Assertion and Reason Questions on Class 9 Maths Chapter 8: Predicting What Comes Next: Exploring Sequences and Progressions

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): The sequence 2, 4, 8, 16, … is an AP.
Reason (R): The ratio of consecutive terms is constant.
Answer: D
Explanation: The sequence is not an AP because the difference is not constant. However, it is a GP since the ratio is constant.

Q2:
Assertion (A): The sequence 6, 12, 24, 48, 96 is a finite sequence.
Reason (R): A finite sequence has a fixed, countable number of terms and does not continue indefinitely.
Answer: (a)
Explanation: Both are true. Unlike infinite sequences, this sequence ends at 96. R correctly defines a finite sequence and explains why A is correct.

Q3:
Assertion (A): The fifth triangular number is 15.
Reason (R): Each triangular number is the sum of natural numbers up to its position. The fifth triangular number = 1 + 2 + 3 + 4 + 5 = 15.
Answer: (a)
Explanation: R gives the defining property of triangular numbers and applies it correctly to confirm A.

Q4:
Assertion (A): The explicit rule for the nth term of the sequence of odd numbers is $u_n = 2n - 1$.

Reason (R): Substituting n = 1, 2, 3, 4, … into 2n − 1 gives 1, 3, 5, 7, … which are the odd numbers.
Answer: (a)
Explanation: Both are true and R is the direct verification of A.
Q5:
Assertion (A): The number 471 is a term of the sequence generated by sn = 5n − 2.
Reason (R): To check, we solve 5n − 2 = 471, giving 5n = 473, n = 94.6. Since 94.6 is not a natural number, 471 is NOT a term of the sequence.
Answer: (d)
Explanation: A is false. 471 is not a term of the sequence, making the assertion incorrect as stated. R is true. Hence (d)
Q6:
Assertion (A): The sequence 5, 15/4, 45/16, 135/64, … is a geometric progression with common ratio 3/4.
Reason (R): The ratios of consecutive terms are all equal to 3/4: (15/4) ÷ 5 = 3/4, (45/16) ÷ (15/4) = 3/4, and (135/64) ÷ (45/16) = 3/4.
Answer: (a)
Explanation: Both are true. R performs the three ratio checks and confirms each equals 3/4.
Q7:
Assertion (A): Points obtained from a GP lie on a straight line.
Reason (R): GP terms grow exponentially.
Answer: C
Explanation: Points from a GP usually form a curve, not a straight line. The reason is correct because GP growth is exponential.
Q8:
Assertion (A): In a GP, the difference between consecutive terms is constant.
Reason (R): In a GP, the ratio between consecutive terms is constant.
Answer: D
Explanation: In a GP, the ratio is constant, not the difference.
Q9:
Assertion (A): The sequence 1, –1, 1, –1, … is not a GP.
Reason (R): Its common ratio is –1.
Answer: C
Explanation: The sequence is actually a GP with common ratio –1.

Q10:
Assertion (A): When the terms of an arithmetic progression are plotted as (n, t□) coordinates, the points lie on a straight line. But when the terms of a geometric progression are plotted similarly, the points do NOT lie on a straight line.
Reason (R): An AP has a linear nth term formula (t□ = a + (n−1)d), while a GP has an exponential nth term formula (t□ = ar^{n-1}), and exponential graphs are curves, not straight lines.
Answer: (a)
Explanation: Both are true . AP points are on a straight line while GP points are on a curve. R correctly attributes this fundamental algebraic difference.
Q11:
Assertion (A): The sum 25 + 26 + 27 + … + 58 = 1411.
Reason (R): This sum equals $S_{58} - S_{24} = (58 \times 59/2) - (24 \times 25/2) = 1711 - 300 = 1411$.
Answer: (a)
Explanation: Both are true.
Q12:
Assertion (A): The sum of the first 10 natural numbers is 100.
Reason (R): The sum of the first n natural numbers is n(n+1)/2
Answer: C
Explanation: Using the formula, the sum is (10×11)/2 =55, not 100.
Q13:
Assertion (A): In the sequence of square numbers 1, 4, 9, 16, 25, 36, …, the differences between consecutive terms are 3, 5, 7, 9, 11, which are all odd numbers.
Reason (R): Each square number is the sum of consecutive odd numbers: 1 = 1, 4 = 1 + 3, 9 = 1 + 3 + 5, 16 = 1 + 3 + 5 + 7, and so on.
Answer: (a)
Explanation: Both are true and R explains A correctly.
Q14:
Assertion (A): The number 308 is a term of the sequence generated by sn = 5n − 2.
Reason (R): Solving 5n − 2 = 308 gives 5n = 310, so n = 62. Since 62 is a natural number, 308 is the 62nd term.
Answer: (a)

Explanation: Both are true. R performs the check whether a number belongs to a sequence correctly and confirms that 308 is the 62nd termof the given AP.

Q15:

Assertion (A): A sequence is an arithmetic progression (AP) if and only if the difference between any two consecutive terms is constant.

Reason (R): This constant difference is called the common difference, denoted by d, and can be positive, negative, or zero.

Answer: (a)

Explanation: Both are true.R is a complete and accurate explanation of the condition in A.