🟦 Chapter 4: Linear Equations in Two Variables

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🧠 Basic Concepts

🟦 A Linear Equation in Two Variables is of the form:
👉 ax + by + c = 0
Where a, b, and c are real numbers, and a ≠ 0, b ≠ 0

Examples:

- 2x + 3y = 6 ✅
- x − y = 5 ✅
- 5x = 7 ❌ (This is linear, but in one variable)

✍️ It's called “linear” because its graph is always a straight line!

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🗒️ Important Properties

✔️ A linear equation in two variables has INFINITELY MANY solutions. 😮
✔️ You can make a table of values like:

x	y
0	2
1	1
2	0

✔️ The graph of ax + by + c = 0 is always a straight line! 📈
✔️ Every solution (x, y) lies on the line; every point on the line is a solution!

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✏️ Graphical Representation

📍 **To draw a line:**

1. Choose two values of x and find corresponding y
2. Plot the two (x, y) points
3. Join the points — that's your line! ✨

🧊 Example: Equation: 2x + 3y = 6
Put x = 0 → y = 2 → (0, 2)
Put y = 0 → x = 3 → (3, 0)
Plot and join → Straight line!

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📌 Important Forms of Equations

- x = a → vertical line (parallel to y-axis)
- y = b → horizontal line (parallel to x-axis)
- y = mx + c → slope-intercept form (m is slope, c is y-intercept)

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📝 Sample Real-Life Examples

💡 Example 1: Autorickshaw Fare
Fixed charge: ₹10 for first 1 km
Additional ₹4/km after that
Let x = distance, y = fare
Equation: y = 4x + 6

💡 Example 2: Work = Force × Distance
If Force = 3 units
Equation: y = 3x

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📊 Points to Remember

✨ If you add/subtract/multiply/divide both sides of a linear equation by the same non-zero number, the equation stays the same.

✨ x = 5 is written as: 1·x + 0·y = 5
✨ y = 4 → line parallel to x-axis and 4 units above

✨ All points on x-axis → (x, 0)
✨ All points on y-axis → (0, y)
✨ All points on y = x → (a, a)

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🎯 MCQ Style Practice (With Answers)

❓ The linear equation 3x − y = x − 1 has:
✅ Infinitely many solutions

❓ The graph of y = 6 is:
✅ A horizontal line 6 units above x-axis

❓ The equation whose graph passes through (1,1) and (2,3) is:
✅ y = 2x − 1

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🔬 Application-Based Problems

🎯 Q. Draw the graph of y = x and y = −x on the same graph.
🟢 They intersect at (0, 0) and are mirror images.

🎯 Q. Write the linear equation where every point on it has y = 3x
✅ y = 3x

🎯 Q. Celsius to Fahrenheit:
Equation: 5F − 160 = 9C
Solve for given values!

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📐 Concept Check Table

Concept	Example / Result
Graph of 2x + 3y = 6	Straight line, cuts x-axis at (3, 0)
Graph of y = x	Diagonal line through origin
Graph of y = 4	Parallel to x-axis, 4 units above
Equation for autorickshaw fare	y = 4x + 6
Fahrenheit to Celsius formula	5F − 160 = 9C

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💡 Final Tips to Remember

📍 Any linear equation in two variables → Straight line on graph
📍 More than one solution → Infinite points on the line
📍 Always label your axes and points clearly when drawing 📏