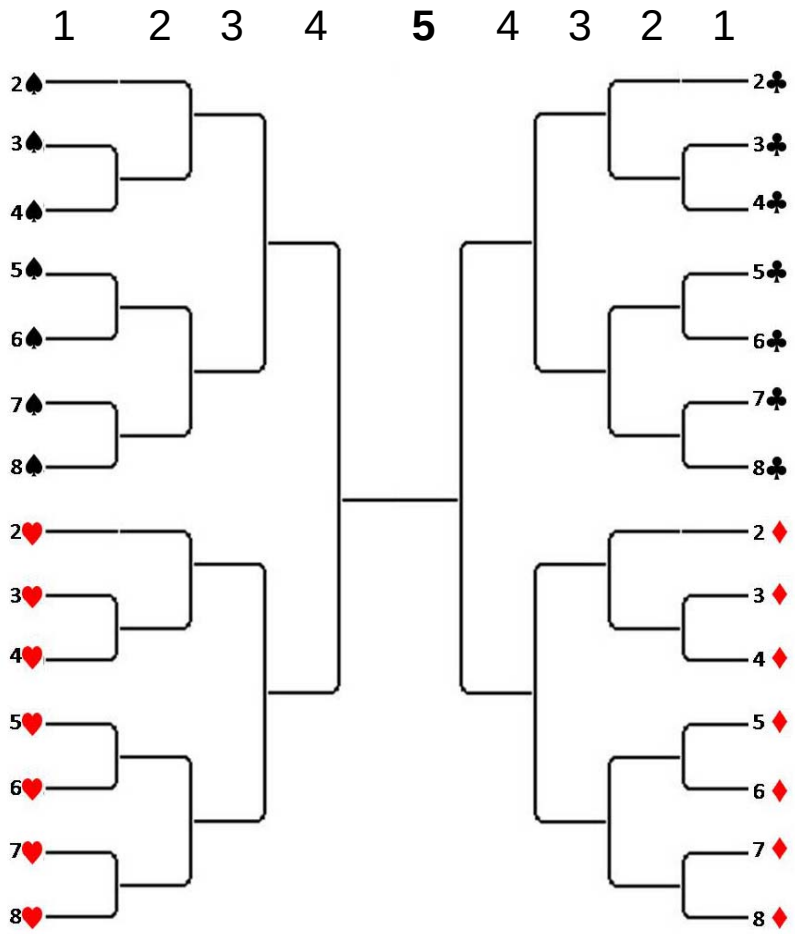


RULES:

1) Play until someone wins **2 times** in rounds 1-4.
2) ROUND 5: Play until someone wins **3 times.**
3) Record your wins, losses and ties ***for your first matchup*** in the table below.
4) Do not count ties.
5) Save your table – it is your ***experimental data***!

Your first round:

Game	1	2	3	4	5
W / L / T					
R / P / S					

For all *theoretical* calculations, assume that players either win ***or*** lose (Rounds 1-4 have three (3) games total; Round 5 has five (5) games total).

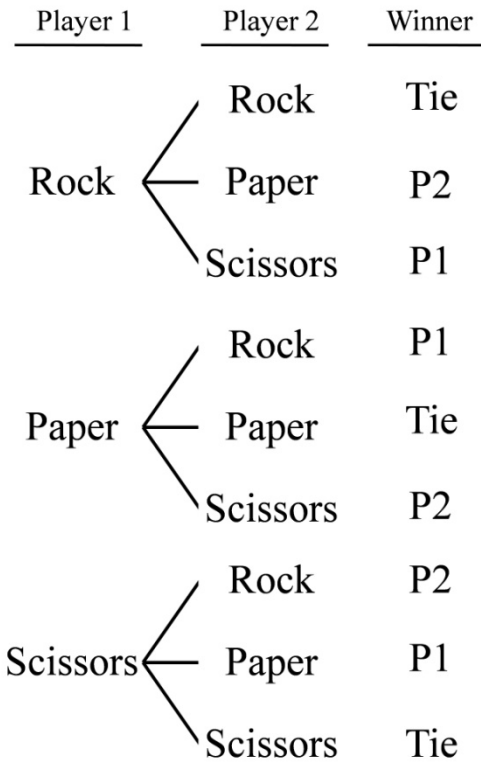
1. Does each player have an equally likely chance of winning a game of Rock, Paper, Scissors?
    a. Show a tree diagram to support your answer.
    b. What is the theoretical probability that each player has of winning the game?
2. Refer to the tournament bracket. Show your work and put answers in *fractional*, *decimal*, and *percentage* form.
    a. What is the theoretical probability for any player to win in Round 1?
    b. What is the theoretical probability for any player to win in Round 5?
    c. What is the theoretical probability that the 6 of diamonds player will win the tournament?
    d. What is the theoretical probability that the 2 of diamonds player will win the tournament?
3. If each round cannot advance *before* all the games in that particular round are completed,
    a. What is the current round if 40% of the games are played?
    b. What is the current round if 87% of the games are played?
    c. How many games must be played for the tournament to be at least 60% complete?
    d. How many games must be played for the tournament to be at least 90% complete?
4. If this tournament represents 62% of the Rock, Paper, Scissors games that are played among all the students at school today, how many total games are played, rounded to the nearest whole number?
5. One night you took your aggressions out on a Nintendo Wii controller and broke it. If you buy a replacement at Amazon.com, it will cost you $25.

