SCIENCE AND INNOVATION
INTERNATIONAL SCIENTIFIC JOURNAL VOLUME 2 ISSUE 5 MAY 2023
UIF-2022: 8.2 | ISSN: 2181-3337 | SCIENTISTS.UZ

COLLECTIONS AND THE METHODOLOGY OF PERFORMING OPERATIONS ON THEM

Dzhurayeva Perdegul Saidovna
Acting associate professor of the department "Methodology of Preschool, primary and special education", National center of training teachers in new methods of Navai region
https://doi.org/10.5281/zenodo.7990670

Abstract. *Explaining the concept of a set, considering a set of certain elements, a group as a whole, objects that make up a set are called set elements, using Euler-Venn diagrams, a complementary set, a geometric representation of sets.*
Keywords: *Euler-Venn diagram, set, element, object, intersection, drawing, difference, geometric representation.*

Introduction

A set is one of the main concepts used in almost all branches of modern mathematics. In many issues, it is necessary to consider a set of certain elements, a group as a whole. In order to give a mathematical description of such sets, the concept of a set is introduced. According to the German mathematician Georg Cantor, one of the founders of set theory, "a set is a plurality considered as a whole in thought." Naturally, these words cannot be a strict definition of a set in mathematics. A set is a basic concept, which itself is the basis for building other concepts of mathematics [11,14,15,16].

Research materials and methodology.

Collections and their properties. A set is one of the elementary concepts of mathematics and is not defined. The word "set" is used in mathematics in the sense of "set", "plurality", "bunch", "heap". [11,17].

Objects that make up a set are called set elements. Collections of the initial letters of the Latin alphabet: *A*, *B*, *C*…. with, its elements are lowercase letters of the Latin alphabet: *a*,*b*, *c*… is determined by.

A collection item $a \in A$ is written in the form and "*a* element *A* belongs to the collection". If *a* element *A* if not in a set, $a \notin A$ or $a \overline{\in} A$ is written in the form. For example, *A*- be the set of even natural numbers , in that case $2 \in A$, $5 \notin A$, $628 \in A$ and $729 \notin A$ will be. A set consisting of a finite number of elements is called a finite set. If the number of elements of a set is infinite, such a set is called an infinite set. Sets consisting of the same elements are called equal sets.

Definition 1. If A every element of the set B also applies to a set, A collection B is called a subset of a set and $A \subset B$ is written in the form. An example. *A*={*a*, *b*, *c*, *d*, *e*, *f*, *g*}, *B*={*a*, *b*, *c*} if, $B \subset A$ will be.

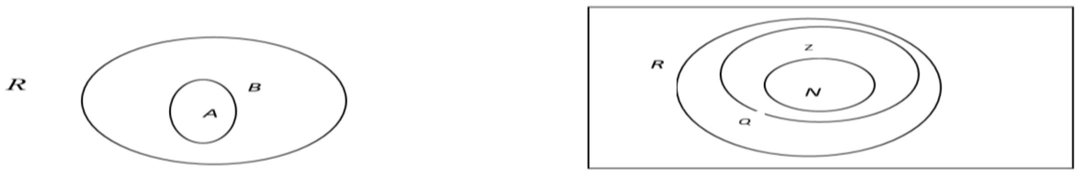


Figure 1

Research results. Methods of using operations on sets and Euler-Venn diagrams Euler-Venn diagrams. Euler-Venn diagrams are used to visualize relationships between sets more clearly. In this case, sets are represented as circles, ovals, or some closed area, and universal sets are usually rectangular. (Drawing 1)

Definition 2. *A* and *B* as the union of sets, refers to the set of elements belonging to at least one of these sets and $A\bigcup B$ is determined in the form. An example. *A*={*a, b, c, d, e, f, g*}, *B*={*e, f, g, h, i, j*} if, $A\cup B=\{a,b,c,d,e,f,g,h,i,j\}$ will be.

Definition 3. *A* and *B* as the intersection of sets, refers to the set of elements that belong to both of these sets at the same time and $A\bigcap B$ is determined in the form. An example. *A*={*a, b, c, d, e, f, g*}, *B*={*e, f, g, h, i, j*} if, $A\cap B=\{e,f,g\}$ will be.

