Apply Sequences and Series in Solving Problems

1. Determine whether the following sequences are arithmetic sequences. If they are, write down the next two terms.

   a. 2, 5, 8, ...   b. 10, 15, 22, …   c. 6, 9, 12, …   d. 50, 47, 44, ...

2. State the common differences in the following arithmetic sequences:

   a. 3, 7, 11, 15, ...   b. -5, 0, 5, 10, ...   c. 20, 16, 12, 8, ...

3. List the next three terms in the following arithmetic sequences:

   a. 4, 7, 10, 13, ...   b. 15, 12, 9, 6, ...   c. 25, 21, 17, 13, ...

4. The nth term of an arithmetic sequence is $t_n = 2n + 3$. Find the first four terms of the sequence.

5. Determine the values of a (the first term) and d (the common difference) for each of the following arithmetic sequences:

   a. 2, 6, 10, 14, ...   b. 75, 70, 65, 60, ...   c. 1, 1.5, 2, 2.5, ...   d. 4, 5.3, 6.6, 7.9, ...

6. List the first five terms of the arithmetic sequences for which the values of a (first term) and d (common difference) are given:

   a. a = 12, d = 3   b. a = -8, d = 5   c. a = 4, d = -2   d. a = 0.5, d = 1.3

7. Calculate the 20th term in the arithmetic sequence: 5, 10, 15, 20, ...

8. In an arithmetic sequence, the 17th term is 48 and the 20th term is 120. Find the first term (a) and the common difference (d).

9. The first term of an arithmetic sequence is 19 and the 9th term is 83. Calculate the common difference.

10. For the arithmetic sequence -2, 2, 6, 10, ..., calculate n if $t_n = 54$.

11. Find the number of terms in the arithmetic sequence 1, 4, 7, ..., 100.

12. The 17th term of an arithmetic sequence is -55. If the common difference is -3, calculate the first term.

13. In a geometric sequence, the first term is 3 and the common ratio is 2. Find the 8th term.

14. The 5th term of a geometric sequence is 192 and the 8th term is 1536. Find the first term and the common ratio.

15. The sum of the first 10 terms of a geometric sequence is 1023. The sum of the first 15 terms is 2047. Find the first term and the common ratio.

ANSWERS:Apply Sequences and Series in Solving Problems

1. a. Arithmetic, next two terms are 11, 14

   b. Not arithmetic

   c. Arithmetic, next two terms are 15, 18

   d. Arithmetic, next two terms are 41, 38

2. a. 4

   b. 5

   c. -4

3. a. 16, 19, 22

   b. 3, 0, -3

   c. 9, 5, 1

4. 5, 7, 9, 11

5. a. a = 2, d = 4

   b. a = 75, d = -5

   c. a = 1, d = 0.5

   d. a = 4, d = 1.3

6. a. 12, 15, 18, 21, 24

   b. -8, -3, 2, 7, 12

   c. 4, 2, 0, -2, -4

   d. 0.5, 1.8, 3.1, 4.4, 5.7

7. 105

8. a = -336, d = 24

9. d = 8

10. n = 15

11. 34 terms

12. a = -70

13. 192

14. a = 3, r = 2

15. a = 3, r = 2