

STEMTeach KU



THE UNIVERSITY OF KANSAS

LESSON PLAN TEMPLATE – C&T 291

Group Members: KP Preut and Willa Kelpé _____ Lesson #: 2 _____ Draft #: 3 _____
Date Lesson will be Taught: April 7th Time of Lesson: 9:26-10:16 Length of Lesson: 50 min
Host Teacher: Ms. Clarkson Grade Level: 7th School: Liberty Memorial Central Middle School

LESSON OBJECTIVES (Students will be able to...)

- Students will be able to calculate the perimeter and area of composite figures.
- Students will be able to calculate the surface area of prisms and pyramids.

ALIGNED STANDARDS

7.G.5. Investigate the relationship between three-dimensional geometric shapes.

7.G.5b. Generalize the surface area formula for prisms and cylinders ($SSSS = 2BB + PPh$ where B is the area of the base, P is the perimeter of the base, and h is the height (in the case of a cylinder, perimeter is replaced by circumference)).

NECESSARY MATERIALS

Attach any handouts to the end of this lesson plan.

- 15 print outs of each composite shape (cuboid net, prism net, pyramid net, rectangular pyramid net)
- 15 glue sticks
- 15 tape dispensers
- 25 worksheets
- 25 Summative assessments
- 15 rulers
- 30 sheets of paper for name tents

SAFETY AND PRECAUTIONS

- While using scissors make sure to be cutting the paper we provide you. Do not use the scissors to cut others or yourself.
- Glue and tape is to be used on the paper only.
- Rulers are used for measuring and not hitting or swords. Should not be heard.
- These are our materials. Please respect them.

CLASSROOM MANAGEMENT STRATEGIES

State at least 4 classroom management strategies that will be utilized in your lesson.

- Teachers will only provide materials for making the shapes when needed. They will be collected once students are finished.
- Teachers will assign groups for students to work in for the explore section based on performance in the engage section.
- Students will be asked to put away their phones and remove their headphones.
- While students are working, teacher will walk around and engage with students to prevent off-task behaviors
- Students will make name tents.

DIFFERENTIATION STRATEGIES

Identify at least 2 differentiation strategies that will be utilized in your lesson. State the element (content, process, product, learning environment) that is being modified and the difference (readiness, interest, learning profile) that justifies the modification.

- For the explore section, assign different groups with easier or harder shapes based on readiness. Change in content based on readiness.
- Students will have the choice to cut out the nets or use the pre-cut nets. If students are struggling, teachers can suggest students use pre-cut nets. This is a change in process based on readiness.

ENGAGE-	Estimated Time: 5 minutes
What the teacher does and what the students will be directed to do:	Critical questions the teacher will ask the students. What questions will guide this part of the lesson? <i>How might the students answer?</i>
<ul style="list-style-type: none"> ● When students walk in they will grab a name tent and write their name on it in readable handwriting. ● Provide students with basic shapes worksheets (ie, a square, rectangle, and triangle) and have them compute the area and perimeter individually. 	<p>How can you find the area and perimeter of these shapes?</p> <ul style="list-style-type: none"> ● <i>length times width</i> ● <i>base times height</i> ● <i>length times width divided by zero</i> ● <i>Base times height divided by two</i> ● <i>Add up the side lengths</i>

