Equations Reducible to Linear Form

Understanding of Equations Reducible to Linear Form

- Some equations may not look linear at first but can be transformed into a linear form by simple operations.
- These operations include cross-multiplication, clearing fractions, removing brackets, or making suitable substitutions.
- After reducing them to linear form, they are solved using usual linear equation methods.

Important Points

- If fractions are present, multiply by LCM to eliminate denominators.
- Simplify both sides of the equation fully.
- Bring variable terms on one side and constants on the other.
- Always maintain equality by performing the same operation on both sides.
- After reduction, solve using rules of linear equations.

Examples with Solutions

Example: Clearing Fractions

> Solve: $\frac{x}{2} + \frac{x}{3} = 5$.
Solution: LCM of 2 and 3 = 6
Multiply whole equation by 6
3x + 2x = 30
5x = 30
x = 6

Example: Cross Multiplication

Solve: $\frac{2x-3}{5} = \frac{x+1}{2}$. Solution: Cross-multiply 2(2x-3) = 5(x+1) 4x-6 = 5x+5 4x-5x = 5+6 -x = 11x = -11

Example: Removing Brackets

> Solve: 3(x - 2) + 2(x + 5) = 0. Solution: Expand 3x - 6 + 2x + 10 = 05x + 4 = 05x = -4 $x = -\frac{4}{5}$ Example: Substitution to Reduce

Solve: $\sqrt{x} + 3 = 7$. Solution: Let $\sqrt{x} = y$ Equation becomes y + 3 = 7y = 4Now $\sqrt{x} = 4$ x = 16

Example: Fractions on Both Sides

> Solve:
$$\frac{x+2}{4} = \frac{x-1}{3}$$
.

Solution: Cross-multiply

$$3(x + 2) = 4(x - 1)$$

$$3x + 6 = 4x - 4$$

$$3x - 4x = -4 - 6$$

$$-x = -10$$

$$x = 10$$

Summary Points

- Some complicated equations can be simplified to a linear form.
- Clear fractions and brackets first.
- Use cross–multiplication when fractions are set equal.
- Make substitution when required to reduce to a linear form.
- Solve using usual linear equation rules after simplification.