

Core Content

Cluster Title: Investigate chance processes and develop, use, and evaluate probability models.
Standard 5: Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
Concepts and Skills to Master
(This is students' first exposure to probability in the Common Core.)
<ul style="list-style-type: none"> • Represent the probability of an event as a fraction or decimal from 0 to 1 or percent from 0% to 100%. • Understand that a probability of 0 is impossible. • Understand that probabilities near 0 are unlikely to occur. • Understand that probabilities of .5 are equally likely and unlikely. • Understand that probabilities near 1 are more likely to occur. • Understand that a probability of 1 is certain.

Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> • Understand that 1 = 100% • Recognize when a number is close to 0, close to 1/2, or close to 1. 	
Academic Vocabulary	
Probability, event, chance event, likelihood, outcome	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> • Brainstorm possible events that fit on the continuum from impossible to certain. 	
Sample Formative Assessment Tasks	
Skill-based Task	Problem Task
The weatherman said that there is a 90% chance of snow today. Describe the likelihood of it snowing today.	Using a six-sided number cube, have students create events that are impossible, unlikely, as likely as unlikely, likely, and certain.

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Standard 6: Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. <i>For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.</i>
Concepts and Skills to Master
<ul style="list-style-type: none"> • Perform an experiment and collect data on a chance event. • Relate the results of an experiment to the theoretical relative frequency of an event. • Use the results of an experiment to estimate the probability of an event. • Estimate the long-run relative frequency of an event given the probability of the event.

Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> • Summarize numerical data sets by reporting the number of observations. (6.SP.5) • Understand the probability of a chance event as a number between 0 and 1 that expresses likelihood. (7.SP.5) 	
Academic Vocabulary	
Theoretical probability, experimental probability, relative frequency	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> • Have students compare experimental and theoretical probability using coins, dice, or spinners. 	<ul style="list-style-type: none"> • Web Simulations • Coins, number cubes, spinners, cards
Sample Formative Assessment Tasks	
Skill-based Task You roll a fair die 200 times. How many outcomes should be even?	Problem Task If Portia were to flip a coin one hundred times could the outcomes be 80 heads and 20 tails? Explain your reasoning.

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Standard 7: Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. <i>a) Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.</i> <i>b) Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?</i>
Concepts and Skills to Master
<ul style="list-style-type: none"> • Use theoretical probabilities to create a probability model (e.g. table showing the potential outcomes of an experiment or random process with their corresponding probabilities) in which all outcomes are equally likely (uniform). • Use observed frequencies to create a probability model for the data generated from a chance process. • Use probability models to find probabilities of events. • Compare theoretical and experimental probability.

Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> • Theoretical and experimental probability 	
Academic Vocabulary	
Probability model, uniform probability, discrepancy, sample space, event	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> • Create a game based on a model, predict the winner, play the game. Compare observed frequencies with the prediction and explain discrepancies. 	
Sample Formative Assessment Tasks	
Skill-based Task Juan rolled 15 fours when rolling a fair die 60 times. Would you expect this result? Justify your answer.	Problem Task The results of a spinner experiment are 50% red, 10% blue, 20% yellow, and 20% green. Draw the spinner.

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Standard 8: Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

a) Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

b) Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.

c) Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*

Concepts and Skills to Master

- Represent probabilities of simple and compound events as a fraction, decimal, or percent.
- Find the sample space of a compound event.
- Create organized lists, tables, tree diagrams, and simulations to determine the probability of compound events.
- Generate frequencies for compound events using random number generators (e.g. tables, calculators, manipulatives).

Supports for Teachers

Critical Background Knowledge

- Compute the probability of a simple event.
- Use lists and tables to organize data.

Academic Vocabulary

Simple event, compound events, tree diagram, simulation, sample space

Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> • Use playing cards to simulate the results of compound events. (e.g. use 4 hearts and 6 clubs to simulate 40% of donors with type A blood) 	<ul style="list-style-type: none"> • Random Number Generator

Sample Formative Assessment Tasks

<p>Skill-based Task What is the probability of a family with five children having exactly two boys?</p>	<p>Problem Task Create a tree diagram for illustrating the outcomes for a car that has two or four doors and is red, black, or silver. Create questions that can be answered based on the diagram.</p>
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