📘 Class 9 Maths – Ganita Manjari

⭐ Chapter 2: Introduction to Linear Polynomials

📝 End-of-Chapter Exercises – Solutions

🟢 Q1. Polynomial of Degree 3

Write a polynomial of degree 3 in x in which the coefficient of x^2 is –7.

✅ Answer:

$x^3 – 7x^2 + 2x + 1$

🟢 Q2. Find the Value

(i) $5x^2 – 3x + 7$, when x = 1

$= 5(1)^2 – 3(1) + 7$
$= 5 – 3 + 7$
$=$ **9**

✅ Answer: **9**

(ii) $4t^3 – t^2 + 6$, when t = a

✅ Answer:

$4a^3 – a^2 + 6$

🟢 Q3. Find the Number

A number is multiplied by 5/2 and 2/3 is added to it. The result is –7/12.

Let the number be x.

$5x/2 + 2/3 = –7/12$

5x/2 = –5/4

x = –1/2

✅ Answer: **–1/2**

🟢 Q4. Two Numbers

One positive number is 5 times another number. If 21 is added to both numbers, one becomes twice the other.

Let the smaller number be x.

Larger number = 5x

5x + 21 = 2(x + 21)

5x + 21 = 2x + 42

3x = 21

x = 7

Larger number = 5 × 7 = 35

✅ Answer: **7 and 35**

🟢 Q5. Savings

You have ₹800 and save ₹250 every month.

(i) After 6 months

800 + 250 × 6 = 2300

✅ Answer: **₹2,300**

(ii) After 2 years

2 years = 24 months

800 + 250 × 24 = 6800

✅ Answer: **₹6,800**

📌 Linear pattern:

800 + 250n

⭐ Q6. Two-Digit Number

The digits of a two-digit number differ by 3. When the digits are interchanged and added to the original number, the sum is 143.

Let the digits be a and b.

a + b = 13

a – b = 3

Therefore:

a = 8
b = 5

Original number = **85**

Interchanged number = **58**

✅ Answer: **85 and 58**

⭐ Q7. Graphs of Linear Polynomials

(i) y = –3x + 4

📈 Slope = **–3**
📍 y-intercept = **4**

(ii) 2y = 4x + 7

y = 2x + 7/2

📈 Slope = **2**
📍 y-intercept = **7/2**

(iii) 5y = 6x – 10

y = 6x/5 – 2

📈 Slope = **6/5**
📍 y-intercept = **–2**

(iv) 3y = 6x – 11

y = 2x – 11/3

📈 Slope = **2**
📍 y-intercept = **–11/3**

⭐ **Parallel lines:**
(ii) and (iv) because both have slope **2**.

⭐ Q8. Kelvin and Fahrenheit

Given:

y = 9/5(x – 273) + 32

(i) When x = 313 K

y = 9/5(313 – 273) + 32

y = 104

✅ Answer: **104°F**

(ii) When y = 158°F

158 = 9/5(x – 273) + 32

x = 343

✅ Answer: **343 K**

⭐ Q9. Work and Distance

Work = Force × Distance

Given force = 3 units.

Therefore:

w = 3d

When d = 2:

w = 3 × 2
w = 6

✅ Answer:

w = 3d

Work done = 6 units

⭐ Q10. Linear Polynomial

The linear polynomial p(x) passes through:

(1, 5) and (3, 11)

Let:

p(x) = ax + b

Using the two points:

5 = a + b

11 = 3a + b

Subtracting:

6 = 2a

a = 3

b = 2

Therefore:

✅ **p(x) = 3x + 2**

📍 y-intercept = **(0, 2)**

📍 x-intercept:

3x + 2 = 0

x = –2/3

✅ **x-intercept = (–2/3, 0)**

⭐ Q11. Two Linear Polynomials

Given:

p(x) = ax + b
q(x) = cx + d

p(0) = 5

Therefore:

b = 5

Using the given conditions:

✅ **p(x) = 2x + 5**

✅ **q(x) = 4x – 1**

⭐ Q12. Matchstick Pattern 🔥

Number of matchsticks:

Stage 1 = 6
Stage 2 = 11
Stage 3 = 16
Stage 4 = 21
Stage 5 = 26

📌 Pattern:

6, 11, 16, 21, 26, ...

Each new stage adds **5 matchsticks**.

Formula:

5n + 1

(i) Stage 4 = **21**

Stage 5 = **26**

(ii) Pattern = 6, 11, 16, 21, 26, ...

(iii) nth stage = **5n + 1**

(iv) 15th stage

5 × 15 + 1 = 76

✅ Answer: **76 matchsticks**

(v) Can 200 matchsticks form a complete stage?

5n + 1 = 200

n = 39.8

Since the stage number cannot be a decimal:

❌ **No**

⭐ Q13. Parallel Linear Polynomials

p(x) passes through:

(2, 3) and (6, 11)

Slope:

(11 – 3)/(6 – 2) = 2

Therefore:

✅ **p(x) = 2x – 1**

Since q(x) is parallel to p(x):

Slope of q(x) = 2

q(x) passes through (4, –1).

Therefore:

✅ **q(x) = 2x – 9**

📍 x-intercept of p(x):

2x – 1 = 0

x = 1/2

✅ **(1/2, 0)**

📍 x-intercept of q(x):

2x – 9 = 0

x = 9/2

✅ **(9/2, 0)**

⭐ Q14. Linear Functions

Given:

f(x) = ax + a, where a > 0

Factorise:

f(x) = a(x + 1)

Put x = –1:

f(–1) = a(–1 + 1)

f(–1) = 0

Therefore, all these lines pass through:

📍 **(–1, 0)**

Also, since a > 0:

📈 **All the lines have positive slopes.**

✅ Answer: **All the lines pass through the common point (–1, 0).**

📋 ⭐ Quick Answer Key

1. **$x^3 – 7x^2 + 2x + 1$**
2. **(i) 9 (ii) $4a^3 – a^2 + 6$**
3. **–1/2**
4. **7 and 35**
5. **₹2,300; ₹6,800; 800 + 250n**
6. **85 and 58**
7. **Slopes: –3, 2, 6/5, 2; (ii) and (iv) are parallel**
8. **104°F; 343 K**
9. **w = 3d; 6 units**
10. **p(x) = 3x + 2**
11. **p(x) = 2x + 5; q(x) = 4x – 1**
12. **5n + 1; 15th stage = 76; 200 not possible**
13. **p(x) = 2x – 1; q(x) = 2x – 9**
14. **Common point = (–1, 0)**