Richmond Public Schools

Curriculum Framework

Grade 7 Honors (7/8)

Strand: Measurement and Geometry	
8.11	**The student will** **a) compare and contrast the probability of independent and dependent events; and** **b) determine probabilities for independent and dependent events.**
7.8	**The student will** **a) determine the theoretical and experimental probabilities of an event; and** **b) investigate and describe the difference between the experimental probability and theoretical probability of an event.**

Suggested Pacing

Related Standards	
Spiral Down:	Spiral Up:

Essential Questions	Common Misconceptions
● How does, whether a situation is independent or dependent, affect the outcome? ● What's the relationship between the theoretical and experimental probability of an event: to real-world situations? ● How is probability in real-life situations?	● Dependent Events: students forget to alter the denominator ● Experimental Probability: students can forget to total the number of trials for the denominator

Understanding the Standard	Essential Knowledge and Skills
SOL 8.11: ● A simple event is one event (e.g., pulling one sock out of a drawer and examining the probability of getting one color). ● If all outcomes of an event are equally likely, the theoretical probability of an event occurring is equal to the ratio of desired outcomes to the total number of possible outcomes in the sample space.	SOL 8.11: ● Determine whether two events are independent or dependent. (a) ● Compare and contrast the probability of independent and dependent events. (a) ● Determine the probability of two independent events. (b) ● Determine the probability of two dependent events. (b)

• The probability of an event occurring can be represented as a ratio or the equivalent fraction, decimal, or percent. • The probability of an event occurring is a ratio between 0 and 1. A probability of zero means the event will never occur. A probability of one means the event will always occur. • Two events are either dependent or independent. • If the outcome of one event does not influence the occurrence of the other event, they are called independent. If two events are independent, then the probability of the second event does not change regardless of whether the first occurs. For example, the first roll of a number cube does not influence the second roll of the number cube. Other examples of independent events are, but not limited to: flipping two coins; spinning a spinner and rolling a number cube; flipping a coin and selecting a card; and choosing a card from a deck, replacing the card and selecting again. • The probability of two independent events is found by using the following formula: *P(A and B) = P(A)•P(B)* – Example: When rolling a six-sided number cube and flipping a coin, simultaneously, what is the probability of rolling a 3 on the cube and getting a heads on the coin? *P(3 and heads)* = $\frac{1}{6} \cdot \frac{1}{2} = \frac{1}{12}$ • If the outcome of one event has an impact on the outcome of the other event, the events are called dependent. If events are dependent then the second event is considered only if the first event has already occurred. For example, if you choose a blue card from a set of nine different colored cards that has a total of four blue cards and you do not place that blue card back in the set before selecting a second card, the chance of selecting a blue card the second time is diminished because there are now only three blue cards remaining in the set. Other examples of dependent events include, but are not limited to: choosing two marbles from a bag but not replacing the first after selecting it; determining the probability that it will snow and that school will be cancelled. • The probability of two dependent events is found by using the following formula: *P(A and B) = P(A)•P(B after A)*	SOL 7.8a,b: • Determine the theoretical probability of an event. (a) • Determine the experimental probability of an event. (a) • Describe changes in the experimental probability as the number of trials increases. (b) • Investigate and describe the difference between the probability of an event found through experiment or simulation versus the theoretical probability of that same event. (b)

- Example: You have a bag holding a blue ball, a red ball, and a yellow ball. What is the probability of picking a blue ball out of the bag on the first pick then *without* replacing the blue ball in the bag, picking a red ball on the second pick?

$P(\text{blue } \textit{and} \text{ red}) = P(\text{blue}) \cdot P(\text{red } \textit{after} \text{ blue}) = \frac{1}{3} \cdot \frac{1}{2} = \frac{1}{6}$

SOL 7.8a,b:

- In general, if all outcomes of an event are equally likely, the probability of an event occurring is equal to the ratio of desired outcomes to the total number of possible outcomes in the sample space.
- The probability of an event occurring can be represented as a ratio or equivalent fraction, decimal, or percent.
- The probability of an event occurring is a ratio between 0 and 1.
  - A probability of 0 means the event will never occur.
  - A probability of 1 means the event will always occur.
- The theoretical probability of an event is the expected probability and can be determined with a ratio.
- If all outcomes of an event are equally likely, the theoretical probability of an event = $\frac{\textit{number of possible favorable outcomes}}{\textit{total number of possible outcomes}}$
- The experimental probability of an event is determined by carrying out a simulation or an experiment.
- The experimental probability of an event = $\frac{\textit{number of times desired outcomes occur}}{\textit{number of trials in the experiment}}$
- In experimental probability, as the number of trials increases, the experimental probability gets closer to the theoretical probability (Law of Large Numbers).

Vocabulary	Instructional Activities Organized by Learning Objective
SOL 8.11:	Textbook

Probability	Independent Event	Dependent Event

Richmond Public Schools

Curriculum Framework

Grade 7 Honors (7/8)

Outcome		

SOL 7.8a, b:

Theoretical Probability	Experimental Probability	Experiment/ Simulation

Assessment

Notes

Resources

- Print
- Technology-based

Station Activities

Cross-Curricular Connections

Tiered Differentiations