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Teaching the Topic of Probability of Events Using

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Abstract:

Nowadays, when it comes to applying new methods or innovations in the educational process, the use of interactive methods in teaching is understood. Interactivity refers to the mutual activity of two individuals, meaning the learning process occurs through dialogue (computer interaction) or communication between the teacher and the student. Interactivity is mutual activity, action, and influence. It takes place in the interactions between the student and the teacher. The main goal of interactive methods is to create a favorable environment for the learning process, enabling students to think actively and freely. This article presents some considerations and methodological recommendations for teaching the topic "Addition and Multiplication of Probabilities. Methods for Calculating the Probability of Events" in the Mathematics curriculum of general education schools.

Keywords: Addition and multiplication of probabilities, Probability of events, Mental attack, Pair matching, Wheel methods.

1. Introduction. One of the important requirements for organizing modern education is achieving high results in a short time without excessive mental or physical effort. Conveying specific theoretical knowledge to students in a short period, developing their skills and competencies in certain activities, monitoring their progress, and assessing their level of acquired knowledge, skills, and competencies require high pedagogical mastery and a fresh approach to the educational process from the teacher.

Pedagogical technology, by its nature, has a subjective quality. Regardless of the forms, methods, and tools used, technologies must:

- ✓ Increase the efficiency of pedagogical activities;
- ✓ Foster mutual collaboration among teachers;

- ✓ Ensure thorough mastery of subject knowledge by students;
- ✓ Develop independent, free, and creative thinking skills in students;
- ✓ Create necessary conditions for students to realize their potential;
- ✓ Guarantee the prioritization of democratic and humanistic ideas in the pedagogical process.

Literature Review.

[3] The article provides information on the use of student-centered learning technologies in mathematics lessons.

[4] The article discusses how a historical approach to studying academic subjects can bring the learning process closer to scientific knowledge to some extent. It also emphasizes that when teachers introduce mathematical concepts, discussing their history and development (primarily the contributions of our great ancestors) can increase students' interest in the subject and foster love for the motherland.

[5] The article analyzes the use of didactic games in the process of teaching mathematics. It notes that the level of lesson organization depends on the teacher's creativity. The article also discusses how students can consolidate their knowledge and prepare to apply it in real life.

[6] The article highlights the importance of independent learning in strengthening students' knowledge in today's era of advanced science and technology. It emphasizes the need to boost students' self-confidence, teach them to acquire knowledge independently, work independently, and improve themselves. It also briefly touches on the aspects that need attention in organizing students' independent learning and the instructions that should be provided to them.

[7] The article provides a brief overview of word problems related to work, their classification, stages of solving them, and the main patterns encountered in such problems. It summarizes considerations on what to pay attention to when solving arithmetic word problems and provides examples of problem solutions as illustrations. The solved problems, along with the provided explanations and considerations, are noted to help students and independent learners master word problems without difficulty.

[8] The article presents a series of theoretical and logical foundations necessary for developing students' creative thinking, emphasizing that solving exponential equations and inequalities correctly is impossible without them. It provides typical variants of exponential equations and inequalities, as well as instructions for solving such problems.

[9] The article provides important information on what to focus on to avoid mistakes when solving inequalities and generalizing solutions, using advanced experiences in the development of the education sector. Examples of solving inequalities related to fractional-rational, irrational, logarithmic, and trigonometric functions using algorithmic methods are provided.

[10-14] The article is dedicated to analyzing the effectiveness of interactive technologies as a means of improving the quality of the educational process. It notes that the widespread use of interactive methods in the educational process today requires humanization, democratization, and liberalization of education. Interactive methods are aimed at achieving high results in a short time without excessive time and physical effort. Teaching theoretical knowledge, developing skills and competencies in specific activities, fostering moral qualities, and monitoring and assessing students' knowledge require great skill and agility.

This article presents some considerations and methodological recommendations for teaching the topic "Addition and Multiplication of Probabilities. Methods for Calculating the Probability of

Events" in the Mathematics curriculum of general education schools.

2. Main Part. As we know well from the school mathematics curriculum, the topic "Addition and Multiplication of Probabilities. Methods for Calculating the Probability of Events" follows the topic "Opposite Events. Operations on Events and Their Representation in Euler-Venn Diagrams." Students will not face difficulties in mastering the methods of calculating the probability of events only if they have detailed knowledge about events, elementary events, opposite events, operations on events (addition, subtraction, multiplication). Before introducing the new topic, the "Mental Attack" method can be used to assess students' understanding of the previous lesson:

1. What is the product of events A and B?
2. What does it mean for events A and B to be equally likely?
3. What is the sum of events A and B?
4. What is the difference between events A and B?
5. What are opposite events?
6. What are mutually exclusive events?

Students take turns answering the six questions listed above. During this process, the teacher can provide explanations or corrections based on whether the answers are correct or incorrect.

