

# Geometry: A Complete Course (with Trigonometry)

## Module A - Progress Tests

Written by: Larry Collins

**ERRATA**  
**3/2015**



**VideoText *Interactive***

Geometry: A Complete Course (with Trigonometry)  
Module A - Progress Tests

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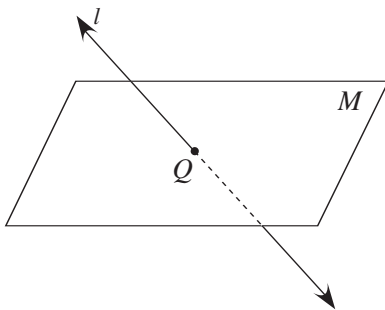
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4. Draw and label a figure for each description given.

a) Plane  $Z$  contains line  $l$  and line  $m$ . Point  $Q$  is on both line  $l$  and line  $m$ .

b) Point  $P$  is not on line  $t$ .

5. Write a description of the following diagram.




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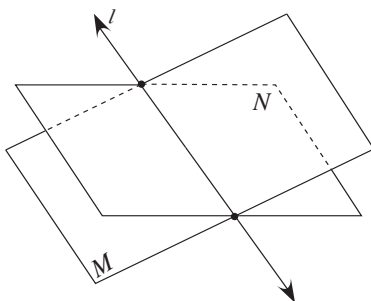


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6. Write a description of the following diagram.




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# Quiz Form B

Name \_\_\_\_\_

Class \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## Unit I - The Structure of Geometry

### Part A - What is Geometry?

#### Lessons 1 - Origin

#### Lessons 2 - Structure

---

1. In our study of Algebra, the symbols used to name numbers were examples of the “things” of mathematics, or the objects around which our study revolves. How many new things did we discuss in Lesson 2? \_\_\_\_\_ Name them.

\_\_\_\_\_

2. Tell what part of mathematical speech each of the following is:

a)  $\div$  \_\_\_\_\_

b)  $\pi$  \_\_\_\_\_

c)  $\parallel$  \_\_\_\_\_

d)  $\sqrt{17}$  \_\_\_\_\_

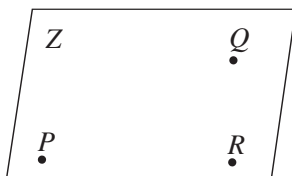
e)  $+$  \_\_\_\_\_

f)  $\{\}$  \_\_\_\_\_

g)  $e$  \_\_\_\_\_

h)  $\neq$  \_\_\_\_\_

3. Name the plane shown in two ways



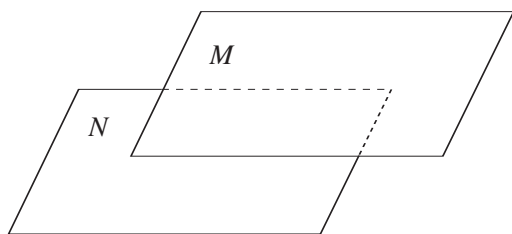
\_\_\_\_\_

**4.** Draw and label a figure for each description given.

a) Line  $m$  is perpendicular to plane  $X$ .

b) Line  $l$  is parallel to line  $q$  with point  $P$  on line  $l$  and point  $Q$  on line  $q$ .

**5.** Write a description of the following diagram.




---

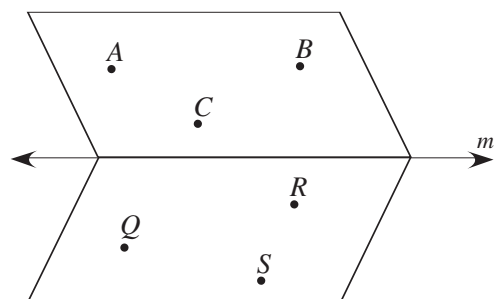


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**6.** Write a description of the following diagram.




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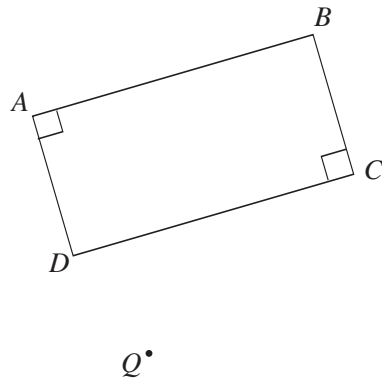


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3. Draw the image of the given rectangle after a rotation of  $90^\circ$  clockwise around the center of rotation  $Q$ .





# Quiz Form A

Name \_\_\_\_\_

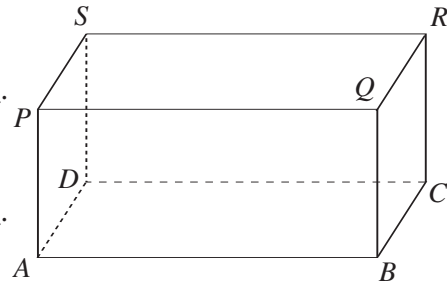
Class \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## Unit I - The Structure of Geometry

### Part A - What is Geometry?

### Lesson 4 - More on Relations

For questions 1 through 5, use the diagram at the right.



- Points P, Q, R, and S are \_\_\_\_\_.  
(coplanar or non-coplanar)
- Points B, C, R, and S are \_\_\_\_\_.  
(coplanar or non-coplanar)
- Name another point which is coplanar with the points A, B, and D. \_\_\_\_\_
- Name another point which is coplanar with points A, D, and S. \_\_\_\_\_
- Complete this statement. "Plane PQRS intersects plane ADSP in line \_\_\_\_\_."
- A line is given. Is the line contained in just one plane or in more than one plane? \_\_\_\_\_  
Use an example to explain. \_\_\_\_\_  
\_\_\_\_\_
- A rectangle is given. Is the rectangle contained in just one plane or more than one plane? \_\_\_\_\_  
Use an example to explain. \_\_\_\_\_  
\_\_\_\_\_

# Quiz Form A

Name \_\_\_\_\_

Class \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## Unit I - The Structure of Geometry

### Part A - What is Geometry?

### **Lesson 5 - More on Groupings**

---

1. Write  $D = \{1, 3, 5, \dots\}$  using set-builder notation. \_\_\_\_\_

2. Write  $B = \{x \mid x = 3y + 1, y \in \mathbb{I}, y \geq 0\}$  using the roster method. \_\_\_\_\_

Rewrite the statements in exercises 3 and 4 using set notation. Use the roster method if possible.

3. The set made up of even counting numbers less than ten is an improper subset of the set made up of even counting numbers less than ten. \_\_\_\_\_

4. The set whose only element is 0 is not a subset of the empty set. \_\_\_\_\_

—Continued—

Consider these sets for questions 5 through 10.

$$A = \{a, e, i, o, u\} \quad B = \{c, m, n, r, t\}$$

$$C = \{m, i, n, t\} \quad D = \{e, i\}$$

5.  $B \cup C =$  \_\_\_\_\_

6.  $B \cap C =$  \_\_\_\_\_

7.  $A \cap D =$  \_\_\_\_\_

8.  $D \cap B =$  \_\_\_\_\_

9. Is  $D \subset A$ ? \_\_\_\_\_

10. Does  $A = B$ ? \_\_\_\_\_

11. Of 73 men surveyed, 54 would rather ride a golf cart when they play golf, and 20 others would prefer to walk when they play golf. However, of those two groups, 4 men also said they would be comfortable with either. How many of the 73 men surveyed would rather do neither? In other words, how many would prefer not even to play golf? \_\_\_\_\_ Use a Venn Diagram to show your work.

