Area
Surface Area and Volume

8th Grade
10 days

by Jackie Gerwitz-Dunn and Linda Kelly
What do you want the students to understand at the end of this lesson?

The students should be able to distinguish between area, surface area and volume when questions are presented to them as figures drawn and dimensions labeled. They should be able to calculate any given word problem. Students should be able to transfer information into everyday real world situations.

What are the objectives for this unit?
Students should be able to:

1. Find the area of a rectangle, trapezoid or right triangle, given its dimensions.
2. Find the area of a rectangle, trapezoid or right triangle in real contexts/word problems.
3. Identify the commutative property of multiplication.
4. Find the surface area of a rectangular solid, given the dimensions.
5. Find the surface area of a rectangular solid in real contexts/word problems.
6. Find the volume of a rectangular solid, given its dimensions.
7. Find the volume of a rectangular solid in real contexts/word problems.
8. Use the TI-73 calculator
Standards for the Unit

**NYS Standard #3:**

Students will understand mathematics and become mathematically confident by communicating and reasoning, by applying mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability and trigonometry.

**NYS Standards Key Ideas Addressed:**

**KI #1** - Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence and construct an argument.

**KI #3** - Students use mathematical operations and relationships among them to understand mathematics.

**KI #4** - Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating and connecting mathematical information and relationships.

**KI #5** - Students use measurement in both metric and English measurement to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.

**NYS Standards Performance Indicators:**

1-C - Derive formulas to find surface area and volume.

3-C - Use grouping symbols to clarify the intended order of operations.

3-D - Apply the associative, commutative and distributive properties.

4-E - Demonstrate an understanding of algebraic expressions, equations, formulas and properties.

5-A - Estimate, make and use measurements in real-world situations. Make appropriate estimates relating to size and capacity.

5-B - Understand the uses of units, square units and cubic units.

5-C - Know and apply formulas for perimeter and area of polygons.
Resources:


Math Topics, Grades 7 – 8, Measurements, Geometry, Area, Probability and Graphing. Instructional Fair, Inc., pg. 41-42
Materials Needed:

• notebooks and  pencils
• rulers
• 4 graphic organizers (included)
• ETA Alphashapes, (2-D shapes, including rectangles, triangles and trapezoids)
• ETA Relational GeoSolids, (3-D shapes, plastic solids, small and large, 3 sets, total of 24 solids)
• 3-D shapes of various boxes covered in construction paper
• TI-73 graphing calculator
• TI Viewing Screen
• 12 plastic tangrams sets
• 1-cm graph paper
• 7 worksheets (included)
• 9 homework assignments (included)
• Answers to homework (included)
• boxes from candy/raisins  (enough for the entire class, same size boxes, approximately 12)
• Aluminum trays
• 8 oz plastic cups of water
• paper towels
• Answer keys for worksheets and homework assignments
• textbook
**Prerequisite Skills/Knowledge:**

Eighth grade students will have completed a review of area, volume, 2-dimensional and 3-dimensional concepts in both 6th and 7th grades.

**Parameters:**

Class time consists of 45-minute periods, 5 days a week. Each class has approximately 25 to 29.

Computer use for students is limited to word processing and set games on 9/30 computers. Internet access and other computer program tools not available at present time.
**DAY 1 - Area of Polygons**

**NYS Standards Performance Indicators:**
5-B  - Understand the uses of units, square units and cubic units.
5-C  - Know and apply formulas for perimeter and area of polygons.

**Materials:**
pencils, paper, calculators, TI-73 and TI viewing screen, 4 sizes per group of rectangles, squares, triangles and trapezoids with the sides measured and labeled in inches, cm, mm or labeled in other units not drawn to scale made of construction paper/graph paper (approximately 12 sets), graphic organizer #1 to classify shapes, ETA Alphashapes

**Warm-Up:**
Write a list of at least ten geometric shapes seen daily, classify the shapes into the following categories: squares, rectangles, triangles, others

**Procedures:**
1. To review the warm-up students will work with the person they sit next to and will generate a list of at least 10 geometric shapes they see in various environments. Then students will classify the shapes into the four categories listed in the warm-up (see attached graphic organizer #1). We will review this as a group by listing the categories on the overhead and calling on students to state an item and which category it falls into.

