

Probability Rules and Conditional Events

Grade 11 – Algebra 2 math · Test · Standards: S-CP.A.1, S-CP.A.2, S-CP.A.3, S-CP.A.4, S-CP.A.5, S-CP.B.6, S-CP.B.7

Name: _____ Date: _____ Class: _____

This 45-minute test covers the addition rule, independence, conditional probability from Venn diagrams, tables and trees. A calculator is allowed. Show each step and write fractions in lowest terms.

Standards: S-CP.A.1, S-CP.A.2, S-CP.A.3, S-CP.A.4, S-CP.A.5, S-CP.B.6, S-CP.B.7 · **Level:** Grade 11 Algebra 2

Time: 45 minutes · 9 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 Union and complement (2 points)

A town survey finds that 55% of residents recycle, 35% compost, and 20% do both. Find the probability that a resident recycles or composts, and the probability that a resident does neither.

Question 2 Independent or not (2 points)

For event A (a student walks to school) and event B (a student lives within a mile), $P(A) = 0.25$, $P(B) = 0.8$ and $P(A \cap B) = 0.2$. Are A and B independent? Find $P(A | B)$.

Question 3 Venn diagram of outdoor activities (3 points)

Of 60 people, the diagram shows how many hike only, bike only, do both, or do neither.

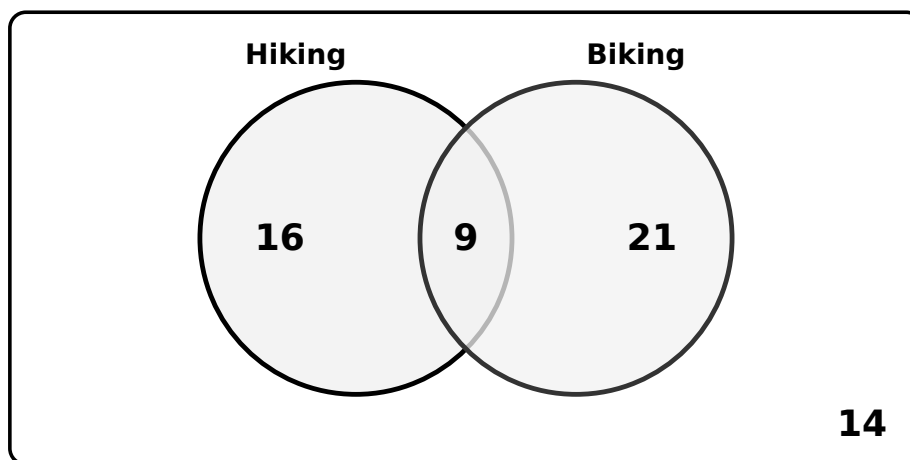


Figure for Question 3.

a. Find $P(\text{hiking})$. (1 point)

- b. Find $P(\text{hiking} \mid \text{biking})$. (1 point)
- c. Find $P(\text{neither})$. (1 point)

Question 4 Gym membership table (3 points)

A gym has 150 members. The table shows when they work out and what they mainly do.

	Cardio	Weights	Total
Morning	38	22	60
Evening	45	45	90
Total	83	67	150

Table for Question 4.

- a. Find $P(\text{Weights})$. (1 point)
- b. Find $P(\text{Evening} \mid \text{Cardio})$. (1 point)
- c. Are “Weights” and “Morning” independent? Justify. (1 point)

Question 5 Draws without replacement (2 points)

A box has 4 green and 6 yellow cubes. Two are drawn without replacement. Find the probability that both are yellow.

Question 6 Snow and a late bus (3 points)

The probability of snow is 0.4. When it snows the bus is late with probability 0.6, and when it does not snow the bus is late with probability 0.1.

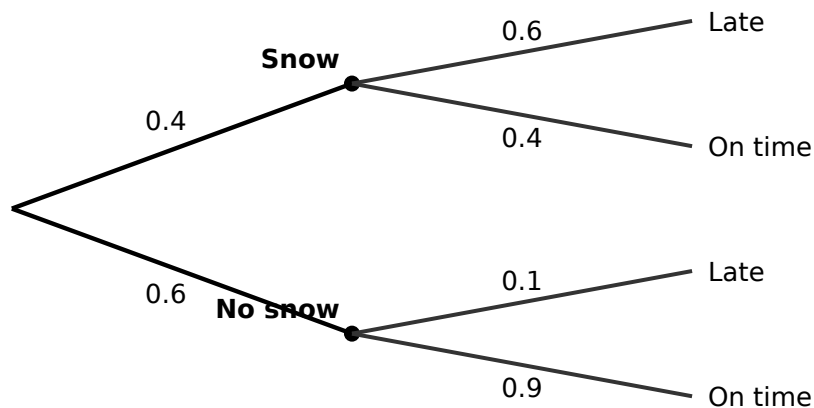


Figure for Question 6.

- a. Find $P(\text{late})$. (1 point)
- b. Given the bus is late, find $P(\text{snow})$ as a fraction. (2 points)

Question 7 At least one success (2 points)

An archer hits the target 80% of the time, and shots are independent. Find the probability of at least one hit in three shots.

Question 8 Conditional with dice (2 points)

Two fair dice are rolled. Given that the sum is 9, find the probability that at least one die shows a 4.

Question 9 Exclusive versus independent (1 point)

Can two mutually exclusive events, each with positive probability, be independent? Explain in one sentence.