1. **ANSWER:** When going from odds in favour to odds against, or vice versa, we just switch the order.
   Odds against Pi knocking her dish over: **7:3**
2. **ANSWER:** First, determine how many dogs do not like to play with frisbees.

   30 total – 21 who like frisbee = 9 who do not

   9:21

3. **ANSWER:** First, convert the odds for each game into a probability of winning. Then compare them to find the highest.
   Since the odds are expressed **against winning**, we need to use the **second number** in our probability statements since we want the probability of winning.

- Lazy Susan - $\frac{3}{8+3} = \frac{3}{11} = 0273 = 27.3\%$ chance of winning
- Rowdy Rays - $\frac{2}{5+2} = \frac{2}{7} = 0.286 = 28.6\%$ chance of winning
- Bird Balloon - $\frac{4}{4+7} = \frac{4}{11} = 0.364 = 36.4\%$ chance of winning

You would be most likely to win the Bird Balloon game.

4. **ANSWER:**
   - We will call drawing a number divisible by 3 ‘Event A’ and drawing a multiple of 4 ‘Event B’.
   - 5 numbers could be drawn for Event A, 4 numbers for Event B and there are a total of 16 numbers.
   - Since there are overlapping outcomes (**EVENTS ARE NON-MUTUALLY EXLCUSIVE**) we can use the **INCLUSION-EXCLUSION PRINCIPLE**

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A \cup B) = \frac{5}{16} + \frac{4}{16} - \frac{1}{16} = \frac{8}{16} = \frac{1}{2} = 0.50$$

The probability that a number drawn is divisible by 3 or divisible by 4 is 50%.

5. **ANSWER:**

a) First, are the events mutually exclusive? No, because $P(A \cap B) \neq 0$

- That means the Principle of Inclusion-Exclusion applies
- We can use it to solve for the probability of Roger scoring.

$$P(M \cup R) = P(M) + P(R) - P(M \cap R)$$
$$0.63 = 0.41 + P(R) - 0.35$$

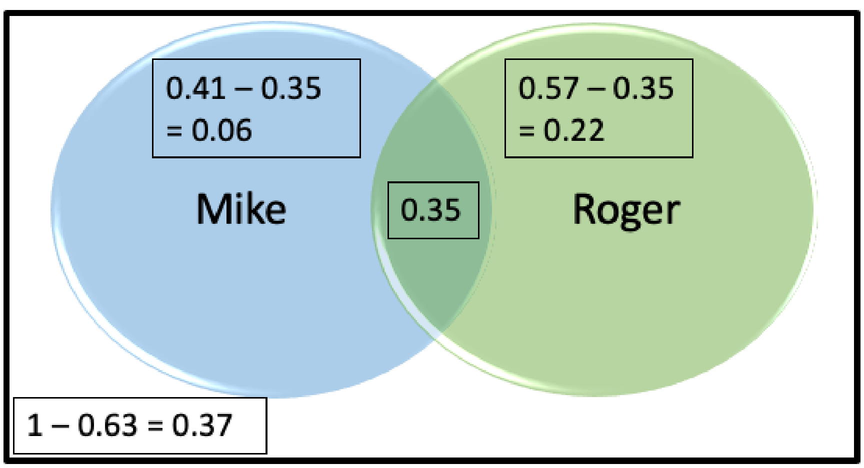
P(R) = 0.57

The probability of Roger scoring in a game is 57%.

b) Using part a, we can fill in a Venn Diagram and determine:

$$\boldsymbol{P(M \cap R') = 0.06 = 6\%}$$

Who scores in a hockey game?



c) $\boldsymbol{P(R \cap M') = 0.22 = 22\%}$

6. **ANSWER:**

- A card cannot be both a face card and a 5 at the same time. These are **MUTUALLY EXCLUSIVE** events: P(A $\cap$ B) = 0
- Let's call drawing a face card 'Event A' and drawing a 5 'Event B'

$$P(A \cup B) = P(A) + P(B) = \frac{12}{52} + \frac{4}{52} = \frac{16}{52} = \frac{4}{13} = 0.308$$

The probability of drawing a face card or a 5 is 30.8%.