<ul style="list-style-type: none"> • While students are working teachers will walk around and mark down how well students are doing to put them in groups. • Teachers will do a fist to five for how students feel about triangles, squares, and rectangles after the pre-test. 	<ul style="list-style-type: none"> • <i>Multiply the side lengths</i> <p>What if you divided each side up and created a grid?</p> <ul style="list-style-type: none"> • <i>I can find the area of each shape and add them</i> • <i>I can find the perimeter of each shape and add them</i> • <i>I can find the area of each shape and multiply them.</i>
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<p>EXPLORE -</p>	<p>Estimated Time: 15 <i>minutes</i></p>
<p>What the teacher does and what the students will be directed to do:</p>	<p>Critical questions the teacher will ask the students. What questions will guide this part of the lesson? <i>How might the students answer?</i></p>
<ul style="list-style-type: none"> • Based on how students perform in the engage section, put them into groups based on readiness and give them specific net shapes. <ul style="list-style-type: none"> ○ Group 1 get figures 1,2 <i>and the cube figure</i> ○ Group 2 get figures 1,3 <i>and the cube figure</i> ○ Group 3 get figures 1,4 <i>and the cube figure</i> ○ Group 4 get figures 2,3 <i>and the cube figure</i> ○ Group 5 get figures 2,4 <i>and the cube figure</i> ○ Group 6 get figures 3,4 <i>and the cube figure</i> <ul style="list-style-type: none"> ■ <i>Each group will get 1 copy of the cube figure and 2 copies of their assigned figures.</i> • <i>Teacher will explain the worksheet verbally and put the instructions up on the board</i> • <i>Teacher will go through the cube example with the students so they are prepared to work on their figures as small groups.</i> <ul style="list-style-type: none"> ○ <i>Go over:</i> <ul style="list-style-type: none"> ■ <i>Shapes in the composite figure</i> ■ <i>How to measure to the nearest tenth centimeter</i> ■ <i>Finding area of individual shapes</i> ■ <i>How to use the area of individual shapes to find the</i> 	<p>Is there an easy formula to figure out the area of these figures?</p> <ul style="list-style-type: none"> • <i>yes</i> • <i>no</i> <p>What can you do to find the area of the whole figure?</p> <ul style="list-style-type: none"> • <i>I can multiply the side lengths of each shape I see</i> • <i>I can multiply the length of the whole figure by the height of the whole figure</i> • <i>I can add up the side lengths of the entire figure.</i> <p>How do you know you found the correct area?</p> <ul style="list-style-type: none"> • <i>I used the side lengths given to me and multiplied them</i> • <i>I added all of the side lengths given to me</i>

<p style="text-align: center; color: red;">total area of the composite figure.</p> <ul style="list-style-type: none"> As the students work, walk around and check in with them. Ask them questions on how they know they found the area of the composite figure. Help the groups that are struggling 	
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EXPLAIN- transfer	Estimated Time: 5 minutes
What the teacher does and what the students will be directed to do:	Critical questions the teacher will ask the students. What questions will guide this part of the lesson? <i>How might the students answer?</i>
<ul style="list-style-type: none"> Have students share their answers as the teacher fills out a chart on the board with all of the areas and perimeter Share the teacher calculated answers and have students agree or disagree. If there are a few groups that disagree then go over that problem. <ul style="list-style-type: none"> Thumbs up thumbs down whether they understand the answer students gave. Ask each group how they found the area and ask if others found it the same way. 	<p>How did you find the area of these figures?</p> <ul style="list-style-type: none"> Found area of each shape and added <p>What formulas did you use?</p> <ul style="list-style-type: none"> Length time width one half base times height <p>How did you find the area of the entire figure?</p> <ul style="list-style-type: none"> I added all the area from the figures together <ul style="list-style-type: none"> Isn't that surface area then? <ul style="list-style-type: none"> Yes, it is! No, the surface area for 3D objects is different! <p>How did you find the perimeter of the shapes?</p> <ul style="list-style-type: none"> Measured the side lengths and added them together. Measure the side lengths and multiply them together. <p>(If groups get different answers) Why do you think you got different answers?</p> <ul style="list-style-type: none"> We measured differently We rounded our answers differently We didn't use the same formula for area

ELABORATE - surface area	Estimated Time: 20 minutes
What the teacher does and what the students will be directed to do:	Critical questions the teacher will ask the students. What questions will guide this part of the lesson? <i>How might the students answer?</i>
<ul style="list-style-type: none"> Have students cut out the net figures and glue/tape them together. 	<p>What is the surface area of these figures?</p> <ul style="list-style-type: none"> It's the same as the area of the unfolded shape