**Unit I, Part A, Lesson 5, Quiz Form B**  
**—Continued—**

Name \_\_\_\_\_

Consider these sets for questions 5 through 10.

$$A = \{a, b, c, d, e\} \quad B = \{a, b, c, d, e, f, g\}$$

$$C = \{m, i, n, t\} \quad D = \{d, e\}$$

5.  $A \cap B =$  \_\_\_\_\_

6.  $A \cup C =$  \_\_\_\_\_

7.  $A \cap D =$  \_\_\_\_\_

8.  $C \cap D =$  \_\_\_\_\_

9. Is  $D \subseteq \{d, e\}$ ? \_\_\_\_\_

10. Does  $A = C$ ? \_\_\_\_\_

11. Of 68 people surveyed, 33 most often drive to work, 57 usually take the bus to work, and 27 do both equally as often. How many of these surveyed did neither? \_\_\_\_\_  
Use a Venn Diagram to show your work.

# Quiz Form B


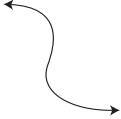

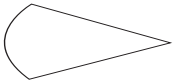
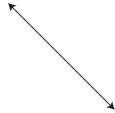
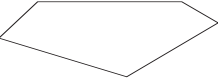


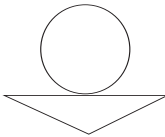
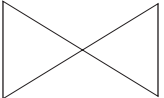
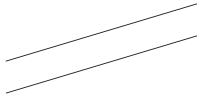

Name \_\_\_\_\_

Class \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## Unit I - The Structure of Geometry Part B - The Scope of Our Geometry **Lesson 2 - Simple Closed Plane Curves** **Lesson 3 - Polygons**

---

For each of the types of geometric figures in exercises 1 through 9, write down the letters of as many of the sets of points which appropriately illustrate that figure. (Note: In general mathematical use, straight lines might be included in the family of curves.)

1. convex curve	_____	a) 	b) 
2. line	_____		
3. closed plane curve	_____	c) 	d) 
4. geometric figure	_____		
5. plane curve	_____	e) 	f) 
6. polygon	_____		
7. concave curve	_____	g) 	h) 
8. simple closed plane curve made up of only straight straight line segments	_____	i) 	j) 
9. point	_____	k) 	l) 

# Quiz Form A

Name \_\_\_\_\_

Class \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## Unit I - The Structure of Geometry Part B - The Scope of Our Geometry **Lesson 4 - Solids**

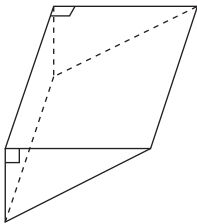
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Complete each sentence in exercises 1 through 5 with the appropriate geometric term(s).

1. The three basic three dimensional shapes in all the world are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
2. A prism has \_\_\_\_\_ for sides.
3. A pyramid has \_\_\_\_\_ for sides.
4. Cones and cylinders have \_\_\_\_\_ for bases.
5. A sphere is a surface which is everywhere the same \_\_\_\_\_ from a fixed point.

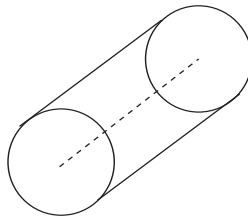
Identify the solids in exercises 6 through 11 as prisms, cylinders, pyramids, cones, or spheres. Notice the shape of the base when naming a prism or pyramid and be as specific as possible. NOTE: For these exercises only, you may assume that lines are parallel if they look parallel.

6.



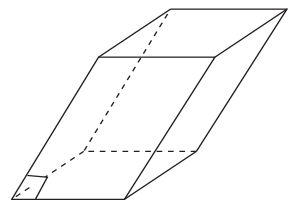
\_\_\_\_\_

7.



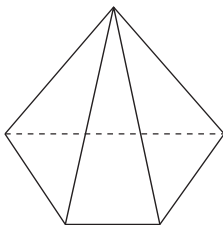
\_\_\_\_\_

8.



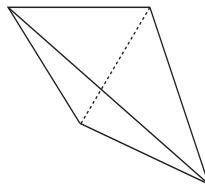
\_\_\_\_\_

9.



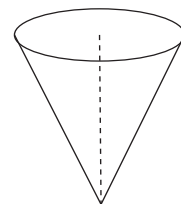
\_\_\_\_\_

10.



\_\_\_\_\_

11.



\_\_\_\_\_

# Quiz Form B

Name \_\_\_\_\_

Class \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

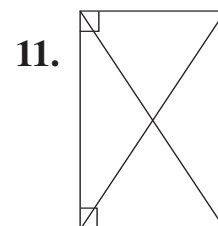
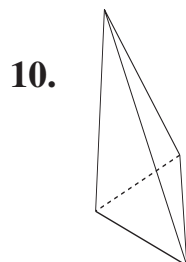
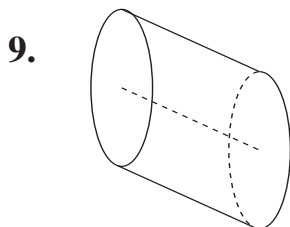
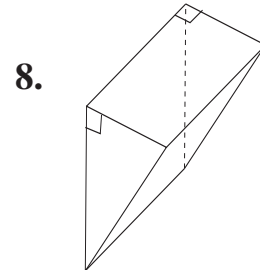
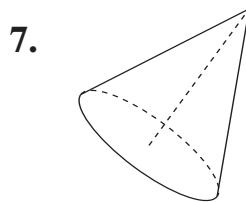
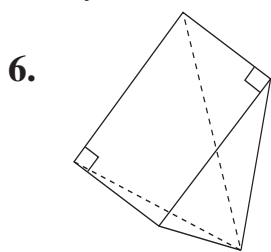
## Unit I - The Structure of Geometry Part B - The Scope of Our Geometry **Lesson 4 - Solids**

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Complete each sentence in exercises 1 through 5 with the appropriate geometric term(s).

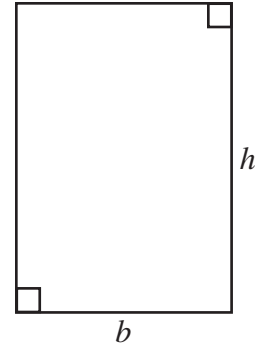
1. A prism is named after the shape of its \_\_\_\_\_.
2. A cone has a circular \_\_\_\_\_.
3. The sides of a prism are \_\_\_\_\_.
4. The sides of a pyramid are \_\_\_\_\_.
5. A cylinder has two \_\_\_\_\_ bases.

Identify the solids in exercises 6 through 11 as prisms, cylinders, pyramids, cones, or spheres. Notice the shape of the base when naming a prism or pyramid and be as specific as possible. NOTE: For these exercises only, you may assume that lines are parallel if they look parallel.



—Continued—

Refer to the rectangle at the right to complete exercises 6 and 7.



	<u>base</u>	<u>height</u>	<u>Area</u>	<u>Perimeter</u>
6.	13"	9"	_____	_____

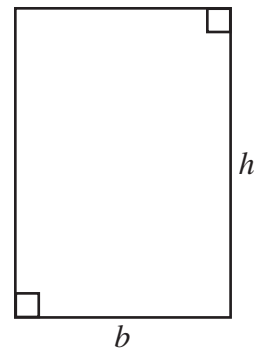
	<u>base</u>	<u>height</u>	<u>Area</u>	<u>Perimeter</u>
7.	_____	7'	63 sq. ft.	_____



**Unit I, Part C, Lesson 1, Quiz Form A**  
**—Continued—**

Name \_\_\_\_\_

Refer to the rectangle at the right to complete exercises 8 and 9.