7. **ANSWER:**
    - There are 5 weekdays per week
    - Probability she does not jump on the bed = 1 – 0.8 = 0.20
    - **Weekdays she does not jump on bed = 0.20 x 5 days = 1 day**

8. **ANSWER:**

- Start by identifying the rolls associated with each outcome:

  A. 1, 2, 3

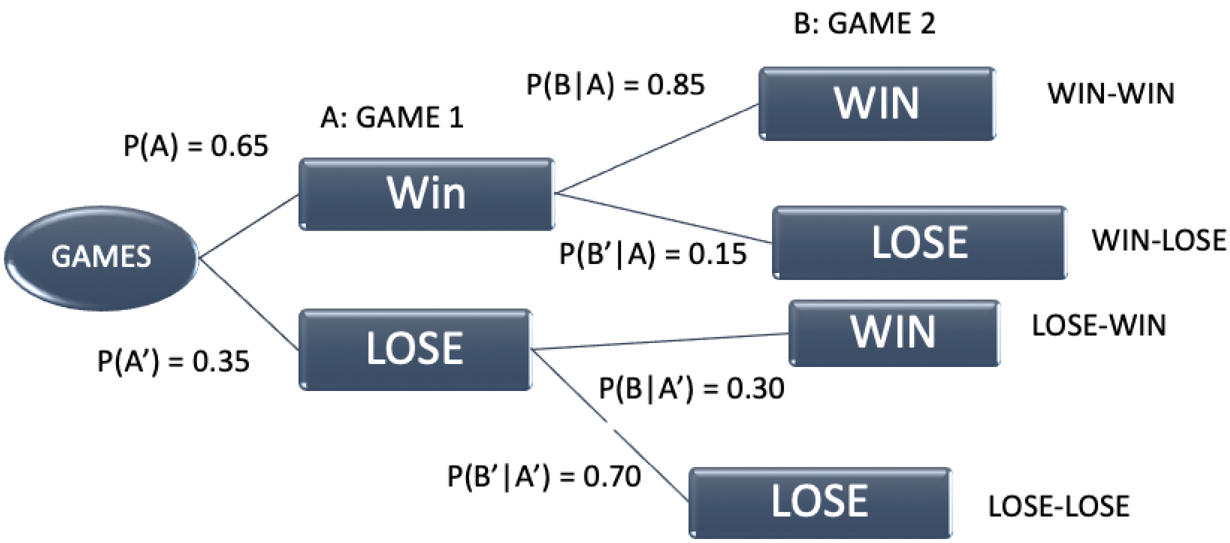
  B. 4, 5, 6

  C. 1, 3, 5

a) A and B have no overlapping values. Therefore A and B are mutually exclusive.

b) A and C have overlapping outcomes and are not mutually exclusive to each other. B and C have overlapping outcomes and are also not mutually exclusive to each other.

9. **ANSWER:** A Venn Diagram would be helpful to visualize the probabilities of each outcome. The outcomes of the second game are **dependent** on the first game, so we will use conditional probability.



a) $P(A' \cap B') = P(A') \times P(B'|A') = 0.35 \times 0.70 = 0.245 = \mathbf{24.5}\%$

b) $P\big((A \cap B') \cup (A' \cap B)\big) = P(A) \times P(B|'A) + P(A') \times P(B|A') =$
$0.65 \times 0.15 + 0.35 \times 0.3 = 0.2025 = \mathbf{20.3}\%$

c) The probabilities from the first round continue into the second. This makes the events **independent** now.

$$P(A' \cap B') = P(A') \times P(B') = 0.35 \times 0.35 = 01225 = \mathbf{12.3}\%$$

10. ANSWER:

- Probabilities are always # desired outcomes/#possible outcomes
- There are 12 students total and 5 will be selected. The total number of possible groups of five is: ${}_{12}C_5 = 792$
- The number of possible groups with three grade 11 and two grade 12 students is: ${}_6C_3 \times {}_4C_2 = 20 \times 6 = 120$

$$\boldsymbol{P(three\ GR11\ \&\ two\ GR12) = \frac{120}{792} = 0.152 = 15.2\%}$$

There is a 15.2% chance that three grade 11 and two grade 12 students will be chosen.