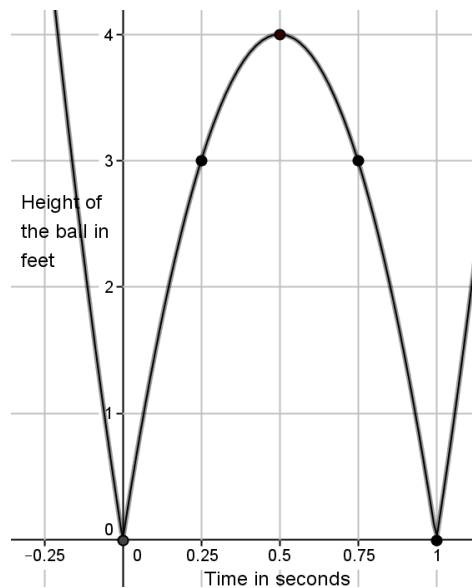Name _____   Date _____

Lesson 1: The Concept of a Function

A ball bounces across the school yard. It hits the ground at $(0,0)$ and bounces up and lands at $(1,0)$ and bounces again. The graph shows only one bounce.

a.   Identify the height of the ball at the following values of t: 0, 0.25, 0.5, 0.75, 1.

b.   What is the average speed of the ball over the first 0.25 second? What is the average speed of the ball over the next 0.25 second (from 0.25 to 0.5 second)?

c.   Is the height of the ball changing at a constant rate?

Name _____   Date _____

Lesson 2: Formal Definition of a Function

Exit Ticket

1. Can the table shown below represent values of a function? Explain.

Input (x)	10	20	30	40	50
Output (y)	32	64	96	64	32

2. Kelly can tune up 4 cars in 3 hours. If we assume he works at a constant rate, we can describe the situation using a function.

   a. Write the rule that describes the function that represents Kelly's constant rate of work.

   b. Use the function you wrote in part (a) as the formula for the function to complete the table below. Round your answers to the hundredths place.

Time it takes to tune up cars (x)	2	3	4	6	7
Number of cars tuned up (y)					

c. Kelly works 8 hours per day. How many cars will he finish tuning up at the end of a shift?

d. For this problem, we assumed that Kelly worked at a constant rate. Do you think that is a reasonable assumption for this situation? Explain.

Name _____   Date _____

Lesson 3: Linear Functions and Proportionality

Exit Ticket

A linear function has the table of values below. The information in the table shows the number of pages a student can read in a certain book as a function of time in minutes. Assume a constant rate.

Time in minutes (x)	2	6	11	20
Total number of pages read in a certain book (y)	7	21	38.5	70

a.   Write the rule or equation that represents the linear function that describes the total number of pages read, y, in x minutes.

b.   How many pages can be read in 45 minutes?

c.   A certain book has 396 pages. The student has already read $\frac{3}{8}$ of the pages. Write the equation that describes the number of pages read as a function of time for reading this book, including the number of pages that have already been read.

d.   Approximately how much time, in minutes, will it take to finish reading the book?

Name _____   Date _____

Lesson 4: More Examples of Functions

Exit Ticket

1. A linear function has the table of values below related to the cost of a certain tablet.

Number of tablets (x)	17	22	25
Total cost (y)	$10,183.00	$13,178.00	$14,975.00

a. Write the linear function that represents the total cost, y, for x number of tablets.

b. Is the function discrete or continuous? Explain.

c. What number does the function assign to 7? Explain.