	<u>base</u>	<u>height</u>	<u>Area</u>	<u>Perimeter</u>
8.	$y$ units	_____	$(y^2 - 5y)$ sq. units	_____

	<u>base</u>	<u>height</u>	<u>Area</u>	<u>Perimeter</u>
9.	_____	10 units	_____	56 units

# Quiz Form A

Name \_\_\_\_\_

Class \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

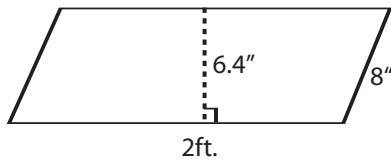
## Unit I - The Structure of Geometry

### Part C - Measurement

## Lesson 2 - Parallelograms

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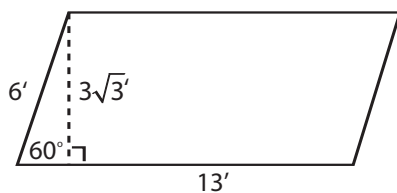
1. Find the area and perimeter of the given parallelogram.



Area: \_\_\_\_\_

Perimeter: \_\_\_\_\_

2. Find the area and perimeter of the given parallelogram.



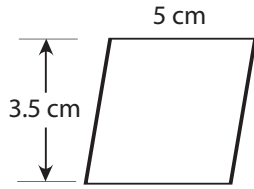
Area: \_\_\_\_\_

Perimeter: \_\_\_\_\_

**Unit I, Part C, Lesson 2, Quiz Form A**  
**—Continued—**

Name \_\_\_\_\_

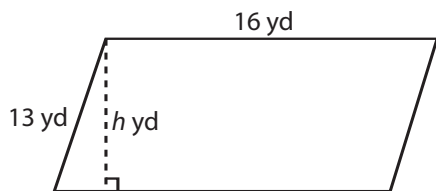
3. Find the area and perimeter of the given rhombus.



**Area:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

4. Find the perimeter and the height of this parallelogram.

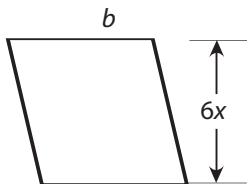


**Area:** 176 sq. yds.

**Perimeter:** \_\_\_\_\_

**height:** \_\_\_\_\_

5. Find the perimeter and the base of the given rhombus.

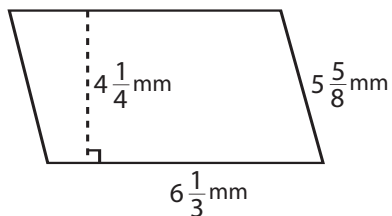


Area:  $48x^2$  sq. units

Perimeter: \_\_\_\_\_

base: \_\_\_\_\_

6. Find the area and perimeter of the given parallelogram.



Area: \_\_\_\_\_

Perimeter: \_\_\_\_\_

# Quiz Form B

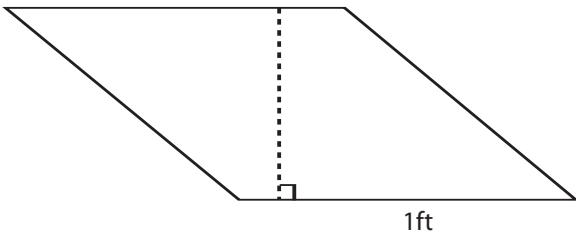
Name \_\_\_\_\_

Class \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## Unit I - The Structure of Geometry Part C - Measurement **Lesson 2 - Parallelograms**

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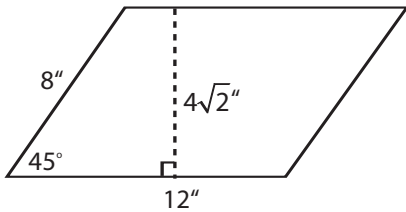
1. Find the height of the given parallelogram.



**Area:** 84 square inches

**height:** \_\_\_\_\_

2. Find the area and perimeter of the given parallelogram.



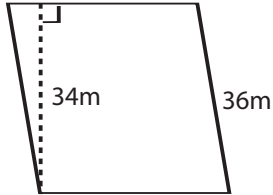
**Area:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

**Unit I, Part C, Lesson 2, Quiz Form B**  
**—Continued—**

Name \_\_\_\_\_

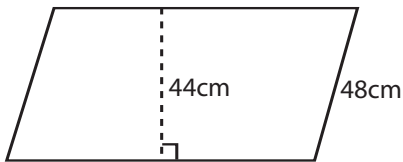
3. Find the area and perimeter of the given rhombus.



**Area:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

4. Find the perimeter of the given parallelogram.



**Area:** 2508 sq. cm.

**Perimeter:** \_\_\_\_\_

# Quiz Form A

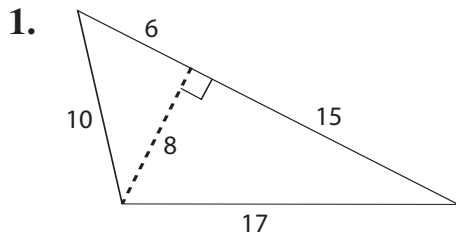
Name \_\_\_\_\_

Class \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## Unit I - The Structure of Geometry Part C - Measurement **Lesson 3 - Triangles**

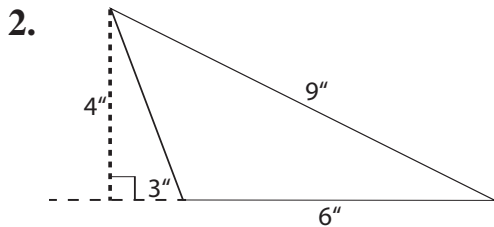
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Find the area and perimeter of the given triangles in exercises 1 through 3. (Note: You may first have to use the Pythagorean Theorem ( $a^2 + b^2 = c^2$ ) to find some missing parts.)



**Area:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_



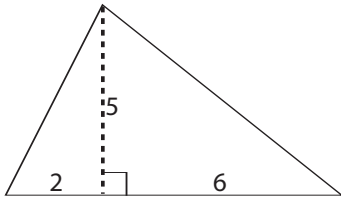
**Area:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

**Unit I, Part C, Lesson 3, Quiz Form A**  
**—Continued—**

Name \_\_\_\_\_

**3.**



**Area:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

**4.** Find the area of a triangle with base  $(2x + 3)$  units and height  $(4x - 2)$  units.

**Area:** \_\_\_\_\_



# Quiz Form B

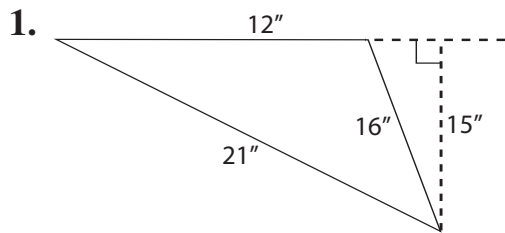
Name \_\_\_\_\_

Class \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## Unit I - The Structure of Geometry Part C - Measurement **Lesson 3 - Triangles**

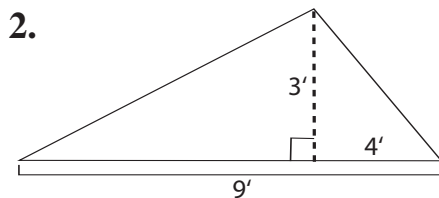
---

Find the area and perimeter of the given triangles in exercises 1 through 3. Note: You may first have to use the Pythagorean Theorem ( $a^2 + b^2 = c^2$ ) to find some missing parts.



