DAY 8 – Comparing Theoretical & Experimental Probabilities

1. Determine whether the game *Rock, Paper, Scissors* is fair when played by two people (players A and B).
    a. Create a tree diagram to determine all the possible outcomes. Label each possible outcome on the tree diagram as a win for player A, player B or a tie.

    b. How many outcomes are there?
    c. How many chances does player A have to win? What is the probability that player A will win any round?
    d. How many chances does player B have to win? What is the probability that player B will win any round?

    e. Is the game fair? Do both players have an equal probability of winning in any round?

    f. Conduct an experiment to test your findings. Conduct an experiment by playing *Rock, Paper, Scissors*. Complete 15 trials.

	TALLY	FREQUENCY
Player A Wins		
Player B Wins		
Tie		

    g. Based on the experiment, what is the probability of each player winning?

    h. Combine your data with 3 or 4 other groups. What is the probability of each player winning now?

    i. What do you notice about the relationship between experimental and theoretical probability as the number of trials increases?

2. Suppose that your final exam has 10 multiple choice questions, each with possible answers of
   A, B, C or D. Use a deck of cards to simulate the probability of passing this portion of the exam simply by guessing.
   Let diamonds represent the correct answer.
   a. For each trial,
      - draw 10 cards one after the other, **replacing** each card between drawings
      - record the number of diamonds (out of 10) drawn
      - note whether you passed or failed the trial
      - repeat the trial 19 more times.

Trial	# of Diamonds Drawn	Pass or Fail	Trial	# of Diamonds Drawn	Pass or Fail
1	/10		11	/10	
2	/10		12	/10	
3	/10		13	/10	
4	/10		14	/10	
5	/10		15	/10	
6	/10		16	/10	
7	/10		17	/10	
8	/10		18	/10	
9	/10		19	/10	
10	/10		20	/10	

b. Calculate the experimental probability of passing the test.

c. Given that the theoretical probability that you would pass is 7.8%, how close were you to this value?

d. Explain why your experiment may not have been exact.