WAMC Lab Template

Math Concept(s): Area of a triangle

Source / Text:

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Date: 6/25/24

Attach the following documents:

- Lab Instructions
- Student Handout(s)
- Rubric and/or Assessment Tool

Short Description (Be sure to include where in your instruction this lab takes place):

- Students will explore the relationship between the area of a rectangle and a triangle. This lab is after work with area for quadrilaterals including rectangles, parallelograms, and trapezoids.

IB Components

SOI: Patterns from models can be used to create form.
ATL: Critical thinking skills: Analyzing and evaluating issues and ideas
LPT: Open-minded, Knowledgeable
Inquiry Question: How do I calculate area? How can I use models to derive new formulas?

Lab Plan

Lab Title: Area of a triangle! How?

Prerequisite skills: using a ruler/straightedge, calculate area of a rectangle, use a calculator, scissor skills

Lab objective: derive the formula for the area of a traingle

Standards: *(Note SPECIFIC relationship to Science, Technology, and/or Engineering)*

Mathematics K–12 Learning Standards:

- 6.G.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

Standards for Mathematical Practice:

- Model with mathematics
- Look for and make use of structure

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

- Integration of Knowledge and Ideas 7. Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

K-12 Science Standards

- n/a

Technology

- n/a

Engineering

- MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

☐ Global Awareness ☐ Financial/Economic/Business/Entrepreneurial Literacy ☐ Civic Literacy
☐ Health/Safety Literacy ☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION
Creativity and Innovation
☐ Think Creatively
☐ Work Creatively with Others
☐ Implement Innovations
Critical Thinking and Problem Solving
x☐ Reason Effectively
☐ Use Systems Thinking
x☐ Make Judgments and Decisions
x☐ Solve Problems
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x☐ Access and Evaluate Information
x☐ Use and manage Information
Media Literacy
☐ Analyze Media
☐ Create Media Products
Information, Communications and Technology (ICT Literacy)
☐ Apply Technology Effectively

LIFE & CAREER SKILLS
Flexibility and Adaptability
x☐ Adapt to Change
x☐ Be Flexible
Initiative and Self-Direction
☐ Manage Goals and Time
☐ Work Independently
☐ Be Self-Directed Learners
Social and Cross-Cultural
☐ Interact Effectively with Others
☐ Work Effectively in Diverse Teams

Productivity and Accountability
☐ Manage Projects
☐ Produce Results
Leadership and Responsibility
☐ Guide and Lead Others
☐ Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- Scissors
- Student handout of rectangles and parallelograms
- Data recording sheet

Set-Up Required:

- Copy handouts
- Get out scissors

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- Students should pick roles to complete the exploration.

Cooperative Learning:

- Students will work together to find the relationship between rectangles/parallelogram and triangles.

Expectations:

- Students are expected to work collaboratively to discover the formula for the area of a triangle.
- Students should be principled and stay on task.

Timeline:

- 30 minutes

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- After putting all the found formulas on the board, discuss how they are the same and different. Come to a consensus on the formula. Teacher should guide this discussion to ensure correct formula in at least one of its variations.