2. A function produces the following table of values.

Serious	Adjective
Student	Noun
Work	Verb
They	Pronoun
And	Conjunction
Accurately	Adverb

a. Describe the function.

b. What part of speech would the function assign to the word *continuous*?
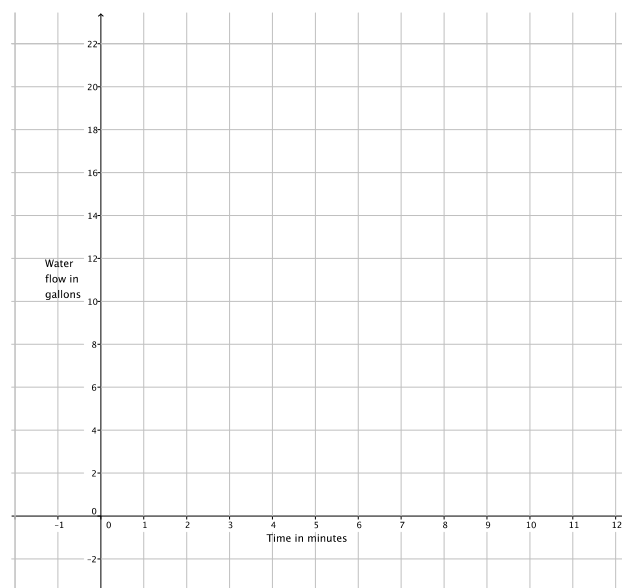
Name _____   Date _____

Lesson 5: Graphs of Functions and Equations

Exit Ticket

The amount of water that flows out of a certain hose in gallons is a function of the amount of time in minutes that the faucet is turned on. The amount of water that flows out of the hose in 4 minutes is 11 gallons. Assume water flows at a constant rate.

   a.   Write an equation in two variables that represents the amount of water, y, in gallons, as a function of the time in minutes, x, the faucet is turned on.

   b.   Use the equation you wrote in part (a) to determine the amount of water that flows out of a hose in 8 minutes, 4 minutes, and 2 minutes.

   c.   The input of the function, x, is time in minutes, and the output of the function, y, is the amount of water that flows out of the hose in gallons. Write the inputs and outputs from part (b) as ordered pairs, and plot them as points on the coordinate plane.

Name _____   Date _____

Lesson 6: Graphs of Linear Functions and Rate of Change

Exit Ticket

1. Sylvie claims that the table of inputs and outputs below will be a linear function. Is she correct? Explain.

Input	Output
−3	−25
2	10
5	31
8	54

2. A function assigns the inputs and corresponding outputs shown in the table to the right.
    a. Is the function a linear function? Check at least three pairs of inputs and their corresponding outputs.

Input	Output
−2	3
8	−2
10	−3
20	−8

b.   What equation describes the function?

c.   What will the graph of the function look like? Explain.

Name _____   Date _____

Lesson 7: Comparing Linear Functions and Graphs

Exit Ticket

Brothers, Paul and Pete, walk 2 miles to school from home. Paul can walk to school in 24 minutes. Pete has slept in again and needs to run to school. Paul walks at constant rate, and Pete runs at a constant rate. The graph of the function that represents Pete's run is shown below.

a.   Which brother is moving at a greater rate? Explain how you know.
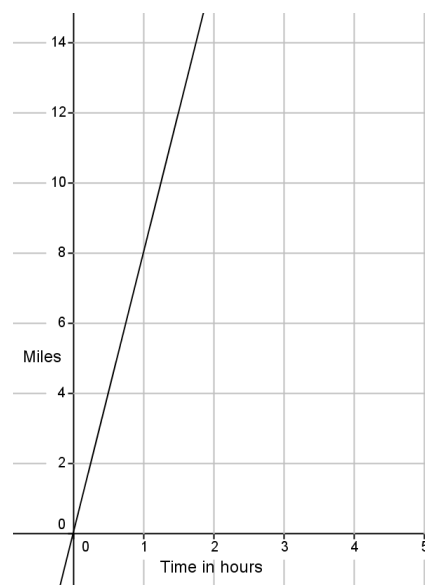
b.   If Pete leaves 5 minutes after Paul, will he catch Paul before they get to school?

