

Introduction to Probability Unit

Algebra 2 - 11th Graders

7 days

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Standards:

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.B.6

Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

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.

Monitoring and Feedback:

Students will work individually

Students will work in groups

Call and Response

I Try, We Try, You Try Practice Problems

Essential Questions:

What is fairness?

How do I calculate probability?

What is a permutation?

What is a combination?

What is the Fundamental Counting Principle?

How do I calculate multiple or conditional probabilities?

Assessment Evidence:

Different homework assignments/labs

Test Assessment at the end of the unit

Overview

Units Prior: Trigonometry

[Day 1: Is it Fair?](#)

[Day 2: Basic Probabilities](#)

[Day 3 & 4: Probabilities with big Numbers - Permutations and Combinations](#)

[Day 5: Multiple Probabilities](#)

[Day 6: Conditional Probability](#)

[Day 7: Test](#)

Units After: Matrices

Daily Plans

Day 1: Is it Fair?

Materials needed:

[Is it Fair?](#) - one for each student

80 poker chips - 30 with x's on both sides, 30 with x's on one side, 10 with an x on one side and o on the other, and 10 with an o on one side.

Provide FlipGrid link to students with a topic called 'Fair Games'

It is expected that students have a background knowledge of BASIC probability (outcomes desired/total) coming into this unit.

Tell students that by the end of the unit they will be given a RANDOM test, I have 4 different versions. To determine which test they get we must come up with a way to choose. Offer a few suggestions both fair and unfair ways of choosing and have students discuss if they would like for me to choose which test they get that way. Make note of which ways seem fair and which ways seem unfair.

Next, tell students they will investigate fairness within their groups of four using the game 'Is it Fair?'. After each game (about 10-15 minutes each) discuss groups findings as a class to make sure students are on the right track. The final question on the Is it Fair task, asks what are some other fair ways to choose things. Have students consider things at home or around the house they could use to simulate a fair game and record 20 trails of this on FlipGrid.

Day 2: Basic Probabilities - Theoretical vs Experimental

Materials needed:

Student Chromebook (or phone) to access FlipGrid

[Theoretical vs. Experimental Probability](#) worksheet - 1 for each student

Prior to this lesson review the FlipGrid activities students have posted, if insufficient, add in videos of drawing cards, rolling 2 dice, pulling skittles out of a bag, and spinning a spinner with 10 slices.

Today we will be finding lots of different probabilities using our FlipGrid videos - remind students how to find probability (again they should have this knowledge). Take one student's video as a volunteer (or if there is an exceptional example that you previewed) watch the video as a class and discuss different probabilities you can find and find them! Have students work through videos finding probabilities this way for 15-20 minutes.

Next, discuss with students you have just been engaging in Experimental Probability, and now we will discuss theoretical probability. Using the worksheet, Theoretical vs. Experimental Probability have students discuss what Theoretical vs Experimental is and then have them complete the worksheet.

Day 3: Permutations and Combinations

Materials needed:

[Probability PLUS](#) slideshow

Today students will learn that sometimes there are too many items to count so that we can find probabilities. Use the Probability PLUS slideshow to show students how this can happen. This will take students through learning the Fundamental Counting Principle and what a factorial is and adding the permutations and combinations formula to their notes. As a class try to work through slide 16, with more examples provided to work through tomorrow as well.

Day 4: More Permutations and Combinations

Materials needed:

[Probability PLUS](#) slideshow

[Winning the Lottery](#) one for each student

Pick up where you left off in examples from yesterday, while adding in examples that now use Permutations and/or Combinations to find probabilities. Through slide 40. Have students work in groups to then complete the Math Journal: Winning the Lottery.

Day 5: Multiple Probabilities

Materials Needed:

[Math Lab: Compound Probabilities](#) one for each student

[Probability of Multiple Events book](#) one for each student

[Probability PLUS](#) slideshow

Pass out Math Lab: Compound Probabilities and read through directions with students and have them complete the lab giving students 15-20 minutes. Discuss findings as a

class. Then have students follow along with you to complete the Probability of Multiple events notebook to discuss the difference between independent and dependent events and mutually exclusive events. If time allows you can use the Probability PLUS slideshow to give a few more examples on slides 41-47.

Day 6: Conditional Probability

Materials Needed:

[Math Lab: Music Streaming](#) one for each student

[Conditional Probability Notes](#) one for each student

Prior to today's lesson (perhaps even at the beginning of the unit) email teachers ask if students can visit their classroom to conduct a short survey.

Give students Math Lab: Music Streaming and read through directions. Assign them a classroom to visit based on which teachers allowed students to come do a short survey. When students return, allow them to complete the 5 questions and then discuss results as a class.

Take notes in the Conditional Probability notebook on what conditional probability is and how you can use two-way tables or tree diagrams to help calculate conditional probability.

Day 7: Test

Materials Needed:

[Probability PLUS](#) slideshow

[4 Probability Tests](#)

Students will work in groups of 3 to complete a test today. Their test will be randomly chosen in a fair way. Remind students of fairness if necessary using Probability PLUS slideshow slides 48-50. Let students decide as a class which fair method they will use to distribute the test. Use the method, pass out tests, and let students work through the hour to completion.