2. Discuss the shapes suggested by students, lead students review to ideas of area and 2-dimensional figures and then have students copy notes on area of polygons that include the following information:
   - definitions of polygons, quadrilaterals, rectangles, triangles, trapezoids
   - examples of each shape and formulas for area of squares, rectangles, triangles and trapezoids
   - use of commutative property of multiplication
   - use ETA Alphashapes as examples

3. Review the concepts of units squared using 1 cm graph paper and encourage the generalized idea of other square units of measurement.

4. Students will practice activities finding the area of squares, rectangles, triangles and trapezoids that are cut out of construction paper as well as graph paper. Each pair of students will receive an envelope of 4 shapes. The units’ dimensions will be provided on each shape. Students will write out the following three steps for each shape: the area formula used, the substitution of dimensions, and areas labeled in units squared.
5. After approximately 15 minutes of group work, review a few of the shapes students have found the area of, stress the ideas of square units, using an overhead version of the chart students have.

**Homework:**
page 472, # 1 – 5
DAY 2 - Area of Polygons

NYS Standards Performance Indicators:
5-B - Understand the uses of units, square units and cubic units.
5-C - Know and apply formulas for perimeter and area of polygons.

Materials:
pencils, notebooks, rulers, calculators, TI-73 and TI viewing screen, graphic organizer #2 to review definitions and formulas, various shapes of rectangles, squares, triangles, trapezoids that do not have the sides measured and labeled, worksheet #1 to complete during activity

Warm-Up:
-Complete graphic organizer on definitions, words to know, area formula, perimeter formula.
-Post answers to homework. After checking off completed homework students will check their answers.

Procedures:
1. To review the warm-up students will work independently on graphic organizers listing facts about each shape (see attached graphic organizer #2). We will review this as a group by completing organizers on the overhead and calling on students to complete them. Review any questions from the homework.

2. Students will work in assigned groups of three students per group. Each team will receive a packet with 6 shapes, rulers, calculators and 3 charts. Each shape will be labeled with a different letter and a unit of measurement indicated on the shape (ex: in, cm, mm). Students will measure the sides of the shapes in the unit indicated on the shape and will fill in the necessary information on the chart, which also includes the formula, substitution and the area written in units squared.

3. After approximately 20 minutes of group work, review a few of the shapes students have found the area of, stress the ideas of square units, using an overhead version of the chart students have.

Homework:
page 574, #1-3
DAY 3 - Area of Polygons

NYS Standards Performance Indicators:
5-B  - Understand the uses of units, square units and cubic units.
5-C  - Know and apply formulas for perimeter and area of polygons.

Materials:
notebooks, pencils, worksheet #2 on trapezoids, rulers, ETA Alphashapes and Tangram shapes, calculators, TI-73 and viewing screen, worksheets 3 and 4

Warm-Up:
- Identify the trapezoids on the given worksheet #2.
- Post answers to homework. After checking off completed homework students will check their answers

Procedures:
1. To review warm-up students will work with the person they sit next to and will complete the review sheet of trapezoids. We will review this as a group by completing the review sheet on the overhead and calling on students to complete them. Review any questions from the homework.

2. Students will find area of plastic 2-dimensional shapes. They will be given packets of 10 plastic shapes each, rulers, calculators and worksheet #4 to complete. They will complete a chart that directs them to measure the sides of each shape in centimeters or convert the measurement of the side to millimeters, meters or kilometers.

3. Review at least 2 shapes with the entire class to give a summary and be sure students understand all steps.

4. Students will solve word problems that require them to make a sketch of the image, then list the area formula, show substitution and label final answer correctly (students should be able to complete at least 3 of the ten problems on worksheet in class).

