8.3 –A- Probability of events

Recall:

- Random experiment is one that depends entirely on chance.
- Sample space Ω (omega) is the set of all possible outcomes
- An Event is a subset of the sample space.
  - Simple event: contains a single outcome from the sample space.
  - Compound event: contains a series of simple events.

Determine the sample space for a random experiment

a) Your favorite subject in school.

Ω= .

b) Flipping a coin 3 times in a row

Ω=

c) For rolling a die once

Ω=

An event of "rolling a # greater than 2" : corresponds to {3,4,5,6)
A simple event is "rolling a 1" because it corresponds to {1}

The probability can be a fraction, a decimal (between 0 and 1), or a percentage. (0 being impossible, and 1 being certain)

Theoretical Prob = $\frac{\text{\# of desired outcomes}}{\text{total \# of outcomes}}$

Ex: P(randomly choosing a point in the dark sector) = $\frac{1}{4}$

Experimental Prob = $\frac{\text{\# of desired outcomes observed}}{\text{\# of trial runs}}$

Ex: The experimental probability that a hockey team will win the Stanley cup is based on its performance in previous games.

- The more times a random experiment is repeated, the closer the experimental probability gets to the theoretical probability.

What is the probability of picking the correct 6 numbers out of the 49 to win the Lotto 649?
(order doesn't matter, and with no repetition)

Prob = $\frac{\text{\# of desired outcomes}}{\text{total \# of outcomes}}$

8 students are auditioning for a part in the school musical.
Adam, Bob, Carl, Dan, Ed, Frank, George, and Howard.
If only 6 will be chosen, what is the probability that it will be: Bob, Carl, Dan, Ed, Frank and Howard?

Prob = $\frac{\text{\# of desired outcomes}}{\text{total \# of outcomes}}$

The AND of Probability: Think MULTIPLY

When 2 independent EVENTS happen in a row, the probability of event 1 AND event 2 occurring is the multiplication of the probability of each individual event.
P(A and B) = P(A,B)= P(A).P(B)

a) Drawing a Queen & Rolling a 6.

b) Drawing a Spade & Rolling an even #.

The OR of Probability: Think ADD

When two independent events happen and one event OR the other is considered a success, the probability of either occurring is the ADDITION of the probabilities of each individual event.

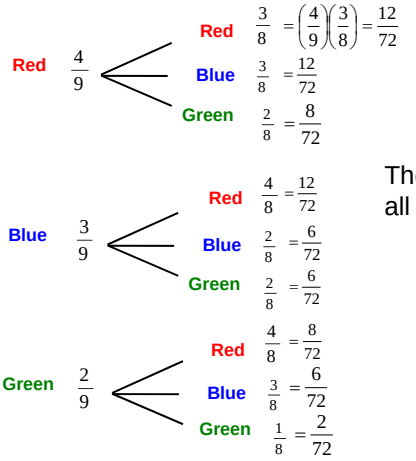
P(A or B) = P(A) + P(B)

Find the probability

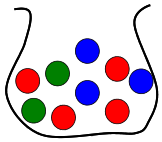
a) Rolling a 1, 2 or 4

b) Drawing a King or Jack

Draw a probability tree for picking 2 marbles from a bag, in order and **without replacement**. The bag contains 4 RED, 3 BLUE and 2 GREEN.

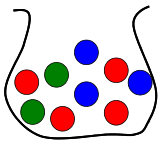


The sum of all probabilities =1



Determine the probability of picking

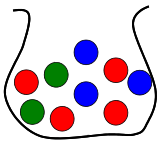
a) a RED or a GREEN marble



b) 2 marbles with at least 1 BLUE marble

Determine the probability of picking

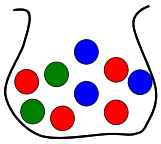
c) 2 RED marbles



d) 2 of the same colour twice

Determine the probability of picking

e) 2 Blue marbles one after the other and with replacement



f) a RED and a GREEN marble with replacement

Sophie has to take two exams. She estimates that she has a $\frac{1}{3}$ chance of passing the first exam and a $\frac{3}{5}$ chance of passing the second exam.

What is the probability of her passing only one exam?

A) $\frac{4}{15}$

B) $\frac{7}{15}$

C) $\frac{8}{15}$

D) $\frac{11}{15}$

Practice: Page 238 # 7-12