

# QUADRATIC EQUATIONS. (TERM-2)

(PULKIT JAWAL)

## Type-1 Questions.

Q1. What is the degree of quadratic equation, and write the standard form.

Q2. Write the roots of this equation  $(x-2)^2$ .

Q3. Find the roots of the equation by FACTORISATION METHOD.

(a)  $x^2 - 4x - 21 = 0$

(b)  $m^2 + 5m - 6 = 0$

(c)  $k^2 = -11k - 30$

(d)  $6 = t(1+t)$

(e)  $x^2 - 289 = 0$

(f)  $y^2 - 784 = 0$

(g)  $-x^2 + 45x - 200 = 0$

(h)  $m^2 = 55m - 750$

(i)  $6n^2 - n - 2 = 0$

(j)  $x(2x+1) = 6$

(k)  $-20x + 1 = 100x^2$

(l)  $t^2 + 48t = 324$

(m)  $6 - m - m^2 = 0$

(n)  $x^3 + 11x^2 + 30x = 0$

(o)  $40m + 3m^2 - m^3 = 0$

(p)  $2x^2 + x = 300$

(q)  $2m - 3 = 1 + (m-2)^2$

(r)  $-m + \frac{1}{8} = -2m^2$

(s)  $9x^3 = 15x^2 - 6x$

(t)  $x^2 + 2x - 143 = 0$

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

(v)  $\frac{2}{m^2} = -2 + \frac{5}{m}$

Q4. Find the roots of the quadratic equation by Factorisation Method.

(a)  $10y = 3 + \frac{1}{y}$

(b)  $\frac{-5}{m} = -2 - \frac{2}{m^2}$

(c)  $x^2 - \frac{5}{2}x + \frac{3}{2} = 0$

(d)  $-18 = -5y + \frac{35}{y}$

(e)  $\frac{3x-7}{2x-3} = \frac{x+3}{x+2}$

(f)  $\frac{m}{m+1} + \frac{m+1}{m} = \frac{34}{15}$

Q5. Find the roots of the equation  $10m^2 - 40m - 210 = 0$  by Factorisation Method.

Q6. Find the solutions of  $22x^2 - 11x^2 - 231x = 0$  by Factorisation Method.

Q7. Find the roots of the equation  $a^2 - a - 156 = 0$  by Factorisation Method.

Q8. Find the values of 'x' for equation  $24m^2 - 41m + 12 = 0$

Q9. Find the roots of  $80m^2 = 220m + 210$

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**SOLUTIONS**

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**Q1 Ans** - Degree of Quadratic Equation is 2.  
Standard form is  $ax^2 + bx + c = 0$   
where  $a \neq 0$

**Q2 Ans** for roots put  $(x-2)=0$   
 $\therefore (x-2)(x-2)=0 \therefore x=2$  &  $x=2$  are roots

**Q3 Ans** (a)  $x^2 - 4x - 21 = 0$

$3 \times -7 = -21$

$3 + -7 = -4$

$x^2 - 4x - 21 = 0$   
 $x^2 + 3x - 7x - 21 = 0$   
 $x(x+3) - 7(x+3) = 0$   
 $(x-7)(x+3) = 0$

$x = 7, -3$

**(c)**  $k^2 = -11k - 30$   
 $k^2 + 11k + 30 = 0$

$(k+5)(k+6) = 0$

$k = -5, -6$

**(d)**  $6 = t(1+t)$

$6 = t + t^2$

OR  $t^2 + t - 6 = 0$

$(t-2)(t+3) = 0$

$t = 2, -3$

**(e)**  $x^2 - 289 = 0$

$x^2 = 289 \Rightarrow x = \sqrt{289}$

$x = \pm 17$  OR  $x = 17, x = -17$

**(f)**  $y^2 - 784 = 0 \Rightarrow y = 28, y = -28$

**(g)**  $-x^2 + 45x - 200 = 0$

$x^2 - 45x + 200 = 0$

$(x-5)(x-40) = 0 \therefore x = 5, 40$

**(h)**  $m^2 = 55m - 750$

$m^2 - 55m + 750 = 0$

$(m-25)(m-30) = 0$

$m = 25, 30$

(splitting of middle term)

