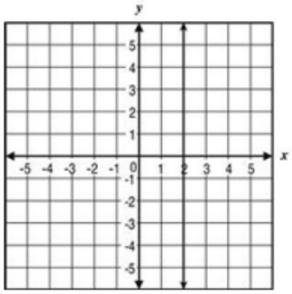
A.



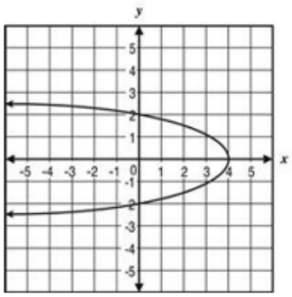
B.



C.



D.



Category 1
400

B

Category 1
600

Which equation does *not* represent a function?

A. $y = x + 5$

B. $y = x^2 + 3$

C. $y^2 = x + 4$

Category 1
600

C

Category 1
800

Which of the equations shown below represents a function?

Equation 1 : $y = x^2 + 2x + 9$

Equation 2 : $x = 9 - y^2$

A. Only 1

B. Only 2

C. Both 1 and 2

D. Neither 1 nor 2

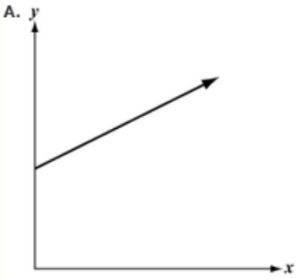
Category 1
800

A

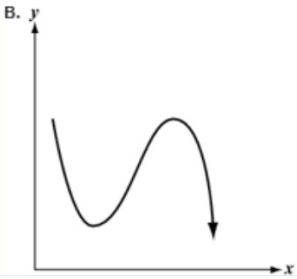
Category 2
200

Which graph represents a linear function?

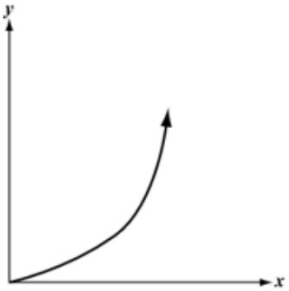
A.



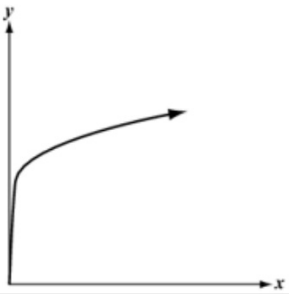
B.



C.



D.



Category 2
200

A

Category 2
400

Which numerical pattern is a linear progression?

A. $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \ldots$

B. 1, 3, 7, 13, . . .

C. −10, −20, −40, −80, . . .

D. 18, 26, 34, 42, . . .

Category 2
400

D

Category 2
600

Which equation represents a linear function?

A. $y = \frac{1}{x}$

B. $y = 2x - 3$

C. $y = 5x^3 + 8$

D. $y = x^2 + 2x + 1$

Category 2
600

B

Category 2
800

Which set of ordered pairs is linear?

A. $\{(-2, 3), (-1, 6), (0, 12)\}$

B. $\{(3, -1), (5, -3), (10, -10)\}$

C. $\{(-1, 0), (2, -3), (5, -6)\}$

Category 2
800

C

Category 3
200

The equation of function J is $y = x - 1$. The table below shows some points of function K.

x	y
4	1
6	2
8	3

Which is true about the two functions?

A. The slope of function J is greater than the slope of function K.

B. The y-intercept of function J is greater than the y-intercept of function K.

C. The slopes of functions J and K are the same.

Category 3
200

A

Category 3
400

Function 1 and function 2 can be represented as shown below.

Function 1: $y = -3x + 2$

Function 2:

x	0	1	2	3	4
y	3	1	−1	−3	−5

Which statement **correctly** compares the rates of change of functions 1 and 2?

A. The slope of function 1 is -3, and the slope of function 2 is 2, so function 2 is changing at a faster rate.

B. The slope of function 1 is 2, and the slope of function 2 is 3, so function 2 is changing at a faster rate.

C. The slope of function 1 is -3, and the slope of function 2 is -2, so function 1 is changing at a faster rate.

D. The slope of function 1 is -2, and the slope of function 2 is -3, so function 1 is changing at a faster rate.

Category 3
400

C

Category 3
600

Pete's Plumbing charges a flat fee of $28 for a house call and inspection and an additional $35 per hour for any onsite work. Which table represents a cost function with a greater hourly rate than these charges?

A.

Hours Worked	Total Charge (in dollars)
3	109
5	163
7	217

B.

Hours Worked	Total Charge (in dollars)
3	136
5	208
7	280

C.

Hours Worked	Total Charge (in dollars)
6	174
9	261
12	348

D.

Hours Worked	Total Charge (in dollars)
6	209
9	296
12	383

Category 3
600

B

Category 3
800

Two different fitness centers charge a one-time membership fee, plus a monthly charge to use the facilities. Fitness center A charges a membership fee of $100, plus $45 per month. The table below shows the cost of fitness center B after a certain number of months of use.

Fitness Center B

Months	Cost for Members
1	$117
3	$221
5	$325

What is the difference between the membership fees at the 2 fitness centers?

