Honors Integrated Math 1 – **Worksheet 1.1** **Name** _____ Block _____

A Picture Is Worth a Thousand Words

Understanding Quantities and Their Relationships

Read each scenario and identify the independent and dependent quantities. Be sure to include the appropriate units of measure.

1. **Endangered Species:** The Elkwood Aquatic Society is working with various reptile species to increase their populations. In their latest effort, the initial population of 450 endangered turtles tripled each year for the past five years.
   - Independent quantity:
   - Dependent quantity:

2. **Video Games:** Gillian is playing video games at an arcade. Gillian starts with $40 and is playing games that cost 50 cents per game.
   - Independent quantity:
   - Dependent quantity:

3. **Commuter Flight:** A commuter flight between two cities in Oregon takes about 40 minutes. The plane will increase its altitude for the first half of the flight until it gets to 18,000 feet, and then is will descend for the second half of the flight. The plane ascends and descends at a constant rate of 900 feet per minute.
   - Independent quantity:
   - Dependent quantity:

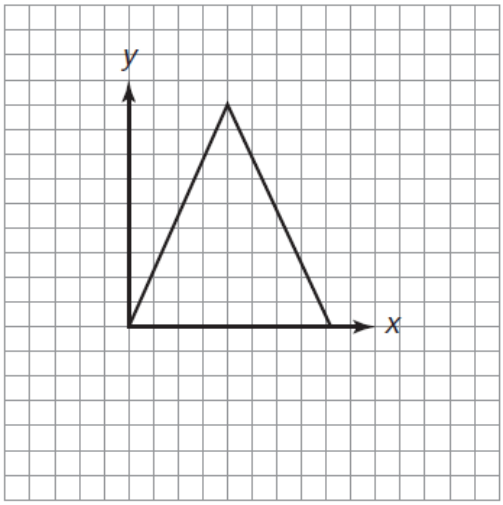
4. **Sales Commission:** Julian works as a salesman for a textbook company. He receives a monthly salary of $3000 as well as a 10% commission on the amount of sales.
   - Independent quantity:
   - Dependent quantity:

5. **Cooling Tea:** A freshly made cup of tea is served at a temperature of about 180°F. The tea cools rapidly at first, and then slows down gradually as it approaches room temperature.
   - Independent quantity:
   - Dependent quantity:

6. **Cross Country:** Brady runs for his high school cross country team. His strategy for each 5-kilometer race is always the same. He begins by increasing his speed so that by the time he reaches the first kilometer, he is running at a speed of 0.3km/min. He then maintains that speed for the next 2 kilometers. He then gradually speeds up for the remaining 2 kilometers so that when he crosses the finish line, he is running at a speed of 0.5 km/min.
   - Independent quantity:
   - Dependent quantity:

For 7 thru 12: Analyze each graph and determine **which of the six scenarios above it models**. For each graph, label the x- and y-axis with the appropriate quantity and unit of measure.

7.



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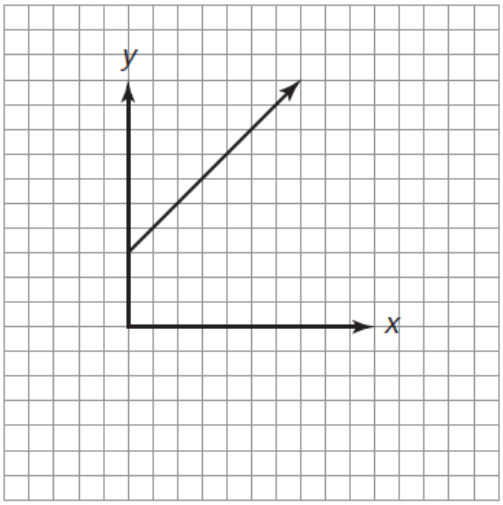

