Integrated Remote Learning Scenario

Overview

This is an elementary math lesson that is intended to take approximately 45 minutes. The lesson has the option to be delivered in a face to face setting (all students and teachers are in the same classroom), hybrid (some students and teachers are face to face and some are remote), or fully remote setting (all students and teachers are remote). In previous lessons, students have been engaging with number patterns that occur when multiplying numbers together. In this lesson, they will focus on patterns with square numbers (a square number is when a number is multiplied by itself, such as 4x4).

This scenario aligns with parts of CCSS.Math.Content.3.OA.D.8: Solve two-step word problems using the four operations. Assess the reasonableness of answers using mental computation and estimation strategies. It also points to the Standards for Math Practice - Modeling and Repeated Reasoning.

Lesson

Students will determine how many bowling balls are in a square pyramid by identifying repeating patterns and finding a formula instead of simply counting. This is important because it supports two math habits of mind: (1) looking for patterns & relationships, and (2) using repeating patterns to find shortcuts to solve a problem. It also helps students understand real world applications; for example, one could use these skills when constructing buildings.

Goals

- Students will be able to identify square numbers and use them to find solutions to problems.
- “I can statement”: I can look for square numbers and use them to solve problems.
Materials

- Square pyramid picture (can be projected, displayed digitally, or printed)
- **Pyramid Handout** (digital or paper version)
- Mathematics cubes or 2x2 Legos (or similar objects you may have in your learning space, such as coins or marbles)
- Step-by-step building directions to build a square pyramid
- Computer with bandwidth for auto-captioned video (could be in a classroom, public, or home environment)
- Internet access that supports options for video-conferencing (such as Zoom, What’s App, Google Meet, or Teams) that can be in a school, public facility, or home

Methods

1. When students join the learning environment (either a classroom or digital learning space), the goal and “I can” statement will be posted.
2. Students can access a picture of this square pyramid image with a caption and alternative text.
3. Students will be told: “Here is a structure that was built on a school’s playground. It’s called a square pyramid.”
4. Students will be shown the objective: “Your challenge is to figure out the pattern that will help you know how many bowling balls are in this square pyramid - or any square pyramid - without counting.”
The square pyramid in the community.
There are 9 balls along each side of the bottom layer.

A square pyramid made from pennies.
There are 5 pennies along each side of the bottom layer.

5. The students will reflect on what the goal means and to make a note of what they know or do not know yet. They will spend a few minutes re-crafting the objective in their own words using the Pyramid Handout. They have the option to pair up either in small groups (if they are in a face to face setting) or in a breakout chat room or other digital option to communicate (such as text or other video conference option) to discuss what the goal means at an agreed upon time.

6. On the Pyramid Handout, students will be prompted to answer:
   ○ "What do you see, notice, or wonder about how this pyramid is built? Take a minute to jot down your ideas or discuss them with a partner."
   ○ "Make an estimate of how many balls you think are in the pyramid and record this."

7. Then, there will be three ways students can learn about the square pyramid. They can work with partners or independently.
   ○ Choice 1: Begin by building a model of the pyramid using cubes (or similar objects you may have in your home, such as coins or marbles).
   ○ Choice 2: Watch a captioned video and then build the pyramid using cubes (note: students have been shown how to turn on captions if preferred).
   ○ Choice 3: Use step-by-step directions with a small, teacher-led group to build the pyramid with Legos, or similar objects from your home, such as coins or marbles. Note: the teacher-led group can be done remote or face-to-face.
8. Students will be prompted to review the objective before making their choice. On their handout, they will indicate why this choice is the best for them.

9. As students work through the lesson, they will track their progress for understanding using the prompts:
   ○ "What is the pattern you notice?"
   ○ "How does it repeat?"
   ○ "How can you use this to figure out the total number of bowling balls? What is the shortcut (formula)?"

10. When students are finished, they can read or have the text read aloud from an article that tells more about the square pyramid located near their school. The article has two bonus questions as options to solve: Learn more about the bowling-ball pyramid this school.

Assessments

1. As students work, the teacher will check in on the responses in their Pyramid Handout (note, if this lesson is remote, the teacher can see the progress in each student’s digital Pyramid Handout). If a group or an individual student is struggling, the teacher will offer support (for example, students might be prompted to remember that a square pyramid has 4 sides or to think about whether they need to use area or perimeter formulas). Note that these “tips” can be digitally recorded.

2. Whether remote or face-to-face, the teacher will have a checklist of student names to monitor progress as they find a shortcut (formula) for the solution to the pyramid problem.

3. At the end of the learning experience, students will record their reflection on their Pyramid Handout:
   ○ How well did they meet the goal for today?
   ○ What is their solution to the pyramid problem: how many balls are in the pyramid?

4. They can use pictures, words, and/or numbers to describe how they know their answer. If students use the digital version of the Handout, they could record their answers verbally.

5. The teacher will offer feedback on students’ reflections and solutions for the next lesson.