Name: ____ Period: __________ Date: _______________

CONDITIONAL PROBABILITY Assignment

State which the following events are independent and which are dependent.

1. Drawing a card from a standard deck of playing card and flipping a penny

2. Drawing two disks from an jar without replacement of the first disk.

3. Winning the lottery and purchasing a new house

4. Driving on a high-speed highway and having an accident

5. Having a wide forehead and having a high IQ

A box contains 8 red coins, 9 yellow coins, and 5 blue coins. Two consecutive draws are made from the bag without replacement of the first draw. Find the probability each of the following events.

6. Red first, red second
7. Red first, blue second
8. Red first, yellow second
9. Yellow first, blue second
10. Yellow first, yellow second
11. Yellow first, red second
12. Blue first, red second
13. Blue first, blue second
14. Blue first, yellow second.

For one roll of a die, let A be the event "even" and let B the event "4 or 6". Find each probability.

15. $\boldsymbol{P(A)}$
16. $\boldsymbol{P(B)}$
17. $\boldsymbol{P(A\ and\ B)}$
18. $\boldsymbol{P(B\ and\ A)}$
19. $\boldsymbol{P(B|A)}$
20. $\boldsymbol{P(A|B)}$

21. Given $\boldsymbol{P(A\ and\ B) = \frac{1}{4}}$ and $\boldsymbol{P(A) = \frac{1}{2}}$, find $\boldsymbol{P(B|A)}$.

22. Given $\boldsymbol{P(A\ and\ B) = 0.38}$ and $\boldsymbol{P(A) = 0.57}$, find $\boldsymbol{P(B|A)}$.

23. Given $\boldsymbol{P(B|A) = \frac{1}{3}}$ and $\boldsymbol{P(A) = \frac{1}{2}}$, find $\boldsymbol{P(A\ and\ B)}$.

Word Problem

24. A jar has 15 marbles, 3 of which are color red. If 2 are selected at random without replacing the first one, find the probability that both are color red.

25. In a country club, the probability that a member who play tennis is 75%. If 54% of the members play tennis and basketball, find the probability that the member who plays basketball, given that the member plays tennis.

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CONDITIONAL PROBABILITY Assignment

ANSWER

State which the following events are independent and which are dependent.

1. Drawing a card from a standard deck of playing card and flipping a penny

   Independent

2. Drawing two disks from an jar without replacement of the first disk.

   Dependent

3. Winning the lottery and purchasing a new house

   Dependent

4. Driving on a high-speed highway and having an accident

   Dependent

5. Having a wide forehead and having a high IQ

   Independent

A box contains 8 red coins, 9 yellow coins, and 5 blue coins. Two consecutive draws are made from the bag without replacement of the first draw. Find the probability each of the following events.

6. Red first, red second

$$\boldsymbol{P(A) = P(red) = \frac{8}{22} = \frac{4}{11}}$$

$$\boldsymbol{P(A\ and\ B) = P(red\ and\ red) = \frac{4}{11}\cdot\frac{7}{21} = \frac{4}{11}\cdot\frac{1}{3} = \frac{4}{33}}$$

$$\boldsymbol{P(B|A) = P(red\ |red) = \frac{P(A\ and\ B)}{P(A)} = \frac{\frac{4}{33}}{\frac{4}{11}} = \frac{4}{33}\cdot\frac{11}{4} = \frac{1}{3}}$$

$\boldsymbol{P(red|red) = 33.33\%}$

7. Red first, blue second

$$\boldsymbol{P(A) = P(red) = \frac{8}{22} = \frac{4}{11}}$$

$$\boldsymbol{P(A\ and\ B) = P(red\ and\ blue) = \frac{4}{11}\cdot\frac{5}{21} = \frac{20}{231}}$$

$$\boldsymbol{P(B|A) = P(blue\ |red) = \frac{P(A\ and\ B)}{P(A)} = \frac{\frac{20}{231}}{\frac{4}{11}} = \frac{20}{231}\cdot\frac{11}{4} = \frac{5}{21}}$$