Homework:
complete worksheet on word problems for homework
DAY 4 - Surface Area of Rectangular Solids

NYS Standards Performance Indicators:
1-C - Derive formulas to find surface area and volume.
3-C - Use grouping symbols to clarify the intended order of operations.
3-D - Apply the associative, commutative and distributive properties.
4-E - Demonstrate an understanding of algebraic expressions, equations, formulas and properties.
5-A - Estimate, make and use measurements in real-world situations. Make appropriate estimates relating to size and capacity.
5-B - Understand the uses of units, square units and cubic units.
5-C - Know and apply formulas for perimeter and area of polygons.

Materials:
notebooks, pencils, graphic organized #3, 1-cm graph paper, scissors, small boxes from candy or raisins(each student has the same size box), rulers, clear tape

Warm-Up:
- Fill in a graphic organizer on geometric solids.
- Post answers to homework. After checking off completed homework students will check their answers

Procedures:
1. To review the warm-up students will work independently to fill in the graphic organizer on geometric solids. We will review this as a group by completing the review sheet on the overhead and calling on students to give answers. Review any questions from the homework.

2. Discuss 3-dimensional images and review notes that include:
   - faces, rectangular solids, box, cube, square prism, rectangular prism, dimensions, edges, vertices
   - review and examples of nets
   - formulas for the surface area of cubes and boxes
   - use Relational GeoSolids as examples

3. Each student will receive a piece of 1-cm graph paper, a small box (from candy or raisins) and a ruler. Students will measure the base and height of the top of the box, one side of the box and the front of the box.

4. Through discussion lead students to the idea that:
   a. there are 2 equal faces that make up the front and back, sides, and top and bottom
   b. these can all be added together
   c. these lead to the formula for the surface area of a box
5. Lead students to the formula and review:
   a. $2(t \times b) + 2(f \times b) + 2(s \times s)$ and $2(b \times w) + 2(h \times b) + 2(w \times h)$

6. Students will trace the 6 faces of the box onto the 1-cm graph paper, with consecutive sides connected.

7. Students will cut out the net of the box as a 2-dimensional figure. Students will fold the figure along the edges to form a box and will tape the net together creating a 3-dimensional box that is congruent to the original box.

8. Summarize the number of faces, names of the faces, and identify the base, width and height.

**Steps 3 through 7 of this lesson will carry over into DAY 5 of the lesson**

**Homework:**
page 563 # 1-5
DAY 5 - Surface Area of Rectangular Solids

NYS Standards Performance Indicators:
1-C - Derive formulas to find surface area and volume.
3-C - Use grouping symbols to clarify the intended order of operations.
3-D - Apply the associative, commutative and distributive properties.
4-E - Demonstrate an understanding of algebraic expressions, equations, formulas and properties.
5-A - Estimate, make and use measurements in real-world situations. Make appropriate estimates relating to size and capacity.
5-B - Understand the uses of units, square units and cubic units.
5-C - Know and apply formulas for perimeter and area of polygons.

Materials:
notebook, pencils, graphic organizer #4, materials from activity in day 4, ETA Relational GeoSolids, additional 3-dimensional shapes covered in construction paper (various boxes from products), worksheet #5, TI-73 and viewing screen

Warm-Up:
-Fill in “count the edges” graphic organizer #4.
-Post answers to homework. After checking off completed homework students will check their answers.

Procedures:
1. To review the warm-up students will work with the person they sit next to and will complete the graphic organizer. We will review this as a group by completing the review sheet on the overhead and calling on students to complete them. Review any questions from the homework.

2. Students will continue activity from yesterday to complete a net of the candy box. Be sure that their nets are folded along lines that would create the seams of the box. Stress with students that we can find the area of each rectangle that helps form the face of the box. Lead students to the idea that the opposite rectangles are congruent rectangles so that they see the formation of the formula for surface area.

3. Students will begin new activity to measure 3-D solids and find the surface area of each shape. Each group will start with one worksheet per person and one shape. Each shape will be labeled in a capital letter. Charts will be prelabeled with letters A - T. A station will be provided where students can return the solids they have measured and take another one, to cover as many letter as possible within the given time frame.