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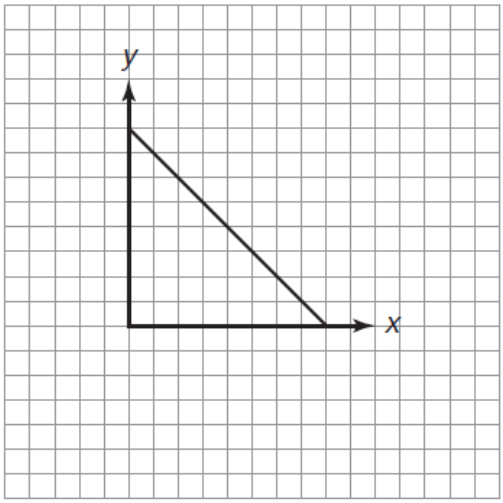

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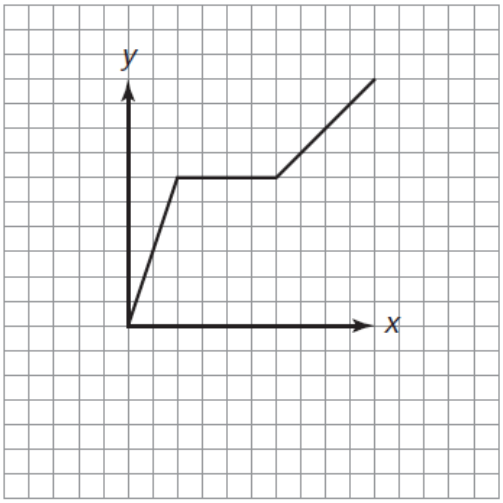
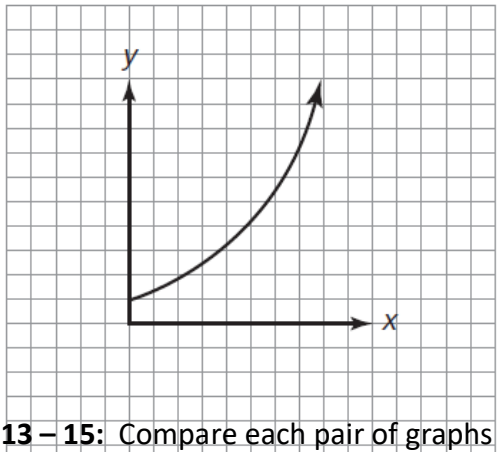
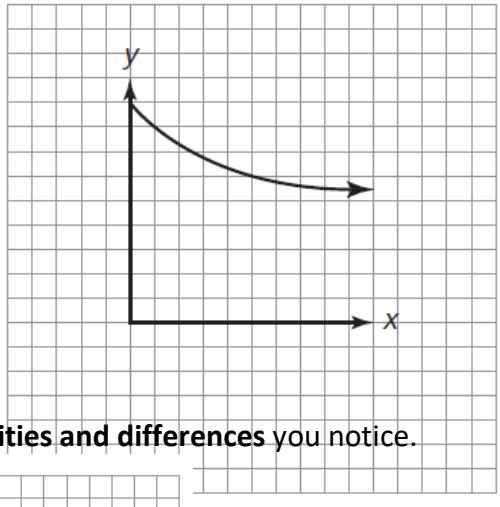


11.

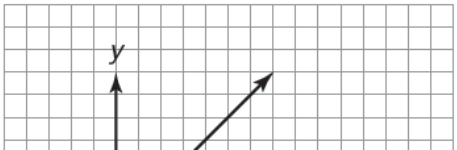


12.



For 13 – 15: Compare each pair of graphs and describe **any similarities and differences** you notice.

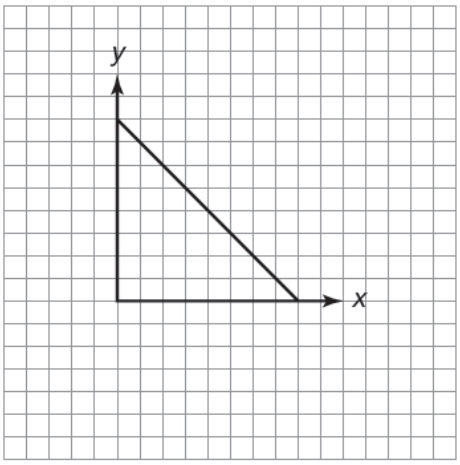
13.

