Unit 6
Probability

Geometry

Building upon content studied in prior grade levels, students will expand their understanding of probability and its application in real-world settings. Students will study conditional probabilities and the meaning of independence. Additionally, students will use Venn diagrams and tree diagrams to model situations involving probability and analyze probable results.

Standards for Mathematical Practice

MP.1 Make sense of problems and persevere in solving them.
MP.2 Reason abstractly and quantitatively.
MP.3 Construct viable arguments and critique the reasoning of others.
MP.4 Model with mathematics.
MP.5 Use appropriate tools strategically.
MP.6 Attend to precision.
MP.7 Look for and make use of structure.

Louisiana Student Standards for Mathematics (LSSM)

Additional Content Standards	
S-CP: Conditional Probability and the Rules of Probability	
A. Understand independence and conditional probability and use them to interpret data.	
S-CP.A.1	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). ★
S-CP.A.2	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. ★
S-CP.A.3	Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. ★

S-CP.A.4	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results. ★
S-CP.A.5	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer. ★
B. Use the rules of probability to compute probabilities of compound events in a uniform probability model.	
S-CP.B.6	Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. ★
S-CP.B.7	Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model. ★

Additional Standards for Enrichment

S-CP.B.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.

S-CP.B.9 (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

$P = \frac{n!}{(n-r)!}$ $C = \frac{n!}{r!(n-r)!}$

Students should be able to recognize answer choices given in terms of factorials.

For ACT include problems in this format:

How many 4 letter words can you make from "Louisiana"?

Answer format: $\frac{9!}{2!2!}$

MD – Using Probability to Make Decisions

S-MD.B.6 (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

S-MD.B.7 (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

★As defined by LSSM, the basic modeling cycle involves:

1. identifying variables in the situation and selecting those that represent essential features,

2. formulating a model by creating and selecting geometric, graphical, tabular, algebraic, or statistical representations that describe relationships between the variables,
3. analyzing and performing operations on these relationships to draw conclusions,
4. interpreting the results of the mathematics in terms of the original situation,
5. validating the conclusions by comparing them with the situation, and then either improving the model or, if it is acceptable,
6. reporting on the conclusions and the reasoning behind them.
Choices, assumptions, and approximations are present throughout this cycle.

Enduring Understandings:	**Essential Questions:**
*The way the data is collected, organized, and displayed influences interpretation. *Statistics can be used to make and evaluate inferences and predictions about our world. *The probability of an event's occurrence can be predicted with varying degrees of confidence.	*How do people use data to influence others? *To what extent can statistics help us to make inferences and predictions about our world? *How can we determine if statistics are valid and reliable? *How can you determine whether two events are independent or not? *What are some considerations when undertaking a statistical study? *How can you use an experiment to test a conjecture? *How can you use a sample survey to infer a conclusion about a population? *How can you test a hypothesis about an experiment?