

Unit 6: Probability & Statistics

Grade 7 Math

14 Class Meetings

Revised June 2022

Essential Questions

- Why is it important to use probability in our daily lives?
- When is statistics in the world and how does it help make predictions?

Enduring Understandings with Unit Goals

EU 1: Probability is used to predict the likelihood of an event and make decisions.

- Evaluate the number of desired or favorable outcomes and divide it by the total number of outcomes possible gives the probability of the event occurring.
- Analyze the probability of an event is a number between 0 and 1 that expresses the likelihood of the event occurring.
- Investigate chance processes and develop, use, and evaluate probability models.
- Represent sample spaces for compound events using various methods.
- Compare probabilities from a model to observe frequencies and discrepancies.
- Develop a probability model and use it to find probabilities of events.
- Design and use a simulation to generate frequencies for compound events.

EU 2: The use of sampling can be used to gain information, draw inferences, and make comparisons about populations.

- Analyze random sampling tends to produce representative samples and support valid inferences.
- Interpret the samples to find mean, median, mode, range, interquartile range, and mean absolute deviation.
- Generate multiple samples of the same size to gauge the variation.
- Create box plots and dot plots to analyze data.
- Asses the degree of overlap of two numerical data distributions.
- Compare two sets of data using measures of center and variability.

Standards

Common Core State Standards

- **7.SP.C.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 $\frac{1}{2}$ indicates an event that is neither unlikely or likely, and a probability near 1 indicates a likely event.
- **7.SP.C.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.
- **7.SP.C.7:** Develop a probability model and use it to find probabilities of events. Compare

Unit 6: Probability & Statistics

Grade 7 Math

14 Class Meetings

Revised June 2022

probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

- **7.SP.C.7.A:** Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.
- **7.SP.C.7.B:** Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.
- **7.SP.C.8:** Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
- **7.SP.C.8.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.
- **7.SP.C.8.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.
- **7.SP.C.8.C:** Design and use a simulation to generate frequencies for compound events.
- **7.SP.A.1:** Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
- **7.SP.A.2:** Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.
- **7.SP.B.3:** Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.
- **7.SP.B.4:** Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

ISAAC Vision of the Graduate Competencies

Competency 1: Write effectively for a variety of purposes.

Competency 2: Speak to diverse audiences in an accountable manner.

Competency 3: Develop the behaviors needed to interact and contribute with others on a team.

Competency 4: Analyze and solve problems independently and collaboratively.

Competency 5: Be responsible, creative, and empathetic members of the community.

Unit Content Overview

1. Probability Models of Simple and Compound Events

- Compare outcomes for experiments
- Predict the relative likelihood of an event
- Calculate the probability of an event
- Write a list of the sample space
- Express probability as a fraction, decimal, or percentage

Unit 6: Probability & Statistics

Grade 7 Math

14 Class Meetings

Revised June 2022

- Describe patterns observed on a table or graph
- Apply relative frequency
- Understand difference between theoretical and experimental
- Explain the probability results of a simulation
- Design and conduct simulations to model real-world situations
- Conduct simulations with multiple events to determine probabilities
- Write a list of the samples space for compound events using tree diagrams, tables and organized lists
- Determine the probability of compound events
- Design simulations to model real-world situations
- **Vocabulary and Key Terms** – Certain, Chance Experiment, Compound Event, Equally likely, Estimate, Event, Frequency, Impossible, Inference, Likelihood, Outcome, Population, Prediction, Probability, Probability Model, Probability Stimulation, Random, Random Sample, Representative, Sample, Sample Space, Single Event, Survey, Tree Diagram, Trial, Unlikely

2. Understanding Populations and Samples to Compare and Draw Inferences

- Distinguish between population and a sample population
- Understand the concept of random sampling
- Construct arguments for biased and unbiased sampling
- Generate a random sample for statistics questioning
- Analyze and interpret data sets
- Calculate mean, median, mode, range, and mean absolute deviation (MAD) for a data set
- Compare and contrasting populations represented in dot plots
- Evaluate dot plots based on their shape, center, spread, and visual overlap
- Construct box plots and finding measures of center and interquartile range
- Determine the impact of sample size on variability and prediction accuracy
- Compare different populations using sample data
- Identify meaningful difference between populations using the mean and mean absolute deviation of samples
- Estimate and make predictions using the variations of populations
- **Vocabulary and Key Terms** – Box Plot, Certain, Chance Experiment, Compound Event, Dot plot, Equally likely, Estimate, Event, Frequency, Histogram, Impossible, Inference, Interquartile Range (IQR), Likelihood, Mean, Mean Absolute Deviation (MAD), Median, Measure of Center, Measures of Variability, Outcome, Population, Prediction, Probability, Probability Model, Probability Stimulation, Random, Random Sample, Range, Representative, Sample, Sample Space, Single Event, Survey, Tree Diagram, Trial, Unlikely