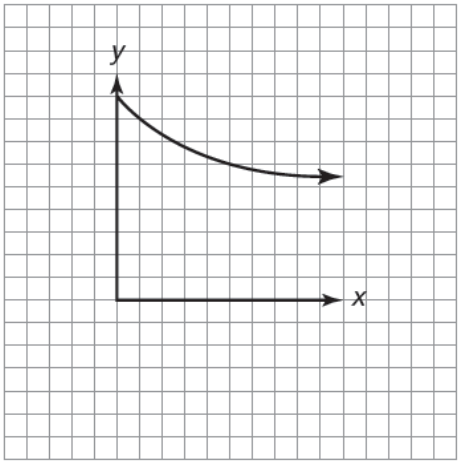


Similarities:

Differences:

14.

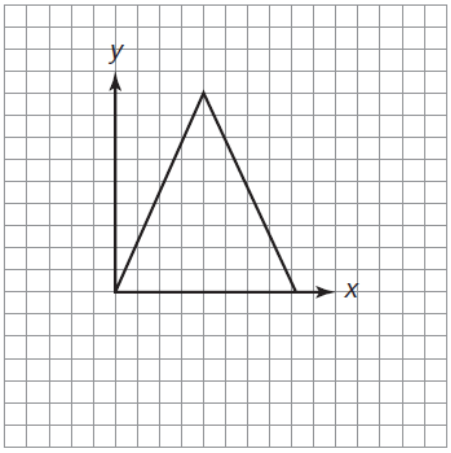


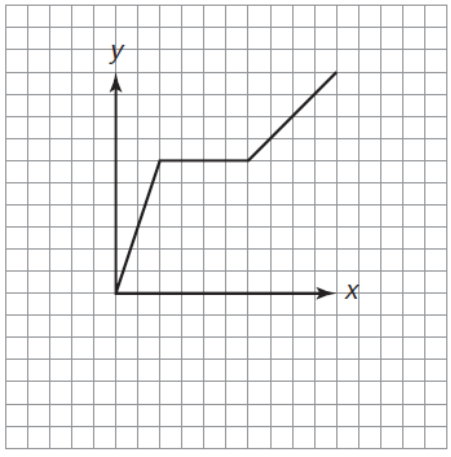


Similarities:

Differences:

15.





Similarities:

Differences:

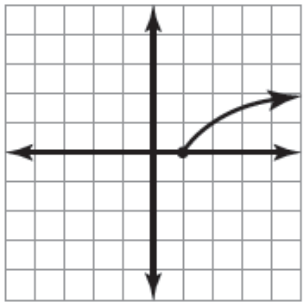
Honors Integrated Math 1 – **Worksheet 1.2** **Name** _____ Block _____

A Sort of Sorts

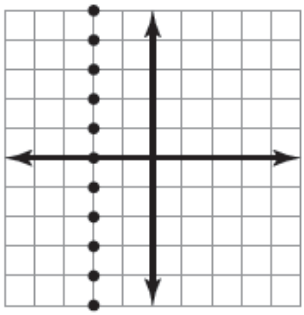
Analyzing and Sorting Graphs

List all graphs that match the characteristics provided in each question on the back.

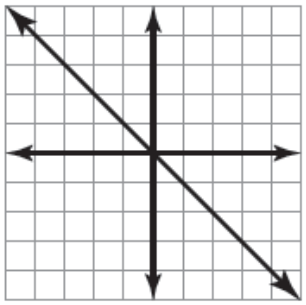
A.



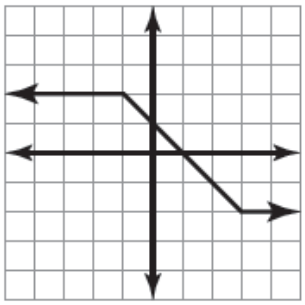
B.



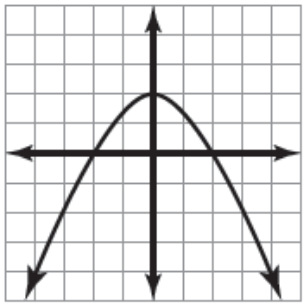
C.