Name _____   Date _____

Lesson 8: Graphs of Simple Nonlinear Functions

Exit Ticket

1. The graph below is the graph of a function. Do you think the function is linear or nonlinear? Show work in your explanation that supports your answer.
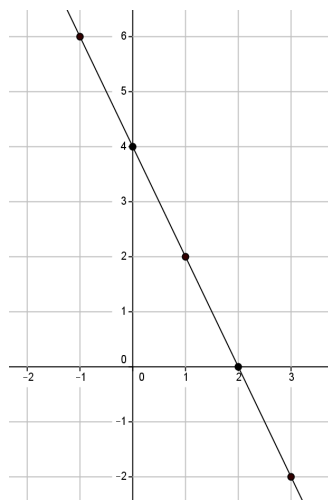
2. A function has the rule so that each input of x is assigned an output of $\frac{1}{2}x^2$. Do you think the graph of the function will be linear or nonlinear? What shape do you expect the graph to take? Explain.
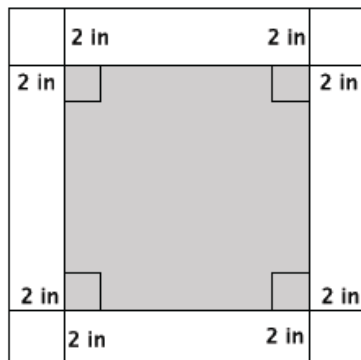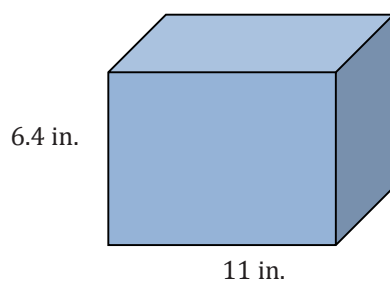
Name _____ Date _____

Lesson 9: Examples of Functions from Geometry

Exit Ticket

1. Write a function that would allow you to calculate the area, A, of a 2-inch white border for any sized square figure with sides of length s measured in inches.

```
2 in          2 in
2 in  ┌─────────────┐  2 in
      │             │
      │             │
      │             │
      │             │
      │             │
2 in  └─────────────┘  2 in
2 in          2 in
```

2. The volume of the rectangular prism is 295.68 in^3. What is its width?

6.4 in.

11 in.

Name _____   Date _____

Lesson 10: Volumes of Familiar Solids—Cones and Cylinders

Exit Ticket

1. Use the diagram to find the total volume of the three cones shown below.
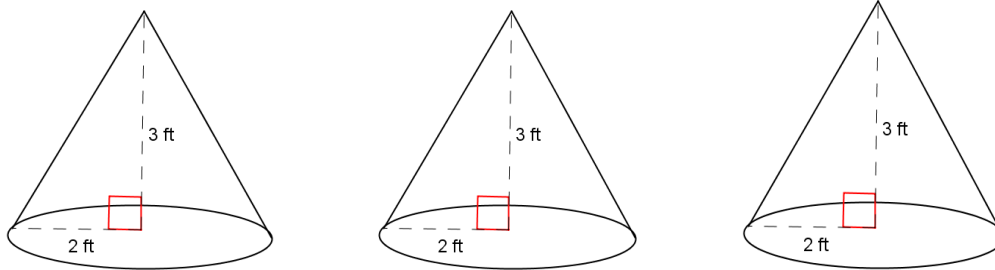
2. Use the diagram below to determine which has the greater volume, the cone or the cylinder.
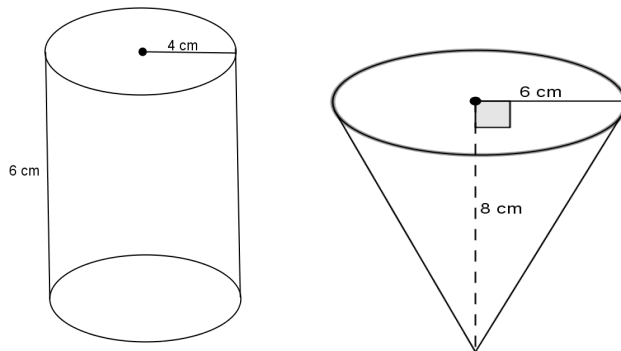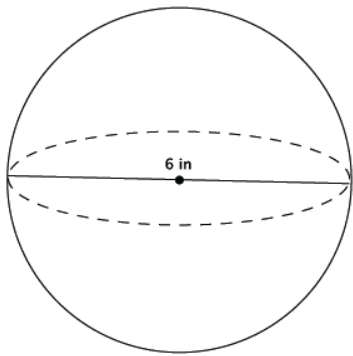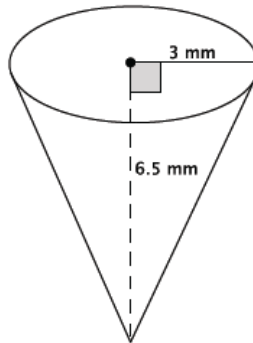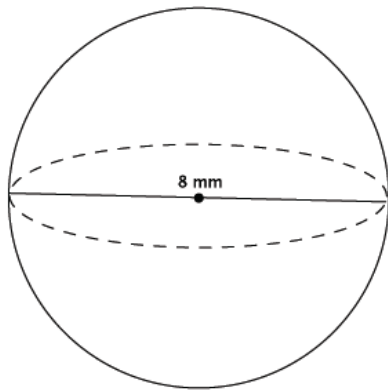
Name _____   Date _____

