



7-11-Z1F

Imagine you are at a school that still has student lockers. There are 200 lockers, all shut and unlocked, and 200 students.

**Here's the problem:**

1. Suppose the first student goes along the row and *opens every locker*.
2. The second student then goes along and *shuts every other locker* beginning with **number 2**.
3. The third student *changes the state* of every **third** locker beginning with **number 3**. (If the locker is open the student shuts it, and if the locker is closed the student opens it.)
4. The fourth student *changes the state* of every **fourth** locker beginning with **number 4**.
5. The fifth student *changes the state* of every **fifth** locker...
6. The sixth student *changes the state* of every **sixth** locker...

Imagine that this continues until all two hundred students have followed the pattern with all two hundred lockers.

**YOUR task:**

You are to work within your groups to answer the following question.

**After all students have walked down the hallway and changed the state of their respective lockers, which locker numbers will be open and which locker numbers will be closed? Why?**

You may use any solution method that you wish; however, you may NOT use a calculator. You will be creating a visual representation of your answer and your solution strategy. Be prepared to discuss your solution method and your solution with the other members of our class!

Extension Questions:

After all of the students have walked down the hallway and performed their opening or closing task, what is the final status of locker #100? Why do you feel this is correct?

What locker is touched by the most students? Give a rationale for your response.

How many students will touch locker #180? How do you know?

Will more students touch (open or close) locker #72 or locker #144? Defend your answer with a clear reason.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

*Hundreds chart-22*

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

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41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

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51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

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51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

## *Four small hundreds charts 23*

## The Little Shepherd Boy

Imagine a poor, rural shepherd boy. Due to the mountains and landscape surrounding his family's farm, he is very isolated from the rest of the world. The shepherd boy has never attended school, and has no mental concept of what it means to read, to write, or to count. Each day, his father entrusts him to take the sheep from their holding pen at the house to graze in the surrounding meadows. Since the family depends on the money they receive from the wool, milk, and meat that the sheep provide, keeping track of the herd is essential to the family's way of life. How could our shepherd boy develop a system to accurately know that the same amount of sheep that he releases to the fields in the day is the same amount of sheep that he brings back to the holding pen at night?

## Counting Legos

One day, an argument arose between two four-year olds as to who had the most Lego pieces. They each counted the block that they had in front of them. One reported to the other, "I have a million and seven Legos," and the other quickly responded that she had "a thousandy hundred". Needless to say, a recount revealed that neither of them could reliably count high enough to count the Legos belonging to either of them. How can they settle their argument without adult intervention?