**(b)**  $m^2 + 5m - 6 = 0$

Similarly on solving by using splitting of middle term we get

$(m-1)(m+6) = 0$

$m = 1, -6$

**(i)**  $6n^2 - n - 2 = 0$

$(3n-2)(2n+1) = 0$

$n = \frac{2}{3}, n = -\frac{1}{2}$

**(j)**  $x(2x+1) = 6$

$2x^2 + x - 6 = 0$

$(2x-3)(x+2) = 0$

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

**(k)**  $+20x - 1 = 10x^2$  (Correct this Question)

$10x^2 - 20x + 1 = 0$

$(10x-1)(10x-1)$

$x = \frac{1}{10}, \frac{1}{10}$

**(l)**  $t^2 + 48t = 324$

$t^2 + 48t - 324 = 0$

$(t-6)(t+54) = 0$

$t = 6, -54$

**(m)**  $6 - m - m^2 = 0$

OR  $-m^2 - m + 6 = 0$

OR  $m^2 + m - 6 = 0$

$(m-2)(m+3) = 0$

$m = 2, -3$

**(n)**  $x^3 + 11x^2 + 30x = 0$

$x(x^2 + 11x + 30) = 0$

$x^2 + 11x + 30 = 0$

$(x+5)(x+6) = 0$

$x = -5, -6$

**(o)**  $40m + 2m^2 - 11 = 0$

$\Rightarrow m(40 + 2m - 11) = 0$

$\Rightarrow 40 + 2m - 11 = 0$

$-m^2 + 3m + 40 = 0$

$m^2 - 3m - 40 = 0$

$(m+5)(m-8) = 0$

$m = -5, 8$

**(p)**  $2x^2 + x = 300$

$\Rightarrow 2x^2 + x - 300 = 0$

$\Rightarrow (2x+25)(x-12) = 0$

$x = -\frac{25}{2}, 12$

**(q)**  $2m-3 = 1 + (m-2)^2$

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

$2m-3 = 1 + m^2 + 4 - 4m$

$m^2 - 6m + 8 = 0$

$(m-2)(m-4) = 0$

$m = 2, 4$

**(r)**  $-m + \frac{1}{3} = -2m^2$

$\Rightarrow 16m^2 - 8m + 1 = 0$

$\Rightarrow (4m-1)(4m-1)$

$m = \frac{1}{4}, \frac{1}{4}$

**(s)**  $9x^2 = 15x^2 - 6x$

$\Rightarrow 3x^2 - 15x^2 + 6x = 0$

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

$\Rightarrow 2x(2x-5)(x+2) = 0$

$\Rightarrow 2x(2x-5)(x+2) = 0$

$x = \frac{5}{2}, x = -2$

**(t)**  $x^2 + 2x - 14 = 0$

$(x-11)(x+13) = 0$

$x = 11, -13$

**(u)**  $x = -\frac{2}{x} + 3$

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

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

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

$x = 1, 2$

**(v)**  $\frac{2}{m^2} = -2 + \frac{5}{m}$

$\frac{2}{m^2} = \frac{-2m+5}{m}$

$2 = m(-2m+5)$

$2 = -2m^2 + 5m$

OR  $2m^2 - 5m + 2 = 0$

$(2m-1)(m-2) = 0$

$m = \frac{1}{2}, 2$

**Q5**  $10m^2 - 40m - 210 = 0$

$10(m^2 - 4m - 21) = 0$

$\Rightarrow m^2 - 4m - 21 = 0$

$\Rightarrow (m+3)(m-7) = 0$

$m = -3, 7$

**Q4.** (a)  $10y = 3 + \frac{1}{y}$

$\Rightarrow (y+1)(2y+1)$

$y = -\frac{1}{2}, -\frac{1}{2}$

**(b)**  $-\frac{5}{m} = -2 - \frac{2}{m}$

same as Q3 (1) part

**(c)**  $x^2 - \frac{5x}{2} + \frac{3}{2} = 0$

$(2x-3)(x+1) = 0$

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

**(d)**  $-18 = -5y + \frac{35}{y}$

$5y^2 - 18y - 35 = 0$

$(5y+7)(y-5) = 0$

$y = -\frac{7}{5}, 5$

**(e)**  $\frac{3x-7}{2x-3} = \frac{x+3}{x+2}$

$x^2 - 4x - 5 = 0$

$(x+1)(x-5) = 0$

$x = -1, 5$

**(f)**  $\frac{m}{m+1} + \frac{m+1}{m} = \frac{34}{15}$

$4m^2 + 4m - 15 = 0$