A. $17

B. $20

C. $35

D. $48

Category 3
800

C

Category 4
200

Which is an equation of the relation shown in the table below?

r	s
-2	1
-1	2
0	3
1	4
2	5

A. $r = 3s$

B. $r = s + 3$

C. $s = 3r$

D. $s = r + 3$

Category 4
200

D

Category 4
400

Which equation represents the relationship between x and y in the table below?

x	y
0	1
2	2
4	3
6	4

A. $y = x + 1$

B. $y = \frac{1}{2}x + 1$

C. $y = x - 2$

D. $y = -\frac{1}{2}x + 1$

Category 4
400

B

Category 4
600

A phone company offers a mobile phone plan for a monthly fee of \$19.95 plus \$0.05 for each minute used during the month. Which equation below best represents the cost, y, for one month when x minutes are used?

A. $y = 0.05x$

B. $y = 0.05x + 19.95$

C. $y = 19.95x$

D. $y = 19.95x + 0.05$

Category 4
600

B

Category 4
800

Which is an equation of the line that goes through the points $(-2, -2)$ and $(1, 7)$?

A. $y = 3x - 8$

B. $y = 3x + 4$

C. $y = \frac{1}{3}x - 8$

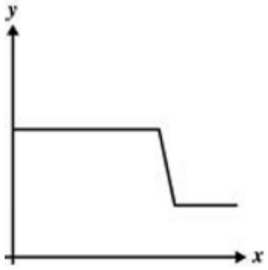
D. $y = \frac{1}{3}x + 4$

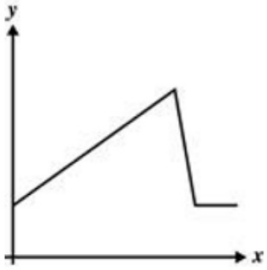
Category 4
800

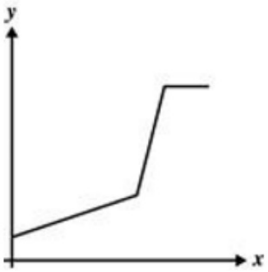
B

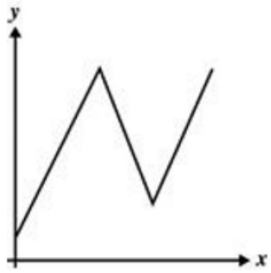
Category 5
200

The value of a sculpture steadily increased for several years and then dropped sharply. It then continued to remain at its lowest value. Which graph best represents the value of the sculpture over these years?

A. 

B. 

C. 

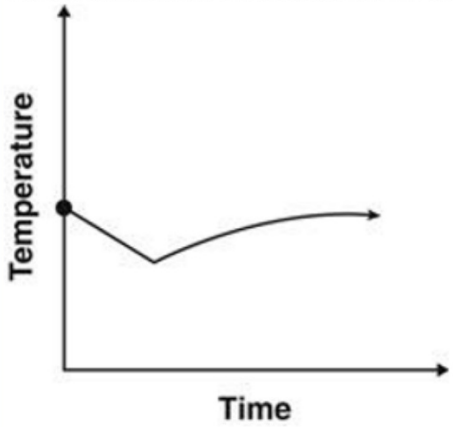
D. 

Category 5
200

B

Category 5
400

Which situation is best illustrated in the graph?



A. Timmy puts his drink in the refrigerator, removes it, and places it in the freezer.

B. Tonya puts her drink in the microwave, heats it, and then drinks it very slowly.

C. Lindsey sets her drink on the table and it warms to room temperature.

D. Michael puts ice in his drink and then drinks it very slowly.

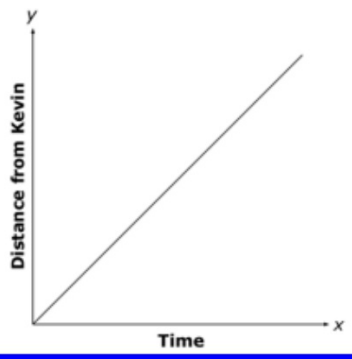
Category 5
400

D

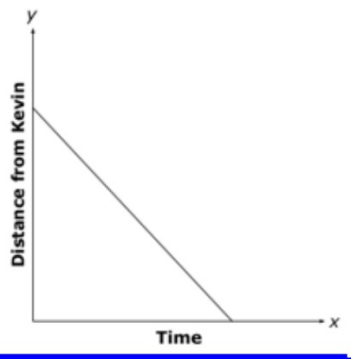
Category 5
600

Kevin was playing fetch with his dog in a field. Kevin threw a stick. The dog ran to get the stick, paused, and then brought it back to Kevin. Which graph *best* represents the dog's distance from Kevin for this event?

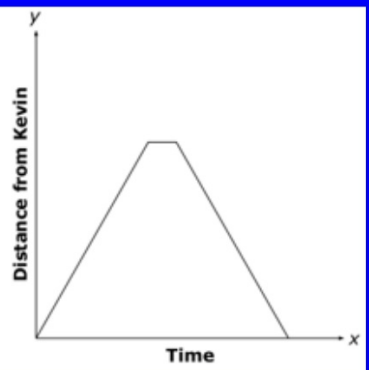
A.



C.



B.



Category 5
600

B

Category 5
800

At the beginning of each month, Patrick restocked his store to make sure he had a total of 25 backpacks available for sale. The graph below shows the number of backpacks he had not sold each month.

Which statement best describes the horizontal segment of the graph in Months 7 through 12?

A. The rate of sales was 25 backpacks per month.

B. The rate of backpacks not sold was 25 per month.

C. There was an increase of 5 backpacks sold per month.

D. There was an increase of 5 backpacks not sold per month.

Category 5
800

B