



NCEA Math Lesson Plan

Grade: 7

Subject: Mathematics

Domain: Probability
Standard Number(s) and Description: 7.SP.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulations. 7.SP.8.C Design and use a simulation to generate frequencies for compound events.
Vocabulary to be Highlighted: Compound event
Mathematical Practices (#): <ol style="list-style-type: none">1. Make sense of problems and persevere in solving them.2. Reason abstractly and quantitatively.3. Construct viable arguments and critique the reasoning of others.4. Model with mathematics.5. Use appropriate tools strategically.6. Attend to precision.7. Look for and make use of structure.8. Look for and express regularity in repeated reasoning.
Essential Question: How can you design and use organized lists, tables, tree diagrams, and simulations to generate frequencies for compound events?
Materials/Tools (include technology): Pencil Paper Large and small Post-it notes
Connections to Other Math Domains:
Connections to Other Subject Areas: Religion
Catholic Identity Component: Bible stories including the Passover Plagues from Exodus Sending of the Apostles Connections to confirmation (i.e. seven gifts of the Holy Spirit and twelve fruits of the Holy Spirit)

Resources (attachments):**Activities/Timeline:**

Introductory Activity: Begin by placing the students in pairs to complete the activity. Ask the question: “You and your partner are celebrating Passover with Jesus and his apostle Thomas. You will be seated at random around a square table, one person to a side. What is the theoretical probability that Thomas is seated opposite of Jesus? Be prepared to present to the class how you came up with your answer.”*

Give students Post-its as a way to help model the process. They can model this by using the large Post-it as the table and the smaller Post-its as the people seated on each side of the table.

Teacher Notes on Introductory Activity: The purpose of this task is for students to compute the theoretical probability of a seating configuration. There are 24 possible configurations of the four friends at the table in this problem. Students could draw all 24 configurations to solve the problem but this is time consuming and so they should be encouraged to look for a more systematic method. Two systematic ways of counting are presented in the solutions below.

The first organizes the 24 possibilities by first looking at where Jesus is sitting and then counting possibilities starting from there. The second solution is more abstract. It also places Jesus in one of the four seats to begin but then the basic idea is that once Jesus has been placed, Thomas is equally likely to be in any of the three remaining places so there is a one in three chance that he will be opposite Jesus at the table. A common mistake is to assume that since there are four people, then there is a $\frac{1}{4}$ chance of Jesus and Thomas seating opposite one another. The event of interest is a compound event because it consists of more than a single outcome in the sample space for this chance experiment.

*(This task was adapted from problem #12 on the 2011 American Mathematics Competition (AMC) 8 Test and the teacher notes are adapted from “Illustrative Mathematics”.)

Class Discussion: In pairs, the students will explain how they arrived at their answer.

Teacher Notes on Class Discussion: Identify students who have used modeling, organized lists, and/or tree diagrams to explain their reasoning. By the end of the discussion, have students write down the different possible methods of solving the problem.

Guided Practice Problems:

1. In Numbers 35:6, the Levites could flee to one of six cities of refuge.
 - a. How many ways would you be able to choose two different cities? Use a tree diagram to show the possible combinations.
 - b. How many ways could you choose from three different cities? Use a tree diagram to show possible combinations.
2. In Exodus, Moses used 10 plagues to convince Pharaoh to release God’s people.
 - a. If plagues come in twos, how many possible combinations would there be? Make an organized list to show the possible combinations.
 - b. What would be the probability that the pair of plagues is frogs and locusts?
 - c. What would be the probability that the pair of plagues includes frogs?
3. Jesus sent the Apostles to take the Good News to others.
 - a. How many ways can the Apostles be sent in pairs? Show or explain your answer!
 - b. What is the probability that Peter is one member of the pair?

Formative Assessment (what to look for, how/when to look):

There are seven Gifts and twelve Fruits of the Holy Spirit. Choose one Gift and one Fruit of the

Holy Spirit: If one Gift and one Fruit are chosen at random, what is the probability that your pair is chosen? How does the probability change if the Gift of the Holy Spirit is wisdom?

Summative Assessment: