Weekly Focus: polygons, triangles
Weekly Skill: solve for missing measurement

LESSON 46: Scale Drawings

Lesson Summary: For the warm up, students will solve a rate problem. In Activity 1, students will solve for the missing measurement in similar figures. In Activity 2, they will do related word problems. There is an exit ticket and also an application activity at the end. Estimated time for the lesson is 2 hours.

Materials Needed for Lesson 46:

- Video (length 5:28) on similar figures. The video is required for teachers and optional for students.
- Rulers for the application activity
- Notes to copy and give to students, pages 37 – 42 (http://www.asu.edu/courses/mat142ej/geometry/Geometry.pdf)
- 1 Worksheet (46.1) with answers (attached)
- *Mathematical Reasoning Test Preparation for the 2014 GED Test* Student Book (pages 104 – 105)
- *Mathematical Reasoning Test Preparation for the 2014 GED Test* Workbook (pages 146 – 149)
- Exit Ticket (link embedded in lesson plan)
- Download the application activity and its images directly from the site (link embedded in lesson plan)

Objectives: Students will be able to:

- Solve the rate word problem about grass seed
- Understand the relationship between similar figures
- Calculate the missing measurement by using proportions
- Solve 1 (exit ticket) or 2 (application activity) real-life problems

ACES Skills Addressed: N, CT, LS, EC
CCRS Mathematical Practices Addressed: Building Solution Pathways, Model with Math, Construct viable arguments and critique the reasoning of others
Levels of Knowing Math Addressed: Intuitive, Pictorial, Abstract, and Application

Notes:
You can add more examples if you feel students need them before they work. Any ideas that concretely relates 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 46 Warm-up: Solve the rate problem	**Time: 10 Minutes**

Write on the board: Margaret has 2 lbs. of grass seed to spread on her front lawn. Each pound covers 400 ft^2. The instructions say to spread the seed at a rate of 4 oz. per 30 seconds.

Basic Question:

- How many minutes will it take to spread the 2 lbs. of seed?
  - 4 minutes. 2 lbs. = 32 oz. $\frac{4\ oz}{30\ seconds} = \frac{32\ oz}{240\ seconds}$. 240 seconds = 4 minutes

Extension Question:

- What is the radius of the largest circular lawn that Margaret can plant with her 2 pounds of seed?
  - A= 3.14 r^2. 800 = 3.14r^2. Solving for r gives us approximately16 feet.

Lesson 46 Activity 1: Similar Figures	**Time: 30 Minutes**

1. Copy the **Similar Triangles Notes, pages 37 – 42** for students. Use the notes as a basis for the examples.
2. The objectives of this lesson are to determine if **two figures are similar- they have different lengths of sides, but the lengths are proportional** – and to find missing numbers for similar figures.
3. Ask students when this might be used in real life. Responses may include the making of maps and in making blueprint models for construction projects. (You can also wait to ask this

question until after you have done one or two examples.)

4. Draw two triangles like on the first page of the notes. Explain that triangles with **congruent (equal) angles** will have opposite sides that are proportional. Sides opposite corresponding angles are corresponding sides.
5. We can find the missing side measurement by setting up proportions.
6. Do the 3 examples in the notes.
7. The relationship of other polygons works the same way.
8. Hand out **Worksheet 46.1**. Do the first problem together.
9. Explain that the **scale factor** is the ratio of one figure to another. An example is on a map, the legend tells you what the ratio on the map is compared to the actual distance.
10. For Question 7, the scale factor of A to B is 2 to 7. Set it up as a proportion of A/B = 2/7 = 6/X. Solving the proportion gives X = 21.

Lesson 46 Activity 2: Scale Drawings Word Problems	**Time: 40 Minutes**

1. Do the problems on **pages 104-105** in the **student book** together.
2. Have a few students do some of the problems on the board.
3. Now students can work independently on **pages 146-149** in the **workbook.**
4. Circulate to help.
5. Have volunteers do some of the more challenging problems on the board.

Lesson 46 Exit Ticket Option	**Time: 5-10 Minutes**

1. Show the picture of the large ladder at a festival (click here to download activity). The solution can be accessed if you are a member.
2. Give students time to discuss and estimate how long it is. They can use the estimated length of cars and estimate how many car lengths it is.

Lesson 46 Application: What Should Highway Sign Show?	**Time: 25-30 Minutes**

1. This activity includes the practice of scale drawings and of measurement in a real-life context.

2. You will need rulers and be able to show the photos and the map on the application activity.
3. Discuss the situation by using some of the questions suggested in the lesson.
4. Become familiar with the lesson before presenting it to students.
5. There are two sets of question in the activity. Only do the first one if you don't have enough time.
6. As an alternative, you can tell the students the estimated measurements in cm to save time and have them solve the problem from there.

Worksheet 46.1 Similar Polygons

The polygons in each pair are similar. Find the missing side length.

