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CBSE Class 10- Mathematics: Chapter – 4 Quadratic Equations Part 1

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Question 1:

Solve by factorization

(a) $4x^2 - 4a^2x + (a^4 - b^4) = 0$

Answer:

a. $4x^2 - 4a^2x + (a^4 - b^4) = 0$

$$4x^2 - [2(a^2 + b^2) + 2(a^2 - b^2)]x + (a^2 - b^2)(a^2 + b^2) = 0$$

$$\Rightarrow 2x[2x - (a^2 + b^2)] - (a^2 - b^2)[2x - (a^2 + b^2)] = 0.$$

$$\Rightarrow x = \frac{a^2 + b^2}{2}$$

$$x = \frac{a^2 - b^2}{2}$$

b. $x^2 + \left(\frac{a}{a+b} + \frac{a+b}{a}\right)x + 1 = 0$

Answer

$$x^2 + \left(\frac{a}{a+b} + \frac{a+b}{a}\right)x + 1$$

$$\Rightarrow x^2 + \left(\frac{a}{a+b}x + \frac{a+b}{a}x + \frac{a}{a+b} \cdot \frac{a+b}{a}\right)$$

$$\Rightarrow \left[x + \frac{a}{a+b}\right] + \frac{a+b}{a} \left[x + \frac{a}{a+b}\right] = 0$$

$$\Rightarrow x = \frac{-a}{a+b}$$

$$x = \frac{(-a+b)}{a}a+b \neq 0,$$

c. $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}a+b \neq 0$

Answer:

$$\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$$

$$\Rightarrow \frac{1}{a+b+x} - \frac{1}{x} = \frac{1}{a} + \frac{1}{b} +$$

$$\Rightarrow \frac{x - (a + b + x)}{x(a + b + x)} = + \frac{a + b}{ab}$$

$$\Rightarrow (a + b) \{x(a + b + x) + ab\} = 0$$

$$\Rightarrow x(a + b + x) + ab = 0$$

$$\Rightarrow x^2 + ax + bx + ab = 0$$

$$\Rightarrow (x + a)(x + b) = 0$$

$$\Rightarrow x = -a$$

$$\Rightarrow x = -b$$

d. $(x - 3)(x - 4) \frac{34}{33^2}$

Answer:

$$(x - 3)(x - 4) = \frac{34}{33^2}$$

$$\Rightarrow x^2 - 7x + 12 = \frac{34}{33^2}$$

$$x^2 - 7x + \frac{13034}{33^2} = 0$$

$$x^2 - 7x + \frac{98}{33}x \frac{133}{33} = 0$$

$$x^2 - \frac{231}{33}x + \frac{98}{33}x \frac{133}{33} = 0$$

$$x^2 \left(\frac{98}{33} + \frac{133}{33} \right) x + \frac{98}{33}x \frac{133}{33} = 0$$

$$\Rightarrow \left(x - \frac{98}{33} \right) \left(x - \frac{133}{33} \right) = 0$$

$$\Rightarrow x = \frac{98}{33} \text{ or } x = \frac{133}{33}$$

$$e. x = \frac{1}{2 - \frac{1}{2 - \frac{1}{2 - x}}} x \neq 2$$

Answer:

$$x = \frac{1}{2 - \frac{1}{2 - \frac{1}{2 - x}}} x \neq 2$$

$$x = \frac{1}{2 - \frac{1}{2 - \frac{(2-x)}{4-2b-1}}}$$

$$x = \frac{1}{2 - \frac{2-x}{3-2x}}$$

$$\Rightarrow x = \frac{3 - 2x}{2(3 - 2x) - (2 - x)}$$

$$\Rightarrow x = \frac{3 - 2x}{4 - 3x}$$

$$\Rightarrow 4x - 3x^2 = 3 - 2x$$

$$\Rightarrow 3x^2 - 6x + 3 = 0$$

$$\Rightarrow (x - 1)^2 = 0$$

$$x = 1$$