

Arithmetic Series (Part Two)

Example: The third term of an arithmetic series is 8 and the sixth term is 17. Find the sum of the first 20 terms.

$$t_3 = 8$$

$$t_6 = 17$$

$$S_{20} = ?$$



$$8 + 3d = 17$$

$$3d = 9$$

$$d = 3$$

$$t_3 = 8$$

$$a + (3-1) \cdot 3 = 8$$

$$a + 6 = 8$$

$$a = 2$$

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

$$S_{20} = \frac{20}{2}(2(2) + (20-1)(3))$$
$$= 610$$

Example: The sum of the first 5 terms of an arithmetic series is 170. The sum of the first 6 terms is 225. The common difference is 7. Determine the first 4 terms of the series.

$$S_5 = 170$$

$$S_6 = 225$$

$$d = 7$$

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

$$170 = \frac{5}{2}(2a + 4(7))$$

$$68 = 2a + 28$$

$$2a = 40$$

$$a = 20$$

20, 27, 34, 41

Example: The sum of the first 2 terms of an arithmetic series is 6 and the sum of the first 5 terms is 45. Determine the first 5 terms of the series.

$$S_2 = 6$$

$$a + a + d = 6$$

$$S_5 = 45$$

$$\textcircled{1} \quad 2a + d = 6$$

and

$$\frac{5}{2} (2a + (4)d) = 45$$

$$\textcircled{2} \quad 2a + 4d = 18$$

$$\textcircled{1} - \textcircled{2}$$

$$-3d = -12$$

$$d = 4$$

and

$$2a + 4 = 6$$

$$2a = 2$$

$$a = 1$$

$$\boxed{1, 5, 9, 13, 17}$$