<ul style="list-style-type: none"> ○ If the student is struggling to cut out the shape we will have some that are pre cut for them to use. ● Discuss that area of the composite figure is the same as surface area 	<ul style="list-style-type: none"> ● <i>We have to measure the length, width, and height and multiply.</i> <p>How does the total area relate to our new figure</p> <ul style="list-style-type: none"> ● <i>It is the surface area</i> ● <i>It is the same as the total area</i> ● <i>They aren't the same.</i> <p>Does the perimeter really translate to the 3-D figure?</p> <ul style="list-style-type: none"> ● <i>Not really.</i> ● <i>The things we measured for the perimeter are the new edges of the shape.</i> ● <i>Yes, we can still add the edges up and get perimeter.</i>
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EVALUATE – FORMATIVE ASSESSMENTS
Identify the formative assessments that will be used to evaluate student learning throughout the lesson. State what content is being measured, how it is being measured, and when in the lesson the assessment is occurring.
<ul style="list-style-type: none"> - Fist to five after the Engage to check for an understanding of what the students know about composite figures. - In the explore section, the teacher will observe the students as they work and walk around/ checking in on them. Seeing how the student proves that they have found the area and perimeter of the composite shapes to make sure they understand how to find them. - <i>In the engage we used a pretest to gauge the students' understandings of the area of simple shapes(ie. square, triangle, rectangle)</i> - <i>In the explain ask for a fist to five on how they are feeling about the calculations that we did for each of the figures</i>

EVALUATE – SUMMATIVE ASSESSMENT	Estimated Time for Summative Assessment: 5 <i>minutes</i>
Include a blank copy of the summative assessment, as well as a completed key/grading guide of the summative assessment.	
What is the relationship between the surface area of a composite figure and a 3D object?	

WORKSHEET

Name _____

Perimeter and Surface Area with Nets

Instructions: Use a ruler to measure and calculate the surface area and perimeter for the shape. Make all measurements to the nearest tenth of a centimeter. Use a scratch piece of paper for your calculations.

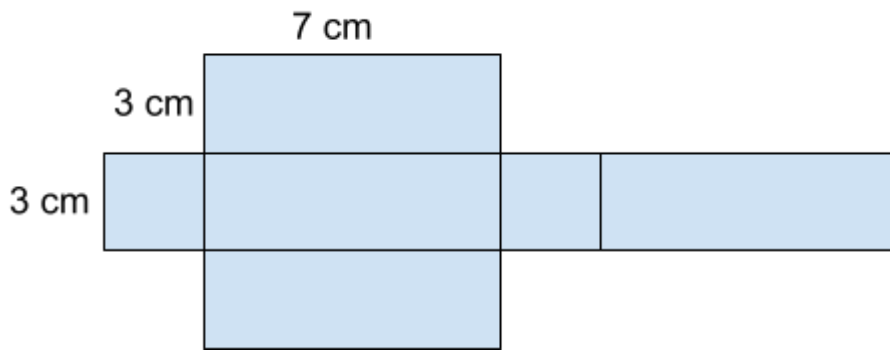
Shape	Perimeter of total composite figure	Number of each shape (ex. 2 squares and 4 rectangles)	Area of each shape (ex. Square= 80cm^2 Rectangle = 180cm^2)	Total area (Add all of the areas) (ex. $80+80+180+180+180+180=880\text{cm}^2$)
Cube (Doing this one together)				
Rectangular Prism (Figure 1)				
Triangular Prism (Figure 2)				
Square Pyramid (Figure 3)				

Triangular pyramid (Figure 4)				
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Summative assessment:

Name: _____

1. Find the perimeter and area of this composite figure.



Perimeter: _____

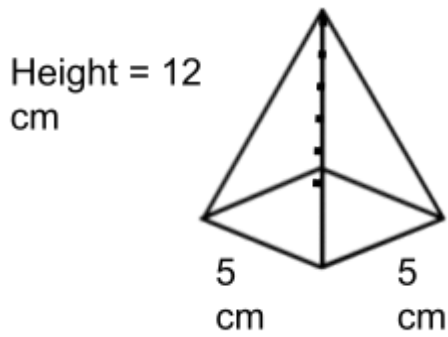
Area: _____

If the composite figure above is folded, it becomes a rectangular prism. What would the surface area of the rectangular prism be?



