

Quadratic Equation for ICSE and CBSE

1. Is $x=1$ a solution of $x^2+x+1=0$? Hint: $(-1)^2+(-1)+1=1\neq 0$, not a solution

2. Is $x=-3$ a solution of $x^2+2x-3=0$? Do yourself!

3. Is the equation $x^3-4x^2-x+1=(x-2)^3$ is a quadratic equation? Hint:

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

$$\Rightarrow x^3-4x^2-x+1=x^3-6x^2+12x-8$$

$$\Rightarrow 2x^2-13x+9=0$$

which is a quadratic equation? What about $(x-\sqrt{3})=\sqrt{3x}$?

4. Find the discriminant of $\frac{x-1}{x-2}+\frac{x-3}{x-4}=\frac{10}{3}$, hence solve it.

$$\frac{x-1}{x-2}+\frac{x-3}{x-4}=\frac{10}{3}$$

Hint: the given equation can be written as $\Rightarrow 2x^2-15x+25=0$

$$\therefore D=(-15)^2-4\times 2\times 25$$

5. Rewrite $\frac{x+1}{x-1}+\frac{x-2}{x+2}=3, x\neq 1, -2$ as quadratic equation in x . Hint:

$$\frac{x+1}{x-1}+\frac{x-2}{x+2}=3, x\neq 1, -2$$

$$\Rightarrow \frac{x^2+3x+2+x^2-3x+2}{(x-1)(x+2)}=3$$

$$\Rightarrow 2x^2+4=3x^2+3x-6$$

$$\Rightarrow x^2+3x-10=0$$

$$\sqrt{2}x^2+7x+5\sqrt{2}=0$$

6. Solve $\sqrt{2}x^2+7x+5\sqrt{2}=0$. Hint: $\Rightarrow \sqrt{2}x^2+2x+5x+5\sqrt{2}=0$

$$\Rightarrow \sqrt{2}x(x+\sqrt{2})+5(x+\sqrt{2})=0$$

7. Solve $a^3x^2+(4-a^5)x-4a^2=0$

$$\Rightarrow a^3x^2+(4-a^5)x-4a^2=0$$

$$\Rightarrow x^2+\left(\frac{4}{a^3}-a^2\right)x-\frac{4}{a}=0$$

Hint: $\Rightarrow x^2+\left(2\frac{2}{a^3}-a^2\right)x-2a^2\frac{2}{a^3}=0$

$$\Rightarrow x^2+2\frac{2}{a^3}x-xa^2-2a^2\frac{2}{a^3}=0$$

$$\Rightarrow (x-a^2)\left(x+\frac{4}{a^3}\right)=0$$

8. Find the quadratic equation whose roots are a and $\frac{1}{a}$. Hint $(x-a)\left(x-\frac{1}{a}\right)=0$

9. Solve $9^{x+2} - 6 \cdot 3^{x+1} + 1 = 0$.Hint''

$$9^{x+2} - 6 \cdot 3^{x+1} + 1 = 0$$

$$\Rightarrow 81 \cdot 3^{2x} - 18 \cdot 3^x + 1 = 0$$

$$\text{Put } 3^x = t$$

$$\Rightarrow 81t^2 - 18t + 1 = 0$$

$$\Rightarrow t = \frac{1}{9}$$

$$\Rightarrow 3^x = 3^{-2}$$

$$\Rightarrow x = -2$$

10. Solve $16 \cdot 4^{x+2} - 16 \cdot 2^{x+1} + 1 = 0$

11. Solve $5^{4x} - 3 \cdot 5^{2x+1} = 250$

12. Solve $\left(\frac{2x-1}{x+1}\right) - 15\left(\frac{x+1}{2x-1}\right) = -2, x \neq -1, \frac{1}{2}$ Hint: Let

$$y = \frac{2x-1}{x+1}$$

$$\therefore \left(\frac{2x-1}{x+1}\right) - 15\left(\frac{x+1}{2x-1}\right) = -2$$

