

INTRODUCTION TO LINEAR POLYNOMIALS**SELECTED IMPORTANT QUESTIONS FROM GANITA MANJARI**

1. Find the degrees of the following polynomials:

(i) $2x^2 - 5x + 3$

(ii) $y^3 + 2y - 1$

(iii) -9

(iv) $4z - 3$

Hint: Degree of a polynomial is the highest exponent of its variable.

2. The present age of Salil's mother is three times Salil's present age. After 5 years, their ages will add up to 70 years. Find their present ages.

Hint: Let Salil's present age be x years. Then, his mother's present age = $3x$ years.

According to the question,

$$(x + 5) + (3x + 5) = 70$$

3. The difference between two positive integers is 63. The ratio of the two integers is 2: 5. Find the two integers.

Hint: Let the two integers be $2k$ and $5k$ ($k > 0$).

$$\text{Their difference} = 5k - 2k = 3k.$$

4. A student has ₹ 500 in her savings bank account. She gets ₹ 150 every month as pocket money. How much money will she have at the end of every month from the second month onwards? Find a linear expression to represent the amount she will have in the n^{th} month.

Sol. Let the amount at the end of n^{th} month be ₹ y .

Initial amount = ₹500

Monthly addition = ₹150

Amount at the end of 1st month

$$= 500 + 150 \times 1 = ₹650$$

Amount at the end of 2nd month

$$= 500 + 150 \times 2 = ₹800$$

Amount at the end of 3rd month

$$= 500 + 150 \times 3 = ₹950$$

Amount at the end of 4th month

$$= 500 + 150 \times 4 = ₹1100$$

Thus, the required equation is given by $y = 500 + 150n$.



5. Suppose the length of a rectangle is 13 cm . Find the area if the breadth is (i) 12 cm , (ii) 10 cm , (iii) 8 cm . Find the linear pattern representing the area of the rectangle.

Sol. Length of rectangle = 13 cm

We know,

Area of rectangle = length $\times$ breadth

(i) When breadth = 12 cm

$$\text{Area} = 13 \times 12 = 156 \text{ cm}^2$$

(ii) When breadth = 10 cm :

$$\text{Area} = 13 \times 10 = 130 \text{ cm}^2$$

(iii) When breadth = 8 cm :

$$\text{Area} = 13 \times 8 = 104 \text{ cm}^2$$

Let the breadth be b cm and area be A .

$$\therefore A = 13b$$

Thus, the linear pattern representing the area is $A = 13b$, where 13 is the constant rate of change (slope).

6. Suppose the length of a rectangular box is 7 cm and breadth is 11 cm . Find the volume if the height is (i) 5 cm , (ii) 9 cm , (iii) 13 cm . Find the linear pattern representing the volume of the rectangular box.

Sol. Volume of a rectangular box

= length $\times$ breadth $\times$ height

$$= 7 \times 11 \times \text{height} = 77 \times \text{height}$$

(i) For height = 5 cm

$$\text{Volume} = 77 \times 5 = 385 \text{ cm}^3$$

(ii) For height = 9 cm

$$\text{Volume} = 77 \times 9 = 693 \text{ cm}^3$$

(iii) For height = 13 cm

$$\text{Volume} = 77 \times 13 = 1001 \text{ cm}^3$$

Let height be h cm and volume be V cm³.

$$\therefore V = 77h$$

Thus, the linear pattern representing the volume is $V = 77h$, where 77 is the constant rate of change (slope).



7. The initial population of a village is 750. Every year, 50 people move from a nearby city to the village.

(i) Find the population of the village after 6 years.

(ii) Make a table of values for t varying from 0 to 10 years and show how the population, P , increases every year.

(iii) Find an expression that relates P and t , and explain why it represents linear growth.

Sol. (i) People moved in 6 years

$$= 50 \times 6 = 300$$

Population of the village after 6 years = $750 + 300 = 1050$.

(ii) Table for $t = 0$ to 10 years:

t	P
0	750
1	$750 + 50 \times 1 = 800$
2	$750 + 50 \times 2 = 850$
3	$750 + 50 \times 3 = 900$
4	$750 + 50 \times 4 = 950$
5	$750 + 50 \times 5 = 1000$
6	$750 + 50 \times 6 = 1050$
7	$750 + 50 \times 7 = 1100$
8	$750 + 50 \times 8 = 1150$
9	$750 + 50 \times 9 = 1200$
10	$750 + 50 \times 10 = 1250$

(iii) The required expression is given by $P = 750 + 50t$.

This represents linear growth because the population increases by a constant amount (50 people) every year.

8. A gym charges a fixed monthly fee and an additional cost per hour for using the badminton court. A student using the gym observed that when she used the badminton court for 10 hours, her bill was ₹800. When she used it for 15 hours, her bill was ₹ 1100 . If the monthly bill y depends on the hours of use of the badminton court, x , according to the relation $y = ax + b$,



find the values of a and b .

Hint: According to given question

$$\begin{aligned}800 &= 10a + b \\1100 &= 15a + b\end{aligned}$$

Solve for a and b .

9. Write a polynomial of degree 3 in the variable x , in which the coefficient of the x^2 term is -7 .
Hint: A polynomial of degree 3 generally is of form: $f(x) = ax^3 + bx^2 + cx + d, a \neq 0$.
Since the coefficient of the x^2 (i.e., b) is -7 , we can choose arbitrary values for the other coefficients (provided $a \neq 0$).
10. A positive number is 5 times another number. If 21 is added to both the numbers, then one of the new numbers becomes twice the other new number. What are the numbers?
Hint: Let the smaller number be x , then the larger number is $5x$.
According to given question, we have $5x + 21 = 2(x + 21)$
11. If you have ₹800 and you save ₹250 every month, find the amount you have after (i) 6 months (ii) 2 years. Express this as a linear pattern.
Hint: Let amount after n months be A .

$$\therefore A = 800 + 250n$$

ANSWER KEY

1. (i) 2
(ii) 3
(iii) 0 (iv) 1
2. 15 years, 45 years
3. 42,105
4. $a = 60, b = 200$
5. 7,35
6. (i) ₹ 2300
(ii) ₹ 6800



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