

Unit 6: Sequences and Series

Common difference


6.2 Arithmetic Series

Series - the sum of a sequence
ie. sequence: 2, 4, 6, 8
series: 2 + 4 + 6 + 8

Arithmetic Series

$$S_n = \frac{n(t_1 + t_n)}{2} \text{ or } S_n = \frac{n[2t_1 + d(n-1)]}{2}$$

n, t_1, t_n t_1, d, n



Ex.) Suppose that under certain circumstances, a particular firefly flashes twice in the first minute, four times in the second minute and six times in the third minute.

a) If the pattern continues, what is the number of flashes in the 30th minute?

$$\frac{2}{t_1}, \frac{4}{t_2}, \frac{6}{t_3}$$

$$t_n = t_1 + (n-1)d$$

$$t_{30} = 2 + (30-1)2$$

$$t_{30} = 60 \text{ flashes}$$

b) What is the total number of flashes in 30 minutes?

$$S_n = \frac{n}{2} [t_1 + t_n]$$

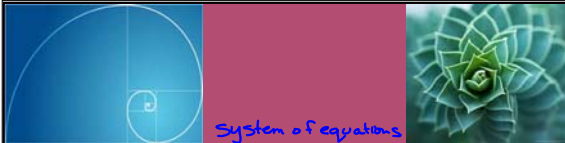
$$S_{30} = \frac{30}{2} [2 + 60]$$

$$S_{30} = 930 \text{ flashes}$$

$$S_n = \frac{n}{2} (2t_1 + (n-1)d)$$

$$S_{30} = \frac{30}{2} (2 \cdot 2 + (30-1)2)$$

$$S_{30} = 930 \text{ flashes}$$



System of Equations

Ex.) The sum of the first two terms of an arithmetic series is 13 and the sum of the first four terms is 46. Determine the first six terms of the series and the sum to six terms.

$$S_n = \frac{n}{2}(2t_1 + (n-1)d) \quad S_n = \frac{n}{2}(2t_1 + (n-1)d)$$

$$13 = \frac{2}{2}(2t_1 + (2-1)d) \quad 46 = \frac{4}{2}(2t_1 + (4-1)d)$$

$$\underline{13 = 2t_1 + d} \quad 46 = 2(2t_1 + 3d)$$

$$\quad \quad \quad 46 = 4t_1 + 6d$$

$$-6 \cdot (13 = 2t_1 + d) \quad 13 = 2(4) + d$$

$$46 = 4t_1 + 6d \quad 13 = 8 + d$$

$$+ \quad -78 = -12t_1 - 6d \quad \underline{5 = d}$$

$$46 = 4t_1 + 6d$$

$$\frac{-32 = -8t_1}{-8} \quad \underline{4 = t_1}$$

$$\underline{4, 9, 14, 19, 24, 29}$$

$$S_6 = \frac{6}{2}(4 + 29) = \underline{99}$$

Pg. 27 # 1ad, 2ad, 3ad, 4ad, 5ad, 6ad, 9-11.