Steps 3 of the this lesson will carry over into DAY 6 of the lesson

Homework:
page 563 # 8 -10
DAY 6 - Surface Area of Rectangular Solids
NYS Standards Performance Indicators:
1-C - Derive formulas to find surface area and volume.
3-C - Use grouping symbols to clarify the intended order of operations.
3-D - Apply the associative, commutative and distributive properties.
4-E - Demonstrate an understanding of algebraic expressions, equations, formulas and properties.
5-A - Estimate, make and use measurements in real-world situations. Make appropriate estimates relating to size and capacity.
5-B - Understand the uses of units, square units and cubic units.
5-C - Know and apply formulas for perimeter and area of polygons.

Materials:
notebook, pencils, graphic organizer #4, materials from activity in day 4, ETA Relational GeoSolids, additional 3-dimensional shapes covered in construction paper (various boxes from products), worksheet #5, TI-73 and viewing screen

Warm-Up:
- No warm-up, students will go right into groups and continue activity from yesterday.
- Post answers to homework. After checking off completed homework students will check their answers.

Procedures:
1. Review any questions from homework
2. Students will finish activity from yesterday
3. Summarize concepts of nets, sides and edges of solids.
4. Begin exercise to use word problems to draw and label images

Homework:
finish worksheet for homework
DAY 7 - **Surface Area of Rectangular Solids**

**NYS Standards Performance Indicators:**
1-C  - Derive formulas to find surface area and volume.
3-D  - Apply the associative, commutative and distributive properties.
4-E  - Demonstrate an understanding of algebraic expressions, equations, formulas and properties.
5-A  - Estimate, make and use measurements in real-world situations. Make appropriate estimates relating to size and capacity.
5-B  - Understand the uses of units, square units and cubic units.
5-C  - Know and apply formulas for perimeter and area of polygons.

**Materials:**
worksheets from day 7, ball, flash cards of terms and questions for teacher to use

**Warm-Up:**
- Post answers to homework. After checking off completed homework students will check their answers

**Procedures:**
1. Students will check off answers to their homework as the warm-up. Answer any questions students have.

2. Class will play a game of toss to review terms, definitions, spelling, synonyms, etc... as follows:
   a. The teacher will call out a word and a direction such as “faces/definition” and throw the ball to a student. The student who catches the ball will state its definition and throw the ball back to the teacher.
   
   b. The teacher will call out another term such as “cube/synonym” and throw the ball to a student, who will state its synonym and throw the ball back to the teacher. Continue in this pattern for about 10 to 15 minutes of review.

3. Students will play a Jeopardy-type game of questions and answers, working in pairs:
   a. Groups will be numbered from 1 – 12.
   
   b. Each group will have 3 seconds to answer a question once the entire question has been read.
   
   c. Start with group 1 and read the question. After 3 seconds if they do not know the answer, move to group 2 and reread the question. As each team gets a correct answer they earn 1 point. If any team shouts out answers they will lose 1 point each time each time they do so (a little review of negative numbers!) No team gets a repeated turn when they answer a question correctly, they only get a point.

**Homework:**
no homework assigned
DAY 8 - Volume of Rectangular Solids

NYS Standards Performance Indicators:
1-C - Derive formulas to find surface area and volume.
4-E - Demonstrate an understanding of algebraic expressions, equations, formulas and properties.
5-A - Estimate, make and use measurements in real-world situations. Make appropriate estimates relating to size and capacity.
5-B - Understand the uses of units, square units and cubic units.
5-C - Know and apply formulas for perimeter and area of polygons.

Materials:
notebooks, pencils, Relational GeoSolids, TI-73 and viewing screen

Warm-Up:
-Copy and answer the following question: Each edge of a wooden cube has a length of 3 inches. What is the least number of cuts needed to cut the cube into 27 one-inch cubes? (answer is 6 cuts)

Procedures:
1. To review the warm-up students will work independently. We will review this as a group by completing the review sheet on the overhead and calling on students to complete them.

