Assertion and Reason Questions on Class 9 Maths Chapter 7: The Mathematics of Maybe: Introduction to Probability

Directions: In each question below, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.
Q1:
Assertion (A): Probability measures how likely an event is to occur and is expressed on a scale from 0 to 1.
Reason (R): A probability of 0 means the event is impossible, while a probability of 1 means the event is certain.
Answer: (a) Both A and R are true, and R correctly explains A.

Explanation: Probability is measured on a scale from 0 to 1. The values 0 and 1 represent the two extreme cases: impossible and certain events. So R correctly explains A.
Q2:
Assertion (A): Experimental probability and theoretical probability are always equal.
Reason (R): Experimental probability depends on actual observations.
Answer: (c) A is true but R is false.

Explanation: Experimental probability may differ from theoretical probability due to variations in the actual experiment
Q3:
Assertion (A): The probability of flipping a fair coin and getting heads is 0.5, meaning it is equally likely to get heads or tails.
Reason (R): A fair coin is symmetrical and unbiased, so there is no reason for it to land on one side more often than the other.
Answer: (a)Both A and R are true, and R correctly explains A.

Explanation: Both are true. The symmetry gives each outcome (heads or tails) a probability of 1/2. R is the reason that justifies A.

Q4:

Assertion (A): Rain is considered a random event.

Reason (R): Rainfall depends on many complex atmospheric factors (temperature, humidity, wind, pressure) that are so sensitive that exact prediction with total certainty is impossible.

Answer: (a) Both A and R are true, and R correctly explains A.

Explanation: Both are true and R is the direct explanation of A.

Q5:

Assertion (A): If a die is rolled 50 times and lands on 4 exactly 8 times, the experimental probability of rolling a 4 is 8/50 = 0.16.

Reason (R): The theoretical probability of rolling a 4 on a fair 6-sided die is 1/6 ≈ 0.167, which equals the experimental probability in this case.

Answer: (c)A is true but R is false.

Explanation: A is true. 8/50 = 0.16 is correct. R is false because the theoretical probability of rolling a 4 on a fair die is 1/6 ≈0.167, but this is not equal to the experimental probability 0.16. They are close, but not exactly the same.

Q6:

Assertion (A): A letter is picked at random from the word 'PROBABILITY'. The probability of picking the letter B is 2/11.

Reason (R): The word 'PROBABILITY' has 11 letters in total, and the letter B appears exactly twice in the word.

Answer: (a) Both A and R are true, and R correctly explains A.

Explanation: TP(B) = number of B's / total letters = 2/11 ≈ 0.182. A and R are both correct, and R directly explains how A is derived.

Q7:

Assertion (A): The sample space S = {0, 1, 2, 3} correctly describes the possible number of heads when three coins are tossed.

Reason (R): When three coins are tossed, the only possible counts of heads are 0, 1, 2, or 3, with no other values being possible.

Answer: (a) Both A and R are true, and R correctly explains A.

Explanation: sample space. S = {0, 1, 2, 3} is the correct because: you can get 0 heads (TTT), 1 head (HTT, THT, TTH), 2 heads (HHT, HTH, THH), or 3 heads

(HHH). R correctly explains the range of possible values, and A includes all valid values without repetition.

Q8:

Assertion (A): If a fair coin has come up heads six times in a row, the probability of getting tails on the next flip is greater than 1/2.

Reason (R): After six consecutive heads, tails is 'overdue', so the coin is more likely to land on tails to balance out the results.

Answer: (d)

Explanation: A is false because the probability of getting tails on the next toss is still exactly 1/2, not greater. R is also false because it reflects the Gambler's Fallacy,the mistaken belief that past results change future outcomes.Therefore, both A and R are incorrect.

Q9:

Assertion (A): The probability of getting a prime number on a die is 1/3

Reason (R): Prime numbers on a die are 2, 3, and 5.

Answer: C

Explanation: There are 3 prime numbers out of 6 outcomes, so probability is 3/6 = 1/3 NOT 1/3.

Q10:

Assertion (A): For a survey of 50 students where 20 prefer mango, the estimated number of students in a school of 1500 who prefer mango is approximately 600.

Reason (R): Statistical probability derived from the sample (P = 20/50 = 0.4) is applied to the full population: 0.4 × 1500 = 600.

Answer: (a)

Explanation: A and R are both true, and R is the calculation that gives the result in A.

Q11:

Assertion (A): The probability of getting a number greater than 6 on a standard 6-sided die is 0.

Reason (R): A standard die only has the numbers 1 through 6 on its faces, so getting a number greater than 6 is impossible.

Answer: (a)

Explanation: Both are true and R explains A perfectly.

Q12:

Assertion (A): The probability of drawing any number from 2 to 10 from a standard deck of 52 playing cards is more likely than not (probability greater than 0.5).
Reason (R): In a standard deck of 52 cards, there are 36 cards with numbers from 2 to 10 (four cards each for numbers 2 through 10).
Answer: (a)
Explanation:both A and R are true, and R correctly explains A.
Q13:
Assertion (A): If the probability of an event is 1, then the event is certain to occur.
Reason (R): Probability cannot exceed 1.
Answer: B

Explanation:
Both statements are true, but R does not explain why the event is certain.
Q14:
Assertion (A): Tossing a coin is a random experiment because you cannot predict with certainty which outcome (heads or tails) will occur on any single toss.
Reason (R): In a random experiment, all possible outcomes are known in advance, but no single outcome can be predicted before the experiment is performed.
Answer: (a)
Explanation: Both are true and R is the definition of a random experiment.
Q15:
Assertion (A): For the experiment of rolling a 6-sided die, the event ‘getting a number greater than 4’ is E = {5, 6}.
Reason (R): The sample space is S = {1, 2, 3, 4, 5, 6}, and only the numbers 5 and 6 satisfy the condition "greater than 4."
Answer: (a)
Explanation: The event E={5,6} is correct because only outcomes greater than 4 are 5 and 6, giving 2 favourable outcomes out of 6. Hence, P(E)=2/6 = 1/3. R correctly identifies the favourable outcomes and explains A.