Lesson Summary: For the warm up, students will solve a problem about the U.S. debt in relation to its population. In Activity 1, students will learn vocabulary about triangles and quadrilaterals. In Activity 2, students will do computation problems. In Activity 3, they will solve word problems. There is an optional card game activity as well as a True/False exit ticket. Estimated time for the lesson is 2 hours.

Materials Needed for Lesson 41:
- Video (length 4:38) on classifying quadrilaterals
- Video (length 4:44) on classifying triangles. The videos are required for teachers and optional for students.
- Vocabulary Worksheet
- Worksheet 41.1 with answers (attached)
- Geometry notes to be used for this lesson and the next 4 lessons also. (the notes come from http://www.asu.edu/courses/mat142ej/geometry/Geometry.pdf) (pages 1-17)
- Mathematical Reasoning Test Preparation for the 2014 GED Test Student Book (pages 94 – 95)
- Mathematical Reasoning Test Preparation for the 2014 GED Test Workbook (pages 126 – 129)
- Decks of cards for the extra activity (optional)
- Exit Ticket

Objectives: Students will be able to:
- Solve the U.S. debt word problem
- Learn geometry vocabulary about triangles and quadrilaterals
- Practice measurement of perimeter and area
- Solve word problems related to triangles and quadrilaterals

ACES Skills Addressed: N, CT, ALS
CCRS Mathematical Practices Addressed: Model with Mathematics, Mathematical Fluency
Levels of Knowing Math Addressed: Intuitive, Abstract, Pictorial, and Application

Notes:
You can add more examples if you feel students need them before they work. Any ideas that concretely relate to their lives make good examples.

For more practice as a class, feel free to choose some of the easier problems from the worksheets to do together. The “easier” problems are not necessarily at the beginning of each worksheet. Also, you may decide to have students complete only part of the worksheets in class and assign the rest as homework or extra practice.

The GED Math test is 115 minutes long and includes approximately 46 questions. The questions have a focus on quantitative problem solving (45%) and algebraic problem solving (55%).

Students must be able to understand math concepts and apply them to new situations, use logical reasoning to explain their answers, evaluate and further the reasoning of others, represent real world problems algebraically and visually, and manipulate and solve algebraic expressions.
This computer-based test includes questions that may be multiple-choice, fill-in-the-blank, choose from a drop-down menu, or drag-and-drop the response from one place to another.

The purpose of the GED test is to provide students with the skills necessary to either further their education or be ready for the demands of today’s careers.

### Lesson 41 Warm-up: Solve the U.S. debt problem  Time: 5 Minutes

Write on the board: The federal U.S. debt is $17 trillion dollars.

**Basic Question:**
- If the population of the U.S. is 314 million, estimate how much debt there is per person.

**Notes:**
- Have students write on the board how much 17 trillion is \((17,000,000,000,000)\) and how much 314 million is \((314,000,000)\).
- Have students Google the population of the U.S. instead of telling them what it is.
- Students may solve the problem with proportions or just division. Have students volunteer to write on the board how they solved the problem.
- The answer is about $\$54,000 per U.S. resident.

**Extension Question:**
- Write an equation to solve the problem.
  - The answer is a variation of \(17,000,000,000,000 = 314,000,000 \times \) \(X\)

### Lesson 41 Activity 1: Geometry Introduction: Vocabulary  Time: 20 Minutes

1. Start the core lesson with a discussion about what geometry is and when it is used. Solicit answers from the students.
   - Answers will vary but may include such responses as: Geometry is a part of math that is used to do measurements, shapes, points, lines and their relationships. Geometry is used in construction, photography, cooking, home improvement, engineering, interior design, etc.
2. Hand out the **Vocabulary Worksheet** to students.
3. Give students a few minutes to fill in the words they know and then finish together.
4. Explain that triangles can be described by their angles or by their sides. The measurement of their inside angles adds up to 180 degrees (half of those of a quadrilateral).
5. Say that the measurement of the inside angles of a quadrilateral is 360 degrees.
6. Explain the relationship among quadrilaterals by making a drawing on the board similar to the one below. It shows that:
   a. Rectangles, rhombi, and squares are all parallelograms.
   b. Squares can be classified as rectangles and as rhombi. (A rhombus has opposite sides parallel.)
   c. All parallelograms are quadrilaterals.