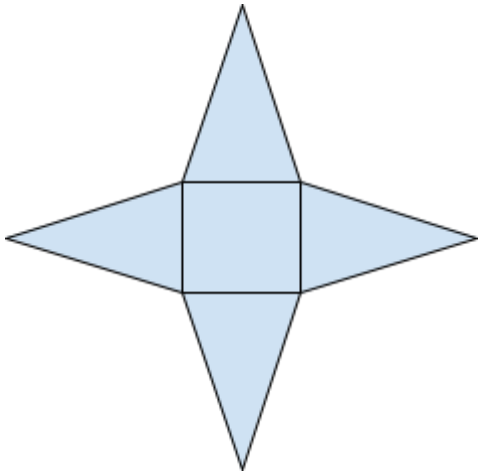
Surface area: _____

2. Find the surface area of this pyramid.



Surface area: _____

If the pyramid above is unfolded, it becomes this composite figure. What is the perimeter and area of the composite figure?



Perimeter: _____

Area: _____

3. What is the relationship between the area of a composite figure and surface area of a 3D figure?

Answer Key/Score breakdown

1. Perimeter: 58 cm

- a. 0.5 points for correct value
- b. 0.5 points for correct label

Area: 102 cm²

- a. 0.5 points for correct value
- b. 0.5 points for correct label

Surface area: 102 cm²

- a. 0.5 points for correct value
- b. 0.5 points for correct label

2. Surface area: 145 cm²

- a. 0.5 points for correct value
- b. 0.5 points for correct label

Perimeter: 96 cm

- a. 0.5 points for correct value
- b. 0.5 points for correct label

Area: 145 cm²

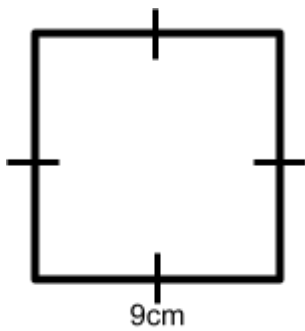
- a. 0.5 points for correct value
- b. 0.5 points for correct label

3. General idea that area of a composite figure and the surface area of the corresponding 3D figure are the same

- a. 1 point for correct answer

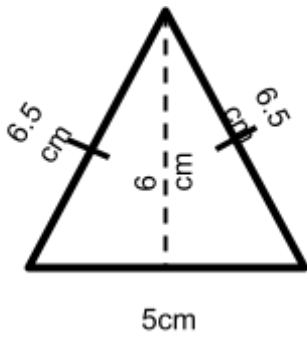
ENGAGE PRETEST

Name: _____



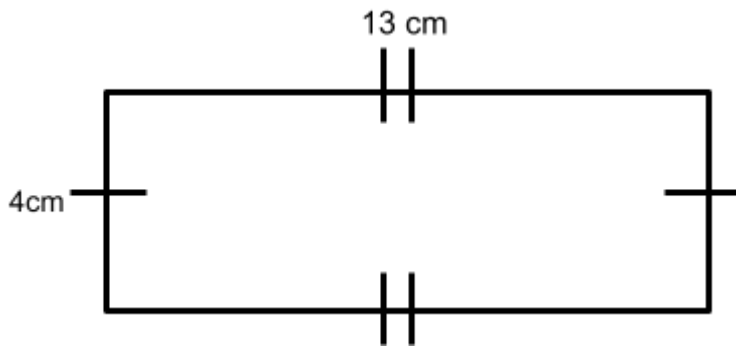
Area: _____

Perimeter: _____



Area: _____

Perimeter: _____



Area: _____

Perimeter: _____