To review the covered topic, the "Pair Matching" method can also be effectively used. Unlike the "Mental Attack" method, in this approach, the answers are presented in a mixed format but are reflected in a table. This gives students some opportunity to recall the correct answers or think logically to find them. Comparing answers often helps reinforce knowledge and solidify the concepts learned.

Table for the "Pair Matching" method to be presented to students:

1.	What is meant by equally likely events?	A	An event consisting of the occurrence of at least one of the events A and B. berishidan iborat
2.	What is the sum of events A and B?	B	An event that cannot be divided into specific cases.
3.	What is the difference between events A and B?	C	An event where $A \subset B$ and $B \subset A$.
4.	What is an elementary event?	D	An event where both A and B occur simultaneously.
5.	What is the product of events A and B?	E	An event where A occurs, but B does not occur.

Students freely express their thoughts, complement each other's answers, and engage in self-assessment.

Correct Answers for the "Pair Matching" Table Presented to Students:

1.	What is meant by equally likely events?	C	An event where $A \subset B$ and $B \subset A$.
2.	What is the sum of events A and B?	A	An event consisting of the occurrence of at least one of the events A and B. berishidan iborat hodisa.
3.	What is the difference between events A and B?	E	An event where A occurs, but B does not occur.

4.	What is an elementary event?	B	An event that cannot be divided into specific cases.
5.	What is the product of events A and B?	D	An event where both A and B occur simultaneously.

Explanation of the New Topic:

The title may seem intimidating, but in reality, it is quite simple. In this lesson, we will familiarize ourselves with the theorems of addition and multiplication of probabilities of events, as well as analyze typical problems. To effectively master the materials in this article, you need to know and understand the basic terms of probability theory and be able to perform the simplest arithmetic operations. As you can see, very little is required. However, I must also warn against a superficial approach to practical examples!

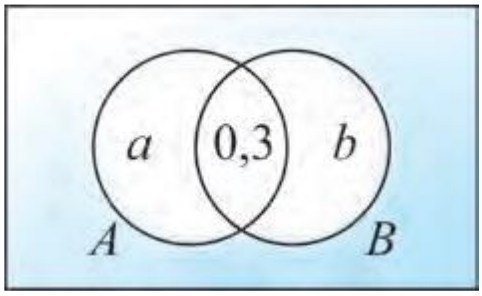
Addition of Probabilities: For any events A and B,

$P(A \cup B)=P(A)+P(B)-P(A \cap B)$

This equality represents the rule of addition of probabilities.

Example 1: Given $P(A)=0.6$, $P(A \cup B)=0.7$ and $P(A \cap B)=0.3$, find $P(B)$.

Method 1: Draw the corresponding Euler-Venn diagram:



From the given: $a+0,3=0,6$; $a=0,3$. $a+b+0,3=0,7$; $0,3+b=0,4$; $b=0,1$.

Thus, $P(B)=0,4$

Method 2: Using the rule of addition of probabilities:

$P(A \cup B) = P(A)+P(B)–P(A \cap B)$;

Substitute the given values:

$0,7 = 0,6+P(B)–0,3$;

Solve for P(B)$P(B)$:

$P(B) = 0,4$.

It is known that for mutually exclusive events, the equality $P(A \cup B) = P(A)+P(B)$

holds.

Multiplication of Probabilities:

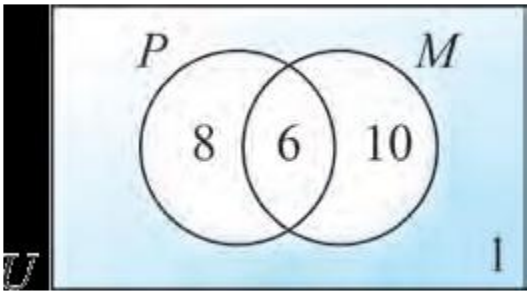
Let events A and B be given. The notation A|B represents the probability of event A occurring given that event B has occurred.

Example 2: Out of 25 students: 14 like pilaf, 16 like manti, 1student likes neither pilaf nor manti, 6 students like both pilaf and manti. Find the probability that a randomly selected student:

a) likes pilaf (P);

b) likes pilaf (P) given that they like manti (M).

Solution:
Draw the Euler-Venn diagram:



a) Probability of liking pilaf (P):

The probability $P(P)$ is calculated as:

$P(P)$=Number of students who like pilaf/Total number of students=14/25

b) Probability of liking pilaf (P) given that they like manti (M):

This is a conditional probability, denoted as $P(P/M)$. It is calculated as:

$P(P/M)$= Number of students who like both pilaf and manti /Number of students who like manti =6/16=3/8

General Formula for Conditional Probability:

The conditional probability of event A given event B is:

$$P(A|B)=\frac{P(A\cap B)}{P(B)}$$

From this, we can derive the multiplication rule: $P(A\cap B)=P(B)\cdot P(A|B)$.

