

**Instructions:** Find the number of items that fit the following descriptions. If the number exceeds 10 million, you can write the expression with 3 significant digits in scientific notation if you prefer. The more work you show, the more partial credit I can give if your answer is incorrect.

1. If there is a bowl of marbles with three green marbles, two red marbles and seven white marbles, how many ways are there to choose a green marble, followed by a white marble?

$$3 \cdot 7 = 21$$

2. You have six friends standing in line at a theatre waiting for the midnight showing of *The Hobbit: Desolation of Smaug*. How many different ways are there for you to stand in line?

$$6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 6! = 720$$

3. You are trying to come up with a really secure password for your computer and have decided on 21 digits.

- a. How many passwords are there if you use only numbers?

1 septillion

$$10^{21} = 1,000,000,000,000,000,000,000$$

- b. How many passwords are there if you use alphanumeric keys (case does **not** matter)?

$$36^{21} \approx 4.81 \times 10^{32}$$

4. Motorcycle license plates can fit five characters. They use all the letters of the alphabet except O and all the numbers as possibilities. How many possible motorcycle plates are there?

$$25 \text{ letters} + 10 \text{ #'s} = 35$$

$$35^5 = 52,521,875$$

5. Suppose I choose 2 cards from a standard deck. How many ways are there to choose one red card followed by one club?

$$26 \cdot 13 = 338$$