

Introduction to Probability

General Outcome: Develop critical thinking skills related to uncertainty.

SO1. Interpret and assess the validity of odds and probability statements. [C, CN, ME]

- 1.1 Provide examples of statements of probability and odds found in fields such as media, biology, sports, medicine, sociology and psychology.
- 1.2 Explain, using examples, the relationship between odds (part-part) and probability (partwhole).
- 1.3 Express odds as a probability and vice versa.
- 1.4 Determine the probability of, or the odds for and against, an outcome in a situation.
- 1.5 Explain, using examples, how decisions may be based on probability or odds and on subjective judgments.
- 1.6 Solve a contextual problem that involves odds or probability.

SO2. Solve problems that involve the probability of mutually exclusive and non–mutually exclusive events. [CN, PS, R, V]

- 2.1 Classify events as mutually exclusive or non–mutually exclusive, and explain the reasoning.
- 2.2 Determine if two events are complementary, and explain the reasoning.
- 2.3 Represent, using set notation or graphic organizers, mutually exclusive (including complementary) and non–mutually exclusive events.
- 2.4 Solve a contextual problem that involves the probability of mutually exclusive or non–mutually exclusive events.
- 2.5 Solve a contextual problem that involves the probability of complementary events.
- 2.6 Create and solve a problem that involves mutually exclusive or non–mutually exclusive events

SO3. Solve problems that involve the probability of two events. [CN, PS, R]

- 3.1 Compare, using examples, dependent and independent events.
- 3.2 Determine the probability of an event, given the occurrence of a previous event.
- 3.3 Determine the probability of two dependent or two independent events.
- 3.4 Create and solve a contextual problem that involves determining the probability of dependent or independent events.

Mathematical Processes

- **Connections [CN]** Students are expected to make *connections* among mathematical ideas, other concepts in mathematics, everyday experiences and other disciplines
- **Problem Solving [PS]** Students are expected to develop and apply new mathematical knowledge through *problem solving*
- **Reasoning [R]** Students are expected to develop mathematical reasoning
- **Visualization [V]** Students are expected to develop *visualization* skills to assist in processing information, making connections and solving problems.
- **Mental Estimation [ME]** Students are expected to demonstrate fluency with mental mathematics and estimation.
- **Technology [T]** Students are expected to select and use technology as a tool for learning and for solving problems

Real Life Applications of Probability

1. [Probability in Real Life](#)
2. [Term Life Insurance and Death Video](#) -- Khan Academy

Exploring Probability

Achievement Indicators:

- 1.4 Determine the probability of, or the odds for and against, an outcome in a situation.
- 1.5 Explain, using examples, how decisions may be based on probability or odds and on subjective judgments.
- 1.6 Solve a contextual problem that involves odds or probability.

Lesson Links:

- [Click here](#) for a Notebook version of ERLC Lesson Link. Please use this lesson as a framework for your own teaching environment.
- [Click here](#) for a pdf version of the same ERLC Lesson Link.

Videos:

- Exploring Probability -- ([Youtube Link](#))
- Probability and Sample Space ([Youtube Link](#))

Additional Resources to Support this Lesson

- [Click here](#) for a Math Goodies lesson on Probability
- [Click here](#) for a OnlineMathLearning lesson on Probability

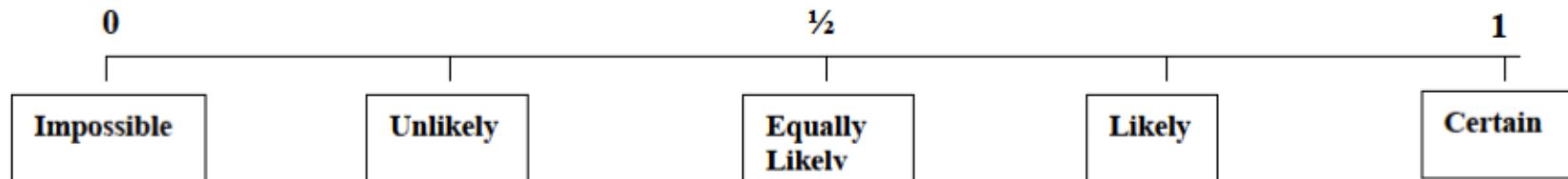
Discovery Based Learning

Technology

1. [Click here](#) for an applet on Experimental Probability (Interactivate)\

Communication and Visualization

The probability of occurrences of any event can be shown on the number line below. Locate the probability of each event described.



1. It will rain today.
2. Today is Saturday.
3. You are in Algebra class.
4. A coin will land tails up.
5. You will pass the next test.
6. You will go skiing tomorrow.

Probability and Odds

Achievement Indicators:

- 1.1 Provide examples of statements of probability and odds found in fields such as media, biology, sports, medicine, sociology and psychology.
- 1.2 Explain, using examples, the relationship between odds (part-part) and probability (partwhole).
- 1.3 Express odds as a probability and vice versa.
- 1.4 Determine the probability of, or the odds for and against, an outcome in a situation.
- 1.5 Explain, using examples, how decisions may be based on probability or odds and on subjective judgments.
- 1.6 Solve a contextual problem that involves odds or probability.

Lesson Links:

- [Click here](#) for ERLC Lesson Link. Please use this lesson as a framework for your own teaching environment
- [Click here](#) for a pdf version of the same ERLC Lesson Link.

