

# NCERT Discrete - 11.5.9.2

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**Question:** The sum of three numbers in an arithmetic progression (AP) is 24 and the product of those three numbers is 440, find the values of the three numbers.

**Solution:** The following information is provided in the question:

Parameter	Value	Description
$d$	3	common difference
$x(n)$	$(x(0) + n \times d) u(n)$	$(n+1)$ th term
$S(n)$	24	sum of $(n+1)$ terms
$p(n)$	440	product of $(n+1)$ terms

TABLE 0  
PARAMETERS

Therefore, The required three numbers in AP is 5, 8 and 11.

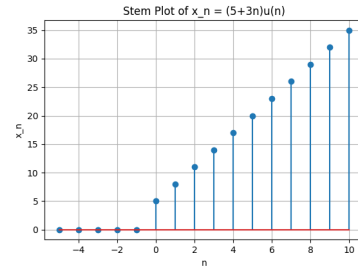


Fig. 0. stem plots of  $x(n)$

Let the three numbers in the arithmetic progression be denoted as  $x(0)$ ,  $x(1)$ , and  $x(2)$ . Then,

$$S(2) = x(0) + x(1) + x(2) \quad (1)$$

$$x(n) = (x(0) + n \times d) u(n) \quad (2)$$

$$x(1) = x(0) + d \quad (3)$$

$$x(2) = x(0) + 2d \quad (4)$$

$$S(2) = x(0) + (x(0) + d) + (x(0) + 2d) \quad (5)$$

$$3 \times (x(0) + d) = 24 \quad (6)$$

$$x(0) + d = 8 \quad (7)$$

$$x(0) = 8 - d \quad (8)$$

$$x(1) = 8 \quad (9)$$

$$x(2) = 8 + d \quad (10)$$

$$p(2) = x(0) \times x(1) \times x(2) \quad (11)$$

$$(8) \times (8 - d) \times (8 + d) = 440 \quad (12)$$

$$(8 - d) \times (8 + d) = 55 \quad (13)$$

$$d = 3 \quad (14)$$

$$x(0) = 5 \quad (15)$$

$$x(n) = (x(0) + n \times d) u(n) \quad (16)$$

$$= (5 + 3n) u(n) \quad (17)$$

$$\text{From } (??) \quad (18)$$

$$X(z) = \frac{5 - 8z^{-1}}{(1 - z^{-1})^2}; \quad |z| > |1| \quad (19)$$