2. Generate a discussion on the students prior knowledge of volume and complete notes on volume that include the following concepts:
   - length, width, height, depth
   - formulas to find volume of rectangular solids (squares, rectangles, others)
   - finding volume using base of solid
   - use Relational GeoSolids as examples

3. Complete practice activities on volume using the dimensions of the GeoSolids measured from days 5 and 6 to substitute into the volume formula to find the volume of each solid.

Homework:
page 479 #3 - 6
DAY 9 - Volume of Rectangular Solids

NYS Standards Performance Indicators:
1-C - Derive formulas to find surface area and volume.
4-E - Demonstrate an understanding of algebraic expressions, equations, formulas and properties.
5-A - Estimate, make and use measurements in real-world situations. Make appropriate estimates relating to size and capacity.
5-B - Understand the uses of units, square units and cubic units.
5-C - Know and apply formulas for perimeter and area of polygons.

Materials:
notebooks, pencils, Relational GeoSolids, 1 aluminum pan per pair (approximately 12 needed), 1 8 oz cup of water per pair (approximately 12 needed), paper towels, worksheet #6

Warm-Up:
-Post answers to homework. After checking off completed homework students will check their answers

Procedures:
1. After students check the answers to their homework, review any questions they may have.

2. Students will be divided into pairs. Each pair will get 1 aluminum pan, 1 8 oz cup of water, 2 GeoSolids, and 1 worksheet per person.

3. Students will label what solids they have on their worksheet. They will predict which solid will have the greater volume (hold the most water).

4. Students will pour water into the first solid. The extra water in the cup will be dumped into the aluminum pan. Students will pour the water from the first solid into the second solid to demonstrate which has the greater volume. Students will fill in the worksheet accordingly.

5. Students will exchange solids and repeat steps 3 and 4. They will continue until they have compared the volume of all 24 solids in sets of 2.

Homework:
page 480 #1 - 4
DAY 10 - Volume of Rectangular Solids

NYS Standards Performance Indicators:
1-C  - Derive formulas to find surface area and volume.
4-E  - Demonstrate an understanding of algebraic expressions, equations, formulas and properties.
5-A  - Estimate, make and use situations. Make appropriate estimates relating to size and capacity.
5-B  - Understand the uses of units, square units measurements in real-world and cubic units.
5-C  - Know and apply formulas for perimeter and area of polygons.

Materials:
notebooks, pencils, calculators, TI-73 and viewing screen, worksheet #7

Warm-Up:
-Post answers to homework. After checking off completed homework students will check their answers

Procedures:
1. Review any questions from the homework.

2. Students will work in pairs to complete diagram review and word problems that distinguish from area, surface area and volume.

3. Students will begin their homework when finished, which is to write 15 test questions – 5 on area, -5 on surface area and -5 on volume

Homework:
to complete the 15 homework test questions
**Worksheet #1**

Complete the chart on the area of rectangles, triangles and trapezoids.

<table>
<thead>
<tr>
<th>Letter</th>
<th>Area Formula</th>
<th>Substitution</th>
<th>Final Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Worksheet # 2

Skills: Find the area of a trapezoid

In 1-4, tell if each polygon appears to be a trapezoid. Explain why or why not.

1. 

2. 

3. 

4. 

______________________________

______________________________

______________________________

______________________________

______________________________

______________________________

______________________________

______________________________
5. 

6. 

7. Complete the formula for the area of a trapezoid. Then, at the right, draw and label a diagram to show what the variables you wrote represent.

\[ A = \frac{1}{2}(b_1 + b_2)h \]
Worksheet #2 Answer Key

Skills: Find the area of a trapezoid

In 1-4, tell if each polygon appears to be a trapezoid. Explain why or why not.

1. Yes; figure has 4 sides; pair of parallel sides.
2. No, figure has no parallel sides.
3. Yes; figure has 4 sides, pair of parallel sides.
4. Yes; figure has 4 sides, pair of parallel sides.
5. No; figure has 5 sides
6. Yes; figure has 4 sides

7. Complete the formula for the area of a trapezoid. Then, at the right, draw and label a diagram to show what the variables you wrote represent.

\[ A = \frac{1}{2}h(b_1 + b_2) \]
Worksheet 3
Vocabulary

1. In the triangle at the right,
   a. which sides are the legs?
   b. which side is the hypotenuse?

Skills  Objective A: Find the area of a rectangle or a right triangle given its dimensions.

