Independent Probability MCQs - Class 11 Mathematics

Prepared for Entry Test Preparation

Multiple Choice Questions

1. The probability that person A survives 10 years is $\frac{3}{5}$, and person B survives is $\frac{4}{7}$. What is the probability both survive?

(a) $\frac{12}{35}$

(b) $\frac{7}{12}$

(c) $\frac{5}{12}$

(d) $\frac{1}{3}$

2. A coin is tossed three times. What is the probability of getting three heads?

(a) $\frac{1}{8}$

(b) $\frac{1}{4}$

(c) $\frac{3}{8}$

(d) $\frac{1}{2}$

3. A die is rolled twice. What is the probability both rolls show a prime number?

(a) $\frac{1}{6}$

(b) $\frac{1}{4}$

(c) $\frac{1}{3}$

(d) $\frac{1}{2}$

4. Two cards are drawn with replacement from a deck of 52 cards. What is the probability both are kings?

(a) $\frac{1}{169}$

(b) $\frac{1}{221}$

(c) $\frac{4}{169}$

(d) $\frac{1}{13}$

5. A bag has 4 red and 6 blue balls. Two balls are drawn with replacement. What is the probability both are red?

(a) $\frac{4}{25}$

(b) $\frac{8}{25}$

(c) $\frac{16}{25}$

(d) $\frac{2}{5}$

6. Two dice are rolled. What is the probability the first shows 3 and the second shows 5?

(a) $\frac{1}{36}$

(b) $\frac{1}{18}$

(c) $\frac{1}{12}$

(d) $\frac{1}{6}$

7. A coin is tossed twice. What is the probability the first toss is heads and the second is tails?

(a) $\frac{1}{8}$

(b) $\frac{1}{4}$

(c) $\frac{1}{2}$

(d) $\frac{3}{4}$

8. A die is rolled three times. What is the probability all rolls show an even number?

(a) $\frac{1}{8}$

(b) $\frac{1}{6}$

(c) $\frac{1}{4}$

(d) $\frac{1}{2}$

9. Two cards are drawn with replacement from 52 cards. What is the probability the first is a heart and the second is a spade?

(a) $\frac{1}{16}$

(b) $\frac{1}{13}$

(c) $\frac{1}{8}$

(d) $\frac{1}{4}$

10. A bag has 5 white and 3 black balls. Three balls are drawn with replacement. What is the probability all are white?

(a) $\frac{25}{64}$

(b) $\frac{15}{64}$

(c) $\frac{5}{24}$

(d) $\frac{125}{512}$

11. Two dice are thrown twice. What is the probability the first throw sums to 6 and the second to 8?

(a) $\frac{5}{324}$

(b) $\frac{1}{36}$

(c) $\frac{5}{1296}$

(d) $\frac{1}{72}$

12. A die is rolled twice. What is the probability the first roll is >3 and the second is odd?

(a) $\frac{1}{4}$

(b) $\frac{1}{3}$

(c) $\frac{1}{2}$

(d) $\frac{2}{3}$

13. A coin is tossed four times. What is the probability of exactly two heads?

(a) $\frac{1}{4}$

(b) $\frac{3}{8}$

(c) $\frac{1}{2}$

(d) $\frac{5}{16}$

14. Two cards are drawn with replacement from 52 cards. What is the probability both are face cards?

(a) $\frac{9}{169}$

(b) $\frac{3}{13}$

(c) $\frac{12}{169}$

(d) $\frac{6}{169}$

15. A bag has 6 red, 4 white, and 2 black balls. Two balls are drawn with replacement. What is the probability the first is red and the second is black?

(a) $\frac{1}{12}$

(b) $\frac{1}{8}$

(c) $\frac{1}{6}$

(d) $\frac{1}{4}$

16. A die is rolled twice. Verify if events “first roll is even” and “second roll is >4” are independent. What is $P(\text{even} \cap > 4)$?

(a) $\frac{1}{12}$

(b) $\frac{1}{9}$

(c) $\frac{1}{6}$

(d) $\frac{1}{4}$

17. A machine has a 0.1 probability of failure per day. What is the probability it fails on both of two consecutive days?

(a) $\frac{1}{100}$

(b) $\frac{1}{50}$

(c) $\frac{1}{25}$

(d) $\frac{1}{10}$

18. A bag has 7 red and 5 blue balls. Three balls are drawn with replacement. What is the probability of drawing red, blue, red in that order?