Definition 4. *A* and *B* as the difference of sets, *A* of the collection *B* refers to the set of elements that are not included in the set and *A**B* is determined in the form. An example. *A*={*a, b, c, d, e, f, g*}, *B*={*e, f, g, h, i, j*} if, $A\setminus B=\{a,b,c,d\}$ will be.

Definition 5. *B* of the collection *A* called a set complementary to a set so $\overline{B}$ collection is told that, of this collection *B* association with collection *A* is equal to the set (Figure 2).

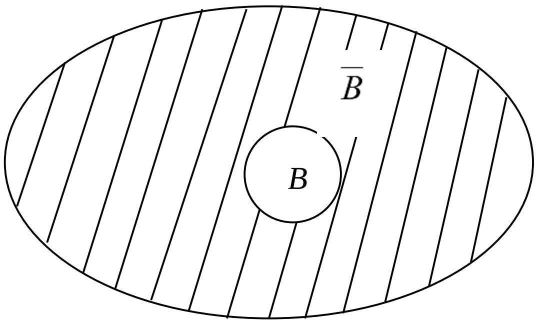


Figure 2.

An example. *A*={*a, b, c, d, e, f, g*}, *B*={*e, f, g*} if, $\overline{B}=\{a,b,c,d\}$ will be.

Definition 6. *A* and *B* as the Cartesian product of sets, the first element *A* from the collection, the second element *B* taken from the collection *(a;b)* refers to the set of all ordered pairs in the view. Cartesian multiplication is defined in the form AxB: $AxB=\{(a;b)|a\in A \text{ va } b\in B\}$. An example *A*={*a, b, c*}, *B*={*e, f*} if, $AxB=\{<a,e>,<a,f>,<b,e>,<b,f>,<c,e>,<c,f>\}$ will be.

Definition 7. The set of elements of A that are not in B and of B that are not in A is called the symmetric difference of these sets and is defined in the form. An example. *A*={*a, b, c, d, e, f, g*}, *B*={*e, f, g, h, i, j*} if, $A\Delta B=\{a,b,c,d,h,i,j\}$ will be.

Discussions. An example 1. $(A\cup B)\setminus C=(A\setminus C)\cup(B\setminus C)$ prove equality and make Euler-Venn diagrams. Solution: To prove the equality of sets, we use the proof M=N⇔ M ⊂ N∧N ⊂ M.

1) $\forall x\in((A\cup B)\setminus C)\Rightarrow x\in(A\cup B)\wedge x\notin C\Rightarrow x\in A\vee x\in B\wedge x\notin C\Rightarrow(x\in A\wedge x\notin C)\vee(x\in B\wedge x\notin C)\Rightarrow x\in(A\setminus C)\vee x\in(B\setminus C)\Rightarrow x\in((A\setminus C)\cup(B\setminus C))$. It follows that $(A\cup B)\setminus C\subset(A\setminus C)\cup(B\setminus C)$.

2) $\forall y\in((A\setminus C)\cup(B\setminus C))\Rightarrow y\in(A\setminus C)\vee y\in(B\setminus C)\Rightarrow(y\in A\wedge y\notin C)\vee(y\in B\wedge y\notin C)\Rightarrow(y\in A\vee y\in B\wedge y\notin C)\Rightarrow y\in(A\cup B)\wedge y\notin C\Rightarrow y\in((A\cup B)\setminus C)$. It follows that $(A\setminus C)\cup(B\setminus C)\subset(A\cup B)\setminus C$. So, $(A\cup B)\setminus C=(A\setminus C)\cup(B\setminus C)$.

