ESTABLISHING PURPOSE

1 **What are the key content standards I will focus on in this lesson?**

Content Standards:

7.G.B

> Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

7.G.B.4

> Know the formulas for the surface area and circumference of a circle and use them to solve problems.

Standards for Mathematical Practice:

- Make sense of problems and persevere in solving them.
- Model with mathematics.

2 **What are the learning intentions (the goal and *why* of learning, stated in student-friendly language) I will focus on in this lesson?**

Content: I am learning to apply my understanding of area and circumference of circles to surface area of cylindrical objects when deciding how large a sign or label should be.

Language: I am learning to use mathematics vocabulary (circumference, diameter, area, surface area, height) when solving problems related to cylindrical objects.

Social: I am learning to engage in productive discussions about how my peers approached their specific problem—including their reasoning and modeling of the scenario.

3 **When will I introduce and reinforce the learning intention(s) so that students understand it, see the relevance, connect it to previous learning, and can clearly communicate it themselves?**

At the beginning of the class, I will introduce the project by showing them several cylindrical objects (e.g., water bottles, water coolers, lamp poles, utility poles, garbage cans) and asking them how to size the labels that will go on these objects for the festival. At that point, I will introduce both the learning intentions and success criteria.

Before I distribute the label size calculations chart, I will ask my learners to relate the task to the learning intentions and success criteria. I want to eliminate any ambiguity before they begin the task.

SUCCESS CRITERIA

4 **What evidence shows that students have mastered the learning intention(s)? What criteria will I use?**

I can statements:

- I can calculate the circumference of a circle and the surface area of a cylinder.
- I can explain how the dimensions of a cylindrical object relate to the surface area.
- I can describe the relationship between the circumference of a circle and surface area.
- I can give appropriate dimensions for the label for each object based on the size of the object and attachment method selected.

5 **How will I check students' understanding (assess learning) during instruction and make accommodations?**

As students work, I will observe and listen to their partner conversations about the task. I will listen for three major elements:

- Seeing that circumference of the cylinder is also the length of the rectangular label.
- Using measurement and formulas appropriately.
- Taking the method of affixing the label into consideration of the size.

I will use the following questions to help students clarify their thinking:

- Show me with your hand where the label will go on the object. How wide is the label? How does that width relate to the dimensions of the cylinder?
- What measurement(s) do you know? What are you trying to figure out? What formula might be helpful for this?

INSTRUCTION

6 **What activities and tasks will move students forward in their learning?**

Students will calculate dimensions for rectangular labels/signs to be placed on cylindrical objects. They will decide how the label/sign will be placed (laced on, paper affixed with overlap) and both calculate the exact dimensions and allow for the more/less required for the method of placement.

Possible items to label include a cylindrical thermos (e.g., for drinks, like the big orange ones sports teams use), a telephone or street lamp pole (e.g., a sign for a current cause), a cylindrical garbage can (e.g., a sleeve to align with an event), or a water bottle with a sloped top (measure the right part).

After I review the task with the whole class, each pair of students will be assigned two objects to determine label size. I will differentiate the task for difficulty and complexity for students based on the objects assigned to each pair.

The telephone pole and garbage can tasks require no measurement but more visualization—this may make them more complex. The can and jar have a constant diameter and require measurement, so they are more difficult from a skill perspective. The most complex task is the water bottle because the diameter is not constant.

7 What resources (materials and sentence frames) are needed?

1. Student recording sheet
2. Sample objects; dimensions of larger objects
3. Measurement tools (rulers, tape measures, firm twine)
4. Calculators

8 How will I organize and facilitate the learning? What questions will I ask? How will I initiate closure?

1. Introduce the Task
   - Show students pictures from previous festivals and remind them that they will be designing signs in art class. Today we are figuring out the dimensions of the signs using what we have learned about circles.
   - Show samples of the various objects and review the possible ways to attach the sign or label.
   - Review the learning intentions, success criteria, and assignment sheet with the class.
   - Assign specific objects to each pair of students.
2. Partner Work
   - Students measure, calculate, and determine sign dimensions for each assigned object.
   - Students may work on additional objects as time permits.
3. Closure
   - Match two pairs of students to discuss their work. There is at least one common object between the two pairs so they can compare results as well as strategy.