Career Applications

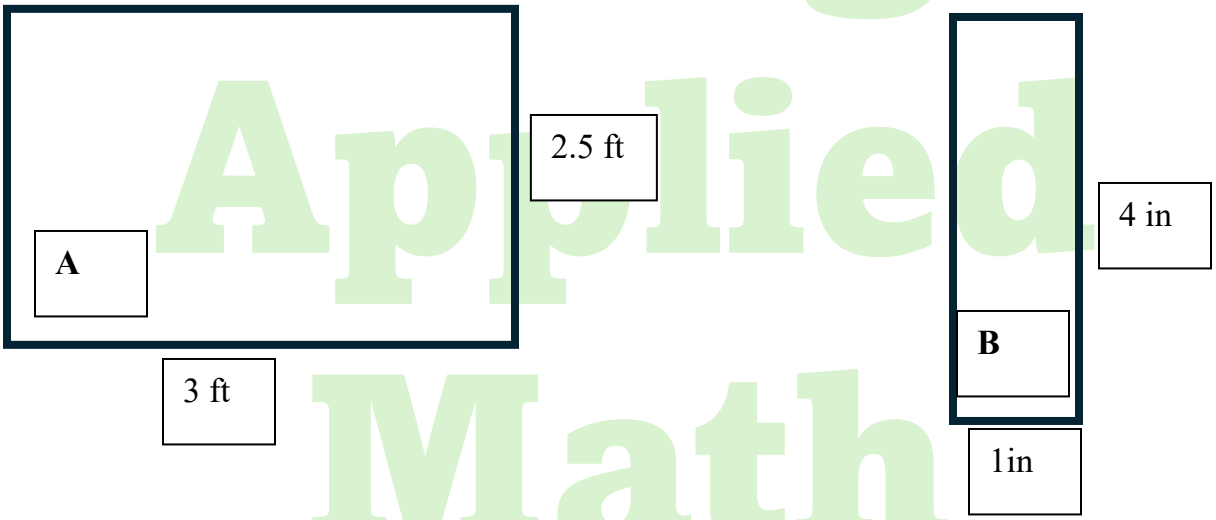
- Problem solving skills, analysis,

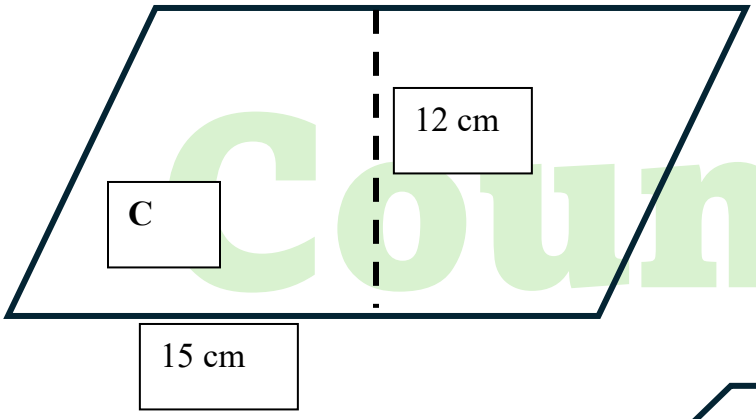
Optional or Extension Activities

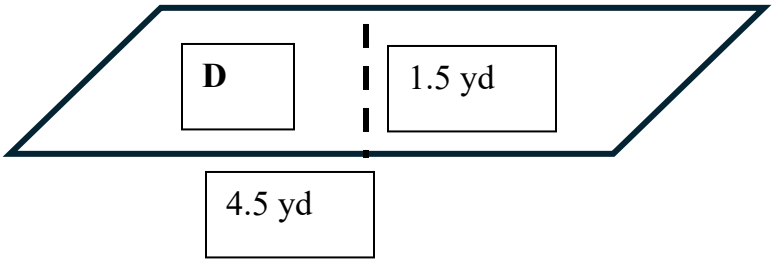
-

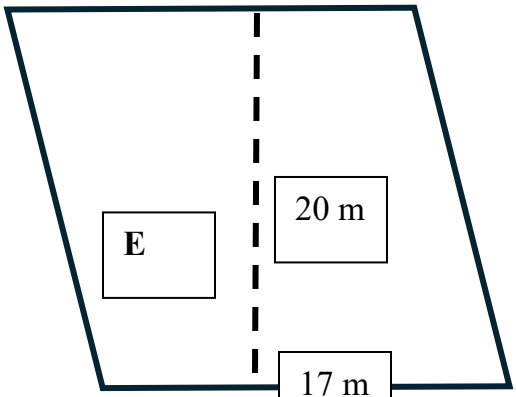
No names. You will be cutting this up.