**Area:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_



**Area:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

# Quiz Form A

Name \_\_\_\_\_

Class \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## Unit I - The Structure of Geometry

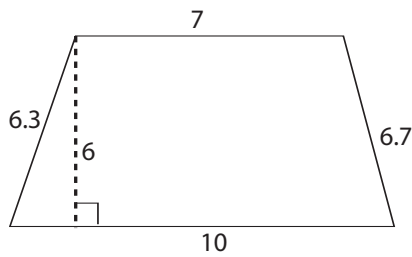
### Part C - Measurement

## Lesson 4 - Trapezoids

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Find the area and perimeter of each of the given trapezoids in exercises 1 through 3. Assume all measures are in inches.

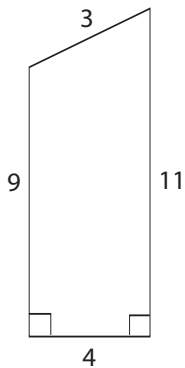
1.



Area: \_\_\_\_\_

Perimeter: \_\_\_\_\_

2.



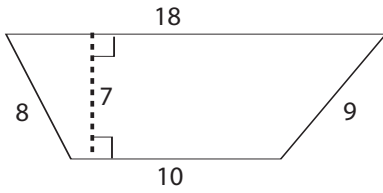
Area: \_\_\_\_\_

Perimeter: \_\_\_\_\_

**Unit I, Part C, Lesson 4, Quiz Form A**  
**—Continued—**

Name \_\_\_\_\_

**3.**



**Area:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

- 4.** The area of a trapezoid is 100 square centimeters. The sum of the lengths of the bases is 50 centimeters. Find the height.

**height:** \_\_\_\_\_

5. The area of a trapezoid is  $420\text{m}^2$ . The height is 12m. One base is 20m. Find the length  $b_2$  of the other base.

**other base:** \_\_\_\_\_

6. **Application:** The area of a trapezoid is 66 square units. The length of its longer base is 4 units longer than the length of its shorter base, and its height is 7 units longer than the length of its shorter base. Find the length of each base and the height of the trapezoid. (draw a diagram and label the necessary parts)

**length of short base:** \_\_\_\_\_

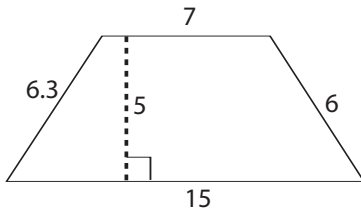
**length of long base:** \_\_\_\_\_

**height:** \_\_\_\_\_

**Unit I, Part C, Lesson 4, Quiz Form B**  
**—Continued—**

Name \_\_\_\_\_

3.



**Area:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

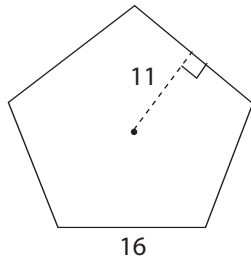
4. The longer base of a trapezoid is twice the length of the shorter base. The longer base measures 14 inches and the height is 4 inches. Find the area. (Draw a diagram and label the appropriate parts.)

**Area:** \_\_\_\_\_

**Unit I, Part C, Lesson 5, Quiz Form A**  
**—Continued—**

Name \_\_\_\_\_

**5.**



**Area:** \_\_\_\_\_

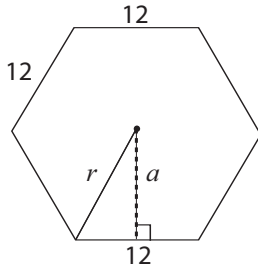
**Perimeter:** \_\_\_\_\_

**6.** Find the area and perimeter of a regular decagon with apothem 6.8cm and side length 4.4cm.

**Area:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

**7. Application:** Find the indicated measures in the given regular hexagon.



**a** = \_\_\_\_\_

**r** = \_\_\_\_\_

**Area** = \_\_\_\_\_

**Perimeter** = \_\_\_\_\_

*Hint: If you draw additional line segments inside the hexagon, from the center to all 6 vertices, you will find that the small triangles formed, appear to be (and actually are) equilateral.*

—Continued—

Find the missing radius or diameter, as indicated in exercises 3 through 6. Then find the circumference and area of the circle. Note: Approximate your answers to the nearest hundredth.

	<u>radius</u>	<u>diameter</u>	<u>Circumference</u>	<u>Area</u>
3.	_____	13"	_____	_____

	<u>radius</u>	<u>diameter</u>	<u>Circumference</u>	<u>Area</u>
4.	7.5 cm	_____	_____	_____



5.      radius      diameter      Circumference      Area  
         \_\_\_\_\_      3.5 m      \_\_\_\_\_      \_\_\_\_\_

6.      radius      diameter      Circumference      Area  
         6 ft.      \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_

## —Continued—

In exercises 7 and 8 find the approximation, correct to the nearest hundredth, of the circumference of a circle with the given radius. Use 3.142 to approximate  $\pi$ .

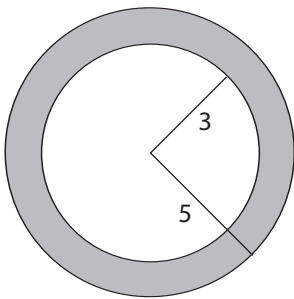
7. radius =  $\frac{7}{3}$  cm

Circumference  $\doteq$  \_\_\_\_\_

8. radius = 8.6 in.

Circumference  $\doteq$  \_\_\_\_\_

9. Find the area of the shaded region. Use 3.142 for  $\pi$ , and approximate the answer to the nearest tenth.



Area  $\doteq$  \_\_\_\_\_

**Unit I, Part C, Lesson 6, Quiz Form B**  
**—Continued—**

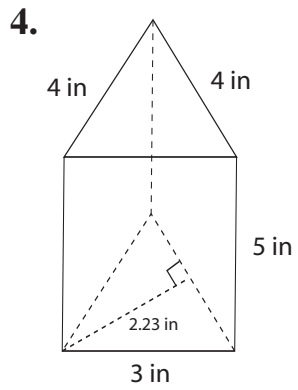
Name \_\_\_\_\_

	<u>radius</u>	<u>diameter</u>	<u>Circumference</u>	<u>Area</u>
5.	$5\frac{5}{6}$ m	_____	_____	_____

	<u>radius</u>	<u>diameter</u>	<u>Circumference</u>	<u>Area</u>
6.	$\pi$ ft	_____	_____	_____

**Unit I, Part C, Lesson 7, Quiz Form A**  
**—Continued—**

Name \_\_\_\_\_



**Lateral Area = \_\_\_\_\_**

**Total Area = \_\_\_\_\_**

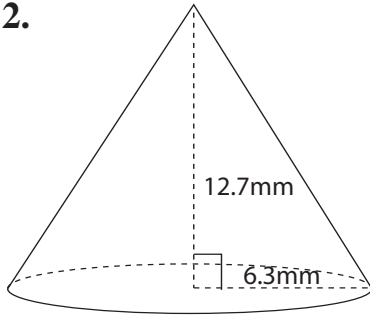
**Volume = \_\_\_\_\_**

—Continued—

Find the lateral area, total area, and volume of the right circular cone shown below.

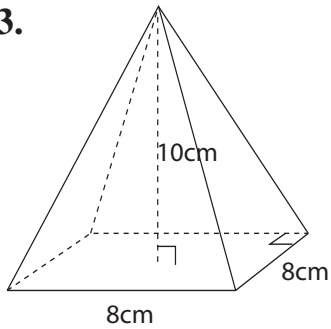
Note: Do not approximate  $\pi$ , but round the decimal numbers on your answers to the nearest hundredths.