Interdisciplinary Connection:

3. Language Arts - Word Problems
- Science – Word Problems

Unit 6: Probability & Statistics

Grade 7 Math

14 Class Meetings

Revised June 2022

Daily Learning Objectives with TWPS

Students will be able to...

- Apply the probability of an event as a number between 0 and 1 to decide if it is likely or unlikely
 - *Examine sample populations & make valid inferences using data*
- Evaluate and describe a situation in which the event is neither likely nor unlikely as a number near $\frac{1}{2}$
 - *Examine sample populations & make valid inferences using data*
- Calculate and explain the simple probabilities of events using the sample space or repeated trials.
 - *Examine sample populations & make valid inferences using data*
- Design an experiment to compare the results of a series of trials and draw conclusions
 - *Examine sample populations & make valid inferences using data*
- Calculate the probabilities of compound events
 - *Compare two numerical data distributions with a box-and-whisker plot & draw inferences about them*
- Construct and explain a tree diagram, list, or table to illustrate all possible outcomes of a compound event
 - *Compare two numerical data distributions with a box-and-whisker plot & draw inferences about them*
- Solve and explain the probability of compound event from data generated in a simulation
- Compare two numerical data distributions with a parallel plot & draw inferences about them
- Evaluate and argue the validity of a statistical sample from a population
 - *Compare two numerical data distributions with a box-and-whisker plot & draw inferences about them*
- Compare and contrast the measures of center and the variability of two numerical data sets
 - *Find probability of simple events*
- Calculate the mean, median, mode, mean absolute deviation, range, and interquartile range
 - *Find probability of simple events*
- Evaluate data from statistical representations (box plots, dot plots)
 - *Find probability of simple events*
- Apply data from multiple samples of the same size to gauge estimations and predictions
 - *Find probability of simple events*
- Assess visual overlap of two data distributions with similar variability
 - *Find probability of compound events*
- Compare and contrast variability of two data sets to draw conclusions about two random samples
 - *Find probability of compound events*

Unit 6: Probability & Statistics

Grade 7 Math

14 Class Meetings

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Instructional Strategies/Differentiated Instruction

- Whole group instruction
- Guided notes
- Student-led instruction
- Small group instruction
- Independent problem-solving
- Collaborative problem-solving
- Cross-curricular problem solving (independent and collaborative)
- Accountable Talk
- Manipulatives
- Homework
- Highlighted words
- Fill in the blanks
- Access to multiplication chart
- Access to calculator
- Color coded notes
- Pre-teaching/Reteaching

Assessments

FORMATIVE ASSESSMENTS:

- Warm-ups (SBAC)
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Accountable Talk Discussions
- Do Now
- Student-led instruction
- Homework
- Performance Task - Counters
 - Future Rubric Assessment in 2021-2022

SUMMATIVE ASSESSMENTS:

- Quiz 1 - EU 1 & EU 2 (Edulastic)
- Unit 6 Test – FIAB: Statistics & Probability
- Performance Task - [Counters](#)

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Unit Task

Unit Task Name: Counters Performance Task

Description: This task challenges students to use knowledge of part/whole relationships and operations with fractions to find the total objects in a set. Students must be able to use probabilities and likelihoods to find and organize all the possible events for a situation (EU 1). Students must be able to determine the theoretical and experimental outcomes to make predictions about events and use this information to construct an argument about a fair game and how to change the game to give a desired outcome (EU 2). Representation of their work will be through tree diagrams, tables, simulations and/or organized lists.

Evaluation: Summative Assessment and Future Rubric in 2021-2022 school year

Unit Resources

- Match FishTank
- Illustrative Mathematics
- Khan Academy
- SolvemeMobiles.org
- Flipped Google Classroom Videos
- Worksheets
- Calculator
- Laptops
- SBAC Prep Online
- Performance Task - [Counters](#)
- Blooket
- Edulastic
- 99math.com
- Legends of Learning