Student Handout #1: Rectangles and parallelograms

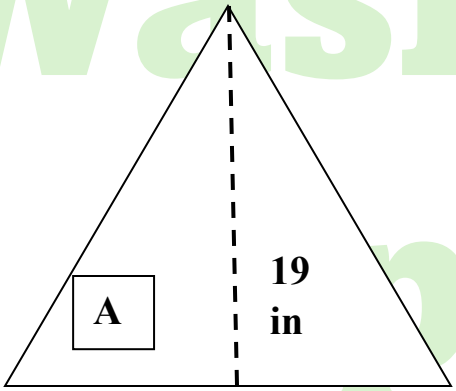


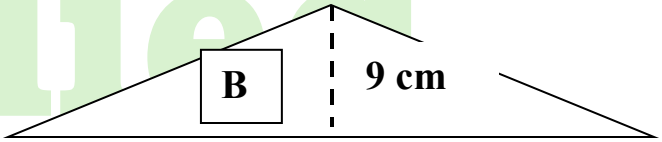


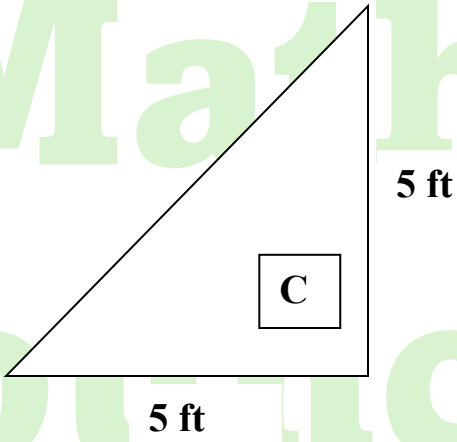


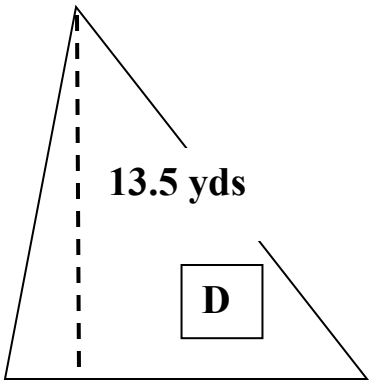


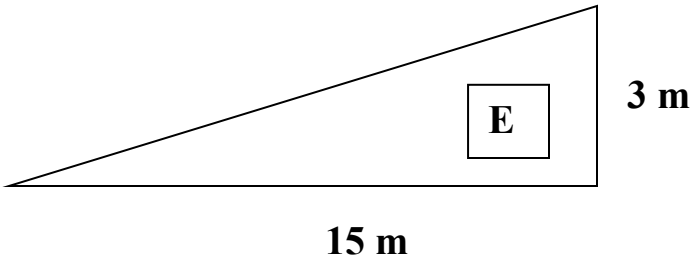
Student handout #2: Triangles











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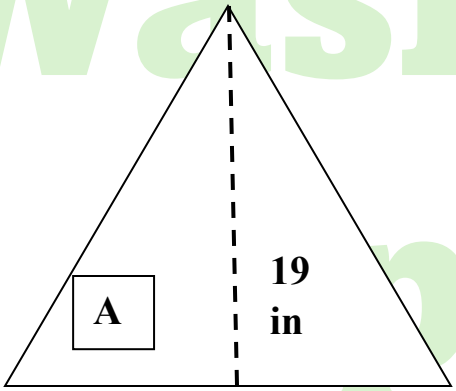

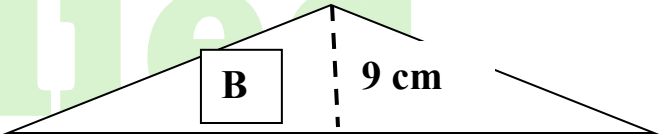

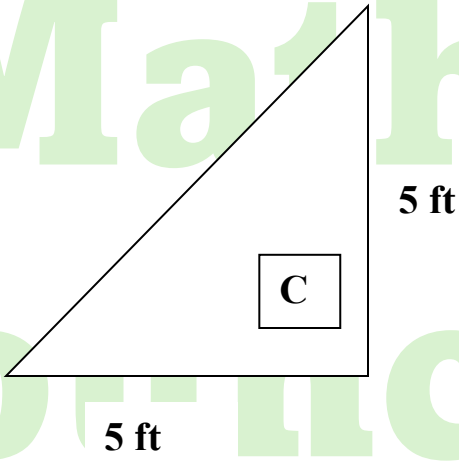

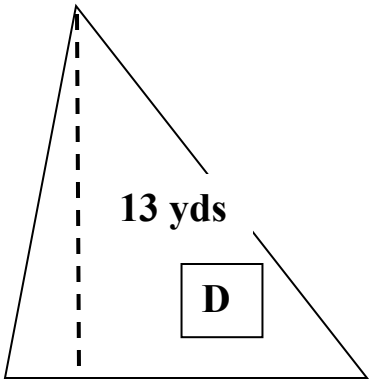

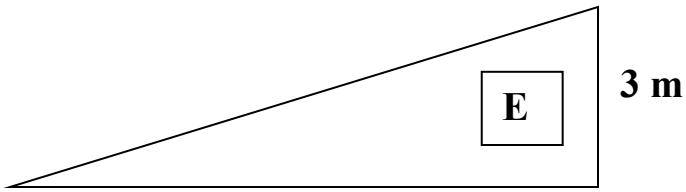

Names in group _____ Class period____

Area of Triangles Lab Instructions

Using Models of rectangles and parallelograms, you will derive (or figure out) the formula for calculating the area of a triangle.

Materials:

- Handout of rectangles and parallelograms
- Scissors
- Handout of triangles.
- Data Recording sheet

Instructions:

1. Calculate the area of the rectangles and parallelograms.
2. Write the area of each in the Data Recording sheet
3. Cut out each shape. Be neat and accurate!
4. Cut each shape diagonally to make 2 triangles. This is 1 (one!) cut to make the triangles.
5. Using these models, decide in your group how the area of the original shape is related to the area 2 new triangles.
6. Using words, write your idea on the Data Recording sheet.
7. Using words, write an equation for the area of a triangle. Start with “Area=”
8. Using math notation, write an equation starting with “A=”
9. Ask teacher for handout of triangles
10. Calculate the area of each triangle. Write the area in the second table on the Data Recording sheet.
11. Cut out the matching triangles.
12. Make rectangles or parallelograms out of matching triangles
13. Calculate the area of the new shape and record in the Data Recording sheet.
14. Answer this question on the data recording sheet: Does your area formula work?