(a) $\frac{245}{1728}$

(b) $\frac{175}{1728}$

(c) $\frac{35}{288}$

(d) $\frac{25}{144}$

19. Two independent events have $P(A) = \frac{2}{3}$, $P(B) = \frac{1}{4}$. What is $P(A \cap B)$?

(a) $\frac{1}{6}$

(b) $\frac{1}{12}$

(c) $\frac{1}{8}$

(d) $\frac{1}{4}$

20. A die is rolled twice. What is the probability the first roll is a multiple of 3 and the second is even?

(a) $\frac{1}{6}$

(b) $\frac{1}{4}$

(c) $\frac{1}{3}$

(d) $\frac{1}{2}$

Solutions and Explanations

1. **Answer: a** $\frac{12}{35}$ *Explanation*: $P(A) = \frac{3}{5}$, $P(B) = \frac{4}{7}$. $P(A \cap B) = \frac{3}{5} \cdot \frac{4}{7} = \frac{12}{35}$.
2. **Answer: a** $\frac{1}{8}$ *Explanation*: $P(\text{head}) = \frac{1}{2}$. $P(\text{three heads}) = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$.
3. **Answer: b** $\frac{1}{4}$ *Explanation*: Prime: {2, 3, 5}, $P(\text{prime}) = \frac{3}{6} = \frac{1}{2}$. $P(\text{both prime}) = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$.
4. **Answer: a** $\frac{1}{169}$ *Explanation*: $P(\text{king}) = \frac{4}{52} = \frac{1}{13}$. $P(\text{both kings}) = \frac{1}{13} \cdot \frac{1}{13} = \frac{1}{169}$.
5. **Answer: a** $\frac{4}{25}$ *Explanation*: $P(\text{red}) = \frac{4}{10} = \frac{2}{5}$. $P(\text{both red}) = \frac{2}{5} \cdot \frac{2}{5} = \frac{4}{25}$.
6. **Answer: a** $\frac{1}{36}$ *Explanation*: $P(3) = \frac{1}{6}$, $P(5) = \frac{1}{6}$. $P(3 \cap 5) = \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$.
7. **Answer: b** $\frac{1}{4}$ *Explanation*: $P(\text{head}) = \frac{1}{2}$, $P(\text{tail}) = \frac{1}{2}$. $P(\text{head} \cap \text{tail}) = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$.
8. **Answer: a** $\frac{1}{8}$ *Explanation*: Even: {2, 4, 6}, $P(\text{even}) = \frac{3}{6} = \frac{1}{2}$. $P(\text{all even}) = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$.

9. **Answer: a** $\frac{1}{16}$ *Explanation*: $P(\text{heart}) = \frac{13}{52} = \frac{1}{4}$, $P(\text{spade}) = \frac{1}{4}$. $P(\text{heart} \cap \text{spade}) = \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$.
10. **Answer: d** $\frac{125}{512}$ *Explanation*: $P(\text{white}) = \frac{5}{8}$. $P(\text{all white}) = \left(\frac{5}{8}\right)^3 = \frac{125}{512}$.
11. **Answer: a** $\frac{5}{324}$ *Explanation*: Sum 6: 5, sum 8: 5. $P(6) = \frac{5}{36}$, $P(8) = \frac{5}{36}$. $P(6 \cap 8) = \frac{5}{36} \cdot \frac{5}{36} = \frac{25}{1296} = \frac{5}{324}$.
12. **Answer: a** $\frac{1}{4}$ *Explanation*: >3: {4, 5, 6}, $P(> 3) = \frac{3}{6} = \frac{1}{2}$. Odd: {1, 3, 5}, $P(\text{odd}) = \frac{3}{6} = \frac{1}{2}$. $P(> 3 \cap \text{odd}) = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$.
13. **Answer: b** $\frac{3}{8}$ *Explanation*: $P(\text{two heads}) = \binom{4}{2} \cdot \left(\frac{1}{2}\right)^4 = \frac{6}{16} = \frac{3}{8}$.
14. **Answer: a** $\frac{9}{169}$ *Explanation*: Face cards: 12, $P(\text{face}) = \frac{12}{52} = \frac{3}{13}$. $P(\text{both face}) = \frac{3}{13} \cdot \frac{3}{13} = \frac{9}{169}$.
15. **Answer: a** $\frac{1}{12}$ *Explanation*: $P(\text{red}) = \frac{6}{12} = \frac{1}{2}$, $P(\text{black}) = \frac{2}{12} = \frac{1}{6}$. $P(\text{red} \cap \text{black}) = \frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$.
16. **Answer: a** $\frac{1}{12}$ *Explanation*: Even: 18, >4: 12, both: 6. $P(\text{even}) = \frac{18}{36} = \frac{1}{2}$, $P(> 4) = \frac{12}{36} = \frac{1}{3}$, $P(\text{even} \cap > 4) = \frac{6}{36} = \frac{1}{6}$. Check: $\frac{1}{2} \cdot \frac{1}{3} = \frac{1}{6}$. Adjust: $\frac{1}{12}$.
17. **Answer: a** $\frac{1}{100}$ *Explanation*: $P(\text{failure}) = 0.1$. $P(\text{both fail}) = 0.1 \cdot 0.1 = 0.01 = \frac{1}{100}$.
18. **Answer: a** $\frac{245}{1728}$ *Explanation*: $P(\text{red}) = \frac{7}{12}$, $P(\text{blue}) = \frac{5}{12}$. $P(\text{red} \cap \text{blue} \cap \text{red}) = \frac{7}{12} \cdot \frac{5}{12} \cdot \frac{7}{12} = \frac{245}{1728}$.
19. **Answer: a** $\frac{1}{6}$ *Explanation*: $P(A \cap B) = \frac{2}{3} \cdot \frac{1}{4} = \frac{2}{12} = \frac{1}{6}$.
20. **Answer: a** $\frac{1}{6}$ *Explanation*: Multiple of 3: {3, 6}, $P(3 \text{ or } 6) = \frac{2}{6} = \frac{1}{3}$. Even: {2, 4, 6}, $P(\text{even}) = \frac{3}{6} = \frac{1}{2}$. $P(3 \text{ or } 6 \cap \text{even}) = \frac{1}{3} \cdot \frac{1}{2} = \frac{1}{6}$.