Now we depict the given equality in Euler-Venn diagrams. To do this, we define a situation for the three sets involved in the equality and depict both sides of the equality in two diagrams. [2, 3, 5]:

$A \cup B$; If we represent $(A \cup B) \setminus C$, then we will create the following (diagram 3):

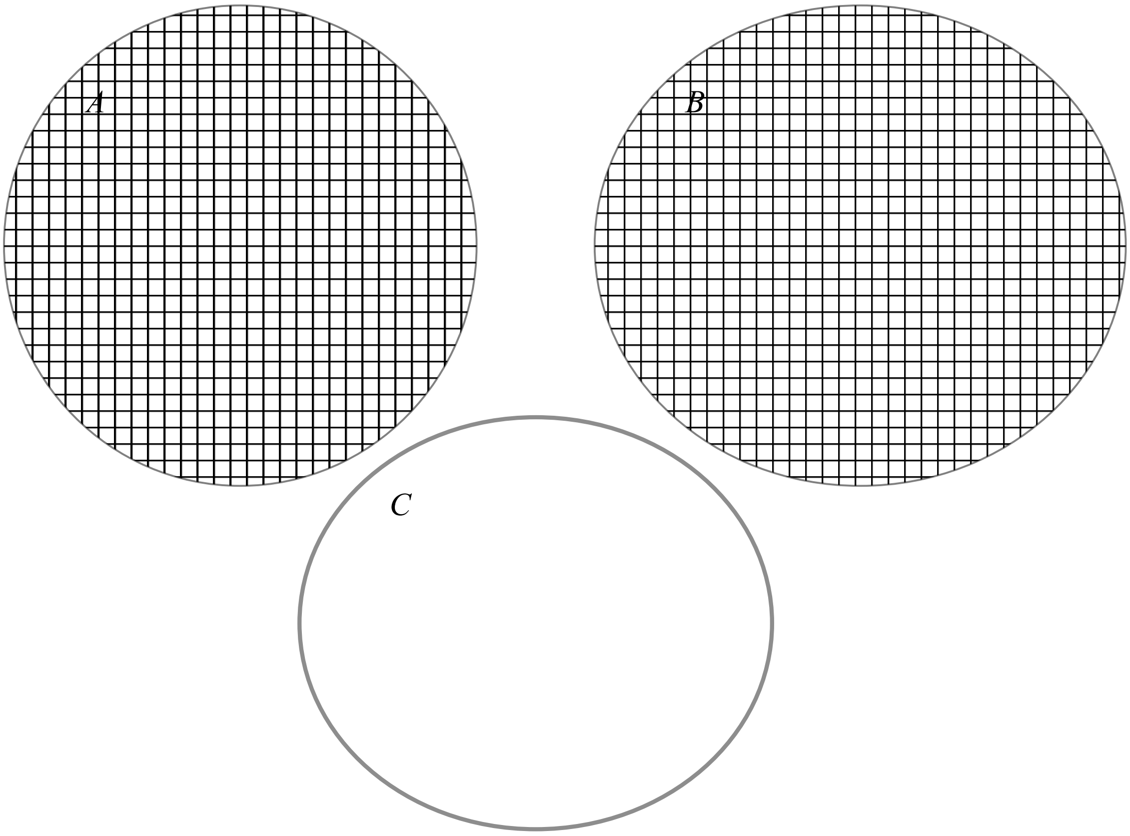
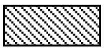


Figure 3

$A \setminus C$  $B \setminus C$; 

$(A \setminus C) \cup (B \setminus C)$ ni 

If we describe it through, then we get the following (Figure 4):

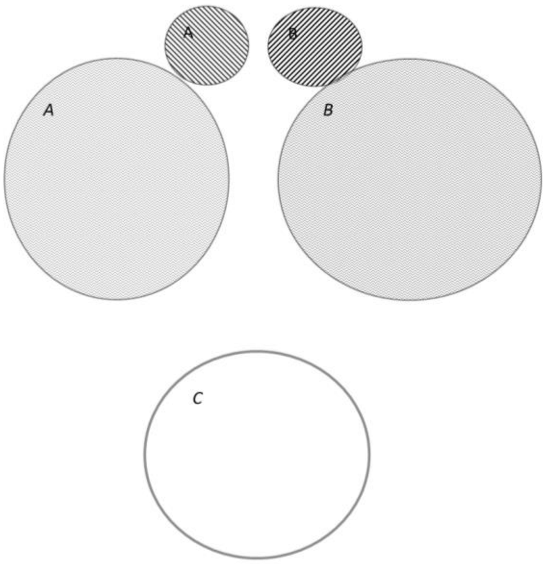


Figure 4

Example 2. $A = \{2;5;7\}$ va $B = \{2;4;7;11\}$ find the union of sets.

