Unit 3 Probability and Inference

Content Area: **Mathematics**
Course(s): **AP Statistics**
Time Period: **November**
Length: **4 weeks**
Status: **Published**

Transfer Skills

The student will be able to independently use their learning to calculate probability and make inferences.

Enduring Understandings

Relative frequency of occurrence is probability.

The Law of Large Numbers allows for accurate estimations when sample size is large enough.

Tree diagrams are an excellent method of displaying sample space and calculating probability.

Probability distribution of a discrete variable becomes more normal as sample size increases.

Essential Questions

Can probability be an accurate tool for making predictions?

What are differences between games of chance and skill and can probability be used for each?

When is simulation a useful tool in calculating probability?

When is data considered normally distributed and when can z-scores be used?

Content

Red Hot Topics:

Compound Probability

Conditional Probability

Law of Large Numbers

Expected Value

Probability Distribution

Binomial Probability

Central Limit Theory

Vocabulary:

Sample Space

Simple/Compound Probability

Mutually Exclusive or Disjoint

Independence

Binomial Distribution

z-score

critical value

Discrete random variable

Skills

Create sample space of a chance experiment.

Use Venn Diagrams to represent outcomes.

Identify mutually exclusive events.

Distinguish between experimental and theoretical probabilities.

Calculate probabilities for compound events and conditional events.

Establish rules for Independence of events.

Calculate means of discrete random variables.

Identify properties of a z-curve.

Use z-scores to find probabilities and percentiles.

Relate probability to area under a normal curve.

Resources

Standards

Need to Add CollegeBoard Standards

CCSS.Math.Content.HSS-CP	Conditional Probability and the Rules of Probability
CCSS.Math.Content.HSS-CP.A	Understand independence and conditional probability and use them to interpret data
CCSS.Math.Content.HSS-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”).
CCSS.Math.Content.HSS-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.
CCSS.Math.Content.HSS-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.
CCSS.Math.Content.HSS-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.
CCSS.Math.Content.HSS-CP.A.5	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.
CCSS.Math.Content.HSS-CP.B	Use the rules of probability to compute probabilities of compound events in a uniform probability model
CCSS.Math.Content.HSS-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.
CCSS.Math.Content.HSS-CP.B.7	Apply the Addition Rule, $P(A$ or $B) = P(A) + P(B) – P(A$ and $B)$, and interpret the answer in terms of the model.
CCSS.Math.Content.HSS-CP.B.8	Apply the general Multiplication Rule in a uniform probability model, $P(A$ and $B) = P(A)P(B\|A) = P(B)P(A\|B)$, and interpret the answer in terms of the model.
CCSS.Math.Content.HSS-CP.B.9	Use permutations and combinations to compute probabilities of compound events and solve problems.
CCSS.Math.Content.HSS-MD	Using Probability to Make Decisions
CCSS.Math.Content.HSS-MD.A	Calculate expected values and use them to solve problems
CCSS.Math.Content.HSS-MD.A.1	Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.
CCSS.Math.Content.HSS-MD.A.2	Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.
CCSS.Math.Content.HSS-MD.A.3	Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.
CCSS.Math.Content.HSS-MD.A.4	Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.
CCSS.Math.Content.HSS-MD.B	Use probability to evaluate outcomes of decisions
CCSS.Math.Content.HSS-MD.B.5	Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.
CCSS.Math.Content.HSS-MD.B.5.a	Find the expected payoff for a game of chance.
CCSS.Math.Content.HSS-MD.B.5.b	Evaluate and compare strategies on the basis of expected values.
CCSS.Math.Content.HSS-MD.B.6	Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).
CCSS.Math.Content.HSS-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).