2.

**Lateral Area** = \_\_\_\_\_**Total Area** = \_\_\_\_\_**Volume** = \_\_\_\_\_

Find the lateral area, total area, and volume of the right pyramid shown below.

3.

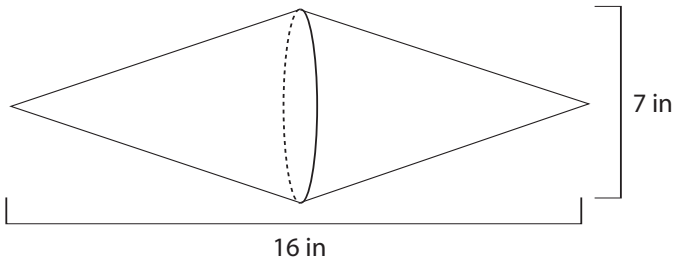


**Lateral Area** = \_\_\_\_\_

**Total Area** = \_\_\_\_\_

**Volume** = \_\_\_\_\_

5. The figure shown below is a composite of two right cones that share a common base. What is the volume of the solid?

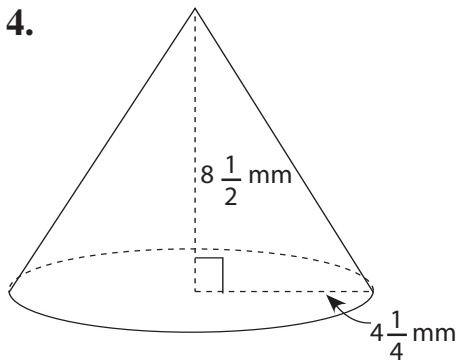


Volume = \_\_\_\_\_

—Continued—

Find the lateral area, total area, and volume of the right circular cone shown below.

4.

**Lateral Area =** \_\_\_\_\_**Total Area =** \_\_\_\_\_**Volume =** \_\_\_\_\_

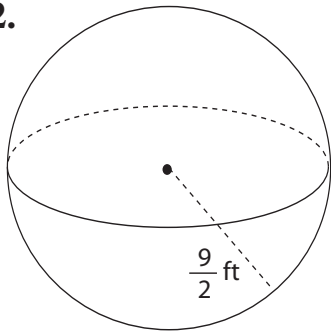


**Unit I, Part C, Lesson 9, Quiz Form A**  
**—Continued—**

Name \_\_\_\_\_

Find the surface area and volume of the sphere illustrated below. Round all answers to the nearest tenth.  
Use 3.14 as an approximation for  $\pi$ .

**2.**



**Surface Area =** \_\_\_\_\_

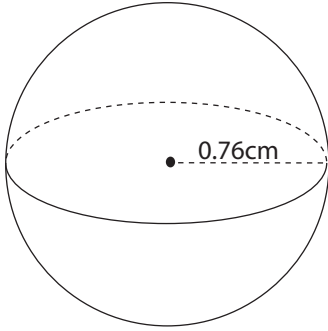
**Volume =** \_\_\_\_\_

**Unit I, Part C, Lesson 9, Quiz Form B**  
**—Continued—**

Name \_\_\_\_\_

Find the surface area and volume of the sphere illustrated below. Round all answers to the nearest tenth.  
Use 3.14 as an approximation for  $\pi$ .

**2.**



**Surface Area =** \_\_\_\_\_

**Volume =** \_\_\_\_\_

3. The volume of a sphere is  $36\pi$  mm<sup>3</sup>. Find the radius and the surface area.

**radius** = \_\_\_\_\_

**Surface Area** = \_\_\_\_\_

5. The radius of a sphere is  $8\sqrt{2}$  inches. Find the surface area and volume.

**Surface Area = \_\_\_\_\_**

**Volume = \_\_\_\_\_**

—Continued—

For each group listed in exercises 4 through 6, read the accompanying scenario illustrating a good use of inductive reasoning. Then write a scenario of your own. Check with another person for its validity.

**4. Football Players**

The opponent in the Cougar’s next game throws a pass on first down 8 out of 10 times according to statistics from the first five games. The Cougars expect they will need to be prepared to use their pass defense the majority of the time on first down.

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**5. Employees**

Employees of the Discount Mart Variety Store have a meeting every Friday morning one hour before the store opens. Their supervisor has been ten to fifteen minutes late to the meeting for the last 7 weeks. There has been a noticeable increase in the number of employees who are late since the meeting never seems to start on time anyway.

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**6. Police Officers**

The intersection of 5th Street and Cumberland Avenue has been the scene of nine accidents in the last four weeks. Over the last three months the number of speeding citations issued on Cumberland Avenue has increased by 5% over the previous three month period. The Police Department has requested that a study of the daily traffic patterns be conducted to determine a remedy for the dangerous situation at this intersection.

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—Continued—

For each group listed, in exercises 4 through 6, read the accompanying scenario illustrating a good use of inductive reasoning. Then write a scenario of your own. Check with another person for its validity

**4. Manufacturers**

Each year, auto makers introduce new colors for their cars. One way auto makers choose colors for new cars is to find out which colors sold well in the past. Trends which are observed over a long period of time, say five years, help automakers to decide what color of automobile to produce, in an attempt to sell more cars.

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**5. Thieves**

The owner of a small photography shop is observed leaving his business to go to the bank at approximately the same time every day. A thief would use such an observation to plan a confrontation and possible robbery. For the businessman, his responsibility is to avoid following the same routine everyday.

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**6. Explorers**

Throughout history, there have been many explorers from Columbus to Lewis and Clark to Space Shuttle Astronauts. Early explorers had only limited knowledge about conditions they would encounter. More modern explorers can use technology to help them prepare for their travels. However, at all levels, explorers were required to make observations and record patterns of activity which might effect their success. For example, how did Columbus acquaint himself with the prevailing winds needed to push him across the ocean? How did Lewis and Clark know when the best time was to move? When is the best “window” for launching a space shuttle? Planning had to be based on observations such as weather patterns and moon phases, and using that information to make assumptions to be acted upon, to successfully complete the mission.

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**Unit I, Part D, Lesson 2, Quiz Form A**  
**—Continued—**

Name \_\_\_\_\_

- 4.** Use inductive reasoning to find the next two terms of the sequence given below. Describe how you found these terms.

A, B, D, G, K, \_\_\_\_\_, \_\_\_\_\_

Look for a pattern and predict the next two numbers in each sequence in exercises 5 through 8. Write a sentence describing how you found these numbers.

- 5.** 1, 10, 100, 1000, \_\_\_\_\_, \_\_\_\_\_

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- 6.** 180, 360, 540, 720, \_\_\_\_\_, \_\_\_\_\_

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- 7.**  $\frac{1}{6}, \frac{1}{3}, \frac{1}{2}, \frac{2}{3}$  \_\_\_\_\_, \_\_\_\_\_

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- 8.** 2, 20, 10, 100, 50, \_\_\_\_\_, \_\_\_\_\_

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—Continued—

4. Write a general formula for the sum of any number ( $n$ ) of consecutive odd integers by examining the following cases and using inductive reasoning.

integers	number of integers	sum of integers
1	1	1
1,3	2	4
1,3,5	3	9
1,3,5,7	4	16
1,3,5,7,9	5	25

For “ $n$ ” consecutive odd integers, the sum will be \_\_\_\_\_

Look for a pattern and predict the next two numbers in each sequence in exercises 5 through 8. Write a sentence describing how you found these numbers.

