Experience Algebra in Meaningful Contexts through Active Engagement

Session 454

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Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

… a unified vision of what is needed to realize the potential of educating all students -- under any standards or in any educational setting. (p. vii)

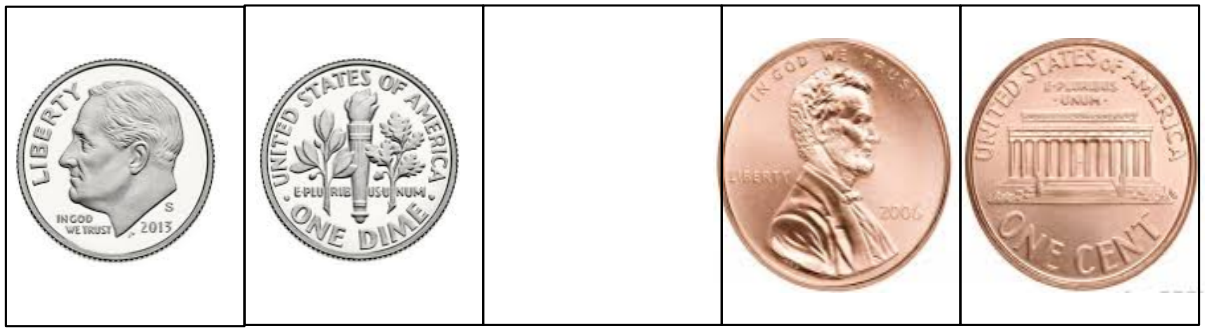
Mathematics Teaching Practices

- Establish mathematics goals to focus learning.
- Implement tasks that promote reasoning and problem solving.
- Use and connect mathematical representations.
- Facilitate meaningful mathematical discourse.
- Pose purposeful questions.
- Build procedural fluency from conceptual understanding
- Support productive struggle in learning mathematics.
- Elicit and use evidence of student thinking.

Coin Switcheroo

Put 2 dimes and 2 pennies in the marked spaces.
You can only make two kinds of moves:

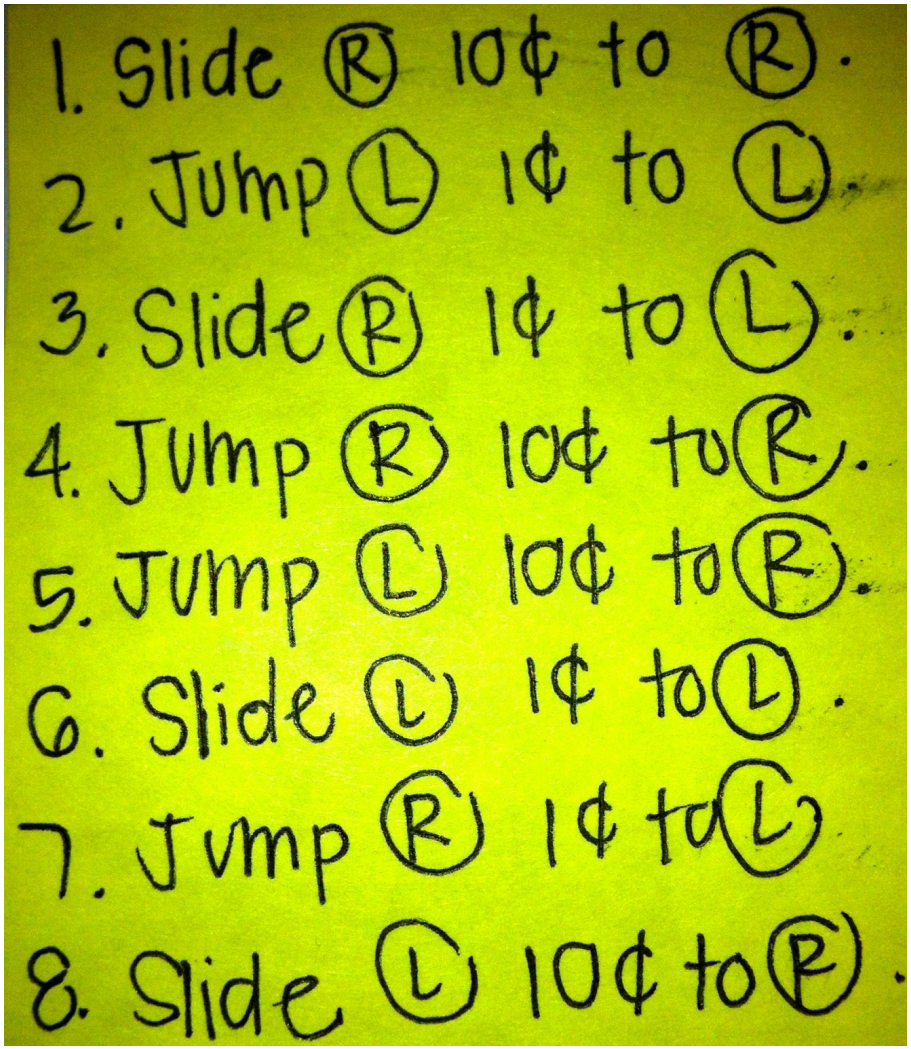
- You can slide any coin into an empty space next to it.
- You can jump any coin over <u>one</u> coin next to it if there's an empty space on which to land.

