

GED 2002 Teachers' Handbook of Lesson Plans

Content Area Mathematics	Lesson Topic/Theme Geometry – Finding the Area of Triangles	Correlation to Math Framework 05.04	Lesson Number - 51
<p>Title: Testing Triangle Area Objectives/Learner Outcomes</p> <p>At the end of this lesson, the learner will be able to:</p> <ul style="list-style-type: none"> • Recall that the area formula for a triangle is $A = (1/2) \times \text{base} \times \text{height}$ • Identify the height of a triangle • Calculate the area for a given triangle • Label all areas in square units • Apply the concept of area to a word problem 		<p>Materials/Resources/Internet Sites/Handouts/Worksheets</p> <ul style="list-style-type: none"> • Chart paper/white board • Markers • Handout – <i>Triangle Area Bingo Game</i> (directions, bingo sheets, clues, answers) • Handout – <i>Triangle Bingo</i> • Handout – <i>Testing Triangle Area</i> 	
<p>Pre-Requisite Knowledge</p> <p>The learner should be able to:</p> <ul style="list-style-type: none"> • Complete basic multiplication problems with whole numbers, decimals, and fractions • Understand that a perpendicular line forms right angles where it intersects another line or segment 		<p>Key Words</p> <ul style="list-style-type: none"> • Area • Base • Height • Formula • Square units (i.e., inches, feet, yards, centimeters, meters, etc.) 	
<p>Anticipatory Set/Introduction</p> <p>Draw: A large rectangle on the board/chart paper</p> <p>Say: Imagine that we want to turn this one rectangle into two triangles.</p> <p>Ask: Is there a way that I can break this rectangle into two triangles? (Once the class explains that it can be done by drawing one of the diagonals of the rectangle, shade in one of the triangles.)</p>			

Preview Questions for Lesson

1. Who remembers the formula for area of a rectangle? (Answer: Area = length x width)
2. How does the area of one of the triangles compare to the area of the original rectangle? (Answer: It's half as big.)
3. Who can show me the base of the shaded triangle? (Answer: use the shaded triangle)
4. What type of units did we have when we were talking about the area of a square or rectangle? (Answer: square units)

Instructional Outline

Say: We know that the area formula for a rectangle is length times width. Write on the board: Area (rectangle) = length x width

Say: You also told me that the area of the shaded triangle is half of the rectangle.

Write: Area (triangle) = _____ (leaving the blank empty for now).

Ask: What do you think should be filled in for the area formula of our triangle? (Answer: $1/2 \times \text{length} \times \text{width}$ or one-half of the rectangle formula)

Say: For triangles, we usually talk about the base, not the length, and the height, not the width. Write (in the blank) $1/2 \times \text{base} \times \text{height}$.

Draw an equilateral triangle on the board/chart paper.

Ask: Where's the base of this triangle? (Students will probably identify the "bottom" of the triangle as the base – which is acceptable.)

Ask: Where's the height? (Students may identify one of the other sides of the triangle. If so, ask why the other side can't be the height. Lead them to see that the height may be something other than a side of the triangle.)

Say: The height of a triangle may not always be one of the sides. The height of a triangle is shown by a perpendicular line that goes from the base of the triangle to the tallest or highest point of the triangle.

Draw some triangles on the board and identify their heights. Give a value for the base and height.

Say: Let's find the area for these triangles. (Work through the examples with students, using the area formula of a triangle.) Explain that the correct label will always be "square units" (stress this throughout the examples). When you have finished your explanation, hand out the **Triangle Bingo** and **Testing Triangle Area** handouts.

Complete at least one round of **Triangle Bingo**. (See the direction sheet for more information on how to play the game.)

Process/Activities

Divide the class into pairs. With the class, work through a problem that asks them to compute a total price. The following example can be used: "Martina is tiling her bathroom floor and is using a special blue tile for a triangle in the middle of the floor. The triangle's base will measure 1.5 feet and the height will be 2 feet. If the tile costs \$4.25 per square foot, how much will this special tile cost?" (Stress that students should first sketch a picture of the shape, label the length of each of the measurements, use the volume formula, and then find the total price.)