5. 0, 10, 21, 33, 46, 60, \_\_\_\_\_, \_\_\_\_\_

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6. 1, 3, 4, 7, 11, 18, \_\_\_\_\_, \_\_\_\_\_

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7. 3, -12, 48, -192, 768, \_\_\_\_\_, \_\_\_\_\_

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8.  $\frac{1}{2}, 9, \frac{2}{3}, 10, \frac{5}{6}, 11, 1$  , \_\_\_\_\_, \_\_\_\_\_

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—Continued—

7. Suppose  $p$  stands for “Triangle DEF is a right triangle” and  $q$  stands for “Triangle DEF is scalene”. Use these two statements to form, and state in words, a conjunction, a disjunction, and a negation of  $q$ .

Conjunction: \_\_\_\_\_

Disjunction: \_\_\_\_\_

Negation of  $q$ : \_\_\_\_\_

Given two statements as indicated in exercises 8 through 11, indicate whether the conjunction, disjunction, and negation of  $p$  are true or false.

**8.** both  $p$  and  $q$  are false

Conjunction: \_\_\_\_\_

Disjunction: \_\_\_\_\_

Negation of  $p$ : \_\_\_\_\_**9.**  $p$  is false and  $q$  is true

Conjunction: \_\_\_\_\_

Disjunction: \_\_\_\_\_

Negation of  $p$ : \_\_\_\_\_**10.**  $p$  is true and  $q$  is false

Conjunction: \_\_\_\_\_

Disjunction: \_\_\_\_\_

Negation of  $p$ : \_\_\_\_\_**11.** both  $p$  and  $q$  are true

Conjunction: \_\_\_\_\_

Disjunction: \_\_\_\_\_

Negation of  $p$ : \_\_\_\_\_

—Continued—

Suppose  $p$  stands for “Scientists are not uneducated” (a true statement) and  $q$  stands for “Geology involves the study of the earth” (a true statement). Write, in words, each of the statements in exercises 12 through 16. Then decide the truth of each compound statement.

12.  $\sim(p \wedge q)$

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13.  $\sim p \vee \sim q$

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14.  $\sim(p \vee q)$

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15.  $(p \vee q)$

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16.  $\sim p \wedge \sim q$

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—Continued—

7. Suppose  $p$  stands for “Triangle ABC is right isosceles” and  $q$  stands for “Triangle ABC is a right triangle”. Use these two statements to form a conjunction, a disjunction, and a negation of  $p$ .

Conjunction: \_\_\_\_\_  
Disjunction: \_\_\_\_\_  
Negation of  $p$ : \_\_\_\_\_

Given two statements as indicated in exercises 8 through 11, indicate whether the conjunction, disjunction, and negation of  $q$  are true or false.

8. both  $p$  and  $q$  are true.

Conjunction: \_\_\_\_\_  
Disjunction: \_\_\_\_\_  
Negation of  $q$ : \_\_\_\_\_

9.  $p$  is true and  $q$  is false.

Conjunction: \_\_\_\_\_  
Disjunction: \_\_\_\_\_  
Negation of  $q$ : \_\_\_\_\_

10. both  $p$  and  $q$  are false.

Conjunction: \_\_\_\_\_  
Disjunction: \_\_\_\_\_  
Negation of  $q$ : \_\_\_\_\_

11.  $p$  is false and  $q$  is true.

Conjunction: \_\_\_\_\_  
Disjunction: \_\_\_\_\_  
Negation of  $q$ : \_\_\_\_\_

—Continued—

Suppose  $p$  stands for “Algebra is a branch of mathematics” (a true statement) and  $q$  stands for “Geometry is not worthless” (a true statement). Write, in words, each of the statements in exercises 12 through 16. Then decide the truth of each compound statement.

12.  $p \vee q$

---

---

13.  $\sim(p \vee q)$

---

---

14.  $\sim p \wedge \sim q$

---

---

---

15.  $\sim(p \wedge q)$

---

---

16.  $\sim p \vee \sim q$

---

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## —Continued—

Consider each of the statements in Exercises 6-10 to be true. State the converse of each, and tell whether the converse is always, sometimes, or never true.

6. If a polygon is a hexagon, then it has exactly six sides.

Converse: \_\_\_\_\_

7. If  $x = 3$ , then  $x^2 = 9$

Converse: \_\_\_\_\_

8. If you are able to finish a triathlon, then you are in good shape.

Converse: \_\_\_\_\_

9. If a person is swimming, then that person is wet.

Converse: \_\_\_\_\_

10. If two lines have a common point, then the lines are intersecting lines.

Converse: \_\_\_\_\_

When a statement and its converse are both always true, you can combine the two statements into a biconditional using the phrase "if and only if". For exercises 11 through 15, decide which of the statements from exercises 6 through 10 can be written in biconditional form, and if possible, write the biconditional. If not possible, explain why.

11. (using exercise 6) \_\_\_\_\_  
\_\_\_\_\_

12. (using exercise 7) \_\_\_\_\_  
\_\_\_\_\_

13. (using exercise 8) \_\_\_\_\_  
\_\_\_\_\_

14. (using exercise 9) \_\_\_\_\_  
\_\_\_\_\_

15. (using exercise 10) \_\_\_\_\_  
\_\_\_\_\_

## —Continued—

Consider each of the statements in Exercises 6-10 to be true. State the converse of each, and tell whether the converse is always, sometimes, or never true.

6. If a figure is a pentagon, then it is a polygon.

\_\_\_\_\_

7. If a whole number has exactly two whole number factors, then it is a prime number.

\_\_\_\_\_

8. If you are an elephant, then you do not know how to fly.

\_\_\_\_\_

9. If you are at least 21 years old, then you can legally vote.

\_\_\_\_\_

10. If an angle is acute, then it is smaller than an obtuse angle.

\_\_\_\_\_

When a statement and its converse are both always true, you can combine the two statements into a biconditional using the phrase "if and only if". For exercises 11 through 15, decide which of the statements from exercises 6 through 10 can be written in biconditional form, and if possible, write the biconditional. If not possible, explain why.

11. (using exercise 6) \_\_\_\_\_

\_\_\_\_\_

12. (using exercise 7) \_\_\_\_\_

\_\_\_\_\_

13. (using exercise 8) \_\_\_\_\_

\_\_\_\_\_

14. (using exercise 9) \_\_\_\_\_

\_\_\_\_\_

15. (using exercise 10) \_\_\_\_\_

\_\_\_\_\_

## ***Unit I - The Structure of Geometry***

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For each term in the left column, choose the letter for the expression in the right column which defines, or most clearly describes that term and place that letter in the blank.

\_\_\_\_\_ 1. octagon

\_\_\_\_\_ 2. deductive reasoning

\_\_\_\_\_ 3. inscribed circle

\_\_\_\_\_ 4. disjoint sets

\_\_\_\_\_ 5. oblique prism

\_\_\_\_\_ 6. discrete geometry

\_\_\_\_\_ 7. right triangle

\_\_\_\_\_ 8. logic

\_\_\_\_\_ 9. cone

\_\_\_\_\_ 10. trapezoid

\_\_\_\_\_ 11.  $\overleftrightarrow{XY}$

\_\_\_\_\_ 12. pyramid

a) a quadrilateral in which only one pair of opposite sides are parallel

b) a geometry in which every point is a “dot”; every line is made up of separated points, having a space between each

c) a polygon made with six line segments.

d) line segment XY

e) any set of points in our Geometry.

f) a three dimensional geometric figure created by “locating” all the points in space which are at a given distance from a given point

g) a special pyramid whose base is a circle.

h) a general classification for all simple closed plane curves made up of straight line segments.

i) a three-dimensional geometric figure created by “translating” a polygon, through space, and tracing the path of that translation

j) a circle which is completely enclosed by a polygon, and barely touches all sides of the polygon

k) an illogical argument, based on false assumptions leading to a false conclusion.

l) distance from the center of a circle to any point on the circle

## —Continued, Page 2—

\_\_\_\_\_ 13. disjunction

\_\_\_\_\_ 14. sphere

\_\_\_\_\_ 15. polygon

\_\_\_\_\_ 16.

