ARITHMETIC SEQUENCES & SERIES WORKSHEET

The **value of the nth term of an arithmetic sequence** is given by the formula
$\mathbf{a_n = a_1 + (n - 1)d}$ where $\mathbf{a_1}$ is the **first term** in the sequence, $\mathbf{n}$ is the **position** of the term in the sequence, and $\mathbf{d}$ is the **common difference**.

Finding the sum of a given arithmetic sequence:

1. Identify a_1, n, and d for the sequence.

2. If one of the above is not known, use $a_n = a_1 + (n-1) \cdot d$ to find it.

3. Substitute and evaluate: $S_n = \dfrac{n}{2}(a_1 + a_n)$

1. Write down the stated term and the formula for the nth term of the following arithmetic sequences

    a. 7, 11, 15, …   (7th)   c. 18, 11, 4, …   (6th)

    b. -7, -5, -3, …   (23rd)   d. 3, 3 ½, 4, …   (16th)

3. Find the sum of the following arithmetic series and write in summation notation.

    a. 4, 11, …   to 16 terms   c. 3, 8 ½, …   to 20 terms

    b. 19, 13, …   to 10 terms   d. -9, -1, …   to 8 terms

    e. 5, 9, 13, …, 101   f. 83, 80, 77, …, 5

g. -17, -12, -7,..., 33

h. 1, 1 ¼ , 1 ½, ... 9 ¾

4. Fill in the gaps in this arithmetic sequence: -3, ___, ___, ___, ___, ___, 12

5. An arithmetic sequence has a 10th term of 17 and a 14th term of 30. Find the common difference.

6. An arithmetic sequence has a 7th term of 54 and a 13th term of 94. Find the common difference.

7. Find the sum of the positive terms of the arithmetic sequence 85, 78, 71, ... 1

8. A theater has 32 rows of seats. If there are 26 seats in the 1st row, 30 in the 2nd, 34 in the 3rd, and so on, how many seats are there in all? Assume the pattern continues.

9. There are 20 rows of seats on a concert hall: 25 seats are in the 1st row, 27 seats on the 2nd row, 29 seats on the 3rd row, and so on. If the price per ticket is $32, how much will be the total sales for a one-night concert if all seats are taken?

10. How many terms of the arithmetic sequence {1,3,5,7,...} will give a sum of 961?

11. How many terms of the arithmetic sequence {2,4,6,8,...} will give a sum of 600?

Arithmetic Sequences & Series   (Key)

1.) a) $a_n = 4n+3$

$a_7 = 31$

b) $a_n = 2n-9$

$a_{23} = 37$

c) $a_n = -7n+25$

$a_6 = -17$

d) $a_n = \frac{1}{2}n + \frac{5}{2}$

$a_{16} = \frac{21}{2}$

3.) a) $S_{16} = 904$

$$\sum_{n=1}^{16} 7n-3$$

b) $S_{10} = -85$

$$\sum_{n=1}^{10} -6n+24$$

e) $S_{25} = 1,325$

$$\sum_{n=1}^{25} 4n+1$$

g) $S_{11} = 88$

$$\sum_{n=1}^{11} 5n-22$$

c) $S_{20} = 1,105$

$$\sum_{n=1}^{20} \frac{11}{2}n - \frac{5}{2}$$

d) $S_8 = 152$

$$\sum_{n=1}^{8} 8n-17$$

f) $S_{27} = 1,188$

$$\sum_{n=1}^{27} -3n+86$$

h) $S_{36} = \frac{387}{2}$ or $193\frac{1}{2}$

$$\sum_{n=1}^{36} \frac{1}{4}n + \frac{3}{4}$$

4.) $-\frac{1}{2}, 2, \frac{9}{2}, 7, \frac{19}{2}$

6.) $d = \frac{20}{3}$

8.) $S_{32} = 2,816$ seats

10.) 31 terms

5.) $d = \frac{13}{4}$

7.) $S_{13} = 559$

9.) $28,160.00$

11.) 24 terms