Core Content

Cluster Title: Use the rules of probability to compute probabilities of compound events in a uniform probability model.

Standard S.CP.8 (+): Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$, and interpret the answer in terms of the model.

Concepts and Skills to Master

- Define the probability of event *(A and B)* as the probability of the intersection of events *A* and *B*.
- Understand $P(B|A)$ *to mean the probability of event B occurring when A has already occurred.*
- Use the Multiplication rule, $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$, to determine $P(A \text{ and } B)$.
- Determine the probability of dependent and independent events in real contexts.

Supports for Teachers

Critical Background Knowledge

- Probabilities of compound events and tree diagrams. (7.SP.8)
- Sample space, sets, subsets, outcomes, events, union, intersection, “and”, “or”. (II.4.S.CP.1)
- Conditional probability. (II.4.S.CP.3)
- Two-way tables. (II.4.S.CP.4)

Academic Vocabulary

uniform probability model, multiplication rule, $P(A \text{ and } B) = P(A)P(B \text{ given } A) = P(B)P(A|B)$, $P(A \cap B) = P(A)P(B|A) = P(B)P(A|B)$

Suggested Instructional Strategies	Resources
• Apply and interpret the Multiplication Rule to a variety of contextual events. • Illustrate the Multiplication Rule with tree diagrams, Venn diagrams and two-way tables.	

Sample Formative Assessment Tasks

Skill-Based Task:
Given the following table, which includes data regarding boating preferences of boys and girls, find the probability that a randomly chosen student is a girl who prefers lake boating.

	Lake (L)	River (R)
Girls (G)	21	29
Boys (B)	32	18

Problem Task:
The probability that a student passes the written portion of a driving test is 62%. The probability that a student passes the driving part of the test is 86%. Draw a diagram to clearly demonstrate the probability that a student passes both tests.

Core Content

Cluster Title: Use the rules of probability to compute probabilities of compound events in a uniform probability model.
Standard S.CP.9 (+): Use permutations and combinations to compute probabilities of compound events and solve problems.
Concepts and Skills to Master
• Define $n!$ as the product: $n \cdot (n-1) \cdot \ldots \cdot 3 \cdot 2 \cdot 1$. • Understand that a permutation is a rearrangement of the elements of an ordered list and calculate probabilities using the permutation formula $P(n,r) = n \cdot (n-1) \cdot \ldots \cdot (n-(r-1)) = n!/(n-r)$. • Understand that a combination is the number of ways to choose r items from a set of n elements and calculate probabilities using the combination formula $C(n,r) = P(n,r)/r! = n!/[(n-r)!\, r!]$.

Supports for Teachers

Critical Background Knowledge	
• Probabilities of compound events (7.SP.8). • Conditional probability (II.4.S.CP.3). • Multiplication rule of probability (II.4.S.CP.8 (+)).	
Academic Vocabulary	
factorial, permutation, combination, $P(n,r)$, ${}_nP_r$, $C(n,r)$, ${}_nC_r$, $\binom{n}{r}$	
Suggested Instructional Strategies	**Resources**
• Embed combination and permutation explorations in contextual situations.	Permutations and Combinations: http://mathforum.org
Sample Formative Assessment Tasks	
Skill-Based Task: Given the set of ice cream flavors {chocolate, strawberry, vanilla}, list all possible two-scoop cones, and find the probability that a randomly selected cone includes chocolate.	**Problem Task:** Referring to the skill-based task, consider all possible sets of two-scoop cones. How would you define “two-scoop cone” in order to be a permutation? What part of your definition would you change to define the cones as a combination? How do the probabilities of getting chocolate change in each setting?