Classwork 22.

Review.

1. Write the extended form of the number in decimal (power of 10 place value) system:
$2315;$ $0.234;$ $12345;$ $0.12345;$

2. Write the extended form of the number in binary (power of 2 place value) system:
$10110_b;$ $111011_b;$ $11111_b;$ $10000_b;$

3. Write the extended form of the number in ternary (power of 3 place value) system:
$12001_3;$ $201001_3;$ $120_3;$ $10000_3;$

4. Find the largest six-digit number, where each digit starting from the third one is equal to the sum of the two preceding digits.

5. There are two kinds of loose-leaf tea in the store, one is $8 per pound, and the other is $5 per pound. How should the store owner mix them so that the blend would be $6 per pound?

6. From the class of 30 students, it is necessary to choose two students to participate in the mathematical Olympiad. How many ways can this be done?

7. How many ways can a team of three students be chosen from the same class?

8. How many ways can three students be chosen from the same class if one will participate in the Math Olympiad, another will go to the poetry competition, and the third one will play piano at the school concert?

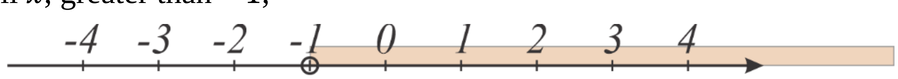
Inequalities.

There is another type of problems, where we want to find all possible values of varible which are greater (or smalle) than a particular number.

The simplest inequality is

$$x > a, or\ x < a, \qquad where\ x\ is\ variable\ and\ a\ is\ a\ number.$$

$x > -1$, the solution is all x, greater than -1,



The solution also can be written as

$$x \in (-1, +\infty)$$

We can add any number to both part of the inequality, the sign (< or >) will not change:

$x > -1$

$x + 2 > -1 + 2 \Rightarrow x + 2 > 1$

$y - 3 < 5$

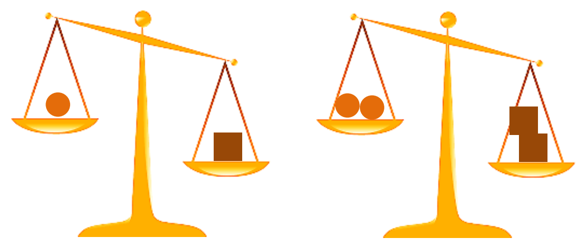
$y - 3 + 3 < 5 + 3$

$y < 8, \qquad y \in (-\infty, 8)$

Now let’s try to multiply or divide both part of the inequality by the positive number.

If $x > 3$, then $2x$ will be grater then 6.

$x > 3\,, \qquad 2x > 6$



But what happened if the number is negative?

If $x > 3$ what can we tell about $-x$?

$-x < 3 \cdot (-1)$

To solve the inequality, we have to find all possible values of the variable, such that the inequality will be a true statement.

Examples:

1. $5x \geq 10.$

   $5x \cdot \frac{1}{5} \geq 10 \cdot \frac{1}{5}; \qquad x \geq 2$

   Answer; $x \in [2, +\infty)$

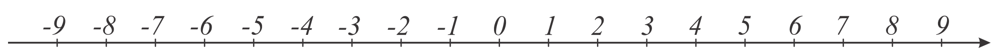
2. $-3x < 15$

$3x > -15;$ $x > -5$

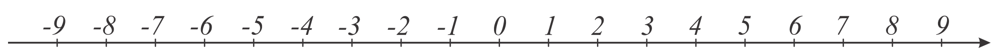
Exercises:

1. $x + 3 > 5x - 5$
2. $4\text{x} - 3 \neq 0$
3. $3(\text{x} - 1) < 5\text{x} + 9$
4. $2x - 1 > -x + 3$
5. $|x| > 8$
6. Show on the number line points that are satisfying the following inequalities:

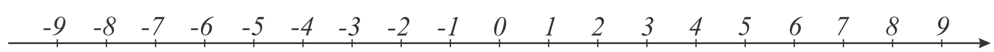
a) $|x| < 4$



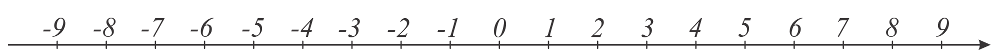
b) $|x| > 3$



c) $\left|x - \frac{1}{2}\right| > 3$



d) $\left|x - \frac{1}{2}\right| < 8$



7. $M = \{x|\ x > 5\},\ K = \{x|x < 20\}$

$M \cap K =$

$M \cup K =$

8. $M = \{x|\ x \leq 5\},\ K = \{x|x \geq 20\}$

$M \cap K =$

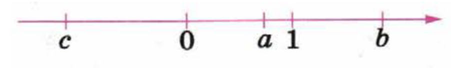
$M \cup K =$

9. Points a, 0, and b are marked on the number line below:

Which of the following expressions is true?

1) $a + b > 0$ or $a + b < 0$
2) $a - b > 0$ or $a - b < 0$
3) $ab > 0$ or $ab < 0$
4) $\frac{b}{a} > 1$ or $\frac{b}{a} < 1$

10. Points a, b, c, 0, and 1 are marked on the number line below:



Which of the following expressions is true?

1) $ab < b \; or \; ab > b$
2) $abc < a \; or \; abc > a$
3) $-ac < c \; or - ac > c$