"There are 10 locked cells with 10 prisoners ... one in each cell. There are also 10 guards, who are due to go off duty.
As they leave, they depart in a very "strange way".
Guard number one goes to every cell (every multiple of one) and unlocks it.
Guard number two goes to every second cell (every multiple of two) and locks it.
Guard number three goes to every multiple of 3. If it is locked, he unlocks it and if it is unlocked, he locks it.
Guard number four ...etc.
After all 10 guards have left, which cells are left unlocked so that the prisoners are able to escape?"
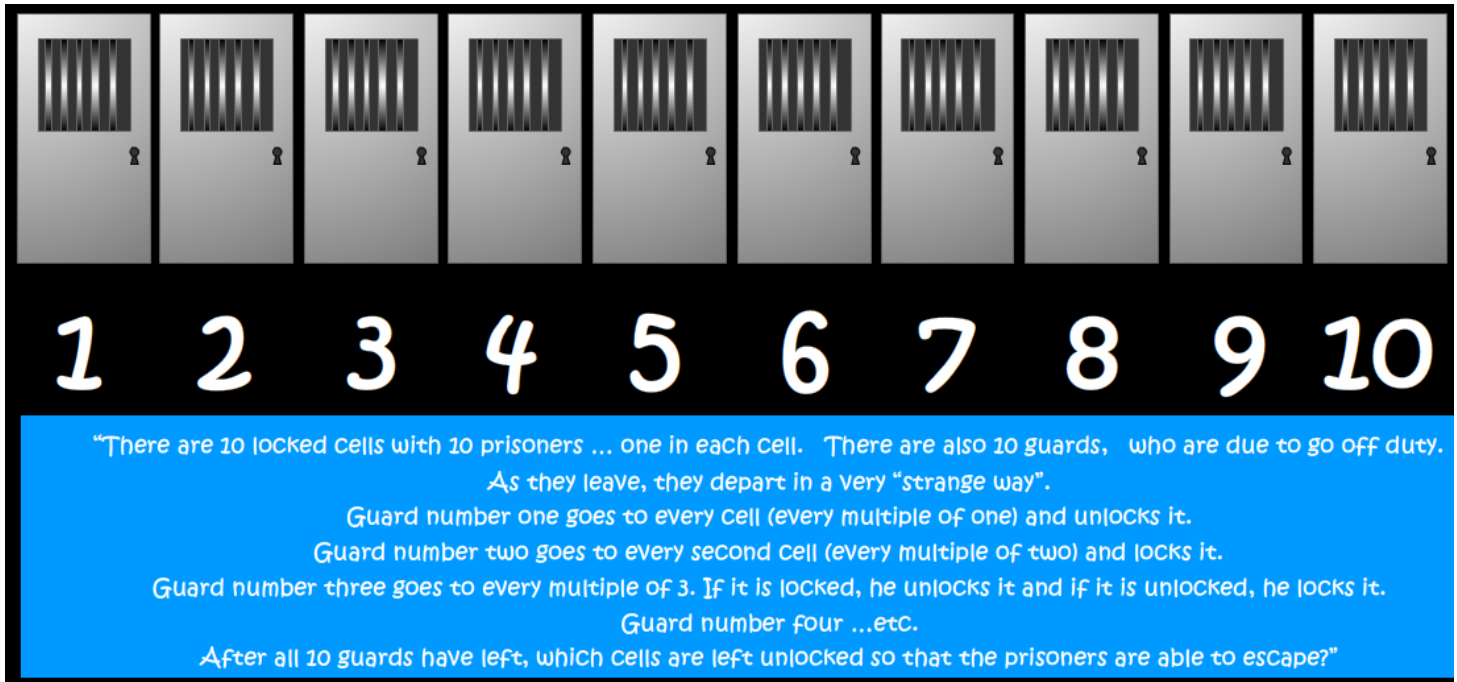
1) For 10 prisoners, which doors will be open?

2) For 20 prisoners, which doors will be open?

3) For 100 prisoners, which doors will be open?

4) Is there a pattern or rule controlling which doors are open? Describe it using words and ideas you have learned in maths.

5) If there were 1,000 doors, would prisoner #400 escape? Explain why.

Bonus question: Why does this pattern occur?