![Diagram of quadrilaterals]

Lesson 41 Activity 2: Perimeter and Area Computation  Time: 15 Minutes

1. Give students the Geometry Notes, pages 1-17. Students will use these notes as reference for this lesson and the next 4 lessons.
2. Review how to measure perimeter and area. Explain that the terms length and width are sometimes used interchangeably with the terms base and height.
3. Explain why the area formula for a triangle is ½ times base times height. Take a square sheet of paper, ask the students how to measure its area (b x h), then fold it in half to show a triangle. The area of a triangle is half that of a quadrilateral.
4. Do Worksheet 41.1. Do #1 together and let the students work independently on the rest.
5. Check answers by having volunteers (those who finish early) write their answers on the board.

Lesson 41 Activity 3: Solve Problems  Time: 60 Minutes

1. Solve the problems in the student book pages 94-95 together (15 minutes).
2. Have students work independently in the workbook pages 126-129 (45 minutes).
3. Have volunteers write their solutions on the board for some of the more challenging problems.
### Lesson 41 Exit Ticket: True or False

<table>
<thead>
<tr>
<th>Time: 5 Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print out this half-sheet activity, and have students complete it individually. Either check each student’s paper for the correct answers as he/she completes it, or go over the answers as a group before students leave.</td>
</tr>
</tbody>
</table>

Answers: 1. F (correct is perimeter) 2. T 3. T 4. F (correct is 2 equal sides) 5. F (correct is 180 degrees)

### Lesson 41 Extra Activity: Area Card Game

<table>
<thead>
<tr>
<th>Time: 10 Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. This card game can be played to reinforce calculation of area or played if there is extra time.</td>
</tr>
<tr>
<td>2. See the attached instructions sheet.</td>
</tr>
</tbody>
</table>
Activity 1 Vocabulary Worksheet

Choose the best word above to fill in the blanks of the definitions below.

1. A __________________________ is a flat closed figure formed by 3 or more lines.
2. A __________________________ is a polygon with 3 sides.
3. A __________________________ is a polygon with 4 sides and 4 angles.
4. A __________________________ triangle is a triangle whose largest angle is 90 degrees.
5. An __________________________ triangle is a triangle whose largest angle is less than 90 degrees.
6. An __________________________ triangle is a triangle whose largest angle is more than 90 degrees.
7. __________________________ means all the sides are equal.
8. A __________________________ triangle is a triangle with 2 congruent sides.
9. A __________________________ triangle is a triangle with no congruent sides.
10. An __________________________ triangle has 3 congruent sides.
11. A __________________________ has 4 sides and 4 right angles with equal length opposite sides.
12. A __________________________ is a quadrilateral with 4 equal sides.
13. The __________________________ is the measurement of the total length of all the sides.
14. The __________________________ is the measure of the surface of a figure.
Worksheet 41.1 Perimeter and Area Calculation

Identify and Calculate the Area and Perimeter for each Polygon.

1) \[ \text{a} = 5.5 \text{ ft} \quad \text{h} = 4.94 \text{ ft} \]

Area: 
Perimeter: 
Type: 

2) \[ \text{a} = 7.2 \text{ inches} \quad \text{b} = 5.1 \text{ inches} \]

Area: 
Perimeter: 
Type: 

3) \[ \text{a} = 6.33 \text{ cm} \quad \text{c} = 9.8 \text{ cm} \quad \text{h} = 5.7 \text{ cm} \]

Area: 
Perimeter: 
Type: 

4) \[ \text{a} = 5.75 \text{ ft} \quad \text{b} = 8.05 \text{ ft} \quad \text{c} = 8.3 \text{ ft} \quad \text{h} = 5.3 \text{ ft} \]

Area: 
Perimeter: 
Type: 

5) \[ \text{a} = 7.8 \text{ cm} \quad \text{b} = 4.9 \text{ cm} \quad \text{c} = 9.21 \text{ cm} \]

Area: 
Perimeter: 
Type: 

6) \[ \text{a} = 7.4 \text{ ft} \quad \text{b} = 4.1 \text{ ft} \quad \text{c} = 8.46 \text{ ft} \]

Area: 
Perimeter: 
Type: 

7) \[ \text{s} = 5 \text{ cm} \]