$\boldsymbol{P(blue|red) = 23.81\%}$

8. Red first, yellow second

$$\boldsymbol{P(A) = P(red) = \frac{8}{22} = \frac{4}{11}}$$

$$\boldsymbol{P(A\ and\ B) = P(red\ and\ yellow) = \frac{4}{11}\cdot\frac{9}{21} = \frac{4}{11}\cdot\frac{3}{7} = \frac{12}{77}}$$

$$\boldsymbol{P(B|A) = P(yellow\ |red) = \frac{P(A\ and\ B)}{P(A)} = \frac{\frac{12}{77}}{\frac{4}{11}} = \frac{12}{77}\cdot\frac{11}{4} = \frac{3}{7}}$$

$\boldsymbol{P(yellow|red) = 42.86\%}$

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CONDITIONAL PROBABILITY Assignment

9. Yellow first, blue second

$$P(A) = P(yellow) = \frac{9}{22}$$

$$P(A\ and\ B) = P(yellowand\ red) = \frac{9}{22} \cdot \frac{5}{21} = \frac{15}{154}$$

$$P(B|A) = P(red\ |yellow) = \frac{P(A\ and\ B)}{P(A)} = \frac{\frac{15}{154}}{\frac{9}{22}} = \frac{15}{154} \cdot \frac{22}{9} = \frac{5}{21}$$

$$P(red|yellow) = 23.81\%$$

10. Yellow first, yellow second

$$P(A) = P(yellow) = \frac{9}{22}$$

$$P(A\ and\ B) = P(red\ and\ yellow) = \frac{9}{22} \cdot \frac{8}{21} = \frac{12}{77}$$

$$P(B|A) = P(red\ |yellow) = \frac{P(A\ and\ B)}{P(A)} = \frac{\frac{12}{77}}{\frac{9}{22}} = \frac{12}{77} \cdot \frac{22}{9} = \frac{8}{21}$$

$$P(red|yellow) = 38.09\%$$

11. Yellow first, red second

$$P(A) = P(yellow) = \frac{9}{22}$$

$$P(A\ and\ B) = P(yellow\ and\ red) = \frac{9}{22} \cdot \frac{8}{21} = \frac{12}{77}$$

$$P(B|A) = P(red\ |yellow) = \frac{P(A\ and\ B)}{P(A)} = \frac{\frac{12}{77}}{\frac{9}{22}} = \frac{12}{77} \cdot \frac{22}{9} = \frac{8}{21}$$

$$P(red|yellow) = 38.09\%$$

12. Blue first, red second

$$P(A) = P(blue) = \frac{5}{22}$$

$$P(A\ and\ B) = P(blue\ and\ red) = \frac{5}{22} \cdot \frac{8}{21} = \frac{20}{231}$$

$$P(B|A) = P(red\ |blue) = \frac{P(A\ and\ B)}{P(A)} = \frac{\frac{20}{231}}{\frac{5}{22}} = \frac{20}{231} \cdot \frac{22}{5} = \frac{8}{21}$$

$$P(red|blue) = 38.09\%$$

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CONDITIONAL PROBABILITY Assignment

13. Blue first, blue second

$$P(A) = P(blue) = \frac{5}{22}$$

$$P(A \text{ and } B) = P(blue \text{ and } blue) = \frac{5}{22} \cdot \frac{4}{21} = \frac{10}{231}$$

$$P(B|A) = P(blue|blue) = \frac{P(A \text{ and } B)}{P(A)} = \frac{\frac{10}{231}}{\frac{5}{22}} = \frac{10}{231} \cdot \frac{22}{5} = \frac{4}{21}$$

$$P(blue|blue) = 19.05\%$$

14. Blue first, yellow second.

$$P(A) = P(blue) = \frac{5}{22}$$

$$P(A \text{ and } B) = P(blue \text{ and } yellow) = \frac{5}{22} \cdot \frac{9}{21} = \frac{5}{22} \cdot \frac{3}{7} = \frac{15}{154}$$

$$P(B|A) = P(yellow|blue) = \frac{P(A \text{ and } B)}{P(A)} = \frac{\frac{15}{154}}{\frac{5}{22}} = \frac{15}{154} \cdot \frac{22}{5} = \frac{3}{7}$$

$$P(yellow|blue) = 42.86\%$$

For one roll of a die, let A be the event "even" and let B the event "4 or 6". Find each probability.