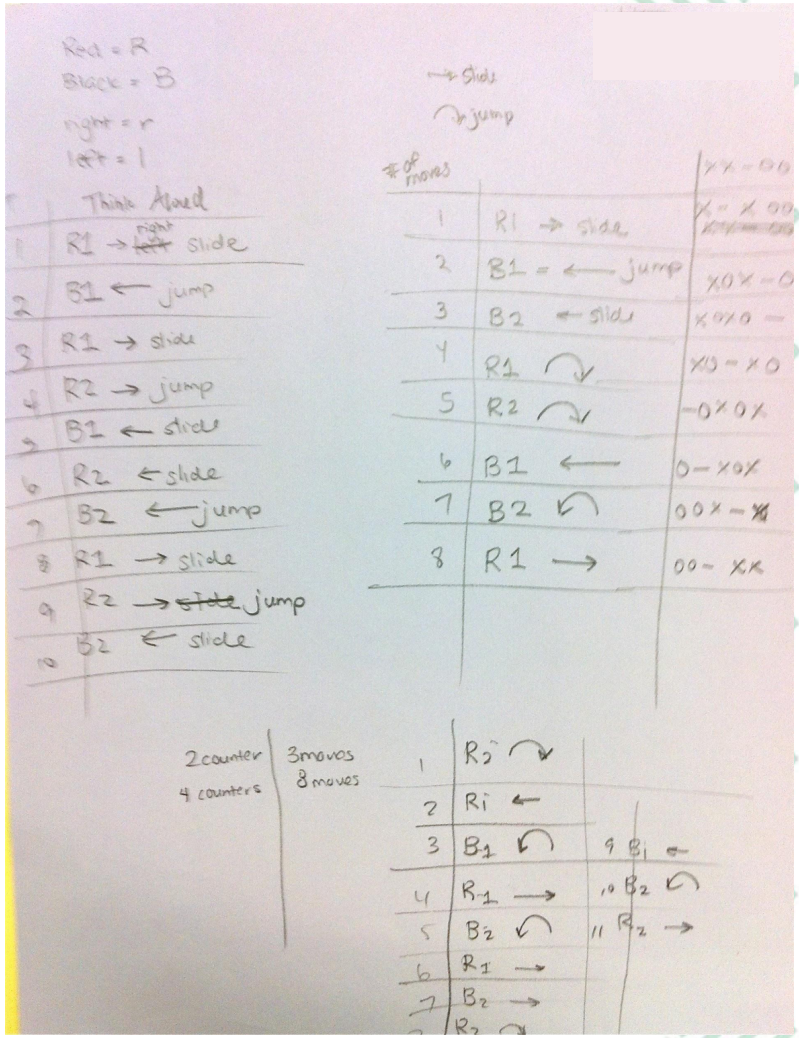


Think about it

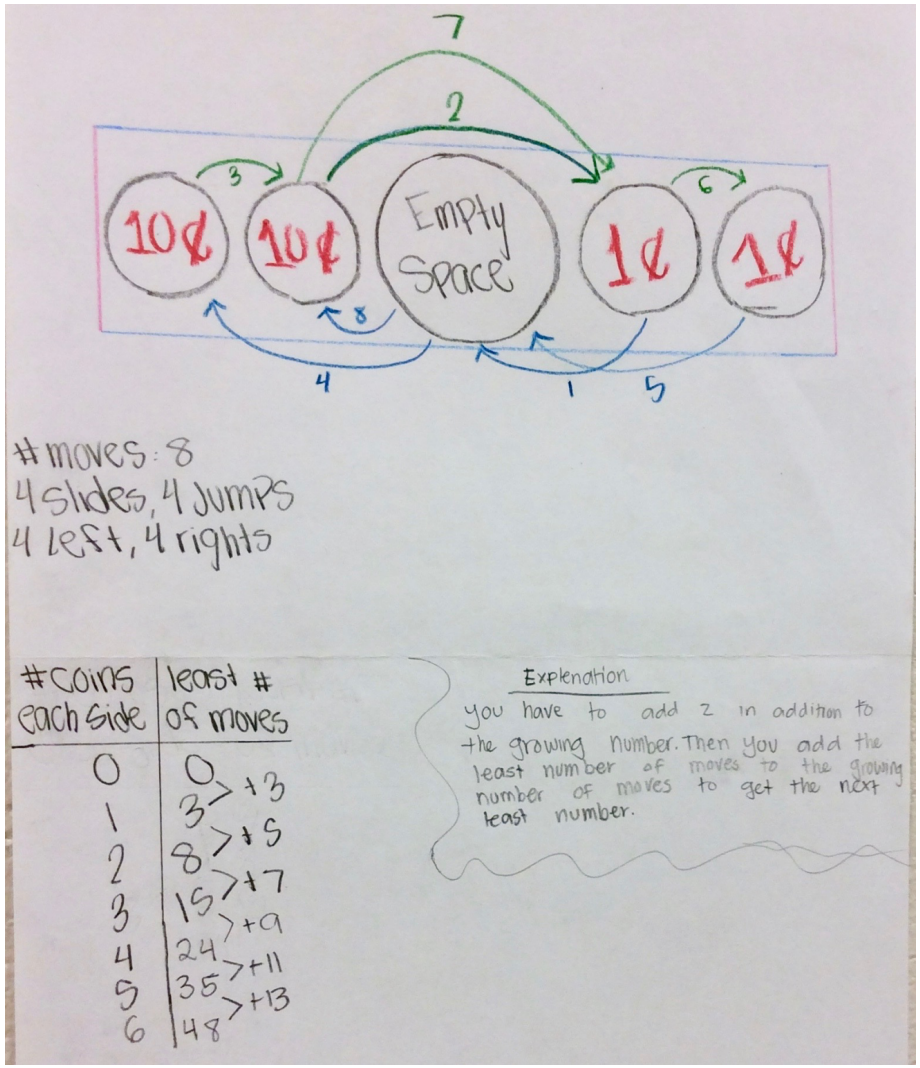
1. Plan and try a sequence of moves that will switch the positions of the dimes and the pennies.
   a. Record the moves you made so that someone else could follow the same sequence to switch the coins.
   b. Now try to find the sequence with the fewest number of moves to switch the coins and record it so that someone else could follow it.
2. Next, extend the board so you must now use 3 dimes and 3 pennies. Do a coin switcheroo using the same kinds of moves, switching the positions of the coins using as few moves as possible. Record your sequence of moves.

Representing switcheroos





Analyzing the data



CSI Hawai'i

How can you identify someone by examining his or her footprint?