Say: Flip over your worksheet to the side marked **Testing Triangle Area**. With your partner, decide how you'd figure out the cost for each job listed. Show your calculations and be ready to explain your steps. As you work together, discuss what you're doing.

Walk around the room to monitor progress and to keep each pair on-task. Have volunteers share their answers and explanations. It may be helpful for students to sketch their figures on the board/chart paper and show their calculations.

Product/Evaluation/Summary

Check: Answers on **Testing Triangle Area** handout.

Ask: What are the two measurements you must know to calculate the area of a triangle? (Answer: base and height)

Ask: How are the base and the height of a triangle related? (Answer: They're perpendicular to each other.)

Ask: What is the area formula for a triangle? (Answer: Area = $1/2 \times \text{base} \times \text{height}$)

Ask: What kind of units do you use for a triangle's area? (Answer: square units)

Teaching to Different Types of Learners			
	Visual	Auditory	Kinesthetic/Tactile
Learning Activity	Provide written directions, charts, and worksheets to students.	Incorporate activities that allow students to work together and discuss what they have done. Have students repeat answers, directions, and formulas to you or a partner.	Students can draw pictures or trace shapes with their fingers to demonstrate what area is and how they do the calculations. Students could also visually demonstrate area by using their hands to show the size of the figure. Construction of triangles can also be done with construction paper, tape, and scissors.
Special Differentiation Strategies	Use an overhead transparency or answer key worksheet to visually	Check for understanding by asking questions when giving	Show students pictures of what's being discussed (i.e., triangles)

	<p>show the correct answers for the area activities, rather than just providing the answers verbally. When providing directions orally, have them in writing as well.</p>	<p>directions or assignments in writing.</p>	<p>painted on walls, triangles used as decorations, etc.). Create the figures (to scale) in your classroom and allow students to walk around to explore the size of the figures.</p>
<p>Evaluation</p>	<p>Allow learners to write their answers instead of saying them aloud.</p>	<p>Allow students to orally report what they have learned.</p>	<p>Allow students to use drawings to demonstrate their understanding of how to find the area of a triangle.</p>
<p>The Family and Adult Literacy Connection</p> <p>If students have school-aged children, have them complete similar examples to find the area of various triangles at home. Students can have their children use rulers or measuring tapes or assist them by holding a measuring tape. Students and children can construct triangles of different sizes using construction paper and tape.</p> <p>Students can connect the concept of area to the real world by looking for examples presented in newspapers, magazines, and store advertisements. Instructors can facilitate this by having periodicals that students can browse through in the classroom. A field trip can also be organized to a home improvement store.</p>		<p>ESE/ESOL Accommodations</p> <p>Partner students with a peer buddy who can facilitate discussion and model tasks. Allow for non-verbal responses such as pointing, nodding, or showing numbers on fingers. Demonstrations can be given by students or instructors.</p> <p>Show students how to use manipulatives or draw pictures to represent the problems that need to be solved.</p>	

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Triangle Bingo Directions

1. Cut up the "clues" into individual strips. Place them in a bag and mix up them up.
2. On the board/chart paper, write the list of answers.
3. Pass out the bingo sheets.
4. Tell the students that they should write one number answer in each box, using all of the answers on the board. They may arrange the order of the answers anyway they like on their bingo sheet. There is no "free space."
5. It may be helpful for students to have some scratch paper on which to do calculations.
6. Shake the bag to mix up the clues. The instructor may pick out a clue and read it to the class or have a student do this. Place the used clues off to the side.
7. Students should do the calculation and then mark the appropriate box on their bingo sheet. The instructor may go over the calculation or have a student volunteer to explain how it was done.
8. Repeat this process by picking a new clue and reading it to the class.
9. The first person to have a row, column, or diagonal marked wins. Answers on the student's bingo sheet can be verified with the "used" clue strips.