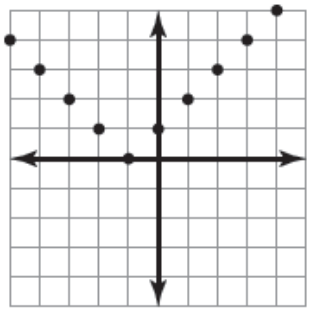
D.



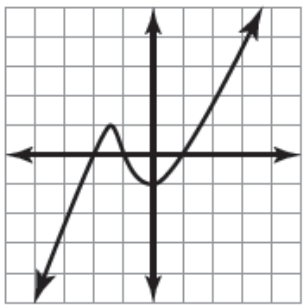
E.



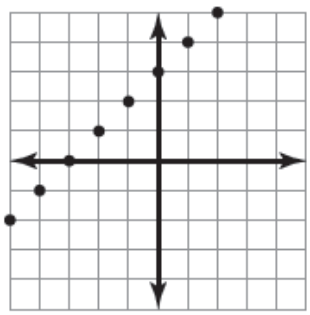
F.



G.



H.



1. Classify each graph as continuous or discrete.

Continuous:

Discrete:

2. Classify each graph as a function or non-function.

Functions:

Non-functions:

3. Identify the linear functions.

4. Identify the functions that show vertical symmetry.

5. Identify the functions that show horizontal symmetry.

6. Identify the graphs that pass through exactly one quadrant.

7. Identify the graphs that pass through all four quadrants.

Honors Integrated Math 1 – **Worksheet 1.3** **Name** _____ Block _____

Function Families for 200, Alex…

Recognizing Functions by Characteristics

1. Complete the table to describe each scenario and its graph.

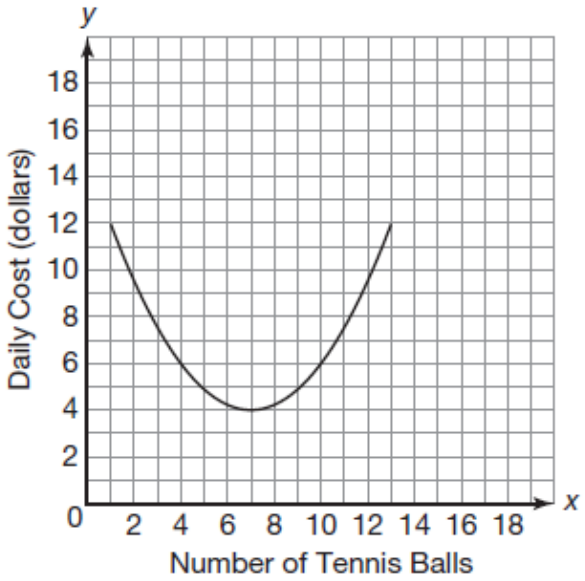
a. Identify the appropriate function family.

b. Based on the problem situation, identify whether the data values represented in the graph are discrete or continuous.

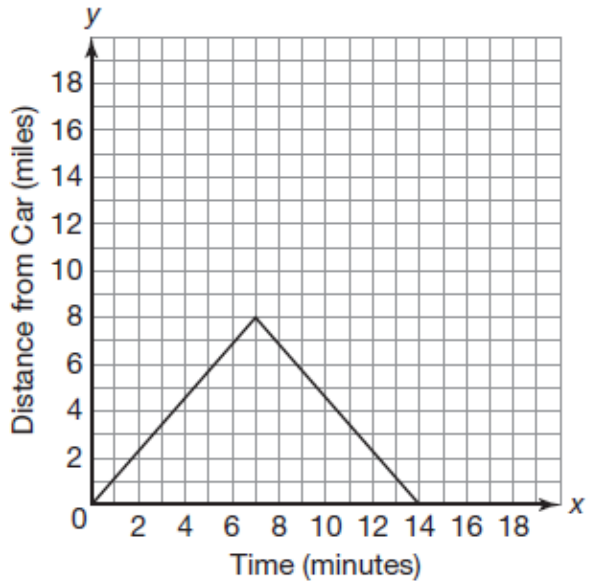
c. Identify the graphical behavior of the function that models the scenario based on the characteristics of its function family.

