Classwork 4.

1.
$$x^5 < y^8 < y^3 < x^6$$

Where 0 should be placed?

$$x^5 \quad y^8 \quad y^3 \quad x^6$$
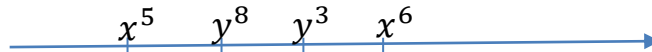
2. Represent a^{24} as an exponent with the base

        a. a^2;   *b.* a^3;   *c.* a^4;   *d.* a^6;   *e.* a^8;   *f.* a^{12}

3. Compare the following exponents:

    a. 127^{23} *and* 512^{18};   *b.* 5^{300} *and* 3^{500};   *c.* 31^{16} *and* 17^{20};

4. Prove that
   $8^5 + 2^{11}$ is divisible by 17
   $9^7 - 3^{10}$ is divisible by 20

5. A farmer has a cow, a goat and a goose. The cow and the goat will eat all the grass on his meadow in 45 days, the cow and the goose will eat all the grass on the same meadow in 60 days, and the goat and the goose will eat all the grass on the meadow in 90 days. How many days will it take them altogether to eat all the grass on the meadow? (we assume that the new grass is not growing.)

6. Write numbers 45 and 165 in binary system

7. Write the numbers, written in the binary system in decimal system:
   a. 11011011;   *b.* 10001101,   *c.* 111111111

8. Write the numbers 245 and 324 in 6-based place-value system. Remember, that in this system you will have only 0, 1, 2, 3. 4, and 5 as digits.

9. Three solutions of salt with concentration 10%, 15%, and 30% (it means that in the solution there are 10% (or 15%, or 30%) of the total mass is NaCl and 90% (or 85%, or 70%) is water) are mixed together. The mass of the first solution is 180g, mass of the second solution is twice as the

mass of the first solution, and the mass of the third solution is 100 g. more than the mass of the second solution. What is the concentration of NaCl in the mixture?

10. Dry apricots contain 22% of water. How much fresh apricot were used to produce a 200 g package of dry apricot if fresh apricots contain 85% of water?

11. Euler formula for prime numbers:

$n^2 - n + 41$ is a prime number for any $n \in N$. Prove or disapprove it.

12. Compute:

$$\frac{10^2 + 11^2 + 12^2 + 13^2 + 14^2}{365}$$

13. Factorize the following polynomials:

a. $x(1+b) + y(1+b)$;
b. $m(2k-3) + 2(2k-3)$;
c. $2a(1-b) - 3(1-b)$;
d. $7x(x-2y) - 2(2y+x)$;
e. $2x(x-2y) + 3y(x+2y)$;

f. $(a+b)a - b(a+b)$;
g. $(x+y)3 - a(x+y)$;
h. $a(b+3) - b(3+b)$;
i. $a(a+b) + (a+b)$;
j. $2x(a-1) - (a-1)$;

14. Appartment bulding has 12 appartments and a parking for 12 cars (each family has different car). How many different way are there to park these 12 cars?

15. Today there were only 4 cars at the parking lot. How many different ways are there to park 4 cars on a 12-place parking lot?
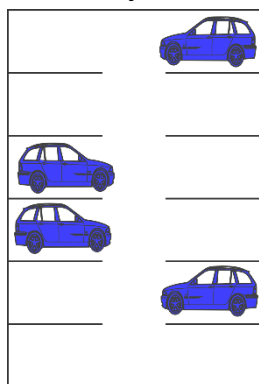
16. Four identical cars parked on a dealership 12 space parking lot. How many different ways are there to park 4 identical cars on a 12-place parking lot?.