Arithmetic Progressions

Multiple Choice Questions

Q: 1 If a_n is the nth term of an arithmetic progression whose common difference is d, then which of the following statements is valid?

1. $a_{24} = a_1 + 24\,d$
2. $a_{25} = a_2 + 24\,d$
3. $a_{26} = a_2 + 24\,d$
4. None of these

Q: 2 Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements (A) and (R).

Assertion (A) : The difference between any two consecutive terms in the sequence of numbers √6, √24, √54, √96, ... is 3√6.

Reason (R) : The sequence of numbers √6, √24, √54, √96, ... form an arithmetic progression.

1. Both (A) and (R) are true and (R) is the correct explanation for (A).
2. Both (A) and (R) are true but (R) is not the correct explanation for (A).
3. (A) is false but (R) is true.
4. Both (A) and (R) are false.

Free Response Questions

Q: 3 Determine whether the following sequence is an arithmetic progression or not.   [1]

(-12 + 12 a), (-11 + 11 a), (-10 + 10 a),... where a is any rational number.

Show your work.

Q: 4 Amit makes the following statement: [1]

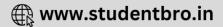"The sequence of positive integers divisible by 2 but not by 6 form an arithmetic progression."

Check if Amit's statement is true. Give reason for your answer.

Q: 5 The 3rd and the 14th terms of an arithmetic progression are (-9) and (35) respectively.   [5]
Which term of this arithmetic progression is five times the 6th term? Show your work.

Q.No	Correct Answers
1	3
2	3

Q.No	What to look for	Marks
3	Identifies the two sets of consecutive terms and finds the difference between the terms in each set by subtracting a term from its next term. For example, **Second term - First term** =(-11 + 11 *a*) - (-12 + 12 *a*) = -11 + 11 *a* + 12 - 12 *a* = (1 - *a*) **Third term - Second term** = (-10 + 10 *a*) - (-11 + 11 *a*) = -10 + 10 *a* + 11 - 11 *a* = (1 - *a*)	0.5
	Compares the difference and concludes that the given sequence is an arithmetic progression.	0.5
4	Lists the sequence of positive integers divisible by 2 but not by 6 as 2, 4, 8, 10, ...	0.5
	Identifies that the difference between the 2nd and the 3rd terms is not equal to the previous difference. (4 - 2) = 2 ≠ (8 - 4) = 4 Concludes that Amit's statement is false.	0.5
5	Writes the 3rd and the 14th terms of the AP as: $a + 2d = -9$ $a + 13d = 35$ where *a* is the first term and *d* is the common difference of the AP.	1
	Solves the above pair of linear equations to obtain the values of *a* and *d* as (-17) and 4 respectively.	1.5
	Formulates the equation to find the *n*th term which is five times the 6th term as: $a + (n - 1)d = 5(a + 5d)$	1

Q.No	What to look for	Marks
	Substitutes the values of *a* and *d* in the above equation and solves it as follows. **-17 + 4(*n* - 1) = 5(-17 + 20)** **=> -17 + 4(*n* - 1) = 15** **=> 4(*n* - 1) = 32** **=> (*n* - 1) = 8** **=> *n* = 9** **Concludes that the required term is the 9 th term.**	**1.5**