

# Magic Box

## Lesson Plan

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### The Task

Your Grandma gives you a wooden box for your birthday. When you unwrapped the gift and opened the box, you were expecting some cash inside but found the box was empty. You felt bad for not appreciating the box, and decided you could use it to store important things. Just before you go to bed, you open the box to put a photo inside, and see 2 pennies. When you check the box at the end of the second day, you count 4 pennies. At the end of Day 3, you count 8 pennies. How many pennies will be in the box after 10 days? 15 days? 20 days? Can you come up with a rule to find the number of pennies in the box on any day?

#### Materials

- The task
- Box (available to model task)
- Coins/counters (available for students)
- Calculators (for computation)
- cm grid paper (available for students)
- Newsprint (for groups to record rule)
- Poster paper (for recording class data table)
- Poster inch grid paper (for graphing class data)

#### Facilitating Task

- Read task and clarify as needed
- Give individual think time before sharing with a partner
- Small groups (3-5 students)
  - Compare and come to consensus on days 10, 15, 20
  - Record you rule on poster
- Whole group
  - Record class data in 3 column table for days 0-10, 15, 20
  - Record class data on graph for days 0-5
  - Share out rules and connect words to symbolic notation
  - Discuss connections between representations - story context, table, graphs, verbal rule, symbolic rule

#### Misconceptions

- Day 0 has 2 pennies (Day 0 has 0 pennies)

#### Suggested Prompts or Questions

- What patterns do you notice?
- What's the relationship between

- Day 3 has 6 pennies (Day 3 has 8 pennies)
- Students might have difficulty identifying the pattern that relates the day to the total number of pennies. While it will likely be easy for students to notice the pattern from one day to the next, this iterative pattern requires you to know the previous day, in order to determine the day you are on. This makes finding the total pennies for any day challenging.

the day and the number of pennies?

- How did you find the total number of pennies for day 3? What expression could you write to show this? ( $2 \times 2 \times 2$  or  $2^3$ )
- Is there a quicker way to figure it out?
- Can you figure out the total number of pennies on day 20 without doing every day?