Name: ____ Period: __________ Date: _______________

CONDITIONAL PROBABILITY Bell Work

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

1. Drawing 2 cards from a standard deck of playing card without replacement.

2. Rolling a die and picking a ball from a box

A box contains 12 yellow balls and 5 red balls. Two consecutive draws are made from the box where the first ball is not replaced. Find the probability each of the following events.

3. Blue first, green second

4. Blue first, blue second

5. Green first, green second

6. Green first, blue second

For one roll of a die, let A be the event "odd" and let B the event "1". Find each probability.

7. $\boldsymbol{P(A)}$

8. $\boldsymbol{P(B)}$

9. $\boldsymbol{P(A\ and\ B)}$

10. $\boldsymbol{P(B\ and\ A)}$

11. $\boldsymbol{P(B|A)}$

12. $\boldsymbol{P(A|B)}$

13. Given $\boldsymbol{P(B|A) = 0.27}$ and $\boldsymbol{P(A) = 0.76}$, find $\boldsymbol{P(A\ and\ B)}$.

14. Given $\boldsymbol{P(B|A) = 0.87}$ and $\boldsymbol{P(A\ and\ B) = 0.75}$, find $\boldsymbol{P(A)}$.

15. Given $\boldsymbol{P(B|A) = \frac{3}{5}}$ and $\boldsymbol{P(A\ and\ B) = \frac{1}{2}}$, find $\boldsymbol{P(A)}$.

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CONDITIONAL PROBABILITY Bell Work

ANSWER

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

1. Drawing 2 cards from a standard deck of playing card without replacement.
   Dependent

2. Rolling a die and picking a ball from a box
   Independent

A box contains 12 yellow balls and 5 red balls. Two consecutive draws are made from the box where the first ball is not replaced. Find the probability each of the following events.

3. Yellow first, red second

$$P(A) = P(yellow) = \frac{12}{17}$$

$$P(A \text{ and } B) = P(yellow \text{ and } red) = \frac{12}{17} \cdot \frac{5}{16} = \frac{60}{272} = \frac{15}{68}$$

$$P(B|A) = P(red|yellow) = \frac{P(A \text{ and } B)}{P(A)} = \frac{\frac{15}{68}}{\frac{12}{17}} = \frac{15}{68} \cdot \frac{17}{12} = \frac{5}{16}$$

$$P(red|yellow) = 31.25\%$$

4. Yellow first, yellow second

$$P(A) = P(yellow) = \frac{12}{17}$$

$$P(A \text{ and } B) = P(yellow \text{ and } yellow) = \frac{12}{17} \cdot \frac{11}{16} = \frac{132}{272} = \frac{33}{68}$$

$$P(B|A) = P(yellow|yellow) = \frac{P(A \text{ and } B)}{P(A)} = \frac{\frac{33}{68}}{\frac{12}{17}} = \frac{33}{68} \cdot \frac{17}{12} = \frac{11}{16}$$

$$P(yellow|yellow) = 68.75\%$$

5. Red first, red second

$$P(A) = P(red) = \frac{5}{17}$$

$$P(A \text{ and } B) = P(red \text{ and } red) = \frac{5}{17} \cdot \frac{4}{16} = \frac{5}{17} \cdot \frac{1}{4} = \frac{5}{68}$$

$$P(B|A) = P(red|red) = \frac{P(A \text{ and } B)}{P(A)} = \frac{\frac{5}{68}}{\frac{5}{17}} = \frac{5}{68} \cdot \frac{17}{5} = \frac{1}{4}$$

$$P(red|red) = 25\%$$

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CONDITIONAL PROBABILITY Bell Work

6. Red first, yellow second

$$P(A) = P(red) = \frac{5}{17}$$

$$P(A \text{ and } B) = P(red \text{ and } yellow) = \frac{5}{17} \cdot \frac{12}{16} = \frac{5}{17} \cdot \frac{3}{4} = \frac{15}{68}$$

$$P(B|A) = P(yellow|red) = \frac{P(A \text{ and } B)}{P(A)} = \frac{\frac{15}{68}}{\frac{5}{17}} = \frac{15}{68} \cdot \frac{17}{5} = \frac{3}{4}$$

$$P(yellow|red) = 75\%$$

For one roll of a die, let A be the event "odd" and let B the event "1". Find each probability.

7. $P(A)$

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

8. $P(B)$

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

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

$$P(A \text{ and } B) = \frac{1}{2} \cdot \frac{1}{6} = P(A \text{ and } B) = \frac{1}{12}$$

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

$$P(B \text{ and } A) = \frac{1}{6} \cdot \frac{1}{2} = P(B \text{ and } A) = \frac{1}{12}$$

11. $P(B|A)$

$$P(B|A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{\frac{1}{12}}{\frac{1}{2}} = \frac{1}{12} \cdot \frac{2}{1} = P(B|A) = \frac{1}{6}$$

12. $P(A|B)$

$$P(A|B) = \frac{P(B \text{ and } A)}{P(B)} = \frac{\frac{1}{12}}{\frac{1}{6}} = \frac{1}{12} \cdot \frac{6}{1} = P(A|B) = \frac{1}{2}$$

13. Given $P(B|A) = 0.27$ and $P(A) = 0.76$, find $P(A \text{ and } B)$.

$$P(A \text{ and } B) = P(B|A) \cdot P(A) = (0.27)(0.76) = 0.2052 = P(A \text{ and } B) = 20.52\%$$

14. Given $P(B|A) = 0.87$ and $P(A \text{ and } B) = 0.75$, find $P(A)$.

$$P(A) = \frac{P(A \text{ and } B)}{P(B|A)} = \frac{0.75}{0.87} = 0.6525 = P(A) = 65.25\%$$

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CONDITIONAL PROBABILITY Bell Work

15. Given $\boldsymbol{P(B|A)=\frac{3}{5}}$ and $\boldsymbol{P(A \text{ and } B)=\frac{1}{2}}$, find $\boldsymbol{P(A)}$.

$$\boldsymbol{P(A)=\frac{P(A \text{ and } B)}{P(B|A)}=\frac{\frac{1}{2}}{\frac{3}{5}}=\frac{1}{2}\cdot\frac{5}{3}=P(A)=\frac{5}{6}}$$