Solution: According to the definition of union of sets {2; 4; 5; 7; 11} will be.

If sets A and B consist of Euler-Venn circles, then in Figure 5 their union is the shaded area.

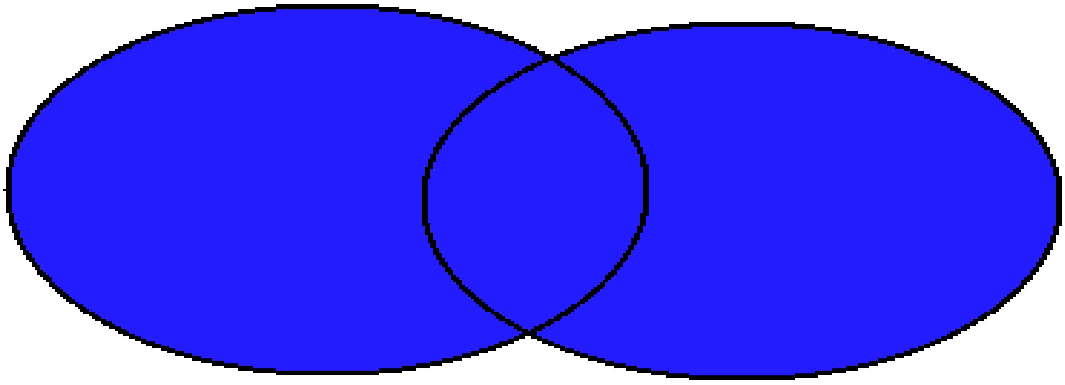


Figure 5

Example 3. $A = \{2;5;7\}$ and $B = \{2;4;7;11\}$ find the intersection of the sets.

Solution: By definition of intersection of sets $A \cap B = \{2;7\}$ will be.

If the sets A and B consist of Euler-Venn circles, then in Figure 6 their intersection is the shaded area.

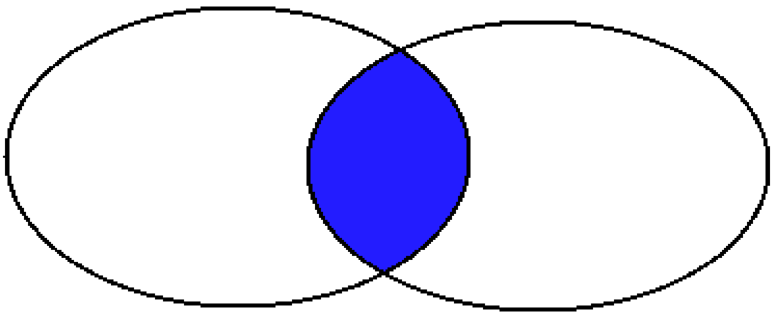


Figure 6

Example 4. $A = \{5;2;7;6\}$ and $B = \{2;4;7;19;17\}$ find the difference of the sets.

Solution: It follows from the $A \setminus B = \{5;6\}$ definition of difference of sets.

If sets A and B consist of Euler-Venn circles, then in Figure 7 their difference is the shaded area.