This is called the **multiplication rule of probability**.

If $P(A|B)=P(A)$, then event A is **independent** of event B. If A and B are independent, then: $P(A\cap B)=P(A)\cdot P(B)$

Example 3: Probability of Machine Repairs

In a factory, several machines are operating. The probabilities of requiring repairs during operation are:

- ✓ Probability of repairing one machine: $P(A)=0.2$,
- ✓ Probability of repairing two machines: $P(B)=0.13$,
- ✓ Probability of repairing more than two machines: $P(C)=0.07$.

We need to find the probability that at least one machine requires repairs during operation.

Solution:

Define the events:

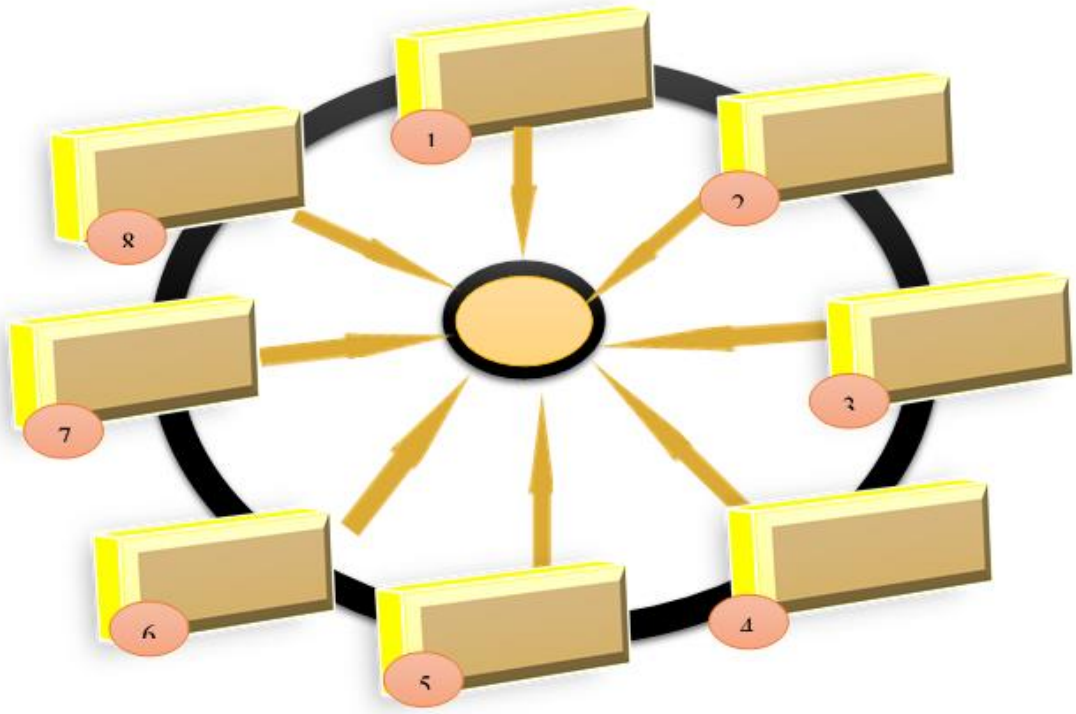
- ✓ A= {One machine requires repairs},
- ✓ B= {Two machines require repairs},
- ✓ C= {More than two machines require repairs}.

The events A, B, and C are mutually exclusive. The probability of at least one machine requiring repairs is:

$P(A + B + C) = P(B) + P(B) + P(C) = 0,2 + 0,13 + 0,07 = 0,4$.

Answer: 0.4▲

After introducing the new topic, analyze examples from the textbook using the concepts learned. Before concluding the lesson, use the **"Wheel" method** to assess students' understanding of the topic. This method involves asking questions and solving problems to determine how well students have grasped the material.



Game Rules:

To conduct this game, students are first divided into 2 groups. The group names are chosen by the students themselves. In the "Wheel" game, students from each group take turns coming to the board and spinning the wheel. Once the wheel stops, the number indicated by the arrow determines which question is selected. The student then solves the problem associated with that question. If the problem is solved correctly, the student earns a motivation card. The game continues in this manner. At the end, the group with the most motivation cards wins the diamond prize.

Conclusion: In teaching the topic "Addition and Multiplication of Probabilities. Methods for Calculating the Probability of Events" to school students, the information provided in this article can be effectively used to organize the following parts of the lesson:

1. Reviewing previously covered material,
2. Introducing the new topic,
3. Reinforcing the knowledge gained on the topic.

In general, to make lessons more effective, productive, and engaging, various interactive teaching methods can be employed[3-14].

Foydalanilgan adabiyotlar

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