Lesson 11: Volume of a Sphere

Exit Ticket

1. What is the volume of the sphere shown below?

2. Which of the two figures below has the greater volume?

Name _____   Date _____

1.
   a. We define x as a year between 2008 and 2013, and y as the total number of smartphones sold that year, in millions. The table shows values of x and corresponding y values.

Year (x)	2008	2009	2010	2011	2012	2013
Number of smartphones in millions (y)	3.7	17.3	42.4	90	125	153.2

     i. How many smartphones were sold in 2009?

     ii. In which year were 90 million smartphones sold?

     iii. Is y a function of x? Explain why or why not.

   b. Randy began completing the table below to represent a particular linear function. Write an equation to represent the function he used, and complete the table for him.

| Input (x)	-3	-1	0	$\frac{1}{2}$	1	2	3
Output (y)	-5		4				13

c. Create the graph of the function in part (b).
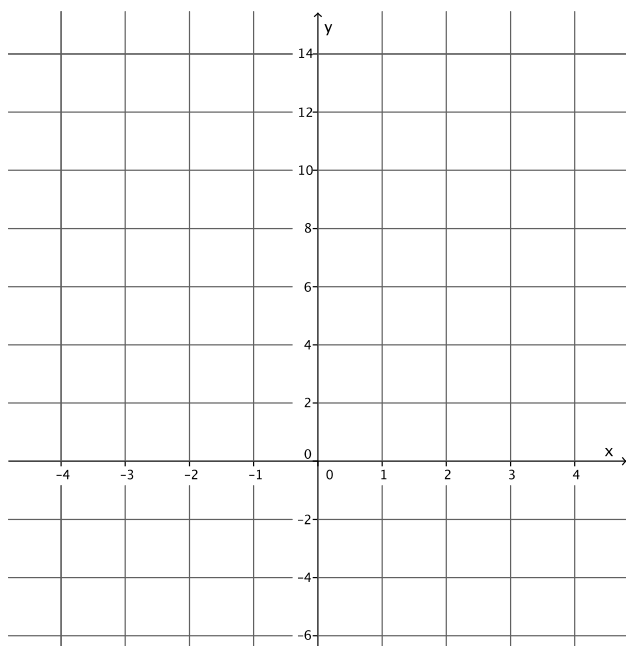
d. At NYU in 2013, the cost of the weekly meal plan options could be described as a function of the number of meals. Is the cost of the meal plan a linear or nonlinear function? Explain.

