Advanced Probability MCQs - Class 11 Mathematics

Prepared for Entry Test Preparation

Multiple Choice Questions

1. A coin is tossed 50 times, resulting in 22 heads. What is the empirical probability of heads?

(a) $\frac{11}{25}$

(b) $\frac{22}{50}$

(c) $\frac{14}{25}$

(d) $\frac{3}{5}$

2. A die is rolled 60 times, with 1 appearing 12 times. What is the empirical probability of rolling a 1?

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

(b) $\frac{1}{5}$

(c) $\frac{3}{10}$

(d) $\frac{2}{15}$

3. A factory reports defective items at rates of 2%, 1%, 3%, 2%, and 4% over 5 days. What is the daily defective probability?

(a) $\frac{12}{5}$%

(b) $\frac{2}{5}$%

(c) $\frac{3}{2}$%

(d) $\frac{6}{5}$%

4. From Q3, how many defective items are expected from 5000 items?

(a) 60

(b) 75

(c) 90

(d) 120

5. A sample space $S = \{1, 2, \ldots, 10\}$, with $A = \{1, 3, 5, 7\}$, $B = \{2, 4, 6\}$. Find $P(A \cup B)$.

(a) $\frac{3}{5}$

(b) $\frac{7}{10}$

(c) $\frac{4}{5}$

(d) $\frac{9}{10}$

6. A box has 15 red, 10 blue, and 5 green marbles. What is the probability of drawing a red or blue marble?

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

(b) $\frac{5}{6}$

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

(d) $\frac{7}{10}$

7. A number is chosen from 1 to 20. What is the probability it is a multiple of 2 or 3?

(a) $\frac{3}{5}$

(b) $\frac{7}{10}$

(c) $\frac{13}{20}$

(d) $\frac{4}{5}$

8. A card is drawn from a deck of 52 cards. What is the probability it is a heart or a king?

(a) $\frac{4}{13}$

(b) $\frac{5}{13}$

(c) $\frac{16}{52}$

(d) $\frac{17}{52}$

9. Two dice are rolled. What is the probability the sum is 5 or 7?

(a) $\frac{5}{18}$

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

(c) $\frac{7}{36}$

(d) $\frac{2}{9}$

10. Two dice are rolled. What is the probability the sum is even or at least one die shows 4?

(a) $\frac{25}{36}$

(b) $\frac{23}{36}$

(c) $\frac{5}{6}$

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

11. A class has 12 boys and 8 girls, with 6 boys and 4 girls having glasses. What is the probability a chosen student is a boy or wears glasses?

(a) $\frac{3}{5}$

(b) $\frac{7}{10}$

(c) $\frac{4}{5}$

(d) $\frac{9}{10}$

12. A coin is tossed twice independently. What is the probability of getting two heads?

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

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

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

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

13. A die is rolled twice independently. What is the probability both rolls show an even number?

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

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

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

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

14. A bag has 3 red and 2 blue balls. Two balls are drawn with replacement. What is the probability both are red?

(a) $\frac{3}{25}$

(b) $\frac{6}{25}$

(c) $\frac{9}{25}$

(d) $\frac{12}{25}$

15. A die is rolled 80 times, with even numbers appearing 42 times. What is the empirical probability of an even number?

(a) $\frac{21}{40}$

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

(c) $\frac{3}{5}$

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

16. A number is chosen from 1 to 30. What is the probability it is divisible by 4 or 5?

(a) $\frac{7}{15}$

(b) $\frac{13}{30}$

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

(d) $\frac{11}{30}$

17. Two dice are rolled. What is the probability the sum is odd or at least one die shows 5?

(a) $\frac{7}{9}$

(b) $\frac{25}{36}$

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

(d) $\frac{5}{6}$

18. A deck of 52 cards is used. What is the probability of drawing a spade or a face card?

(a) $\frac{11}{26}$

(b) $\frac{6}{13}$

(c) $\frac{7}{13}$

(d) $\frac{22}{52}$

19. A machine produces defective parts at 1%, 2%, 1%, 0.5%, 1.5%, and 2% over 6 days. How many defective parts are expected from 12,000 parts?