Names in group _____ Class period ___

Area of a Triangle Lab Rubric

	Criteria B: Investigating Patterns	Task Specific
	The student is able to:	
1-2 (60 or 65%)	i. apply, with teacher support, mathematical problem-solving techniques to recognize simple patterns ii. state predictions consistent with simple patterns	> struggles to find pattern w/ teacher support > unable to reverse the pattern
3-4 (73 or 78%)	i. apply mathematical problem-solving techniques to recognize patterns ii. suggest how these patterns work.	> found pattern w/ sone support > struggled to reverse pattern
5-6 (83 or 88%)	i. apply mathematical problem-solving techniques to recognize patterns ii. suggest relationships or general rules consistent with findings iii. verify whether patterns work for another example	> found pattern > could write formula in words > could reverse pattern
7-8 (93 or 100%)	i. select and apply mathematical problem-solving techniques to recognize correct patterns ii. describe patterns as relationships or general rules consistent with correct findings iii. verify whether patterns work for other examples.	> found pattern > could write formula in words and math notation > could reverse and verify pattern

Names in group _____ Class period ____

Area of Triangles Data Recording sheet

Table 1: Area of Rectangles, Parallelograms, and Triangles

Shape name	Base (unit)	Height (unit)	Area of Rectangle or Parallelogram ($Unit^2$)	Area of Triangle ($Unit^2$)
A				
B				
C				
D				
E				

What is the relationship between the original shape and the triangles made from them.

In words: what is the equation for the area of a triangle?

Area = _____

In math notation: what is the equation for the area of a triangle?

A= _____

Table 2: Area of Triangles made into Rectangles and Parallelograms

Shape name	Base (unit)	Height (unit)	Area of Triangle ($Unit^2$)	Area of Rectangle or Parallelogram ($Unit^2$)
A				
B				
C				
D				
E				

Did your equation work in reverse?

Did your equation work?

WAMC Lesson Plan

Name(s): N Betsy Kimmel
Email Address: nkimmel@cloverpark.k12.wa.us
Unit: Measurement and Area
Lesson Title: Area of a triangle
Date: 6/25/24
Text: STEM Correlation: Lesson Length: 1 class period

Big Idea (Cluster):	
Mathematics K–12 Learning Standards: • 6.G.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	
Mathematical Practice(s): • Model with mathematics • Look for and make use of structure	
Content Objectives: • **Learning Target:** *I can calculate the area of triangles.*	Language Objectives (MLL): • Students will improve understanding of English vocabulary
Vocabulary: • triangle, right, isosceles, equilateral, scalene, obtuse, acute, formula, base height, multiply	Connections to Prior Learning: • students will be using understanding of area of quadrilaterals, multiplication, and formula use
Questions to Develop Mathematical Thinking: • How can the models help you to decide how to calculate area of a triangle?	Common Misconceptions: • Dividing by is not the same as multiplying by ½ • Forgetting to divide by 2
SOI: Patterns from models can be used to create form.	
Inquiry Question(s) How do I calculate area? How can I use models to derive new formulas?	
ATL: Critical thinking skills: Analyzing and evaluating issues and ideas	Learner Profile: Open minded, Knowledgeable

Assessments:

Formative:
- The teacher will observe students while they are working on the lab. Teacher will guide students toward finding the pattern.

Summative:
- Students will make a tessellation of triangles repeating the chosen triangle at least 20 times then calculate the area of the picture.

Materials:
- Scissors
- Handouts #1 and #2
- Data Recording sheet

Instruction Plan:

Introduction:

1. Reminder of formula for area of rectangle/parallelogram
2. Review kinds of triangles
3. Review vocabulary: base and height

Explore:
Students will use lab instructions to explore area of rectangles, parallelograms, and triangles

When I observe students: I will look for cutting skills, data entry, coach area of quads, coach to have students see relationship between quads and triangles.

Questions to Develop Mathematical Thinking as you observe: Is the area of the rectangle or parallelogram changed when you cut it? How much of the rectangle or parallelogram is the triangle? What could you do to the formula (A=bh) to make it work for the triangle?

Answers to Questions Above: No, the area did not change. Half. Multiply by ½ or divide by 2.

Summarize: In the lesson, students will develop the formula for area of a triangle using the formula for a parallelogram.

Career Application(s):

- Interior Design, Engineering,

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)
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21st Century Skills (Check those that students will demonstrate in the above activity.)

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☐ Create Media Products
Information, Communications and Technology (ICT Literacy)
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x☐ Adapt to Change
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☐ Produce Results
Leadership and Responsibility
☐ Guide and Lead Others
☐ Be Responsible to Others