In 2-4, give the area of each figure. First indicate the calculation you will do.

2.

3.

4.

Properties  Objective E: Identify the Commutative Property of Multiplication.

5. Multiple choice. Which sentence or sentences illustrate the Commutative Property of Multiplication?

   (a) $7 + 9 = 9 + 7$
   (b) $0.2 \cdot 6 = 6 \cdot 0.2$
   (c) $\frac{1}{4} \cdot 20 = 20 \cdot \frac{1}{4}$
   (d) $50\% \cdot 8 = 4$
   (e) $xy = yx$
   (f) $0.75 \cdot 60 = \frac{3}{4} \cdot 60$
Worksheet #4

<table>
<thead>
<tr>
<th>name of shape</th>
<th>dimension of base in cm</th>
<th>dimension of height in cm</th>
<th>conversion to meters</th>
<th>conversion to km</th>
</tr>
</thead>
</table>


## Worksheet #5

<table>
<thead>
<tr>
<th>letter</th>
<th>formula</th>
<th>substitution</th>
<th>final answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Worksheet #6

name of two solid prediction of greater volume actual greater volume
Worksheet #7
8. A rectangular solid is 5 in. wide, 6 in. long, and \( h \) in. high. What is its surface area?

9. The length of the edge of a cube is \( e \) units.
   a. What is the surface area of the cube?
   b. What is the volume of the cube?

10. A cracker tin is a box measuring 12 cm by 12 cm by 24 cm. Ignore waste and overlap and tell how much tin sheet material is needed for one box.

11. A redwood planter is shaped like an open box 30 inches long, 8 inches wide and 8 inches deep. Mrs. Sato is staining the outside surface. What is the area of the surface she is staining?

12. A box of sugar cubes measures 5 cm by 13 cm by 20 cm.
   a. Ignore waste and overlap and tell how much cardboard is needed to make the box.
   b. How many 1-cm cubes of sugar can the box hold?

13. The surface area of a box is 232 square inches. The box is 4 inches wide and 8 inches long. If it is \( h \) inches high,
   a. write an equation that could be used to find \( h \).
   b. find \( h \).

14. The volume of a box is 540 cubic centimeters. The box is 9 centimeters long and 12 centimeters high.
   a. How wide is the box?
   b. What is the surface area of the box?

15. What is the length of an edge of a cube whose surface area and volume have the same numerical value? (Hint: Refer to Question 9.)
List at least ten geometric shapes you see around you daily.
1. ________
2. ________
3. ________
4. ________
5. ________
6. ________
7. ________
8. ________
9. ________
10. ________

Classify the shapes into the following categories:

squares rectangles triangles others
### Graphic Organizer #2 - To Use Day 2

Move into concept of area and perimeter of shapes. Make a concept grid as follows

<table>
<thead>
<tr>
<th>Definition: A parallelogram with 4 right angles</th>
<th>Words to know: length, width, height</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="Rectangle.jpg" alt="Rectangle" /></td>
<td><img src="Rectangle.jpg" alt="Rectangle" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area Formula</th>
<th>Perimeter Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area = length ( \times ) width</td>
<td>Perimeter = (2 \times ) length + (2 \times ) width</td>
</tr>
<tr>
<td>(A = l \times w)</td>
<td>(P = 2l + 2w)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Definition: A parallelogram with 4 right angles and 4 equal sides</th>
<th>Words to know: side, right angle</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="Square.jpg" alt="Square" /></td>
<td><img src="Square.jpg" alt="Square" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area Formula</th>
<th>Perimeter Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area = side ( \times ) side</td>
<td>Perimeter = (4 \times ) side</td>
</tr>
<tr>
<td>(A = s^2)</td>
<td>(P = 4s)</td>
</tr>
<tr>
<td>Definition</td>
<td>Words to know</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td><strong>Triangle</strong></td>
<td><strong>Obtuse</strong></td>
</tr>
<tr>
<td>Area Formula: ( A = \frac{1}{2} b \times h )</td>
<td><strong>Height</strong></td>
</tr>
<tr>
<td>Perimeter Formula: ( P = s + s + s )</td>
<td><strong>Right</strong></td>
</tr>
<tr>
<td><strong>Trapezoid</strong></td>
<td><strong>Acute</strong></td>
</tr>
<tr>
<td>Definition: A quadrilateral with exactly one pair of parallel sides.</td>
<td><strong>Base</strong></td>
</tr>
<tr>
<td>Area Formula: ( A = \frac{1}{2} (b_1 + b_2) h )</td>
<td><strong>Height</strong></td>
</tr>
<tr>
<td>Perimeter Formula: ( P = 2s + b_1 + b_2 )</td>
<td><strong>Parallel</strong></td>
</tr>
</tbody>
</table>
Graphic Organizer #3 - To Use Day 3

