Combinations, Permutations, and Probability after Spring Break

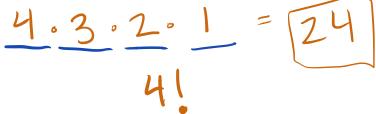
REVIEW

1. What is the difference between a <u>combination</u> and a <u>permutation</u>?



order matters

2. How many ways can you arrange all the letters in the word M-A-T-H2-

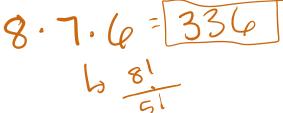


3. How many ways can you arrange two of the letters drawn from the word M-A-T-H?

$$4.3 = 12$$

 $4.3 = 4.3.2.1$
 $2! = 4.3.2.1$
 $1.3.2.1$

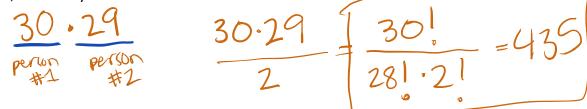
4. Eight different runners are running in a race. The fastest three will win gold, silver, and bronze medals, respectively. How many different outcomes are possible?



5. Twenty basketball players form teams with 5 members each. How many different teams can be formed? or der doesn't matter

$$\frac{20 \cdot 19 \cdot 18 \cdot 17 \cdot 16}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = \begin{bmatrix} 20! \\ 15! \cdot 5! \\ 15! \cdot 5! \\ 0 \end{bmatrix}$$

6. At a party, there are 30 people. If each person shakes hands with each other person, how many handshakes will occur?

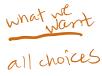


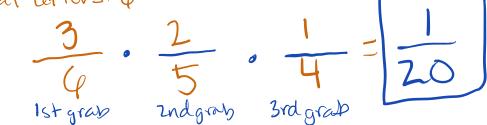
NEW IDEA: PROBABILITY

Probability problems are often just counting problems. What is the probability of rolling the number "2" on normal 6-sided dice? Well, there are six possible outcomes, and only one of them is the desired one. Thus, the probability is 1 out of 6.

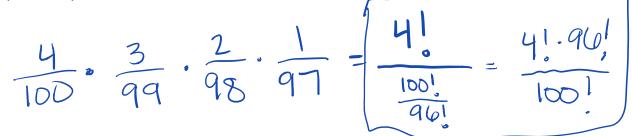
MIXED PRACTICE

7. The letters A-B-C-T-U-V are placed in a bag. You randomly draw three letters. What is the probability that you will draw the letters necessary to spell the word C-A-T?





8. All of our names are in a hat, along with a bunch of other names, such that there are 100 names in total in the hat. I will draw four names at random. What is the probability that I draw the names Alex, Elili, Thea, and Olivia?



9. There are 30 students in a class, including Ian and Sathvik. I choose two names at random to lead a discussion. What is the probability that I choose Ian and Sathvik?

15.29 2

10. How many distinct ways can all of the letters in the word G-E-O-M-E-T-R-Y be arranged to form new "words"?

$$\frac{8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{\frac{8!}{2}} = 8!$$
divide by 2
$$\frac{8!}{2} = 20,140$$

11. How many 4-digit numbers less than 2000 are odd, not even?

$$\underbrace{ \begin{array}{c}
 \int_{1}^{2} x \\
 \frac{1}{2} \\
 \frac{1}{2} \\
 \frac{1}{2} \\
 \frac{1}{3} \\$$

12. In how many ways can 5 people stand in a line? In how many ways can 5 people stand in a circle?

line:
$$5 4 3 2 1 = 5, = 120$$

circle: answer will be different.
we will have less answers here
 $\frac{1}{2}, \frac{5}{4} = \frac{3}{4}, \frac{7}{5}$ # divide by 5 $\frac{120}{5} = 24$
 $\frac{1}{5}, \frac{5}{5} = 24$
 $\frac{$

1