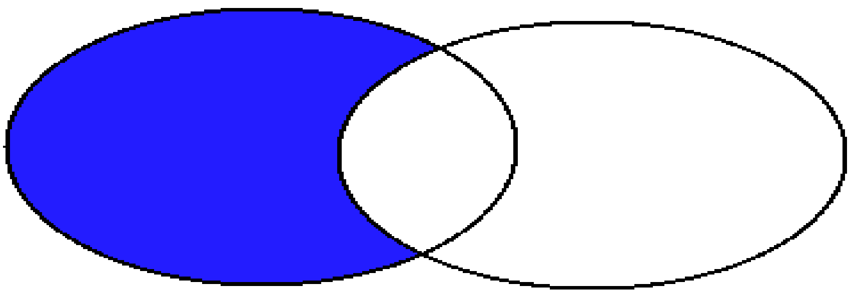


Figure 7

Example 5. $A = \{2;5;7;9\}$ and $B = \{2;4;7;11;13\}$ find the symmetric difference of sets. Solution: By definition of difference of sets will be $A \Delta B = \{4;5;9;11; 13\}$. If the sets A and B consist of Euler-Venn circles, then in Figure 8 their symmetric difference is the shaded area.

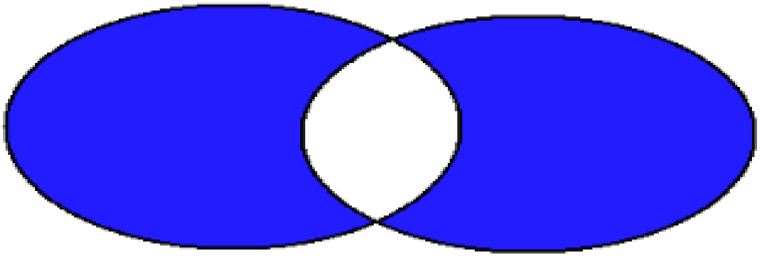


Figure 8

Example 6. $A=\{1;4;5;6;7\}$and $B=\{4;6\}$ find the complementary set if .

Solution: According to the definition of the complement set $\overline{B}=\{1;\ 5;\ 7\}$ will be.

If sets A and B are Euler-Venn circles, then their complement in Figure 9 is the shaded area.

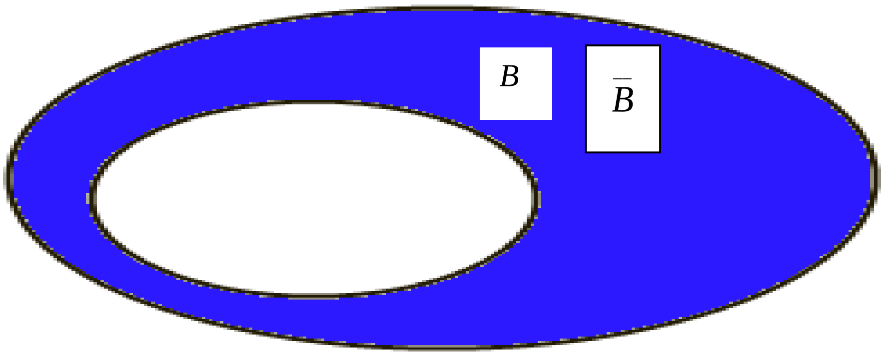


Figure 9

Conclusion. Example 7. *A*= {1,2,3}, *B*={ *a,b*} if given, *A*x*B*, *B*x*A*, *A*x*A*, *B*x*B* find the. Solution: Pairs in Cartesian multiplication are written in small brackets.

*A*x*B*={<1;a>,<2;a>,<3;a>,<1;b>, <2;b>, <3;b>};

*B*x*A*={<a;1>,<b;1>,<a;2>,<b;2>,<a;3>,<b;3>};

*A*x*A*={<1;1>,<1;2>,<1;3>,<2;1>,<2;2>,<2;3>,<3;1>,<3;2>,<3;3>};

*B*x*B*={<a;a>,<a;b>,<b;a>,<b;b>}.

Example 8. *A*=[1;3], *B*=[2;4] s are given, *A*x*B*, *B*x*A* find the:

Solution: *A*x*B*=[1;3] x [2;4] = {<*a*;*b*>:1≤*a*≤ ,2≤*b*≤4};

*B*x*A*=[2;4] x [1;3] = {<*a*;*b*>:2≤*a*≤4, 1≤*b*≤3}.

We describe the first coordinates of the elements of the set AxB (the elements of A) on the Ox axis, and the second coordinates (the elements of B) on the Moon ***Oy*** axis. From these points, we draw perpendiculars to the Ox and Oy Moon axes, respectively. The coordinates of the points of intersection of this perpendicular consist of the elements of the set AxB.

