Standards-Aligned Lesson Design: 5E Lesson Plan Model

Grade Level: 5th

Subject area: mathematics - Area, perimeter, and volume lesson plan towards the middle/end of the geometry and measurement unit

Standard: 5.4H **Represent and solve problems related to perimeter and/or area and related to volume.**

Objectives: Students will be able to determine the correct formula to use for perimeter, area, and volume questions using their reference sheet. Students will be able to define and solve area, perimeter, and volume using visual models or manipulatives. Students will be able to solve one and two-step word problems on area, perimeter, and volume, using Plickers and an assessment.

Student Expectations: During the course of this lesson, students need to maintain school rules, which are to be safe, to be respectful, and to be responsible. That includes but is not limited to, working in students' designated areas, handling materials appropriately, and collaborating with peers in a respectful manner.

Engage - Materials: None.

The students will be presented with the following situation: *You are in charge of designing a new playground for our school. Within this playground, you will need to calculate the amount of fencing to go around the outside, the amount of wood chips to cover the floor of the playground, and the amount of sand needed to fill up the sandbox. What type of math will be involved in planning these three elements of the playground? Work with your shoulder partner to develop a plan for calculating these three components.* After about 3-5 minutes of discussion, the teacher

will bring everyone back together and facilitate a whole-class discussion on what the students talked about.

Explore - Materials: student math books, ruler, a student handout, STAAR reference sheet, and three different-sized milk crates per group.

Attention Grabber: The teacher will explain that we need to organize our desks and our classroom. The teacher will take a big milk crate and put one math book in it. They will then ask: "is this a good use of space? Did I get anything organized?" The students will answer no. The teacher will then ask: how can we better organize our math books in our classroom? The students will then say "bye each table group." The teacher will then hold up three different-sized milk crates and ask, which one will work best for each table group. The students will say they are not sure, and now the teacher will go into explaining the student directions.

Student directions: *Students will each work with a partner. You and your partner will need to figure out a solution to the following problem: I will give you three different-sized milkcrates per table group. There are eight students in each table group. You will need to figure out the most efficient way to store your table group's math textbooks. The goal is to take up the least amount of space possible in our classroom. Use your reference sheet to refer to your formulas for perimeter, area, and volume!*

Differentiation: When I implement this assignment in my classroom, I will simply provide the above directions for my gifted and talented students. I would leave it up to them to figure out how and when to find the dimensions and formulas for the book. I will provide the handout to my on-level students and have them use it as a guide to help them determine the best milk crates

to use. I will then work with my below-grade level students in a small group with the handout. I will scaffold their thinking process by guiding them in the right direction.

Higher-order thinking questions: The teacher will ask the students these questions while they are working on the explore page.

1. How would you describe the process you and your partner went about to solve this problem?
2. Can you explain why your selected size and number of milk crates are the best form of organization?
3. What would have happened if we needed to organize sixteen math books instead of just eight?
4. What would have been your second choice of milk crates?
5. Which operations did you use to calculate? Did it matter which order you did them in?
6. What would happen if we measured in centimeters? Would that have changed your results?

Explain: Materials: Powerpoint, student journals, pencils, STAAR Reference Sheet

At this point in the lesson, the teacher will call everyone back to their seats and instruct them to get out their math journals and a pencil. He or she will facilitate a discussion extending on the exploration activity that directly covers the concepts of area, perimeter, and volume. During the discussion, the teacher will display the PowerPoint presentation so students can take notes in

their math journals on perimeter, area, and volume if they have not already done so. The class will then do some practice questions in their journals along with the teacher.

Discussion questions:

1. What exactly is perimeter?
2. When do we use perimeter?
3. What is the formula to find the perimeter of a rectangle or square?
4. How did you find the perimeter of your math textbook?
5. How did finding the perimeter help you determine which milk crate(s) to use?
6. What exactly is area?
7. When do we use are?
8. What is the formula for the area of a rectangle or a square?
9. How did you find the area of your math textbook?
10. How did finding the area help you determine which milk crate(s) to use?
11. What exactly is volume?
12. When do we use volume?
13. What is the formula for the volume of a rectangular prism or a cube?
14. How did you find the volume of your math textbook?
15. How did finding the volume help you determine which milk crate(s) to use?

Elaborate: Materials: Plicker cards for students, Teacher's cell phone (with Plikers app downloaded), student whiteboards, whiteboard markers (1 per student), whiteboard erasers (1 per student)

Standards-Aligned Lesson Design: 5E Lesson Plan Model

The practice problems that students completed in the Explain portion of the lesson were all just computation problems. In my experience, most of the student mistakes on this TEK don't come from computations, but rather from problem-solving. Students have a difficult time determining if the question is a perimeter, area, or volume question. For the elaborate portion of the lesson, I have compiled old STAAR-released questions on perimeter, area, and volume to expose the students to the level of rigor that is expected of fifth graders.

We will answer these questions using one of my favorite forms of classroom technology, Plickers. Plickers are a great way for students to get more math practice. Each student has a previously assigned QR code. The teacher will pass out each student's designated Plicker card and explain how to use them. If the students hold it one way, they are answering "A." If they flip the card again clockwise, now they are answering "B." The cards are labeled with "A,B,C,D" on each side of the rectangle, so depending on which letter the student is holding up will be what they scan in as their answer. The teacher will display the question on the classroom's screen, and then he or she will open the Plickers app on their phone. The students will be working out the problem on their individual whiteboards. When they think they have their answer, they will hold up their card to be scanned in. The teacher will then use the camera on their phone to scan in student answers. The student's name turns blue on the classroom screen when they have scanned in. There are several reasons why I love using Plickers. The first one is that as soon as my phone scans an answer, the student's name will either turn green or red, and only I can see this. If they got the question right, I will see their name in green on my phone. If they got the question incorrect, their name will turn red on my phone. Whenever I see a red name, I can immediately

go over to the student and help them pinpoint where they made their mistake. I use this as a tool to help clear up misconceptions for the students that got the answer incorrect. They then can re-scan in a different answer after I have scaffolded their thinking by guiding them in the right direction. Another reason that I love using Plickers is that only the teacher can see student responses. The students can see a bar graph of the answers chosen, however, they do not know who chose what. This takes the pressure off the students, and they are not embarrassed if they are the only student that got a question wrong because no one but myself knows. Another reason I love using this technology is if everyone in the class gets 100% accuracy on a question, the screen does a little party, and the students absolutely LOVE this, so they always encourage everyone to show their work so the screen can sprinkle confetti.

Evaluate Materials - exit tickets, pencils, STAAR Reference sheet, summative assessment.

Informal/Formative Assessment

After the elaborate (Plicker questions) portion of the lesson, the teacher will then administer an informal assessment in the form of an exit ticket. The exit ticket is just a quick, three-question assessment so the teacher can make observations on which students understand the concept fully, and which students need scaffolding or a reteach.

Formal/Summative Assessment

Within the next few days, the teacher will implement a formal or summative assessment. This assessment is ten questions, and they are all word problems. I created this assessment using my

school district's question database. All of the questions are on the standard 5.4H, and they range in difficulty. All three of the lesson objectives will be covered in some way throughout this assessment. This assessment will provide the teacher with valuable data pertaining to the 5E lesson plan on area, perimeter, and volume. This assessment can be taken on a computer, or using pencil and paper. The amount of support a teacher provides on this assessment is up to their own discretion.