Scenario	Function Family	Domain: Discrete or Continuous	Graphical Behavior	
			Absolute Minimum or Absolute Maximum	**Increasing, Decreasing, or Combination**
	Exponential Function			
		Discrete		Combination of decreasing and constant
			Absolute Minimum	Combination of decreasing and increasing
	Linear Function			
Scenario 2				

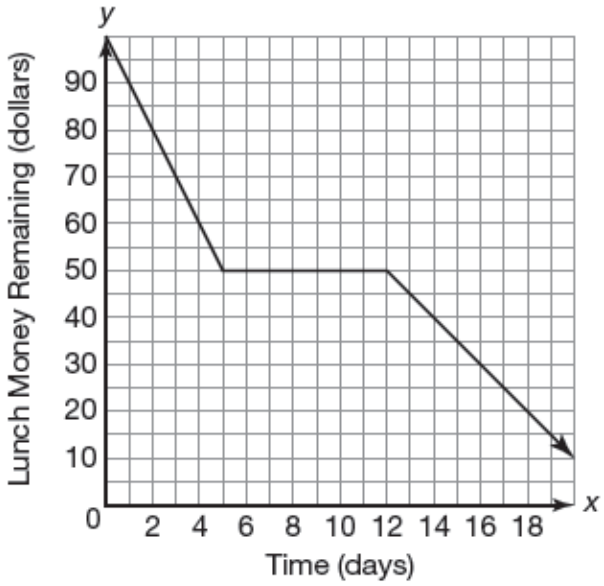
Scenario 1: A manufacturing company finds that the daily costs associated with making tennis balls is high if they don't make enough balls and then becomes high again if they make too many balls. The function graphed models the daily costs of making x tennis balls.



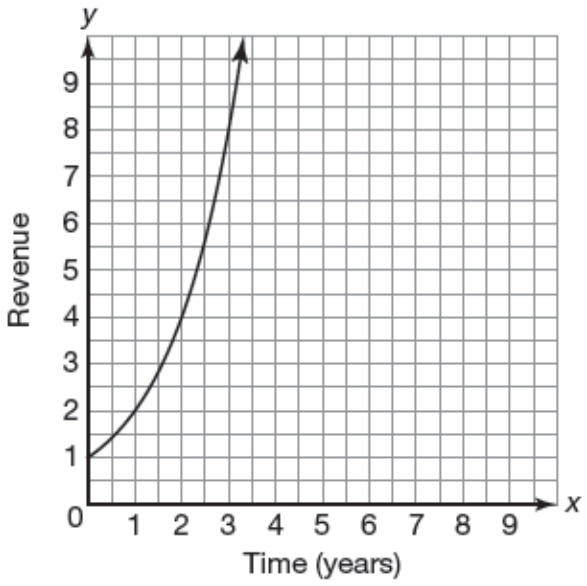
Scenario 2: Greg is training for a mountain bike race. He leaves his car at the beginning of a trail and proceeds to bike 8 miles away and then comes back the same way to his car. If he bikes at a constant rate, the function graphed models the distance he is away from his car after x minutes.



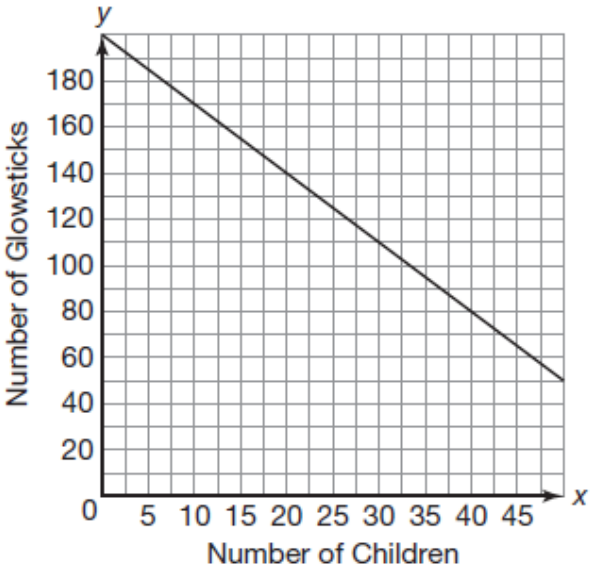
Scenario 3: You have $100 to spend on lunch over the next 20 days. The first five days, you spend $10 on lunch each day. You pack your lunch for the next week and spend nothing. You then spend $5 on lunch each of the remaining days until you have spent all your money. The function graphed models the amount of money left after x days.