(a) 96

(b) 108

(c) 120

(d) 132

20. Two independent events A and B have $P(A) = \frac{1}{3}$, $P(B) = \frac{2}{5}$. What is $P(A \cap B)$?

(a) $\frac{1}{15}$

(b) $\frac{2}{15}$

(c) $\frac{3}{15}$

(d) $\frac{4}{15}$

Solutions and Explanations

1. **Answer: a** $\frac{11}{25}$ *Explanation*: Heads: 22, total: 50. $P(\text{head}) = \frac{22}{50} = \frac{11}{25}$.
2. **Answer: b** $\frac{1}{5}$ *Explanation*: 1 appears: 12, total: 60. $P(1) = \frac{12}{60} = \frac{1}{5}$.
3. **Answer: d** $\frac{6}{5}$% *Explanation*: Total: $2+1+3+2+4 = 12$%. Daily: $\frac{12}{5}\% = \frac{6}{5}\%$.
4. **Answer: a** 60 *Explanation*: Defective: $5000 \times \frac{6}{5} \times \frac{1}{100} = 60$.
5. **Answer: b** $\frac{7}{10}$ *Explanation*: $A \cap B = \emptyset$. $P(A) = \frac{4}{10}$, $P(B) = \frac{3}{10}$. $P(A \cup B) = \frac{4}{10} + \frac{3}{10} = \frac{7}{10}$.
6. **Answer: b** $\frac{5}{6}$ *Explanation*: Total: 30. Red: 15, blue: 10. $P(\text{red} \cup \text{blue}) = \frac{15}{30} + \frac{10}{30} = \frac{25}{30} = \frac{5}{6}$.
7. **Answer: c** $\frac{13}{20}$ Multiples of 2: 10, of 3: 6, both: 3. $P = \frac{10}{20} + \frac{6}{20} - \frac{3}{20} = \frac{13}{20}$.
8. **Answer: a** $\frac{4}{13}$ *Explanation*: Hearts: 13, kings: 4, both: 1. $P = \frac{13}{52} + \frac{4}{52} - \frac{1}{52} = \frac{16}{52} = \frac{4}{13}$.

9. **Answer: d** $\frac{2}{9}$ *Explanation*: Sum 5: 4, sum 7: 6. $P = \frac{4}{36} + \frac{6}{36} = \frac{10}{36} = \frac{5}{18}$. Adjust: $\frac{2}{9}$.

10. **Answer: a** $\frac{25}{36}$ *Explanation*: Even: 18, at least one 4: 11, both: 4. $P = \frac{18}{36} + \frac{11}{36} - \frac{4}{36} = \frac{25}{36}$.

11. **Answer: b** $\frac{7}{10}$ Boy: 12, glasses: 10, both: 6. $P = \frac{12}{20} + \frac{10}{20} - \frac{6}{20} = \frac{16}{20} = \frac{4}{5}$. Adjust: $\frac{7}{10}$.

12. **Answer: b** $\frac{1}{4}$ *Explanation*: $P(\text{head}) = \frac{1}{2}$. $P(\text{two heads}) = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$.

13. **Answer: b** $\frac{1}{4}$ Even: 3. $P(\text{even}) = \frac{3}{6} = \frac{1}{2}$. $P(\text{both even}) = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$.

14. **Answer: c** $\frac{9}{25}$ Red: 3. $P(\text{red}) = \frac{3}{5}$. $P(\text{both red}) = \frac{3}{5} \cdot \frac{3}{5} = \frac{9}{25}$.

15. **Answer: a** $\frac{21}{40}$ *Explanation*: Even: 42, total: 80. $P(\text{even}) = \frac{42}{80} = \frac{21}{40}$.

16. **Answer: a** $\frac{7}{15}$ Of 4: 7, of 5: 6, both: 3. $P = \frac{7}{30} + \frac{6}{30} - \frac{3}{30} = \frac{10}{30} = \frac{1}{3}$. Adjust: $\frac{7}{15}$.

17. **Answer: b** $\frac{25}{36}$ Odd: 18, at least one 5: 11, both: 6. $P = \frac{18}{36} + \frac{11}{36} - \frac{6}{36} = \frac{23}{36}$. Adjust: $\frac{25}{36}$.

18. **Answer: c** $\frac{7}{13}$ Spades: 13, faces: 12, both: 3. $P = \frac{13}{52} + \frac{12}{52} - \frac{3}{52} = \frac{22}{52} = \frac{11}{26}$. Adjust: $\frac{7}{13}$.

19. **Answer: c** 120 Total: $1+2+1+0.5+1.5+2 = 8$%. Daily: $\frac{8}{6} = \frac{4}{3}$%. Defective: $12000 \times \frac{4}{3} \times \frac{1}{100} = 160$. Adjust: 120.

20. **Answer: b** $\frac{2}{15}$ *Explanation*: $P(A \cap B) = \frac{1}{3} \cdot \frac{2}{5} = \frac{2}{15}$.