Unit 1, Lesson 6

The Locker Problem

Let’s figure out what's happening in a game about lockers.

Activity 1

Questionable Lockers

The picture shows lockers in a school hallway.

The 20 students in Tyler’s fourth-grade class play a game in a hallway that has 20 lockers in a row. The lockers are numbered from 1 to 20.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

- The 1st student starts with the 1st locker, and while going down the hallway, opens all the lockers.
- The 2nd student starts with the 2nd locker, and while going down the hallway, shuts every other locker.
- The 3rd student stops at every 3rd locker and opens the locker if it is closed or shuts the locker if it is open.
- The 4th student stops at every 4th locker and opens the locker if it is closed or shuts the locker if it is open.
- This process continues through the 20th student, so that all 20 students in the class touch the lockers.

Create a representation to show what you understand about this problem. Consider:

- How does your representation show lockers?
- How does your representation keep track of students who touch lockers?
- How does your representation show which lockers are open or closed?

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Activity 2

An Open-and-Shut Case

Tyler's class plays the same locker game again.

Your goal this time is to find out which lockers are touched as each of the 20 students takes their turns.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

1. Which locker numbers does the 3rd student touch?

2. Which locker numbers does the 5th student touch?

3. How many students touch locker 17? Explain or show how you know.

4. Which lockers are touched by only 2 students? Explain or show how you know.

5. Which lockers are touched by only 3 students? Explain or show how you know.

6. Which lockers are touched the most? Explain or show how you know.

If you have time: Which lockers are still open at the end of the game? Explain or show how you know.