3-Dimensional Solids

- prism
- pyramid
- cylinder
- cone
- sphere
**Graphic Organizer #4 - To Use Day 5**

Count the edges worksheet

<table>
<thead>
<tr>
<th>Figure</th>
<th>Number of faces</th>
<th>Number of</th>
<th>Number of</th>
<th>Faces + Vertices</th>
</tr>
</thead>
<tbody>
<tr>
<td>pentagonal pyramid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rectangular pyramid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>triangular prism</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rectangular prism</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pentagonal prism</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
HOMEWORK ASSIGNMENTS:

Homework - Day 1
(from textbook page 472, #1 – 5)

Read each problem and complete, show all work including a diagram of shape, area formula, substitution and a labeled answer.

1. What is the area of a rectangle with the dimensions 3 cm and 4 cm?

2. Make an accurate drawing of rectangles to show that the product of 3.2 and 4 is greater than the product of 3 and 4 (use cm as the unit of measurement).

3. If the length and width of a rectangle were measured in centimeters, the area would be given in what unit?

4. Draw a rectangle that is 4 inches by 5 inches and give its area.

5. Draw a rectangular array of dots with 7 rows and 5 columns. How many dots are in the array?

Homework - Day 2
(from textbook page 574, #1- 3)

Read each problem and complete, show all work including a diagram of shape, area formula, substitution and a labeled answer.

1. Find the area of the isosceles triangle DEF that has a base of 38 in and a height of 24 in.

2. Find the area of right triangle ABC, where base AB measures 14 yds and height AC measures 12 yds.

3. A rectangular field ABCD has the following measurements: AB measures 44 m and BC measures 13 m. If you create a diagonal from points A to C, what would be the area of the triangle you create?
(homework from day 3 is a continuation of worksheet started in class)
Homework - Day 4
(from textbook page 563 #1-5)

Read each problem and complete, show all work including a diagram of shape, area formula, substitution and a labeled answer.

1. A raisin box and all points inside it is an example of a figure called a ________________________

2. What is the surface area of a solid?

3. What is a net for 3-dimensional figure?

4. How many faces does a rectangular solid have?

5. Find the surface area of Given a box with the dimensions 9 cm, 12 cm and 7 cm:
   a. Make a sketch of the box
   b. Draw a net for the box
   c. Find the surface area of the box

Homework - Day 5
(textbook page 563, #8-10)

Read each problem and complete, show all work including a diagram of shape, area formula, substitution and a labeled answer.

8. A box has a length of 2 ft, a height of 18 in and width of 2 in.
   a. Draw a diagram of the box
   b. Convert the units of measurement
   c. Find the surface area in square inches

9. A rectangular solid has a length of L, a width of W, and a height of H.
   a. Show the surface area of the rectangular solid

10. A shirt is to be given as a gift. It is put into a box. The dimensions of the box are 14”, 2.5” and 9”. What is the least amount of wrapping paper needed to wrap the gift?
Homework – Day 6

Finish classwork word problems on surface area.