Area: 
Perimeter: 
Type: 

8) \[ \text{s} = 6.9 \text{ cm} \]

Area: 
Perimeter: 
Type: 

9) \[ \text{a} = 6.01 \text{ inches} \quad \text{c} = 8.2 \text{ inches} \quad \text{h} = 5.6 \text{ inches} \]

Area: 
Perimeter: 
Type: 

D. Legault, Minnesota Literacy Council, 2014
Worksheet 41.1 Answers

1) \[ \begin{array}{c}
\text{a} = 5.5 \text{ ft} \\
\text{h} = 4.94 \text{ ft}
\end{array} \]

Area: 27.17 sq ft
Perimeter: 22 ft
Type: Rhombus

2) \[ \begin{array}{c}
\text{a} = 7.2 \text{ inches} \\
\text{b} = 5.1 \text{ inches}
\end{array} \]

Area: 36.72 sq inches
Perimeter: 24.6 inches
Type: Rectangle

3) \[ \begin{array}{c}
\text{a} = 6.33 \text{ cm} \\
\text{c} = 9.8 \text{ cm} \\
\text{h} = 5.7 \text{ cm}
\end{array} \]

Area: 55.86 sq cm
Perimeter: 32.26 cm
Type: Parallelogram

4) \[ \begin{array}{c}
\text{a} = 5.75 \text{ ft} \\
\text{b} = 8.05 \text{ ft} \\
\text{c} = 8.3 \text{ ft} \\
\text{h} = 5.3 \text{ ft}
\end{array} \]

Area: 21.995 sq ft
Perimeter: 22.1 ft
Type: Common Triangle

5) \[ \begin{array}{c}
\text{a} = 7.8 \text{ cm} \\
\text{b} = 4.9 \text{ cm} \\
\text{c} = 9.21 \text{ cm}
\end{array} \]

Area: 19.11 sq cm
Perimeter: 21.91 cm
Type: Right Triangle

6) \[ \begin{array}{c}
\text{a} = 7.4 \text{ ft} \\
\text{b} = 4.1 \text{ ft} \\
\text{c} = 8.46 \text{ ft}
\end{array} \]

Area: 15.17 sq ft
Perimeter: 19.96 ft
Type: Right Triangle

7) \[ \begin{array}{c}
\text{s} = 5 \text{ cm}
\end{array} \]

Area: 25 sq cm
Perimeter: 20 cm
Type: Square

8) \[ \begin{array}{c}
\text{s} = 6.9 \text{ cm}
\end{array} \]

Area: 47.61 sq cm
Perimeter: 27.6 cm
Type: Square

9) \[ \begin{array}{c}
\text{a} = 6.01 \text{ inches} \\
\text{c} = 8.2 \text{ inches} \\
\text{h} = 5.6 \text{ inches}
\end{array} \]

Area: 45.92 sq inches
Perimeter: 28.42 inches
Type: Parallelogram
Area Card Game

Find the Area

Introduce the concept of area to your third grader with this fun card game. You'll show your child how to determine the area of any object and help him begin thinking in terms of units as you create shapes out of playing cards. Count the cards you use or try applying multiplication to find the total area. Once you've got the hang of the game, assign different values to the cards!

What You Need:

- Deck of cards
- Several players

What You Do:

1. Decide on the unit value of the cards. If you decide on the number 2, each card will amount to two units and players will have to keep this value in mind when calculating the area of the figure you're building.
2. Have the players take turns placing one card at a time face down on a flat surface. Every card placed down should touch the side of another card. Cards should not overlap.
3. Every so often, interrupt the game and have one of the players calculate the area of the figure.

Helpful Tip: You may want to guide the players to build rectangles as they'll make it easier to calculate the area. Stop the game at intervals when rectangles have been completed. Then, introduce the formula for finding the area of a rectangle: length x width = area.

Play this game multiple times and assign the cards several different values in order to get as much practice as possible.

© Copyright 2006-2012 Education.com All Rights Reserved.

Find the original activity at https://www.education.com/activity/article/last-place/.
Exit Ticket

True or False?

_____ The distance around the outside of a polygon is the area.
_____ The area of a triangle is half the base times the height.
_____ A square is a rectangle.
_____ An isosceles triangle has no equal sides.
_____ All the angles of a triangle measure 360 degrees.