

Strand VI: Probability and Discrete Mathematics

Standard 1: Probability -Students develop an understanding of the notion of certainty and of probability as a measure of the degree of likelihood that can be assigned to a given event based on the knowledge available, and make critical judgments about claims that are made in probabilistic situations.

- Key Ideas:
1. Students develop an understanding of the concepts of chance and uncertainty.
 2. Students express the likelihood of chance events in terms of probabilities.
 3. Through experiments students learn that some outcomes are affected by prior events, while others are independent.
 4. Students also learn to examine outcomes and search for explanations, and they realize the difference between probabilities determined from observations and probabilities derived mathematically.
 5. Making predictions and decisions in the face of uncertainty are essential skills for coping with the modern world.

Middle School Benchmark	Grade 5	Grade 6	Grade 7	Grade 8
1. Describe events as likely or unlikely and give qualitative and quantitative descriptions of the degree of likelihood.		Understand the concept of probability and solve problems D.PR.06.01 Express probabilities as fractions, decimals or percentages between 0 and 1; know that 0 probability means an event will not occur, and that probability 1 means an event will occur. D.PR.06.02 Compute probabilities of events from simple experiments with equally likely outcomes, e.g., tossing dice, flipping coins, spinning spinners, by listing all possibilities and finding the fraction that meets given conditions.	Currently, 7 th grade does nothing with probability due to time	Samples & population to be added by 07-08
2. Describe probability as a measure of certainty ranging from 0 to 1 and conduct activities that allow them to express probabilities of simple events in mathematical terms.		Understand the concept of probability and solve problems D.PR.06.01 Express probabilities as fractions, decimals or percentages between 0 and 1; know that 0 probability means an event will not occur, and that probability 1 means an event will occur. D.PR.06.02 Compute probabilities of events from simple experiments with equally likely outcomes, e.g., tossing dice, flipping coins, spinning spinners, by listing all possibilities and finding the fraction that meets given conditions.	Currently, 7 th grade does nothing with probability due to time	Samples & population to be added by 07-08
3. Conduct experiments and give examples to illustrate the difference between dependent and independent events.		Understand the concept of probability and solve problems D.PR.06.02 Compute probabilities of events from simple experiments with equally likely outcomes, e.g., tossing dice, flipping coins, spinning spinners, by listing all possibilities and finding the fraction that meets given conditions.	Currently, 7 th grade does nothing with probability due to time	Understand probability concepts for simple and compound events D.PR.08.04 Apply the Basic Counting Principle to find total number of outcomes possible for independent and dependent events, and calculate the probabilities using organized lists or tree diagrams. D.PR.08.06 Understand the difference between independent and dependent events, and recognize common misconceptions involving probability, e.g. Alice rolls a 6 on a die three times in a row; she is just as likely to roll a 6 on the 4 th roll as she was on any previous roll. Samples & population to be added by 07-08
4. Explain the difference between probabilities determined from experiments or chance events (empirical) and probabilities derived mathematically (theoretical), and explain how the empirical probability changes for a large number of trials.			Currently, 7 th grade does nothing with probability due to time	Understand probability concepts for simple and compound events D.PR.08.06 Understand the difference between independent and dependent events, and recognize common misconceptions involving probability, e.g. Alice rolls a 6 on a die three times in a row; she is just as likely to roll a 6 on the 4 th roll as she was on any previous roll. Samples & population to be added by 07-08
5. Conduct probability experiments and simulations to model and solve problems.		Understand the concept of probability and solve problems D.PR.06.02 Compute probabilities of events from simple experiments with equally likely outcomes, e.g., tossing dice, flipping coins, spinning spinners, by listing all possibilities and finding the fraction that meets given conditions.	Currently, 7 th grade does nothing with probability due to time	Understand probability concepts for simple and compound events DA.PR.08.03 Compute relative frequencies from a table of experimental results for a repeated event and be able to answer questions about the results, using relationship of probability to relative frequency. Samples & population to be added by 07-08

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Standard 2: Discrete Mathematics -Students investigate practical situations such as scheduling, routing, sequencing, networking, organizing and classifying, and analyze ideas like recurrence relations, induction, iteration, and algorithm design.

Key Ideas:

1. Problems involving counting and arranging finite collections of objects occur in many applications.
2. Concepts of sets and set relationships give students useful tools for representing problems.
3. Many important practical applications involve networks.
4. Many important practical applications are modeled by recurrence relations.
5. Mathematical applications frequently require students to develop their own procedures for solving problems.
6. Applications of discrete mathematics drawn from many important practical situations introduce students to contemporary uses of mathematics.

Middle School Benchmark	Grade 5	Grade 6	Grade 7	Grade 8
1. Use manipulatives, diagrams and the fundamental theorem of counting to count permutations and combinations.	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks	Understand probability concepts for simple and compound events D.PR.08.04 Apply the Basic Counting Principle to find total number of outcomes possible for independent and dependent events, and calculate the probabilities using organized lists or tree diagrams.
2. Use sets and set relationships to explore and solve simple algebraic and geometric problems.	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks
3. Solve problems involving networks, for example planning delivery routes or counting paths between points.	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks
4. Explore recurrence relations and iterations.	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks
5. Continue to use manipulatives and drawings to model the concepts and procedures for the standard arithmetic algorithms, and develop and analyze their own and other students' algorithms to accomplish a task or solve a mathematical problem.	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks
6. Use discrete mathematics concepts as described above to model situations and solve problems; and look for whether or not there is a solution (existence problems), determine how many solutions there are (counting problems) and decide upon a best solution (optimization problems).	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks	Under investigation as to how best to address these benchmarks