The set of all points whose coordinates are equal to elements (pairs of numbers) of AxB. AxB is called the geometric representation of the set.

Given in Example 7 **A**x***B*, *B*x*A*, *A*x*A*** the geometric presentation of the sets is in Figure 10, given in Example 8 ***A*x*B*, *B*x*A*** and the geometric representation of the sets is shown in Figure 11.

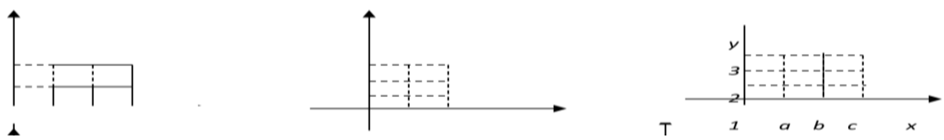
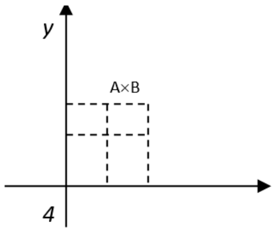


Figure 10



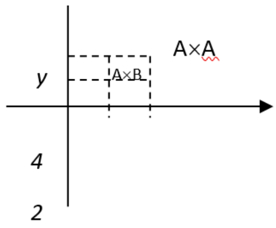


Figure 11

Example 8. This is for optional A, B and C kits. $A\text{x}(B\cup C) = (A\text{x}B)\cup(A\text{x}C)$ prove that the relation is correct. (1)

a) optional $<x;y>\in A\text{x}(B\cup C)$ let it be, from this $x \in A$, $y\in B \cup C$ for being, from the definition of union $x\in A$, $y\in B$ or $y\in C$. And so, $x\in A$ and $y\in B$ or $x\in A$ and $y\in C$, from these and from the definition of proper multiplication $<x;y>\in A\text{x}B$ yoki $<x;y> \in A\text{x}C$. So, $<x;y>\in (A \text{ x } B) \cup (A\text{x}C)$, i.e, $A \text{ x } (B\cup C) \subset(A\text{x}B)\cup(A\text{x}C)$. (2)

b) optional $<x;y>\in (A \text{ x } B)\cup(A\text{x}C)$ let it be, from this $<x;y>\in (A \text{ x } B)$ or $<x;y>\in (A\text{x}C)$. From the definition of proper multiplication $x\in A$ and $y\in B$ or $x\in A$ and $y\in B$, of these $x\in A$ and $y\in B\cup C$. So, $<x;y>\in A\text{x}(B\cup C)$ or $(A\text{x}B)\cup(A\text{x}C)\subset A\text{x}(B\cup C)$. (3)

(2) and (3) from relationships (1) it follows that equality is appropriate.

REFERENCES

1. Resolution No. 140 of March 15, 2017 of the Cabinet of Ministers of the Republic of Uzbekistan "On approval of the regulation on general secondary education.
2. The Cabinet of Ministers of the Republic of Uzbekistan "Approval of state educational standards of general secondary special, professional education
3. Resolution No. 187 of April 6, 2017.
4. President of Uzbekistan Sh. Mirziyoyev spoke at the celebration of the Day of Teachers and Trainers on October 1. September 30, 2020.
5. Encyclopedic dictionary of young mathematicians. - T.: Komuslar Bosh editorial office, 1991. - 480 p.
6. Saidahmedov N. New pedagogical technologies. - T., Finance, 2003.-172 p.
7. Tolipov O'.Ḱ., Usmonboeva M. Practical foundations of pedagogical technologies. T., Science, 2006, p. 261.
8. Yunusova D.I. Organization of mathematical education based on educational technologies. T., "Universitet", 2005, 131 p.
9. M. Ya. Vygodsky. Elements of mathematics spravochnik. T.: Teacher, 1971.-444 p.
10. Social information and education portal: www.ziyonet.uz.
11. https://www.lex.uz - National database of legislation of the Republic of Uzbekistan.