Math 4a. Class work 24.

There are 5 chairs and 5 kids in the room. In how many ways can kids sit on these chairs? The first kid can choose any chair. The second kid can choose any of the 4 remaining chairs, the third child has a choice between the three chairs, and so on. Therefore, there are $5 \times 4 \times 3 \times 2 \times 1$ ways how all of them can choose their places. Thus obtained long expression, $5 \times 4 \times 3 \times 2 \times 1$, can be written as 5!. By definition:

$$5 \times 4 \times 3 \times 2 \times 1 = 5! \quad or \quad n \times (n-1) \times (n-2) \times \ldots \times 3 \times 2 \times 1 = n!$$

Write the following expressions as a factorial and vice versa:

Example: $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 7!$, $4! = 4 \times 3 \times 2 \times 1$

$10 \times 9 \times 8 \times \ldots \times 3 \times 2 \times 1 =$

$6! =$

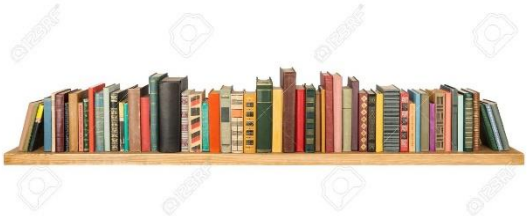
$b \times (b-1) \times (b-2) \times \ldots \times 3 \times 2 \times 1 =$

$c! =$

1. Simplify the following fractions:

   $\frac{5!}{7!} =$

   $\frac{n!}{(n-2)!} =$



2. How many different ways are there to put 64 books on the shelf?
3. In the restaurant, there are 3 choices of starters, 4 choices of entrees and 5 choices of tasty desserts in the fix price dinner menu. How many different ways are there to fix a dinner for the restaurant's clients?
4. How many two-digit numbers can be composed from digits 1, 2, 3 without repetition of digits?
5. How many three-digit numbers can be composed from digits 3, 4, 5, without repetitions. How many of these numbers will be odd? Even? Will be divisible by 3, by 6, by 5?

6. How many two-digit numbers can be composed from digits 1, 2, 3, if repetition is allowed?
7. Peter took 5 exams at the end of the year. Grade for exams are A, B, C, D. How many different ways are there to fill his report card?
8. There are red and green pencils in a box. How many pencils do you have to take out of the box without seeing them to be sure that you have at least 2 pencils of the same color?
9. If there are pencils of 5 different colors in a box, how many pencils do you have to take out to be sure that you have at least 2 of the same color? 3 of the same color?

10. There are 10 pairs of red gloves and 10 pairs of black gloves in a box. How many gloves do you have to take out to be sure that you have a pair of gloves that you can wear?

11. Simplify the following expressions:

$a \cdot a \cdot a \cdot x \cdot x \cdot x \cdot x \cdot x;$
$3 \cdot 3 \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y;$

$a \cdot a \cdot a + a \cdot a \cdot a \cdot a \cdot a;$
$(c+d) \cdot (c+d) \cdot (c+d) \cdot (c+d).$

12. Fill the empty spaces in the table:

a	0	1	−1	10	−10	0,1	−0,1	$\frac{1}{2}$	$-\frac{1}{2}$
a^2									
a^3									
a^4									

13. Simplify the following numerical expressions:

$$-(34); \quad +\big(-(-34)\big), \quad +(-(+(34))$$

14. Write the expression for the perimeter and area of the figure below.