\_\_\_\_\_ 17. isosceles triangle

\_\_\_\_\_ 18. rhombus

\_\_\_\_\_ 19. right prism

\_\_\_\_\_ 20. quadrilateral

\_\_\_\_\_ 21. prism

\_\_\_\_\_ 22. fallacy

\_\_\_\_\_ 23. geometric figure

\_\_\_\_\_ 24. [ ]

\_\_\_\_\_ 25. hexagon

\_\_\_\_\_ 26. radius

m) a prism whose lateral faces are at an angle other than  $90^\circ$  with the base.

n) a three dimensional geometric figure created by “connecting” a polygon to a point not in the plane.

o) a system of reasoning, in an orderly fashion, which draws conclusions from specific premises.

p) two or more sets which have no members in common.

q) a polygon made with eight line segments

r) a triangle in which one of the angles is a right angle ( $90^\circ$ )

s) grouping symbol; brackets

t) an operation on two or more sets which selects only those elements common to all of the original sets at the same time

u) a quadrilateral in which all four sides are of equal measure

v) an operation in logic which joins two simple statements using the word “or”.

w) a prism whose lateral faces are at an angle of  $90^\circ$  with the bases.

x) a polygon made with four line segments.

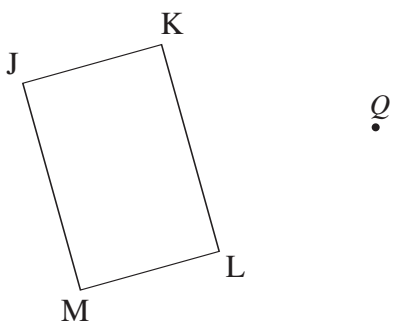
y) a triangle in which at least two of the three sides are of equal measure

z) the process of using a general statement which calls for a conclusion, based on certain conditions, and then applying a specific statement which satisfies those conditions, therefore establishing the validity of the conclusion.



29. Draw the image of the given rectangle, after a reduction with center Q, using the given scale factor.

Scale factor: .5



**30.** For each of the following sets, list all of the members of the set. Use the set of whole numbers as the domain of  $x$ .

a)  $\{x \mid 3x = 27\}$

b)  $\{x \mid 3 < x < 7\}$

c)  $\{x \mid x \leq 4\}$

d)  $\{x \mid x^2 - 5x + 6 = 0\}$

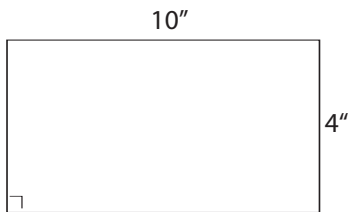
e)  $\{x \mid x^2 + 7x + 12 = 0\}$

f)  $\{x \mid x \leq 4\} \quad \{x \mid x^2 - 5x + 6 = 0\}$

g)  $\{x \mid 3x = 27\} \quad \{x \mid x^2 + 7x + 12 = 0\}$

In exercises 33 through 40, identify the polygon, as specifically as possible, find the perimeter of the polygon, and find the area of the polygon. Show your work and label your answers properly.

33.

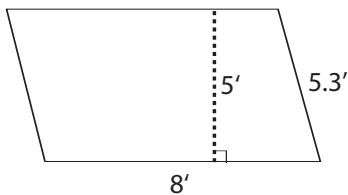


**Polygon:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

**Area:** \_\_\_\_\_

34.

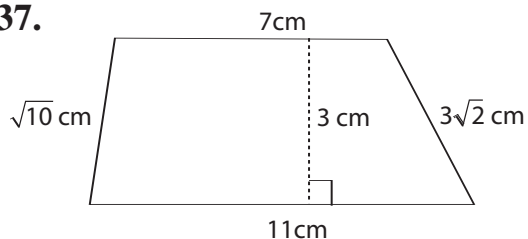


**Polygon:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

**Area:** \_\_\_\_\_

37.

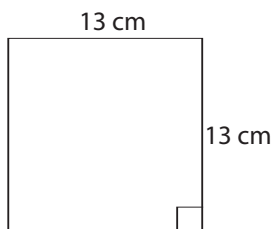


**Polygon:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

**Area:** \_\_\_\_\_

38.

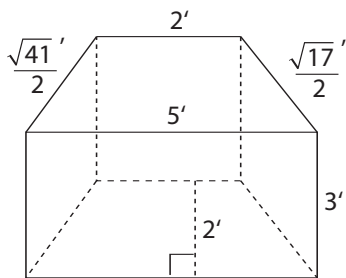


**Polygon:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

**Area:** \_\_\_\_\_

47.

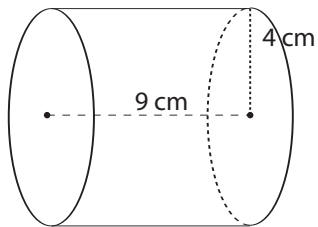


Lateral Area = \_\_\_\_\_

Total Area = \_\_\_\_\_

Volume = \_\_\_\_\_

48.



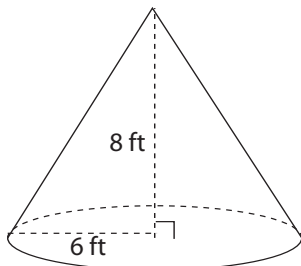
Lateral Area = \_\_\_\_\_

Total Area = \_\_\_\_\_

Volume = \_\_\_\_\_

For exercises 49 and 50, find the lateral area, total area, and volume of each right pyramid. Label your answers properly. Give exact answers where  $\pi$  is involved and label them properly.

49.



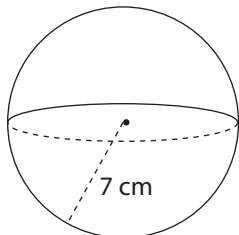
Lateral Area = \_\_\_\_\_

Total Area = \_\_\_\_\_

Volume = \_\_\_\_\_

Find the surface area and volume of this sphere. Substitute 3.14 for  $\pi$  and round your answers to the nearest tenth.

(C-9)  
51.



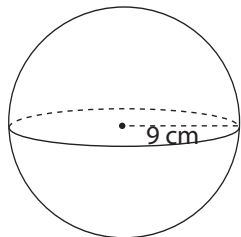
Surface Area = \_\_\_\_\_

Volume = \_\_\_\_\_



Find the surface area and volume of this sphere. Do not use an approximation for  $\pi$ . Give exact answers

(C-9)  
52.



Surface Area = \_\_\_\_\_

Volume = \_\_\_\_\_

53. Given that the following two statements are true:
- p is: Lizards eat crickets.
  - q is: Crickets eat tomatoes.

Write in words the following statements, and tell which are true and which are false.

a)  $p \wedge q$

---

---

b)  $p \vee \sim q$

---

---

c)  $p \rightarrow q$

---

---

d)  $\sim p \wedge q$

---

---

e)  $p \rightarrow \sim q$

---

---

f)  $\sim p \rightarrow \sim q$

---

---

## ***Unit I - The Structure of Geometry***

For each term in the left column, choose the letter for the expression in the right column which defines, or most clearly describes that term and place that letter in the blank.

