Math Virtual Learning

Probability and Statistics

May 11, 2020

Probability and Statistics
Lesson: May 11, 2020

Objective/Learning Target:
Students will be able to answer probability questions using the Fundamental Counting Principle

Fundamental Counting Principle

How many times have you seen these types of questions before?

Mary has 3 shirts(red, blue, black), 2 pants(black, blue jeans), and 4 pairs of shoes(red, black, tennis shoes, hiking boots). How many outfits can Mary make?

I flip a coin 3 times. How many outcomes are possible?

There are a few ways that you could figure this out:

- Write out every combination
    - red shirt, black pants, red shoes
    - blue shirt, black pants, black shoes
    - etc. etc. etc.

      OR

    - HHH, HHT, HTH, THH, etc. etc.etc.
- Make a Tree Diagram
- Use the Fundamental Counting Principle

Let's Get Started!

Explain the difference between a probability of 1/1 and odds of 1:1.
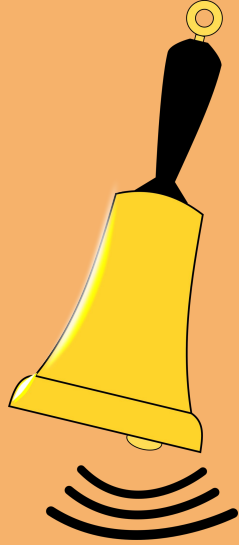
Let's Get Started! ANSWERS

Probability of 1/1 means that out of 1 chance total, you have 1 chance the event will occur. That means you are guaranteed that the event will occur...100% certain.

Odds of 1:1 mean that there is 1 chance that the event will occur and 1 chance that it will not occur. So there is only a 50% chance that the event will occur.

This is why most companies use odds. It looks better to say 1:1 than to say you have a 50% or ½ chance of winning.
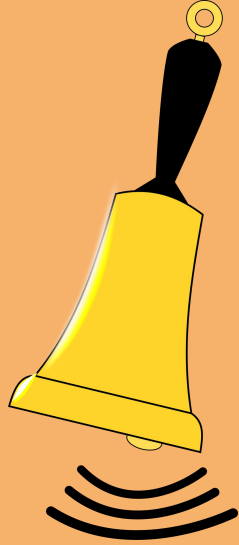
Option 1: Write out every combination

Mary has 3 shirts(red, blue, black), 2 pants(black, blue jeans), and 4 pairs of shoes(red, black, tennis shoes, hiking boots). How many outfits can Mary make?

→

- Red shirt, black pants, red shoes
- Red shirt, black pants, black shoes
- Red shirt, black pants, tennis shoes
- Red shirt, black pants, hiking boots
- Blue shirt, black pants, red shoes
- Blue shirt, black pants, black shoes
- Blue shirt, black pants, tennis shoes
- Blue shirt, black pants, hiking boots
- Black shirt, black pants, red shoes
- Black shirt, black pants, black shoes
- Black shirt, black pants, tennis shoes
- ……….

This is going to take **FOREVER** and I might accidentally miss one!
Probably not our best choice for finding this answer, especially if you are taking a timed test!!!
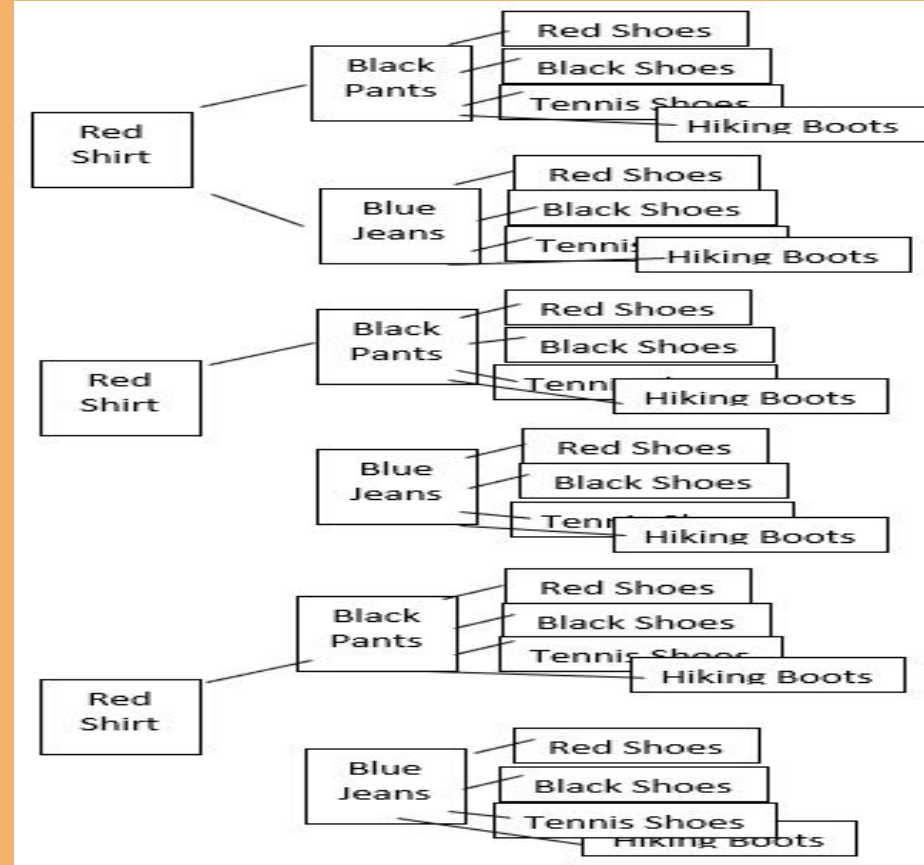
Options 2: Make a Tree Diagram

Mary has 3 shirts(red, blue, black), 2 pants(black, blue jeans), and 4 pairs of shoes(red, black, tennis shoes, hiking boots). **How many outfits can Mary make?**

This video teaches how to make tree diagrams:

TREE DIAGRAMS

While it is more reliable, as you can see tree diagrams also takes **FOREVER** and it gets **VERY messy and crowded**! **Probably not our best choice for finding this answer, especially if you are taking a timed test!!!**

Option 3: Fundamental Counting Principle

Allows us to find the number of different outcomes given a series of decisions

When there are **m** ways to do one thing,
and **n** ways to do another,
then there are **m*n** possible outcomes.

(This rule can be expanded for more than just 2 subgroups of choices.)

This method is very quick and to the point. It gets you the number of combinations quickly.

⟶

Probably the best choice for finding this answer, especially if you are taking a timed test!!!

*Mary has 3 shirts(red, blue, black), 2 pants(black, blue jeans), and 4 pairs of shoes(red, black, tennis shoes, hiking boots). **How many outfits can Mary make?***

3 shirts * 2 pants * 4 shoes

3 * 2 * 4 = 24 possible outfits

Option 3: Fundamental Counting Principle

I flip a coin 3 times. How many outcomes are possible?

A coin only has 2 options for outcomes, Heads or Tails, so there are always only 2 options every time you flip the coin, no matter how many times you flip it.

2 options(H/T) * 2 options(H/T) * 2 options(H/T)

2 * 2 * 2 = **8 possible outcomes**

Click on this link to try some on your own

Fundamental Counting Principle