15. $P(A)$

$$P(A) = \frac{3}{6} = P(A) = \frac{1}{2}$$

16. $P(B)$

$$P(B) = \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = P(B) = \frac{1}{3}$$

17. $P(A \text{ and } B)$

$$P(A \text{ and } B) = \frac{1}{2} \cdot \frac{1}{3} = P(A \text{ and } B) = \frac{1}{6}$$

18. $P(B \text{ and } A)$

$$P(B \text{ and } A) = \frac{1}{3} \cdot \frac{1}{2} = P(B \text{ and } A) = \frac{1}{6}$$

19. $P(B|A)$

$$P(B|A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{\frac{1}{6}}{\frac{1}{2}} = \frac{1}{6} \cdot \frac{2}{1} = P(B|A) = \frac{1}{3}$$

20. $P(A|B)$

$$P(A|B) = \frac{P(B \text{ and } A)}{P(B)} = \frac{\frac{1}{6}}{\frac{1}{3}} = \frac{1}{6} \cdot \frac{3}{1} = P(A|B) = \frac{1}{2}$$

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CONDITIONAL PROBABILITY Assignment

21. Given $P(A \text{ and } B) = \frac{1}{4}$ and $P(A) = \frac{1}{2}$, find $P(B|A)$.

$$P(B|A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{\frac{1}{4}}{\frac{1}{2}} = \frac{1}{4} \cdot \frac{2}{1} = P(B|A) = \frac{1}{2}$$

22. Given $P(A \text{ and } B) = 0.38$ and $P(A) = 0.57$, find $P(B|A)$.

$$P(B|A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{0.38}{0.57} = 0.6666 = P(B|A) \cong 66.67\%$$

23. Given $P(B|A) = \frac{1}{3}$ and $P(A) = \frac{1}{2}$, find $P(A \text{ and } B)$.

$$P(A \text{ and } B) = P(B|A) \cdot P(A) = \left(\frac{1}{3}\right)\left(\frac{1}{2}\right) = \frac{1}{6} = P(A \text{ and } B) \cong 16.66\%$$

Word Problem

24. A jar has 15 marbles, 3 of which are color red. If 2 are selected at random without replacing the first one, find the probability that both are color red.

$$P(A) = P(red) = \frac{3}{15} = \frac{1}{5}$$

$$P(A \text{ and } B) = P(red \text{ and } red) = \frac{1}{5} \cdot \frac{2}{14} = \frac{1}{5} \cdot \frac{1}{7} = \frac{1}{35}$$

$$P(B|A) = P(red|red) = \frac{P(A \text{ and } B)}{P(A)} = \frac{\frac{1}{35}}{\frac{1}{5}} = \frac{1}{35} \cdot \frac{5}{1} = \frac{1}{7}$$

$$P(red|red) \cong 14.29\%$$

25. In a country club, the probability that a member who play tennis is 75%. If 54% of the members play tennis and basketball, find the probability that the member who plays basketball, given that the member plays tennis.

$$P(A) = P(tennis) = 0.75$$

$$P(A \text{ and } B) = P(tennis \text{ and } basketball) = 0.54$$

$$P(B|A) = P(basketball|tennis) = \frac{P(A \text{ and } B)}{P(A)} = \frac{0.54}{0.75} = 0.72$$

$$P(basketball|tennis) = 72\%$$