Name: _____

Mathematics: The Language of STEM

Power of a Penny

CONTENT AND TASK DECISIONS

Grade Level(s): 3rd Grade

Description of the Task:
During this lesson, students will have the chance to manipulate coins so that they can explore the equivalent values of coin collections. The task will be to make one dollar using fifty coins.

I have a piggy bank that has fifty coins. My little brother told me that I couldn't use all fifty coins to make exactly one dollar. I say that it is possible. Who is correct?

Consider your students needs:
This lesson could be used after exploring money concepts such as coin id, and values of coins. This lesson could be used as an introduction to coin collections.

Indiana Mathematics Content Standards:

3.M.4 find the value of a collection of coins

Students will understand equivalent values of different groupings of coin collections.

Indiana Mathematics Process Standards:

Make sense of problems and persevere in solving them.

Mathematics Content Goals:

Students will demonstrate equivalent values of different groupings of coin collections.

Language Objectives:

Students will be able to verbally communicate to their task partner and the math congress their coin trials while using the terms *penny, nickel, dime, quarter, half-dollar,* and *value*.

Materials:

Each group will need:

- **Coin collections (at least 50 pennies, 20 nickels, 20 dimes, 20 quarters, a few half dollars)**
- **A piece of butcher paper**
- **Markers**

THE LESSON

Before:

- Student Actions
  - Students will recall prior knowledge of coin identification and values of coin collections.
  - Students will work to find two different ways to show fifty cents.
  - Sentence Frames:
    - A nickel equals ___.
    - A _____ (coin name) is ____ cents. We used ____ (number of coins).

Begin with a simpler version of the task:

- Teacher Actions:
- Before giving the problem, the teacher will show equal values of money using different coins. For example, in one hand show 1 quarter, and in the other hand show 2 dimes and five pennies. Ask students to explain why both values are equal.
- What are two different ways that you could show fifty cents? Record answers on butcher paper to demonstrate record keeping. (e.g. Trial 1: 2 quarters, Trial 2: 4 dimes, 1 quarter (discuss with students how trials do **not** have to be correct, but that all evidence of thinking needs to be documented), Trial 3: 5 dimes)
- Demonstrate how to use sentence frames when talking with their partners.
    - Sentence Frames:
        - A nickel equals ___.
        - A _____ (coin name) is ____ cents. We used ____ (number of coins).

Present the focus task to the class:

- Hold up a piggy bank and tell the students that they has been saving change in this piggy bank. The students' task will be to find out whether or not fifty coins can be used in order to make one dollar.

Provide clear expectations:

1. **Work with partner to manipulate the coins/coin values.**
2. **Record all trials on the butcher paper.**
3. **Use previous trials to guide thinking for the next trial.**

During:

- Student Actions
- Students will work with a partner to manipulate coins to find one dollar. They may use whatever coins they need to use. As they work, they will talk with their partner to make more reasonable choices for their coin choices. Students will record their trials on a large piece of paper (butcher paper) as they work in order to make more reasonable guesses.

- Teacher Actions

Initial:

- Observe that each student understands the task and is in the process of attempting to solve the problem.
- If you are noticing that some students are struggling, you may need to start them by asking some supporting questions:
  - What are you noticing about the coins you are choosing?
  - Did you identify the coins in your collection correctly?
  - Have you investigated the value of a penny? (Nickel, dime, quarter)

Ongoing:

- Ask students to explain and show their trials.
  - How are you showing your thinking?
  - What were you thinking when you made decisions or selected strategies to solve the problem?
  - What past mistakes have you learned from? What will you/did you do differently?
  - Have you investigated the value of a penny? (Nickel, dime, quarter)
  - How many coins have you used so far?
  - What is the value of your collection so far?
  - What has been the most challenging part of the task? Why?

- Challenge early finishers to see if they can find one more way to use fifty coins to find one dollar.

After:

- Student Actions
  - Students will present their work in a math congress and explain their thinking to the rest of the class both with written and verbal communication.
  - Students will ask questions of other groups as they work to justify their answer.

- Teacher Actions
- The teacher will choose some example groups to model their thinking and work and encourage discussion of different strategies and thinking.
  - Will this answer be the same if we used different numbers of coins? How about a different amount of money?
  - What strategies did you use?
  - What changes did you make to solve the problem?
  - What did you learn about the power of the penny?

ASSESSMENT

Observe:

- Look for evidence that students see the connection between the number of coins and the values.
- Exit ticket: Write down two different ways to make 48 cents.

Ask:

- How are the values of coins and the quantities of coins related?
- Why do the values of coins matter?