

## Work on these with your partner(s) at the board

1. A combination padlock requires selecting three numbers from 0 through 39.
  - (a) How many different combinations are there?
  - (b) No number may be used twice, how many combinations are there?
2. Wheaton is adjusting the registration PINs to be a sequence of four symbols chosen from the 26 letters in the alphabet and the digits 1–9.
  - (a) If repetition is allowed, how many PINS are available?
  - (b) If repetition is not allowed, how many PINs are available?
  - (c) Repeat (a) and (b) if a PIN must begin with a letter.
3.
  - (a) How many integers are there from 1000 through 9999, inclusive?
  - (b) How many odd integers are there from 1000 through 9999?
  - (c) How many integers from 1000 through 9999 have distinct digits?
  - (d) How many odd integers from 1000 through 9999 have distinct digits?
  - (e) What is the probability that a randomly chosen four-digit integer has distinct digits?  
has distinct digits and is odd?

4. Joel and Ellie are playing a best three out of five rock-paper-scissors tournament. How many ways can the tournament be completed where no one wins three in a row?

5. If  $A$  and  $B$  are finite sets, explain why the following is true:

$$|A \cup B| = |A| + |B| - |A \cap B|$$

6. If  $A$ ,  $B$ , and  $C$  are finite sets, create a formula similar to the one above for  $|A \cup B \cup C|$

7. Suppose you're on a game show, and you're given the choice of three doors:

Behind one door is a car; behind each of the others is a goat.

You pick a door, say No. 1, and the host, who knows what's behind the doors, opens another door, say No. 3, which has a goat.

He then says to you, "Do you want to pick door No. 2?"

Is it to your advantage to switch your choice (assuming you'd prefer the car)?