Scenario 4: A local television company determines that the revenue it gets from running ads doubles each year. The function graphed models the revenue from advertising after x years



Scenario 5: The Redwood Heights Women's Club is hosting a summer nighttime party in the park. They are handing out glow sticks to all the children who attend. They start with 200 glow sticks and each child receives three glow sticks. The function graphed models the number of glow sticks they have left after x children have entered.



Honors Integrated Math 1 – **Worksheet 1.4** **Name** _____ Block _____

There are Many Ways to Represent Functions

Recognizing Algebraic and Graphical Representations of Functions

Directions: For each scenario, enter the function into your graphing calculator to determine the shape of its graph (be sure to use the window provided in each problem). Then complete the table based on the characteristics of the function family.

1. A fitness company is selling DVDs for one of its new cardio routines. Each DVD will sell for $15. Due to the fixed variable costs, the profit that the company will see after selling x DVDs can be represented by the following function.

$P(x) = 11.5x - 0.1x^2 - 150$

Window:

Xmin: -20	Ymin: -100
Xmax: 150	Ymax: 200
Xscl: 10	Yscl: 20

Function Family	
Increasing or Decreasing	
Absolute Maximum or Absolute Minimum	
Smooth Curve or Straight Line	

2. The PARK SAFE commuter lot charges different rates depending on the number of hours a car is parked during the 5-day work week. The lot charges $3 per hour for the first day, $2 per hour for the next two days, and will charge $1 per hour if the car is parked for more than three days in the lot. The fees after x hours can be represented by the following function.

$$f(x) = \begin{cases} 3x, & 0 \le x \le 24 \\ 72 + 2(x - 24) & 24 < x \le 72 \\ x + 168 & 72 < x \le 120 \end{cases}$$

Calculator Notation:

$y_1 = 3x/((0 \le x)(x \le 24))$
$y_2 = 72 + 2(x - 24)/((24 < x)(x \le 72))$
$y_3 = x + 168/((72 < x)(x \le 120))$

Window:

Xmin: -20	Ymin: -10
Xmax: 140	Ymax: 300
Xscl: 25	Yscl: 10

Function Family	
Increasing or Decreasing	
Absolute Maximum or Absolute Minimum	
Smooth Curve or Straight Line	

3. Shari is going to put $500 into an account with The People's Bank. The bank is offering a 3% interest rate compounded annually. The amount of money that Shari will have after x years can be represented by the following function.

$A(x) = 500(1.03)^x$

Window:

Xmin: -100	Ymin: -200
Xmax: 100	Ymax: 1000
Xscl: 10	Yscl: 50

Function Family	
Increasing or Decreasing	
Absolute Maximum or Absolute Minimum	
Smooth Curve or Straight Line	

4. The Ace Calendar Company is going to buy a new 3D printer for $20,000. In order to plan for the future, the owners are interested in the salvage value of the printer each year. The salvage value after x years can be represented by the following function.

S(x) = 20,000 – 2000x

Window:

Xmin: -10	Ymin: -500
Xmax: 10	Ymax: 25,000
Xscl: 1	Yscl: 1000

Function Family	
Increasing or Decreasing	
Absolute Maximum or Absolute Minimum	
Smooth Curve or Straight Line	

5. An underwater camera has been placed in the center of the 25-meter pool at the Grandtown Aquatic Center to take pictures of swimmers during a swim meet. The camera will go off at different times depending on the distance of the swimmer to the camera. If the swimmer is moving at a constant rate of 1.28 meters per second, then the distance the swimmer is from the camera after x seconds can be represented by the following function.

