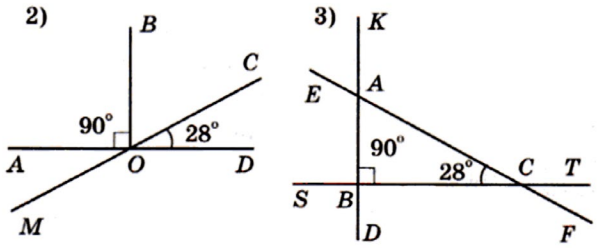
Math 4. Classwork 22

Review of Homework 20

1. Remove parenthesis:

$w \cdot (w + 3) =$ $3x \cdot (1 - 5x) =$

2. Can you find the missing angular measures on the picture below without measuring angles? (hint: three angles of any triangle add up to a straight angle (180 degrees), vertical angles are equal)



3. There are 6 kids and 6 chairs in the room. In how many ways can kids sit on these chairs?

4. There are 6 kids and 3 chairs in the room. In how many ways can kids sit on these chairs?

5. There are 26 letters in the alphabet. How many possible 3 letter words can be created? (Any letter combination is allowed including repeating letters. Even crazy words that do not exist such as - “jsz”, “oqw”, “ttt”. You do not have to calculate the final answer, just write out the expression.)

Combinations

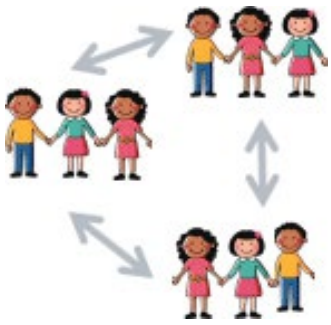
1) How many different 3-digit numbers can we create using 8 digits, 1, 2, 3, 4, 5, 6, 7, and 8 without repetition of the digits, i.e. such numbers that only contain different digits?

2) How many different ways are there to choose a team of 3 students out of 8 to participate in the math Olympiad.

In both cases, we have 8 possible ways to choose the first item (digit or student), 7 possible ways to choose the second item, and 6 different ways to choose the third one. So, there are $8 \cdot 7 \cdot 6$ different 3-digit numbers (permutations) created from digits 1, 2, 3, 4, 5, 6, 7 and 8.

$$P(8,3) = 8 \cdot 7 \cdot 6 = \frac{8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = \frac{8!}{5!} = \frac{8!}{(8-3)!}$$

How about the teams of 3 students? Is it $8 \cdot 7 \cdot 6$ different teams of 3 students out of 8?



We can create numbers 123, 132, 213, 231, 321, 312 and they are all different numbers (permutations -the number of ways to arrange three digits in a three digit number 3!)

If we chose Mike, Maria, and Jessika, a team of 3 students for the math Olympiad, it doesn't matter in which order we wrote their names. There is only 1 way to pick these 3 students.

So for each group of 3 kids we will count 6 times (3! – number of ways to put 3 kids in line) more possible choices than there really are.

$$8C3 = \frac{8 \cdot 7 \cdot 6}{3!} = \frac{8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{3! \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = \frac{8!}{3! \cdot 5!} = \frac{8!}{3! \cdot (8-3)!}$$

$$0! = 1$$

Combinations are the ways of choosing objects from a set of an objects and their order does NOT matter. To get from a **permutation** to a **combination**, we divide by the total number of ways to order the objects we choose.

- In the school cafeteria, there is only limited space to form the line, so only 25 students can be inside simultaneously and form the line. How many ways are there to this line to be formed in the cafeteria, if there are 100 students in school in total?

- How many different ways are there to form a Science Olympiad team of 25 students in this school? In which case do you think, order is very important and in which case it is not?

- Three men have 4 coats, 5 waist coats, and 6 caps. In how many ways can they wear them?

Your odds of being struck by lightning this year are **1 in 960,000**.

In your lifetime those odds drop to about 1 in 12,000.

Your odds of being struck by lightning twice in your lifetime are 1 in 9 million

The odds of getting attacked and killed by a shark are **1 in 3,748,067**.

Odds of dying from fireworks (**1 in 340,733**) or drowning (**1 in 1,134**)

- Let's calculate our chance to win a lottery:

$_{56}C_{5}$ $_{46}C_{1}$

Simplify the following expressions:

a. $aa^m(-a)^2 =$
b. $c^k c(-c^2)c^{k-1}c^3 =$
c. $2^4 + 2^4 =$
d. $2^m + 2^m =$
e. $2^m \cdot 2^m =$