** Note: All clues will lead to an answer that was written on the board/chart paper. If a student comes up with an answer that was not listed on the board/chart paper, he/she should examine the area calculations. This game can have many variations, such as allowing students to work in pairs or small groups, allowing only vertical rows to win, etc.

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Triangle Bingo

Clues

I am a triangle whose base is 10 cm and height is 10 cm. What's my area?

I am a triangle whose base is 8 cm and height is 10 cm. What's my area?

I am a triangle whose base is 12 cm and height is 10 cm. What's my area?

I am a triangle whose base is 6 cm and height is 10 cm. What's my area?

I am a triangle whose base is 6 cm and height is 5 cm. What's my area?

I am a triangle whose base is 2 cm and height is 2 cm. What's my area?

I am a triangle whose base is 20 cm and height is 10 cm. What's my area?

I am a triangle whose base is 15 cm and height is 10 cm. What's my area?

I am a triangle whose base is 4 cm and height is 6 cm. What's my area?

I am a triangle whose base is 7 cm and height is 4 cm. What's my area?

I am a triangle whose base is 2 cm and height is 25 cm. What's my area?

I am a triangle whose base is 6 cm and height is 9 cm. What's my area?

I am a triangle whose base is 6 cm and height is 6 cm. What's my area?

I am a triangle whose base is 3 cm and height is 3 cm. What's my area?

I am a triangle whose base is 7 cm and height is 10 cm. What's my area?

I am a triangle whose base is 7 cm and height is 8 cm. What's my area?

I am a triangle whose base is 2 cm and height is 4 cm. What's my area?

I am a triangle whose base is 10 cm and height is 2 cm. What's my area?

I am a triangle whose base is 1 cm and height is 10 cm. What's my area?

I am a triangle whose base is 2 cm and height is 3 cm. What's my area?

I am a triangle whose base is 6 cm and height is 3 cm. What's my area?

I am a triangle whose base is 11 cm and height is 2 cm. What's my area?

I am a triangle whose base is 11 cm and height is 1 cm. What's my area?

I am a triangle whose base is 10 cm and height is 9 cm. What's my area?

I am a triangle whose base is 20 cm and height is 20 cm. What's my area?

GED 2002 Teachers' Handbook of Lesson Plans

Triangle Bingo Answers

50 sq. cm

40 sq. cm

60 sq. cm

30 sq. cm

15 sq. cm

2 sq. cm

100 sq. cm

75 sq. cm

12 sq. cm

14 sq. cm

25 sq. cm

27 sq. cm

18 sq. cm

4.5 sq. cm

35 sq. cm

28 sq. cm

8 sq. cm

10 sq. cm

5 sq. cm

3 sq. cm

9 sq. cm

11 sq. cm

5.5 sq. cm

45 sq. cm

200 sq. cm

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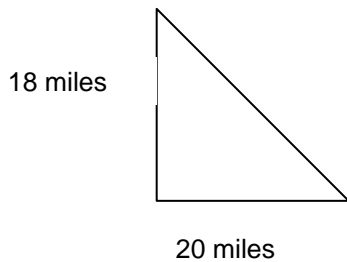
Triangle Bingo

GED 2002 Teachers' Handbook of Lesson Plans

Testing Triangle Area

1. Raul is painting his cousin's room and will be putting 5 triangles on the walls. Each triangle will have a base that's 3 feet long and a height of 3 feet.
 - A. What's the total area for all of the triangles?
 - B. If he wants to buy a special silver paint that costs \$4.55 per square foot, how much will it cost to paint the triangles?
2. Natasha's building a bird fountain and wants to put a decorative triangle in the middle of it. She plans to make the triangle have a height of 6 inches and a base of 4 inches.
 - A. What's the area for this triangle?
 - B. If she makes it out of a special outdoor concrete mixture that sells for \$0.55 per inch, what'll this decoration cost to make?

3. The town of Triangle-ville is shown below.



- A. How many square miles does the town occupy?
 - B. If Triangle-ville was double the size, what would its area be?
- 4.) Below, circle the measurement of the triangle that you do **not** need to know to find its area.