$d(x) = 1.28|x - 9.77|$

Window:

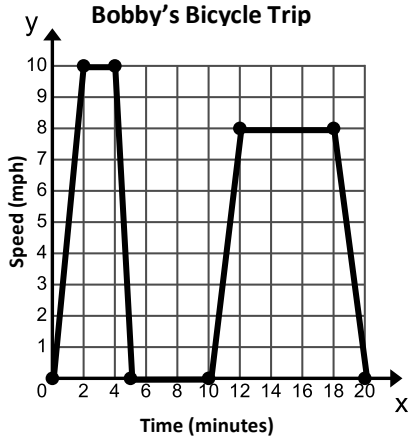
Xmin: -2	Ymin: -10
Xmax: 20	Ymax: 10
Xscl: 1	Yscl: 1

Function Family	
Increasing or Decreasing	
Absolute Maximum or Absolute Minimum	
Smooth Curve or Straight Line	

Let's Take a Little Trip

Every Graph Tells a Story

The graph shows the relation between time in minutes and Bobby's speed in miles per hour as he rides his bicycle to run errands. Use the graph to answer the questions.



1. Is the relation between Bobby's time and his speed a function? Explain your reasoning.

2. Identify any absolute minimum or absolute maximum values. Explain what these values mean in terms of the problem situation.

3. State the domain and range of this problem situation.

4. How fast was Bobby moving after:

a. 2 minutes? **b.** 12 minutes? **c.** 19 minutes?

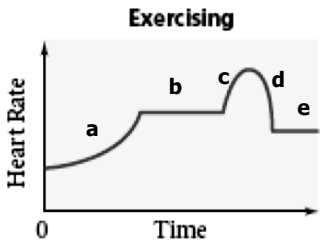
5. During which times was Bobby moving:

a. 5 mph? **b.** 8 mph?

6. Write a paragraph about Bobby's bicycle trip. Include and explain any intervals of increase and intervals of decrease you see on the graph.

Describe what's happening in each section of the graph using real life examples:

1.



a)

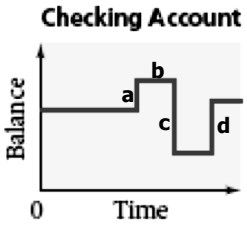
b)

c)

d)

e)

2.

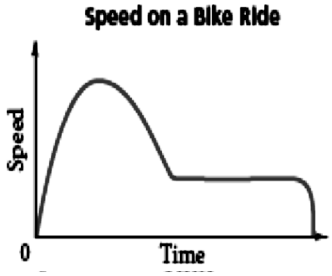


a)

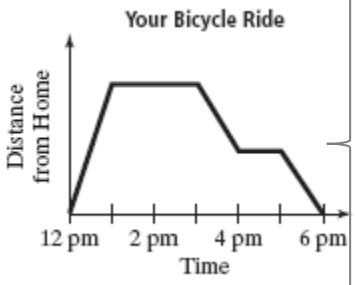
b)

c)

d)



3. The graph at the left shows a person's speed over the course of a bike ride. Your friend said that his graph describes a person bicycling up and then down a hill. **Explain your friend's error.**



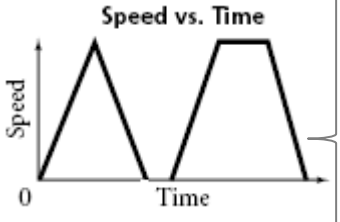
4. What is the slope from 1 **P.M.** to 3 **P.M.**? What does this mean?

5. How do the slopes of the sections 3**P.M.** to 4 **P.M.** and 5 **P.M.** to 6 **P.M.** compare? What does this mean in this scenario?

6. How do the slopes of the sections 12**P.M.** to 1 **P.M.** and 5 **P.M.** to 6 **P.M.** compare? What does this mean in this scenario?

7. What is the domain of the graph?

8. Is the graph a function? How can you tell?



9. Put a **star** where the plane is slowing down.

10. **Circle** the sections of the graph that show the speed increasing.

11. Mark an **X** on the section the show the plane not moving.

12. **Box** the section of the graph that shows the plane moving at a constant speed.

13. What do the following slopes mean on this graph?

a. 0

b. positive

c. negative