    You drew a 2 of hearts and won the tournament. Assuming you would use any winnings to purchase the controller, which would make the controller cost less – getting $11 for winning the tournament or a 10% discount at Amazon (which can be combined) for each round won?

    What if you had the same options but drew a 5 of clubs and won the tournament?

After the matchups, students with the same face value card (2s, 3s, 4s, etc.) will form groups and answer the following questions. For all *theoretical* calculations, assume that players either win ***or*** lose (Rounds 1-4 have three (3) games total; Round 5 has five (5) games total).

1. Does each player have an equally likely chance of winning a game of Rock, Paper, Scissors? **Yes, each player has a 1/3 chance of winning, losing, or tying.**
    a. Show a tree diagram to support your answer.



    b. What is the theoretical probability that each player has of winning the game?
    In the tree diagram above, P1 could win in 3 out of the 9 possible outcomes. Therefore the theoretical probability is 3/9 or 1/3.
2. Refer to the tournament bracket. Show your work and put answers in *fractional*, *decimal*, and *percentage* form.
    a. What is the theoretical probability for any player to win in Round 1?
    Since each win is not related to a player's prior decision, the theoretical probability for winning in Rounds 1-4 is the product of the

probability of winning each of the two games required:

$$\left(\frac{1}{3}\right)\left(\frac{1}{3}\right) = \left(\frac{1}{9}\right) = 0.111 = 11.1\%$$

b. What is the theoretical probability for any player to win in Round 5?
The probability is calculated similarly to (2a) – however a player needs to win 3 games in the Round 5, best-of-five series.

$$\left(\frac{1}{3}\right)\left(\frac{1}{3}\right)\left(\frac{1}{3}\right) = \left(\frac{1}{27}\right) = 0.037 = 3.7\%$$

c. What is the theoretical probability that the 6 of diamonds player will win the tournament?
The 6 of diamonds player has to advance through Rounds 1-4 and Round 5 in order to win the tournament. Therefore the probability is

$$\left(\frac{1}{3}\right)\left(\frac{1}{3}\right)\left(\frac{1}{3}\right)\left(\frac{1}{3}\right)\left(\frac{1}{27}\right) = \left(\frac{1}{2187}\right) = 0.000457 = 0.046\%$$

d. What is the theoretical probability that the 2 of diamonds player will win the tournament?
The 2 of diamonds player is seeded one round *after* players with other face card values.

$$\left(\frac{1}{3}\right)\left(\frac{1}{3}\right)\left(\frac{1}{3}\right)\left(\frac{1}{27}\right) = \left(\frac{1}{729}\right) = 0.00137 = 0.14\%$$

3. If each round cannot advance *before* all the games in that particular round are completed,
   a. What is the current round if 40% of the games are played?
   If 3 games are played per matchup in rounds 1-4 and 5 are played in round 5, 83 total games will have been played.

   There are 12 matchups in Round 1; 8 matchups in Round 2; 4 matchups in round 3; 2 matchups in Round 4; and 1 matchup in round 5. The matchups must be multiplied by the number of games to arrive at the number of games played per round.

   $$0.4 * 83 = 33.2 \rightarrow 34 < 36$$ **Round 1.**

   b. What is the current round if 87% of the games are played?

   $$0.87 * 83 = 72.2 \rightarrow 73 < 78$$ **Round 4.**

   c. How many games must be played for the tournament to be at least 60% complete?

$0.60 * 83 = 49.8 \rightarrow 50$ **games (Round 2)**

d. How many games must be played for the tournament to be at least 90% complete?

$0.90 * 83 = 74.7 \rightarrow 75$ **games (Round 4)**

4. If this tournament represents 62% of the Rock, Paper, Scissors games that are played among all the students at school today, how many total games are played, rounded to the nearest whole number?

   $83 \div 0.62 = 133.8 \rightarrow 139$

5. One night you took your aggressions out on a Nintendo Wii controller and broke it. If you buy a replacement at Amazon.com, it will cost you $25.

   You drew a 2 of hearts and won the tournament. Assuming you would use any winnings to purchase the controller, which would make the controller cost less – getting $11 for winning the tournament or a 10% discount at Amazon (which can be combined) for each round won?

   The 2 of hearts has to win 4 rounds in order to win the tournament.

   Applying the discount: $0.40 * \$25 = \$10$ **; $25 - $10 = $15**

   (or) $0.60 * \$25 = \$15$

   Taking the cash: $25 - $11 = $14

   What if you had the same options but drew a 5 of clubs and won the tournament?

   The 5 of clubs has to win 5 rounds in order to win the tournament.

   Applying the discount: $0.50 * \$25 = \$12.50$ **; $25 - $12.50 = $12.50**

   (or) $0.50 * \$25 = \$12.50$

   Taking the cash: $25 - $11 = $14