

Introduction to Probability Rules & Events

Probability Worksheet · Grade 7–10

Name: _____

Date: _____

Learning Objectives

- Apply the three basic probability rules: range, sum of outcomes, and complement
- Calculate probabilities using the addition and multiplication rules for independent events
- Distinguish between independent and dependent events and solve problems accordingly

Problems

1. A spinner is spun once. The probability of landing on blue is 0.45. Is this a valid probability? Explain why or why not.

$$P(\text{blue}) = 0.45$$

2. A bag contains only red, green, and blue marbles. The probability of picking red is 0.25 and the probability of picking green is 0.50. What is the probability of picking blue?

$$P(\text{red}) = 0.25, \quad P(\text{green}) = 0.50$$

3. The probability that it will rain tomorrow is 35%. What is the probability that it will NOT rain tomorrow?

$$P(\text{rain}) = 0.35$$

4. A standard six-sided die is rolled once. Complete the probability table below. Verify that all probabilities sum to 1.

Outcome	1	2	3	4	5	6	Sum
$P(\text{outcome })$	1/6	1/6	1/6	1/6	1/6	1/6	

5. The probability of passing a math exam is 72%. Find the probability of NOT passing the exam. Then verify that the two probabilities together satisfy the complement rule.

Scan to watch



$$P(\text{pass}) = 0.72$$

6. Two dice are rolled. Using the addition rule for independent events, find the probability of getting a sum of 4 OR a sum of 7. The probability of a sum of 4 is 3 out of 36 and the probability of a sum of 7 is 6 out of 36.

$$P(A \text{ or } B) = P(A) + P(B)$$

7. A fair coin is tossed twice. Using the multiplication rule for independent events, find the probability of getting heads on the first toss AND heads on the second toss.

$$P(A \text{ and } B) = P(A) \times P(B)$$

8. Decide whether each scenario represents an independent or dependent event. Justify each answer.

Scenario	Independent or Dependent?	Reason
Rolling a die twice		
Drawing two cards WITHOUT replacement		
Flipping a coin three times		
Drawing two marbles WITHOUT replacement from a jar		

9. A jar contains 5 red marbles and 2 blue marbles (7 total). Two marbles are drawn WITHOUT replacement. Find the probability that the first marble is red AND the second marble is also red.

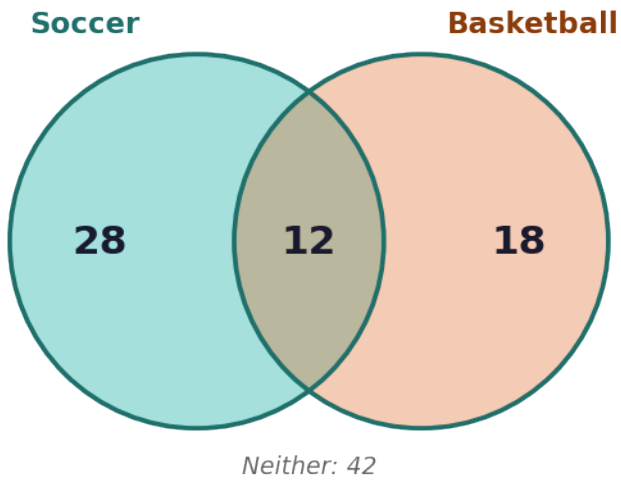
$$P(A \text{ and } B) = P(A) \times P(B|A)$$

10. In a class, the probability that a student plays soccer is 0.40, the probability that a student plays basketball is 0.30, and the probability that a student plays BOTH sports is 0.12. Using the Venn diagram shown, find: (a) the probability that a student plays soccer OR basketball, and (b) the probability that a student plays NEITHER sport.

Scan to watch



Students Playing Sports



Scan to watch



Introduction to Probability Rules & Events — Answer Key

Probability Worksheet · Grade 7–10

Answer Key

1. Answer: Yes, it is valid because $0 \leq 0.45 \leq 1$

- Rule 1 states: any probability must be a number between 0 and 1.
- Since $0 \leq 0.45 \leq 1$, this is a valid probability.

2. Answer: $P(\text{blue}) = 0.25$

- Rule 2 states: the sum of all probabilities of all possible outcomes equals 1.
- $P(\text{blue}) = 1 - P(\text{red}) - P(\text{green})$
- $P(\text{blue}) = 1 - 0.25 - 0.50 = 0.25$

3. Answer: $P(\text{no rain}) = 0.65$ or 65%

- Rule 3 (Complement Rule): $P(\text{event does not occur}) = 1 - P(\text{event occurs})$.
- $P(\text{no rain}) = 1 - 0.35 = 0.65$
- The probability it will NOT rain is 65%.