- |                               |  |
|-------------------------------|--|
| _____ 1. lateral area         | a) a triangle with an angle greater than 90 degrees  |
| _____ 2. scalene triangle     | b) the process of finding a general principle based upon the evidence of a finite number of specific cases.                  |
| _____ 3. perimeter            | c) a polygon made with twelve line segments  |
| _____ 4. hypothesis           | d) operation symbol; indicates taking the square root.   |
| _____ 5. circumscribed circle | e) a polygon in which there are two distinct pairs of consecutive sides which are of equal measure.                          |
| _____ 6. equilateral triangle | f) a statement in logic which is made up of two or more simple statements.   |
| _____ 7. net                  | g) a polygon made with five line segments.   |
| _____ 8. negation             | h) a statement consisting of a hypothesis and a conclusion, generally in “if-then” form.                                     |
| _____ 9. inductive reasoning  | i) an operation in logic which joins two simple statements using the word “and”.   |
| _____ 10. parallelogram       | j) shortest distance from the center of a regular polygon to any one of the sides of the polygon.                            |
| _____ 11. $\vec{AM}$          | k) the plane geometric figure obtained by “unfolding” a three-dimensional geometric figure, and laying it “flat” in a plane. |
| _____ 12. dodecagon           | l) line CD   |
|                               | m) a circle which completely encloses a polygon  |

—Continued, page 2—

\_\_\_\_\_ 13. pentagon

\_\_\_\_\_ 14. conditional

\_\_\_\_\_ 15.  $\pi$

\_\_\_\_\_ 16. kite

\_\_\_\_\_ 17.  $\cong$

\_\_\_\_\_ 18. obtuse triangle

\_\_\_\_\_ 19.  $\sqrt{\quad}$

\_\_\_\_\_ 20. right prism

\_\_\_\_\_ 21.  $\in$

\_\_\_\_\_ 22. compound statement

\_\_\_\_\_ 23.  $\overleftrightarrow{CD}$

\_\_\_\_\_ 24. conjunction

\_\_\_\_\_ 25. apothem

\_\_\_\_\_ 26. regular polygon

n) states a condition that must be met; serves as a starting point in an argument.

o) a triangle with no congruent sides

p) a prism whose lateral faces are all at an angle of  $90^\circ$  with the bases

q) a statement in logic which changes the truth of a statement using the expression “it is not the case that”.

r) a quadrilateral in which there are two pairs of parallel sides.

s) relation symbol indicating two geometric figures have the same size and shape.

t) a relation symbol indicating an object is a member or element of a set.

u) ray AM

v) the sum of the areas of the lateral faces of a prism, pyramid, cylinder or cone.

w) a triangle with all sides equal in measure

x) a polygon which is both equilateral and equiangular

y) the measure of the distance around a polygon; sum of the measures of the sides.

z) number symbol representing the ratio of the circumference of a circle to the diameter of the circle.

30. Suppose  $X = \{2, 4, 6, \dots, 20\}$  and  $Y = \{4, 8, 12, \dots, 20\}$

a) Name the elements in each set.

b) Find  $X \cap Y$

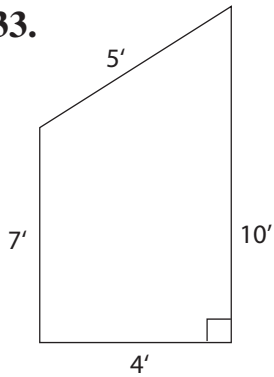
c) Find  $X \cup Y$

d) Find  $X \cap \{1, 2\}$

e) Find  $Y \cap \{1, 2\}$

In exercises 33 through 40, identify the polygon, find the perimeter of the polygon, and find the area of the polygon. Show your work and label your answers properly.

33.

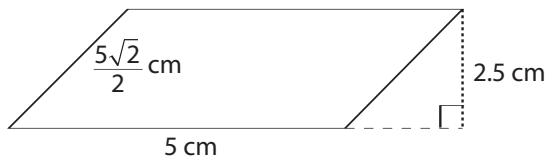


**Polygon:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

**Area:** \_\_\_\_\_

34.



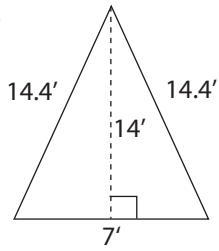
**Polygon:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

**Area:** \_\_\_\_\_

—Continued, page 8—

35.

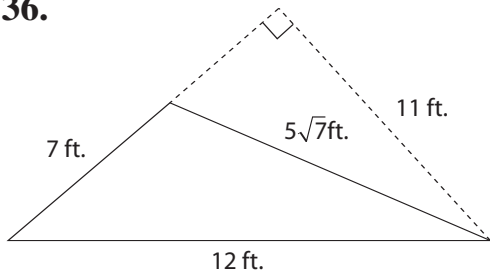


**Polygon:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

**Area:** \_\_\_\_\_

36.



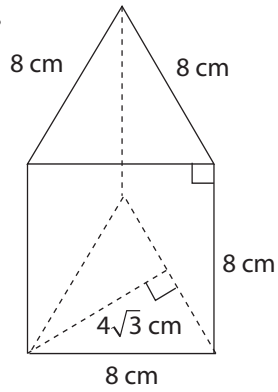
**Polygon:** \_\_\_\_\_

**Perimeter:** \_\_\_\_\_

**Area:** \_\_\_\_\_

For exercises 45 through 48, find the lateral area, total area, and volume of each right prism or right circular. Give exact answer where  $\pi$  is involved in an answer. Label your answers properly.

45.



**Lateral Area = \_\_\_\_\_**

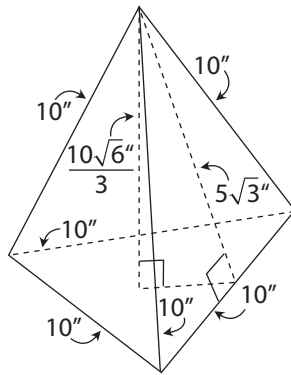
**Total Area = \_\_\_\_\_**

**Volume = \_\_\_\_\_**



For exercises 49 and 50, find the lateral area, total area, and volume of each right pyramid or right circular cone. Label your answers properly. Give exact answers where  $\pi$  is involved in an answer.

49.

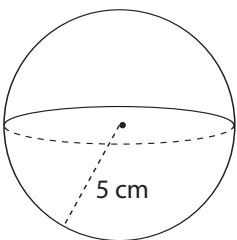


Lateral Area = \_\_\_\_\_

Total Area = \_\_\_\_\_

Volume = \_\_\_\_\_

51. Find the surface area and volume of this sphere. Do not use an approximation for  $\pi$ . Give exact answers.

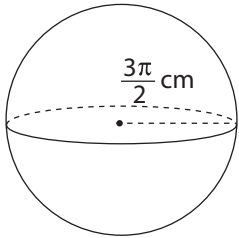


**Surface Area** = \_\_\_\_\_

**Volume** = \_\_\_\_\_

—Continued, page 20—

**52.** Find the surface area and volume of this sphere. Use 3.14 as an approximation for  $\pi$  and round your answers to the nearest tenth.



**Surface Area** = \_\_\_\_\_

**Volume** = \_\_\_\_\_