Videos:

- Probability and Odds – ([Youtube Link](#))
- Calculating Odds and Probability – ([Youtube Link](#))
- The Difference Between Odds and Probability – ([Youtube Link](#))

Additional Resources to Support this Lesson

- Absolute Value Workbook
- [Click here](#) for a Lesson from nRich maths on Racing Odds
- [Click here](#) for a Lesson from nRich maths on Fixing the Odds

Discovery Based Learning

Technology

1. [Odds calculator](#) -- Enter the odds in favor and it will calculate the probability.

Assessment for Learning

Peer Assessment:

1. [Probability and Odds Examples Worksheet](#) -- BeaconPress

This worksheet gives brief notes on probability and odds with a worksheet for students to practice. The answer key and a general rubric is also provided.

One could have students in pairs using the answer key and rubric to assess the other and have discussions on how to correct any mistakes.

Probabilities Using Counting Methods

Achievement Indicators:

5.9 Solve a contextual problem that involves probability and permutations.

6.4 Solve a contextual problem that involves combinations and probability.

Lesson Links:

- [Click here](#) for ERLC Lesson Link. Please use this lesson as a framework for your own teaching environment
- [Click here](#) for a pdf version of the same ERLC Lesson Link.

Videos:

- Probabilities Using Counting Methods -- ([Youtube Link](#))

Discovery Based Learning

1. [Click here](#) for an interactive that shows a basic example of two sets that must intersect -- Basketball and Volleyball. (Tools4Teachers) You will need to have an account with Tools4teachers to access this interactive.

Mutually Exclusive Events

Achievement Indicators:

- 1.6 Solve a contextual problem that involves odds or probability.
- 2.1 Classify events as mutually exclusive or non–mutually exclusive, and explain the reasoning.
- 2.2 Determine if two events are complementary, and explain the reasoning.
- 2.3 Represent, using set notation or graphic organizers, mutually exclusive (including complementary) and non–mutually exclusive events.
- 2.4 Solve a contextual problem that involves the probability of mutually exclusive or non–mutually exclusive events.
- 2.5 Solve a contextual problem that involves the probability of complementary events.
- 2.6 Create and solve a problem that involves mutually exclusive or non–mutually exclusive events

Lesson Links:

- [Click here](#) for ERLC Lesson Link. Please use this lesson as a framework for your own teaching environment
- [Click here](#) for a pdf version of the same ERLC Lesson Link.

Videos:

- Mutually Exclusive Events -- ([Youtube Link](#))

Assessment for Learning

Worksheet:

1. [Mutually Exclusive Assessment for Learning Worksheet](#) -- Fowler

Conditional Probability

Achievement Indicators:

- 1.6 Solve a contextual problem that involves odds or probability.
- 2.4 Solve a contextual problem that involves the probability of mutually exclusive or non–mutually exclusive events.
- 3.1 Compare, using examples, dependent and independent events.
- 3.2 Determine the probability of an event, given the occurrence of a previous event.
- 3.3 Determine the probability of two dependent or two independent events.
- 3.4 Create and solve a contextual problem that involves determining the probability of dependent or independent events.

Lesson Links:

- [Click here](#) for ERLC Lesson Link. Please use this lesson as a framework for your own teaching environment
- [Click here](#) for a pdf version of the same ERLC Lesson Link.

Videos:

- Conditional Probability – ([Youtube Link](#))
- Calculating Probability – " And " statements, Dependent -- ([Youtube Link](#))

Additional Resources to Support this Lesson

- [Dependent Events \(Math Goodies\)](#)
- [Conditional Probability – How to Handle Dependent Events \(mathisfun.com\)](#)
- [Dependent Events \(OnlineMathLearning.com\)](#)

Assessment for Learning

Journal Prompts

Explain the difference between two probabilities $P(A | B)$ and $P(B | A)$.

Independent Events

Achievement Indicators:

- 1.6 Solve a contextual problem that involves odds or probability.
- 3.1 Compare, using examples, dependent and independent events.
- 3.3 Determine the probability of two dependent or two independent events.
- 3.4 Create and solve a contextual problem that involves determining the probability of dependent or independent events.

Lesson Links:

- [Click here](#) for ERLC Lesson Link. Please use this lesson as a framework for your own teaching environment
- [Click here](#) for a pdf version of the same ERLC Lesson Link.

Videos:

- Independent Events – ([Youtube Link](#))
- Probability of Independent Event – ([Youtube Link](#))

Discovery Based Learning

1. [Algebra 2: Probability of Repeated Independent Events](#) -- TInspire Activity
This lesson involves an investigation of probability by simulating tossing a coin three times. As a result, students will:
 - Understand probability of specific outcomes of repeated independent trials.
 - Understand using a probability tree diagram to determine probability.

Assessment for Learning

1. [Online Selfchecker](#) – IXL
This is a small selfchecker on identifying independent and dependent events.

Journal Prompts:

- Explain the difference between an unconditional probability and conditional probability.
- Defend or refute each of the following statements:
 - Dependent events are mutually exclusive events.
 - Mutually exclusive events are always dependent.
 - Independent events are always mutually exclusive.

Overall Unit Shared Resources

Unit Lessons:

1. [Notebook Lessons](#) -- Allen
2. [Powerpoint Lessons](#) -- Fowler