4. Answer: Sum = $6/6 = 1$

Outcome	1	2	3	4	5	6	Sum
$P(\text{outcome})$	1/6	1/6	1/6	1/6	1/6	1/6	$6/6 = 1$

- Each face of a fair die has an equal chance: $P(n) = 1/6$.
- $\text{Sum} = 1/6 + 1/6 + 1/6 + 1/6 + 1/6 + 1/6 = 6/6 = 1$.
- This confirms Rule 2: all probabilities of all outcomes sum to 1.

5. Answer: $P(\text{not pass}) = 0.28$ or 28%; $0.72 + 0.28 = 1$ ✓

- Using the Complement Rule: $P(\text{not pass}) = 1 - P(\text{pass})$
- $P(\text{not pass}) = 1 - 0.72 = 0.28$
- Verification: $0.72 + 0.28 = 1.00$ ✓

6. Answer: $P(\text{sum of 4 or sum of 7}) = 9/36 = 1/4 = 25\%$

- Identify: $P(\text{sum of 4}) = 3/36$, $P(\text{sum of 7}) = 6/36$.
- Since these are independent mutually exclusive events, use the Addition Rule: $P(A \text{ or } B) = P(A) + P(B)$.
- $P(A \text{ or } B) = 3/36 + 6/36 = 9/36 = 1/4 = 0.25 = 25\%$.

7. Answer: $P(\text{HH}) = 1/4 = 0.25 = 25\%$

- Each coin toss is independent — the outcome of one does not affect the other.
- $P(\text{heads on first toss}) = 1/2$.
- $P(\text{heads on second toss}) = 1/2$.

Scan to watch



- $P(H \text{ and } H) = (1/2) \times (1/2) = 1/4 = 0.25 = 25\%$.

8. Answer: See completed table

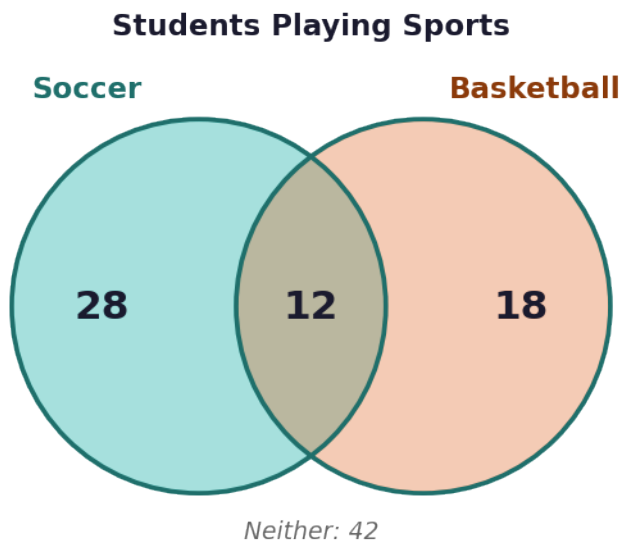
Scenario	Independent or Dependent?	Reason
Rolling a die twice	Independent	Second roll not affected by first roll
Drawing two cards WITHOUT replacement	Dependent	Sample space changes after first draw
Flipping a coin three times	Independent	Each flip has same probability of heads/tails
Drawing two marbles WITHOUT replacement from a jar	Dependent	Sample space decreases after first pick

- Independent events: the outcome of event A does NOT affect event B.
- Dependent events: the outcome of event A DOES affect event B (sample space changes).
- Rolling dice and flipping coins are classic independent events.
- Drawing WITHOUT replacement is always dependent because the sample space changes.

9. Answer: $P(\text{red then red}) = 20/42 = 10/21 \approx 47.6\%$

- This is a dependent event because marbles are drawn WITHOUT replacement.
- $P(\text{first red}) = 5/7$ (5 red out of 7 total).
- After removing one red marble, 4 red remain out of 6 total: $P(\text{second red}) = 4/6$.
- $P(\text{red and red}) = (5/7) \times (4/6) = 20/42 = 10/21 \approx 0.476 \approx 47.6\%$.

10. Answer: (a) $P(\text{soccer or basketball}) = 0.58$; (b) $P(\text{neither}) = 0.42$



- Given: $P(\text{soccer}) = 0.40$, $P(\text{basketball}) = 0.30$, $P(\text{both}) = 0.12$.
- Part (a): Use the General Addition Rule: $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$.

Scan to watch



- $P(\text{soccer or basketball}) = 0.40 + 0.30 - 0.12 = 0.58$.
 - Part (b): Use the Complement Rule: $P(\text{neither}) = 1 - P(\text{soccer or basketball})$.
 - $P(\text{neither}) = 1 - 0.58 = 0.42$ or 42%.
-

Scan to watch