8 meals: $125/week
10 meals: $135/week
12 meals: $155/week
21 meals: $220/week

2. The cost to enter and go on rides at a local water park, Wally's Water World, is shown in the graph below.
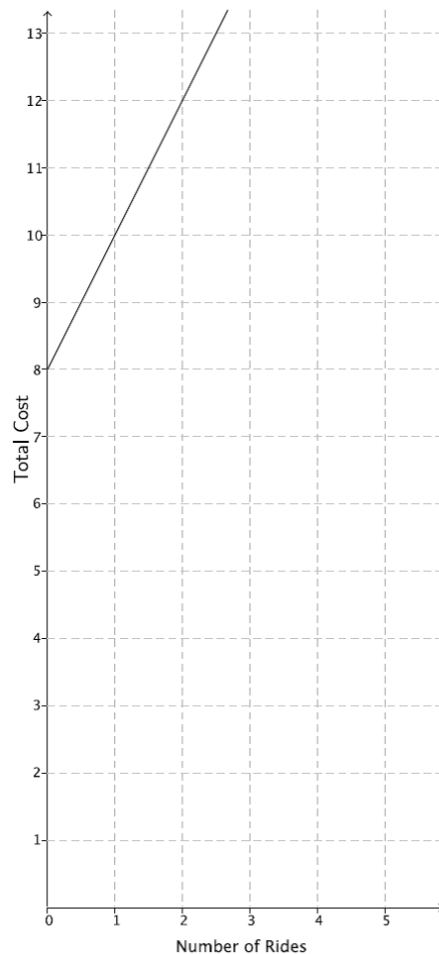
A new water park, Tony's Tidal Takeover, just opened. You have not heard anything specific about how much it costs to go to this park, but some of your friends have told you what they spent. The information is organized in the table below.

| Number of rides	0	2	4	6
Dollars spent	$12.00	$13.50	$15.00	$16.50

Each park charges a different admission fee and a different fee per ride, but the cost of each ride remains the same.

a. If you only have $14 to spend, which park would you attend (assume the rides are the same quality)? Explain.

b. Another water park, Splash, opens, and they charge an admission fee of $30 with no additional fee for rides. At what number of rides does it become more expensive to go to Wally's Water World than Splash? At what number of rides does it become more expensive to go to Tony's Tidal Takeover than Splash?

c. For all three water parks, the cost is a function of the number of rides. Compare the functions for all three water parks in terms of their rate of change. Describe the impact it has on the total cost of attending each park.

3. For each part below, leave your answers in terms of π.

    a. Determine the volume for each three-dimensional figure shown below.
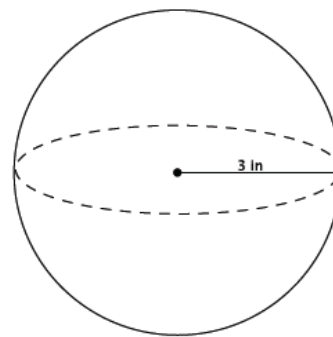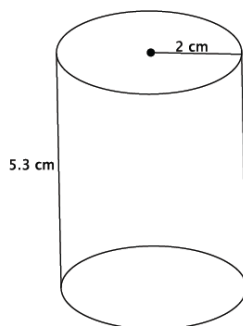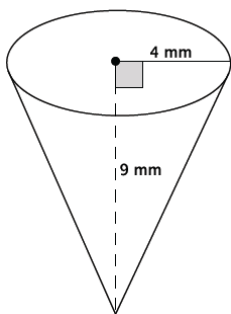
    b. You want to fill the cylinder shown below with water. All you have is a container shaped like a cone with a radius of 3 inches and a height of 5 inches; you can use this cone-shaped container to take water from a faucet and fill the cylinder. How many cones will it take to fill the cylinder?
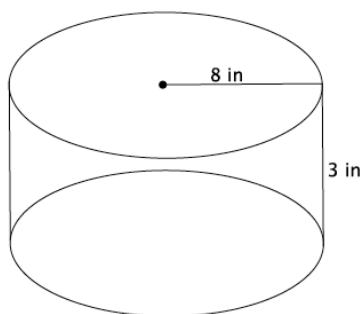
c.   You have a cylinder with a diameter of 15 inches and height of 12 inches. What is the volume of the largest sphere that will fit inside of it?