$$\Rightarrow y - \frac{15}{y} + 2 = 0$$

$$\Rightarrow y^2 + 2y - 15 = 0$$

13. Solve $2\left(\frac{2x-1}{x+3}\right) - 3\left(\frac{x+3}{2x-1}\right) = 5, x \neq -3, \frac{1}{2}$

14. Solve $2\left(\frac{x-1}{x+3}\right) - 7\left(\frac{x+3}{x-1}\right) = 5, x \neq -3, 1$

15. Solve $abx^2 + (b^2 - ac)x - bc = 0$ Hint:

$$abx^2 + (b^2 - ac)x - bc = 0$$

$$\Rightarrow x^2 + \left(\frac{b}{a} - \frac{c}{b}\right)x - \frac{c}{a} = 0$$

$$\Rightarrow x\left(x + \frac{b}{a}\right) - \frac{c}{b}\left(x + \frac{b}{a}\right) = 0$$

$$\Rightarrow \left(x + \frac{b}{a}\right)\left(x - \frac{c}{b}\right) = 0$$

16. Solve: $4x^2 + 4bx - (a^2 - b^2) = 0$

17. Solve: $4x^2 - 2(a^2 + b^2)x + a^2b^2 = 0$ Hint:

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

$$\Rightarrow x^2 - \frac{1}{2}(a^2 + b^2)x + \frac{a^2b^2}{4} = 0$$

$$\Rightarrow x^2 - \left(\left(\frac{a}{\sqrt{2}} \right)^2 + \left(\frac{b}{\sqrt{2}} \right)^2 \right) x + \frac{a^2b^2}{\sqrt{2}\sqrt{2}} = 0$$

$$\Rightarrow x \left(x - \left(\frac{a}{\sqrt{2}} \right)^2 \right) - \left(\frac{b}{\sqrt{2}} \right)^2 \left(x - \left(\frac{a}{\sqrt{2}} \right)^2 \right) = 0$$

$$\Rightarrow \left(x - \left(\frac{a}{\sqrt{2}} \right)^2 \right) \left(x - \left(\frac{b}{\sqrt{2}} \right)^2 \right) = 0$$

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

18. Solve $4x^2 - 4a^2x + (a^4 - b^4) = 0$ Hint:

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

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

19. Determine if 3 is a root of the equation

$$\sqrt{x^2 - 4x + 3} + \sqrt{x^2 - 9} = \sqrt{4x^2 - 14x + 16} \text{ . Hint:}$$

$$\sqrt{3^2 - 4 \cdot 3 + 3} + \sqrt{3^2 - 9} \neq \sqrt{4 \cdot 3^2 - 14 \cdot 3 + 16} \text{ . So 3 is not a root of the equation.}$$

20. Find the values of p, q such that $x = -3$ and $x = \frac{2}{3}$ are the roots of

$$px^2 + 7x + q = 0 \text{ .}$$

21. Solve $9x^2 - 9(a+b)x + (2a^2 + 5ab + 2b^2) = 0$ Hint: Discriminate =

$$(-9(a+b))^2 - 4 \cdot 9(2a^2 + 5ab + 2b^2)$$

$$= 9(a-b)^2$$

22. Solve $a^2b^2x^2 - (4b^4 - 3a^4)x - 12a^2b^2 = 0$ Hint:

$$x = \frac{(4b^4 - 3a^4) \pm \sqrt{(4b^4 - 3a^4)^2 - 4 \cdot a^2b^2 \cdot (-12a^2b^2)}}{2a^2b^2}$$

$$x = \frac{(4b^4 - 3a^4) \pm \sqrt{(4b^4 - 3a^4)^2 + 48 \cdot a^4b^4}}{2a^2b^2}$$

$$x = \frac{(4b^4 - 3a^4) \pm \sqrt{(4b^4 + 3a^4)^2}}{2a^2b^2}$$

23. Solve $12abx^2 - (9a^2 - 8b^2)x - 6ab = 0$

24. Solve $abx^2 + (b^2 - ac)x - cb = 0$

25. Solve $p^2x + (p^2 - q^2)x - q^2 = 0$

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