The scene on Sunrise Beach one Sunday morning surprised everyone who saw it. All the litter had been cleared and placed in the garbage cans. The only residue left behind were footprints, thought to be of those who cleaned up the beach. The neighborhood board wanted to thank the people who cleaned up the beach, but all the one witness who saw what happened could say was that a boy and a girl left the scene. The witness could not provide any further description.

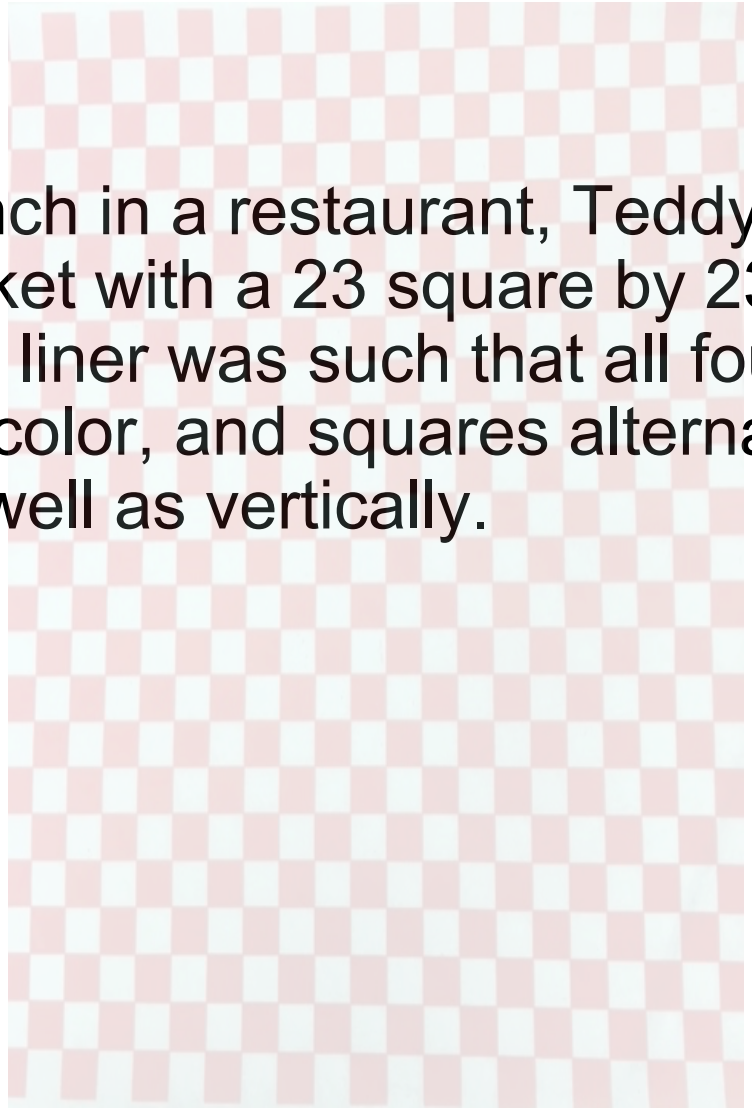
Collecting the evidence

Several relationships exist between lengths of some parts of the human body with others. How might the length of a footprint provide additional information about that person?

1. Collect data from fellow participants on the length of their footprint and their height.

1. As a class, input the data into a graphing program and decide on a model that best fits the data.

Odd Square Patterns



While eating lunch in a restaurant, Teddy's food was served in a basket with a 23 square by 23 square paper liner. The liner was such that all four corners were the same color, and squares alternated colors horizontally as well as vertically.

Let's investigate

1. Teddy wondered how many individual squares there were of each color. Think of different ways you could help Teddy determine these amounts.
2. In any sized square, if the colors alternate horizontally and vertically, will the four corners be the same color?
3. How can Teddy find the number of red squares in any sized square liner, where the colors of squares alternate and all four corners are red?

Wrapping it up

- Problem solving and making sense of a context using algebraic techniques
- Mathematical representation and modeling through an investigative manner
- Communication through multiple forms
- Others ...

Thank you!

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