(no homework listed for day 7 in lesson)

Homework - Day 8
(textbook page 479, #3 - 6)

Read each problem and complete, show all work including a diagram of shape, volume formula, substitution and a labeled answer.

3. Find the volume of the following rectangular solid that has a height of 6 cm, a width of 3 cm and a depth of 4 cm.

4. Find the volume of the following rectangular solid that has a height of 10 meters, a width of W meters and depth of D meters.

5. The area of the base of a rectangular solid is 40 square centimeters and the height is 4 centimeters. Find the volume of the solid.

6. The area of the base of rectangular solid is A and the height is H. Show the volume of the solid.

Homework - Day 9
(textbook page 480, #1 - 4)

Read each problem and complete, show all work including a diagram of shape, area formula, substitution and a labeled answer.

1. The floor of a rectangular shaped room is 9 feet by 12 feet and the ceiling is 8 feet high. How much space is there is the room?

2. Give two possible sets of dimensions for a rectangular solid whose volume is 144 cubic inches.
3. Draw a rectangular solid whose volume is 8 cubic centimeters. What is this rectangular solid called?

4. A portable cassette player is a rectangular solid with the dimensions 12 cm × 9 cm × 4 cm. Another cassette player has the dimensions 18 cm × 55 cm × 19 cm. How many times more volume does the second cassette player occupy?

Homework – Day 10

Write 15 test questions, 5 on area, 5 on surface area, 5 on volume.
ANSWERS TO HOMEWORK

Day 1 Homework
Page 472 (no drawings are attached to answers)
1. 12 cm squared
2. 12.8 cm vs 12 cm
3. cm squared
4. 20 in squared
5. 35 dots in the array

Day 2 Homework
Page 574
1. 456 in squared
2. 84 yds squared
3. 286 m squared

Day 3 Homework
Answers to worksheet #1

Day 4 Homework
Page 563
1. a rectangular solid
2. the sum of the area of its faces
3. a 2-dimensional flat figure that can be folded into that given shape
4. six faces
5. 510 squared centimeters

Day 5 Homework
Page 563
8. b. 24 in, 18 in, 2 in
   c. 1116 square inches
9. 2LW + 2LH + 2HW
10. 367 square inches

Day 6 Homework
(none listed at present time)

Day 7 Homework
(none listed at present time)

Day 8 Homework
Page 479
3. 72 cubic centimeters
4. $V = 10WD$
5. 160 cubic centimeters
6. $V = AH$

Day 9 Homework
Page 480
1. 864 cubic feet
2. 12 in, 12 in and 1 in or 12 in, 3 in and 4 in
3. (this would be a cube whose l,w,h all equal 2 cm each)
4. the second cassette player has 40 times more volume

Day 10 Homework
(none listed at present time)
Vocabulary

Areas
area trapezoid
parallelogram rhombus
base height
circle

3-D
solid polyhedron
prism pyramid
cylinder cone
sphere
edge, vertex

Surface Area
net surface area

Formulas

Area of parallelogram = bh
Area of trapezoid = \(_(b_1 + b_2) \times h\)
Surface area of prism = \(2B + Ph\)

Vol of prism is Base \(\times\) height where base is \(l \times w\) so....
\((V=1/2 l \times w \times h)\) or \((V=1/3 \times w \times h)\)

Vol of Cylinder \((V=\pi r^2 \times h)\) where Base equals \(\pi\) times \(r\) squared times \(h\) so....
\((V=\pi r^2 \times h)\)

Vol of a pyramid with a square base \((V=1/3 B \times h)\) where Base is \(s^2\) so.....
\((V=1/3 \times s^2 \times h)\)
Vol of pyramid with different length base \((V=1/3 B \times h)\) where Base is \(l \times w\) so.....
\(V=1/3(1/2 l \times w) \times h\)

Maybe make a chart that counts the number of vertices, edges and faces of a polyhedron
(Page 495) McDougal Littell and (512)

NOTE: EXTREMELY FUN GAME AT www.classzone.com under Math


http://www.classzone.com/books/msmath_3/pdfs/me3_10_7.pdf