Classwork 11.

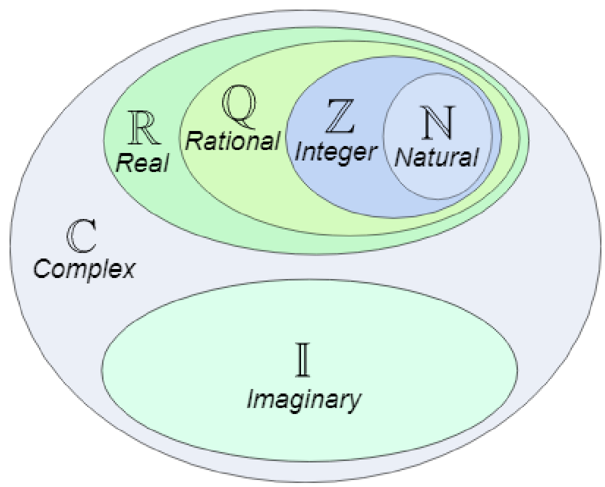
1. Set A is a set of all students in school. Set B is a set of straight A students. What is relationship between set A and set B?

2. Set $A = \{1, 2, 3, 4, 5, 6\}$, set $B = \{1, 3, 5, 7, 9\}$, set $C = \{2,3,6,8, 9, 10, 11\}$
   Write sets:
   $A \cap B$; $A \cup B$, $A \cap B \cap C$; $(A \cap B) \cup C$; $A \cup (B \cap C)$;

3. A is a set of prime factors of 18, B is a set of prime factors of 24. Write:
   $$A \cap B; \quad A \cup B$$
   Wow do we call the product of the elements of these sets?

4. Which of two sets is a subset of the other set?
   a. A or $A \cup B$
   b. A or $A \cap B$

5. Look at the illustration of the sets of numbers:



6. A is the set of all triangles, B is the set of isosceles triangles, C is the set of equilateral triangles, R is the set of right triangles. Draw the Venn diagrams for these sets.

N is the set of natural numbers. E is the set of even natural numbers, O is the set of odd natural numbers.

$$E \subset N; \quad O \subset N; \quad E \cap N = \emptyset, \quad E \cup O = N$$

We did the classification of set N.
We can classify the set of natural umbers on a very similar manner, based on the divisibility by 3. Can you do this? How many classes you got? If we will classify the set of natural numbers based on divisibility by 4, how many classes will we get?

Describe the classes of the set of natural numbers crated by two parameters, multiples of 2 (even numbers) and multiples of 5.

Class	numbers	
	Even	Multiples of 5
A	+	+
B	+	-
C	-	+
D	-	-

Find GCD (GCF) and LCM for numbers

a. 222 and 345.
b. $2^2 \cdot 3^3 \cdot 5$ and $2 \cdot 3^2 \cdot 5^2$

Can we apply the same strategy to find CF and CM for algebraic expressions? (In this case the concept of GCD and LCM cannot be applied.) For example, can CF and CM be found for expressions $2x^2y^5$ and $4x^3y^2$? x and y are variables and can't be represented as a product of factors, but they itself are factors, and the expression can be represented as a product:

$2x^2y^5 = 2 \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y \cdot y,$ $\qquad 4x^3y^3 = 2 \cdot 2 \cdot x \cdot x \cdot x \cdot y \cdot y \cdot$

$A = (Factors, 2x^2y^5) = \{2, x, x, y, y, y, y, y\}, B = (Factors, 4x^3y^3) = \{\, 2, 2, x, x, x, y, y\}$

Common devisors are any product of $A \cap B = \{\, 2, x, x, y, y\}$.

What about common multiples? Product of all factors of both numbers (or the product of two numbers) will be the multiple, but minimal common multiple will be the product of the

$$A \cup B = \{2{,}2, x, x, x, y, y, y, y, y\}$$

$\dfrac{2x^2y^5}{2 \cdot x^2y^2} = y^3;$ $\qquad \dfrac{4x^3y^2}{2 \cdot x^2y^2} = 2x;$

$\dfrac{4x^3y^5}{2 \cdot x^2y^5} = 2x;$ $\qquad \dfrac{4x^3y^5}{4 \cdot x^3y^3} = y^2;$

Algebraic fraction

Algebraic fraction are fraction $\frac{A}{B}$ $(B \neq 0)$ whose numerator and denominator are algebraic expressions. For example:

$$\frac{3x^2+y}{y^2-5x+2}; \qquad \frac{\frac{1}{x}-3}{y+\frac{1}{y}}$$

Several properties of these expressions:

$$\frac{A}{1}=A; \qquad \frac{A}{B}=\frac{A\cdot C}{B\cdot C} \quad (C\neq 0); \qquad -\frac{A}{B}=\frac{-A}{B}=\frac{B}{-A}$$

1. Add fractions:

   Example:

   $$\frac{2}{x^2a}+\frac{3}{a^2x}=\frac{2a}{a^2x^2}+\frac{3x}{a^2x^2}=\frac{2a+3x}{a^2x^2}$$

   $a.\ \frac{1}{a}+\frac{1}{b};$ $\qquad b.\ \frac{2}{x}-\frac{3}{y};$ $\qquad c.\ \frac{x}{a}+\frac{y}{b};$

   $d.\ \frac{5a}{7}-\frac{b}{x};$ $\qquad e.\ \frac{1}{2a}-\frac{1}{3};$ $\qquad f.\ \frac{1}{a}-\frac{1}{bc};$

2. Transform the following fraction, so that the sign before fraction is changed to the opposite:

   Example:

   $$-\frac{x}{x-3}=\frac{x}{-(x-3)}=\frac{x}{3-x}$$

   $a.\ \frac{1-x}{3};$ $\qquad b.\ -\frac{1}{2x+3y};$ $\qquad c.\ \frac{x-y}{x+y}$

   $d.\ \frac{-a-b}{x+y};$ $\qquad e.\ -\frac{a^2+1}{a-2};$ $\qquad f.\ -\frac{-x-y}{-a-b}$

3. Simplify fractions:

   1. $\frac{x-y}{y-x};$ 9. $\frac{2(a-b)}{3(b-a)};$ 17. $\frac{4mn(m-n)}{2m(n-m)};$ 24. $\frac{6a^2b^3(3-a)}{14ab^3(a-3)}.$

   2. $\frac{2x+2y}{4};$ 10. $\frac{3a+3b}{6a};$ 18. $\frac{4m-4n}{8mn};$

   3. $\frac{12ab}{6a-6b};$ 11. $\frac{2a-2b}{4a+4b};$ 19. $\frac{6x+6y}{3x-3y}.$

   4. $\frac{ax-bx}{cx+dx};$ 12. $\frac{ac+bc}{mc+nc};$ 20. $\frac{x^2}{x^2+xy};$

   5. $\frac{ab}{a-ab};$ 13. $\frac{m^2n}{m^2n-mn^2};$ 21. $\frac{ax-bx}{xy+x^2};$

   6. $\frac{p^2-p}{ap-bp};$ 14. $\frac{x^2-xy}{2xy+2x^2}.$

   7. $\frac{3xy}{3x^2a-3x};$ 15. $\frac{4m^2n}{6mn^2-8m^2n};$ 22. $\frac{3a^2+4ab}{9a^2b+12ab^2};$

   8. $\frac{4xy-x^2}{4x^2y-x^3y};$ 16. $\frac{2mn-6m^2}{12m^2n-4mn^2};$ 23. $\frac{16p^3q^3-24p^2q^4}{12p^2q^3-8p^3q^2}.$