

Unit 8: Conditional Probability

ADVANCED

Name: _____ Date: _____

Show all work. Give each answer as an exact fraction in lowest terms (or as specified). Do not round unless told to.

1. In a survey of 120 students, 45 are in band and the rest are not. Of the 45 band members, 28 also play a school sport. Find $P(\text{plays a sport} \mid \text{in band})$.

Answer: _____

3. Among 150 people, 50 wear glasses. Of the glasses-wearers, 6 are left-handed. Find $P(\text{left-handed} \mid \text{wears glasses})$ as a fraction in lowest terms.

Answer: _____

5. Using the setup where Bag A (prob $2/5$) gives red with prob $3/8$ and Bag B (prob $3/5$) gives red with prob $5/9$, a red marble was drawn. Find $P(\text{Bag A} \mid \text{red})$.

Answer: _____

7. Events A and B are independent with $P(A) = 3/8$ and $P(A \text{ and } B) = 3/20$. Find $P(B)$ as a fraction in lowest terms.

Answer: _____

9. Out of 500 people, 40 have a disease. A test is positive for 38 of the 40 with the disease and for 23 of the 460 without it. Given a positive test, find $P(\text{has disease})$ as a fraction in lowest terms.

Answer: _____

2. For events A and B, $P(A) = 0.4$, $P(B) = 0.35$, and $P(A \text{ and } B) = 0.14$. Are A and B independent? Answer 'yes' or 'no'.

Answer: _____

4. Bag A is chosen with probability $2/5$ and Bag B with probability $3/5$. A red marble is drawn with probability $3/8$ from Bag A and $5/9$ from Bag B. Find the overall probability of drawing a red marble.

Answer: _____

6. In a group, $n(A) = 90$, $n(B) = 70$, and $n(A \text{ and } B) = 25$, out of 200 total. Find $P(A \mid B)$ as a fraction in lowest terms.

Answer: _____

8. Two cards are drawn without replacement from a standard 52-card deck. Given that the first card is a king, find the probability the second card is also a king.

Answer: _____

10. Given $P(A \mid B) = 0.6$, $P(B) = 0.5$, and $P(A) = 0.45$, find $P(B \mid A)$ as a fraction in lowest terms.

Answer: _____

11. A jar has 3 red, 5 blue, and 4 green marbles. Two are drawn without replacement. Find the probability both marbles are the same color, as a fraction in lowest terms.

Answer: _____

12. A factory has two lines. Line 1 makes 60% of items with a 2% defect rate; Line 2 makes 40% with a 5% defect rate. Given an item is defective, find $P(\text{it came from Line 2})$ as a fraction in lowest terms.

Answer: _____