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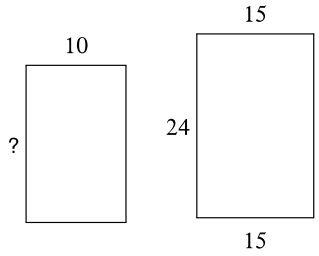

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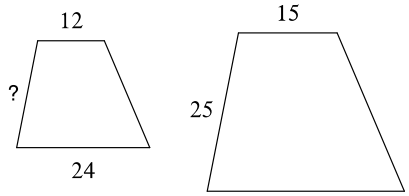

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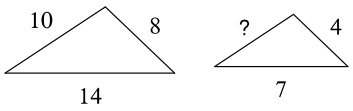

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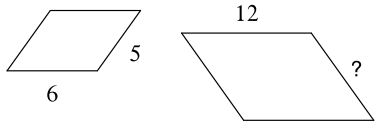

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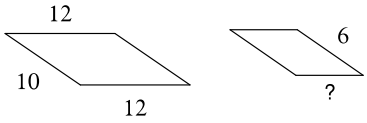

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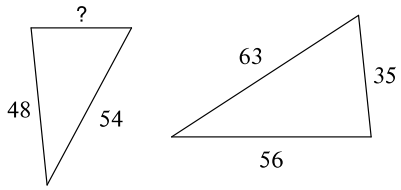

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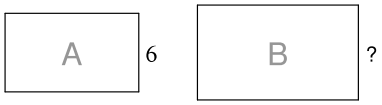
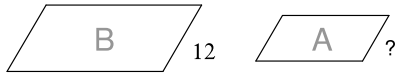


scale factor from A to B = 2 : 7

8)



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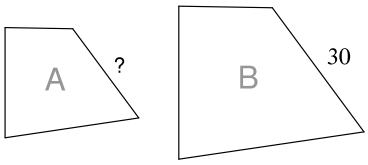

scale factor from A to B = 5 : 6

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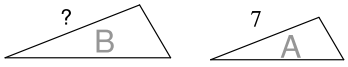

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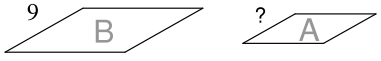

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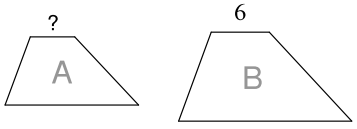

scale factor from A to B = 1 : 2

Worksheet 46.1 Answers

The polygons in each pair are similar. Find the missing side length.

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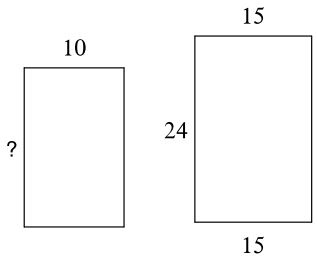

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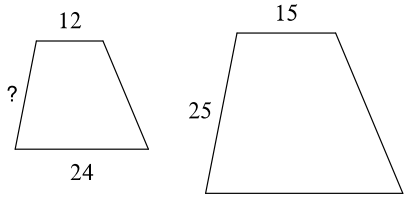

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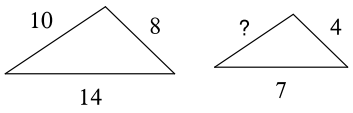

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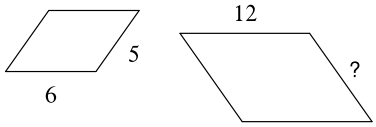

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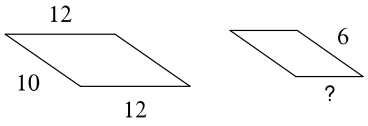

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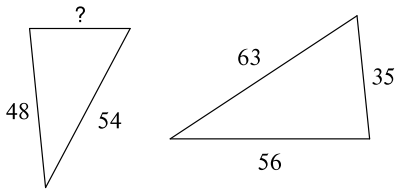

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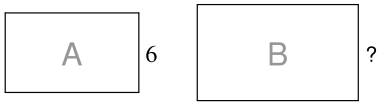

scale factor from A to B = 2 : 7

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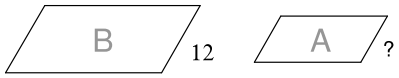

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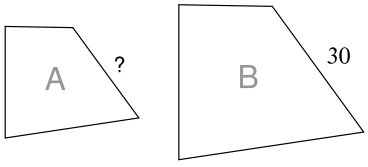

scale factor from A to B = 5 : 6

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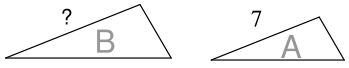

scale factor from A to B = 1 : 7

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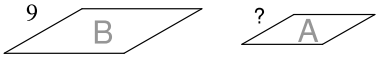

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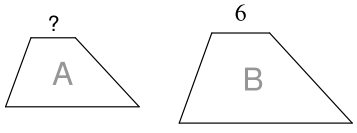

scale factor from A to B = 1 : 2

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