

# Arithmetic Series

*Level 1 – 2*

1. Calculate the value of the sum of the first  $n$  terms of the following arithmetic series.

a)  $t_1 = 3, n = 14, d = 2$  .....

b)  $t_1 = 7, n = 20, d = -1$  .....

c)  $t_1 = -5, n = 27, d = 3$  .....

d)  $t_1 = 10, n = 20, d = -4$  .....

e)  $t_1 = 50, n = 21, d = -5$  .....

f)  $t_1 = 40, n = 7, d = 0$  .....

2. Calculate the sum of the first ten terms of the following arithmetic series:

a)  $t_1 = -4, t_{10} = 23$  .....

b)  $t_1 = 0, t_{10} = 90$  .....

c)  $t_1 = 8, t_{10} = -16$  .....

d)  $t_1 = 53, t_{10} = 17$  .....

e)  $t_1 = 81, t_{10} = -36$  .....

f)  $t_1 = 2.5, t_{10} = -2$  .....

3. The sum of the first five terms of an arithmetic sequence is 70. If the fifth term is 20, find the first term.

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Level 3 – 4

4. Using an appropriate formula, calculate the value of the following arithmetic series:

a)  $5 + 7 + 9 + \dots + 81$  .....

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b)  $70 + 66 + 62 + \dots + (-74)$  .....

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c)  $(-12) + (-9) + (-6) + \dots + 69$  .....

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d)  $91 + 84 + 77 + \dots + (-91)$  .....

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e)  $(-5) + 0 + 5 + \dots + 90$  .....

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f)  $1.0 + 1.5 + 2.0 + \dots + 21.5$  .....

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5. a) If  $t_n = 3n - 7$  calculate the sum of the first 25 terms.

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b) If  $t_n = t_{n-1} + 3$  and  $t_1 = 6$  calculate the sum of the first 17 terms.

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c) If  $t_n = 5 - 2n$  calculate the sum of the first 38 terms.

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d) If  $t_n = t_{n-1} - 2$  and  $t_1 = 2$  calculate the sum of the first 21 terms.

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Level 5 – 6

6. Calculate the sum of the 50 largest even numbers which are less than 143.

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7. Calculate the sum of the 20 smallest multiples of 3 which are greater than 50.

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8. The sum of the first 3 terms of an arithmetic sequence is 15. The sum of the first 4 terms is 28. The sum of the first 5 terms is 45. Find the sum of the first 6 terms.

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9. Peter invests \$10 on week 1. The amount he invests on each subsequent week is \$5 more than the amount he invested the previous week. After week 20 how much has he invested in total?

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10. The sum of the first  $n$  terms of an arithmetic series is given by  $S_n = n^2 + 6n$ . Find the first 4 terms.

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11. The sum of the first  $n$  terms of an arithmetic series with first term 2 and common difference 3 is 126. Determine the value of  $n$ .

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12. The sum of the first  $n$  terms of an arithmetic series with first term -5 and common difference -2 is -221. Determine the value of  $n$ .

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13. The sum of the first 3 terms of an arithmetic series is 12. The sum of the first 10 terms is 110. Find the first term and the common difference.

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14. Calculate the minimum amount of terms needed for the following series to first exceed 600:

$$10 + 16 + 22 + \dots$$

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15. Determine the value of

$$1 + 2 + 5 + 6 + 9 + 10 + \dots + 197 + 198$$

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16. The sum of the first  $n$  terms of an arithmetic sequence minus the sum of the next  $n$  terms is equal to -16. Determine all possible pairs of integer values for  $n$  and  $d$ .

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