

Lesson 46 – Probability of Compound Events – Visualizations

(A) Overview

We will divide our investigation into probability into 2 parts:

(1) Single Events

(2) Compound Events

Def'n:

Def'n:

Ex:

Ex:

Eq'n:

Eq'n

(B) Probabilities to be Calculated – AND/OR

1. We can determine $p(A)$ AND $p(B)$ →
2. We can determine $p(A)$ OR $p(B)$ →

(C) HOW to calculate probabilities

1. **Algebraically** → we can develop formulas to use in probability questions
2. **Visualizations** → we can draw various representations that help us to see outcomes and sample spaces which include:
 - i.
 - ii.
 - iii.
 - iv.

(D) Classifying Compound Events:

To help us to eventually develop algebraic formulas for calculating probabilities of compound events, we need to understand that there are different TYPES of compound events:

- 1.
- 2.
- 3.
- 4.

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(E) Examples of Working with Visualizations and Compound Probability Calculations

Ex 1. If two coins are tossed, what is the probability of getting exactly two heads?

Grid diagram:

Lists:

Tree Diagram:

Ex 2. If three coins are tossed, what is the probability of getting exactly two heads?

Grid diagram:

Lists:

Tree Diagram:

Ex 3. If three coins are tossed, what is the probability of getting at most two heads??

Lists:

Tree Diagram:

Ex 4. Jody has four bottles of soft drink – one bottle of cola, one of root beer, one of ginger ale, and one of orange. She chooses three of these bottles to take to a party. If she chooses the ginger ale, what is the probability she also chooses root beer??

Lists:

Tree Diagram:

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(F) Examples of Working with Visualizations and Compound Probability Calculations

A box contains three green marbles (G), five blue marbles (B) and eight orange marbles (O). Use a tree diagram (or create lists) to help you visualize or analyze and then calculate the probabilities of the following events:

- (a) that the first two picked will both be green if the first marble is **replaced** after its colour is noted.
- (b) that the first two picked will both be green if the first marble is **NOT replaced** after its colour is noted.
- (c) Should the answers for Q(a) and Q(b) be the same? Why or why not?

- (d) Selecting a blue marble OR a green marble with your first pick.
- (e) NOT selecting a blue marble with the first pick
- (f) Selecting an orange OR green marble with the first pick

Now we will assume replacement and make 2 picks, so how probable is:

- (g) Selecting a blue marble AND then a green marble.
- (h) Selecting a green marble given that your first pick had been blue.
- (i) Selecting at least one orange marble in your first two picks.
- (j) NOT selecting an orange marble .
- (k) Selecting an orange marble AND a blue marble.
- (l) Selecting an orange marble OR a blue marble.
- (m) Selecting a green marble given that your first marble was NOT blue.

(G) Examples of Working with Visualizations and Compound Probability Calculations

A shuffled deck of cards is placed face-down on the table. It contains 3 hearts (H), 4 diamonds (D), 5 clubs (C) and 2 spades (S). Use a tree diagram (or create lists) to help you visualize or analyze and then calculate the probabilities of the following events:

1. the top two cards are both spades.
2. The top 2 cards are EITHER hearts OR spades.
3. The top two cards are clubs AND diamonds.
4. The top two cards are NOT red.
5. The top two cards are NEITHER spades NOR hearts.

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http://www.matsuk12.us/17682011592912890/lib/17682011592912890/Geometry/Probability/Probability%202011/prob_ws_3.pdf

http://natna.info/English/Teaching/MTH23-Fall2008/materials/lecture13-compound_events.pdf

<http://www.gcsemathstutor.com/pdf/ws-info-probability/ws-ip-treediagrams01-pw.pdf>

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