$(2m-3)(2m+5) = 0$

$m = \frac{3}{2}, -\frac{5}{2}$

**Q6.**  $25x^2 - 11x^2 - 23x = 0$

$11x(2x^2 - x - 21) = 0$

$2x^2 - x - 21 = 0$

$(2x-7)(x+3) = 0$

$x = \frac{7}{2}, -3$

**Q7.**  $a^2 - a - 156 = 0$

$(a+12)(a-13) = 0$

$a = -12, 13$

**Q8.**  $24m^2 - 41m + 12 = 0$

$(8m-3)(3m-4) = 0$

$m = \frac{3}{8}, \frac{4}{3}$

**Q9.**  $30m^2 - 220m - 210 = 0$

$10(3m^2 - 22m - 21) = 0$

$m = -\frac{3}{4}, \frac{7}{2}$

**SOLUTIONS**

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**Q1 Ans:** Degree of Quadratic Equation is 2.  
Standard form is  $ax^2 + bx + c = 0$   
where  $a \neq 0$

**Q2 Ans:** for roots put  $(x-2) = 0$   
 $\therefore (x-2)(x-2) = 0 \therefore x=2$  &  $x=2$  are roots

**Q3 Ans:** (a)  $x^2 - 4x - 21 = 0$  (splitting of middle term)

$3 \times -7 = -21$

$3 + -7 = -4$

$x^2 - 4x - 21 = 0$

$x^2 + 3x - 7x - 21 = 0$

$x(x+3) - 7(x+3) = 0$

$(x-7)(x+3) = 0$

$x = 7, -3$

(b)  $m^2 + 5m - 6 = 0$

Similarly on solving by using splitting of middle term we get

$(m-1)(m+6) = 0$

$m = 1, -6$

(i)  $6n^2 - n - 2 = 0$

$(3n-2)(2n+1) = 0$

$n = \frac{2}{3}, -\frac{1}{2}$

(j)  $x(2x+1) = 6$

$2x^2 + x - 6 = 0$

$(2x-3)(x+2) = 0$

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

(k)  $+20x + 1 = 100x^2$  (convert this equation)

$100x^2 - 20x + 1 = 0$

$(10x-1)(10x-1)$

$x = \frac{1}{10}, \frac{1}{10}$

(l)  $t^2 + 48t = 324$

$t^2 + 48t - 324 = 0$

$(t-6)(t+54) = 0$

$t = 6, -54$

(m)  $6 - m - m^2 = 0$

OR  $-m^2 - m + 6 = 0$

OR  $m^2 + m - 6 = 0$

$(m-2)(m+3) = 0$

$m = 2, -3$

(n)  $x^3 + 11x^2 + 30x = 0$

$x(x^2 + 11x + 30) = 0$

$x^2 + 11x + 30 = 0$

$(x+5)(x+6) = 0$

$x = -5, -6$

(o)  $40m + 3m^2 - 117 = 0$

$\therefore m(40 + 3m - 117) = 0$

$= 40 + 3m - 117 = 0$

$-m^2 + 3m + 40 = 0$

$m^2 - 3m - 40 = 0$

$(m+5)(m-8) = 0$

$m = -5, 8$

(p)  $2x^2 + x = 300$

$\therefore 2x^2 + x - 300 = 0$

$\therefore (2x+25)(x-12) = 0$

$x = -\frac{25}{2}, 12$

(q)  $2m-3 = 1 + (m-2)^2$

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

$2m-3 = 1 + m^2 + 4 - 4m$

$m^2 - 6m + 8 = 0$

$(m-2)(m-4) = 0$

$m = 2, 4$

(r)  $-m + \frac{1}{8} = -2m^2$

$\therefore 16m^2 - 8m + 1 = 0$

$\therefore (4m-1)(4m-1)$

$m = \frac{1}{4}, \frac{1}{4}$

(s)  $9x^2 = 15x^2 - 6x$

$\therefore 9x^2 - 15x^2 + 6x = 0$

$-2x(3x^2 - 5x + 2) = 0$

$= 2x(3x-2)(x-1) = 0$

$x = \frac{2}{3}, 1, 0$

(t)  $x^2 + 2x - 143 = 0$

$(x-11)(x+13) = 0$

$x = 11, -13$

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

$\therefore x^2 = 2 + 3x$

$\therefore x^2 - 3x + 2 = 0$

$\therefore (x+1)(x-2) = 0$

$x = 1, 2$

(v)  $\frac{2}{m^2} = -2 + \frac{5}{m}$

$\frac{2}{m^2} = \frac{-2m+5}{m}$

$2 = m(-2m+5)$

$2 = -2m^2 + 5m$

OR  $2m^2 - 5m + 2 = 0$

$(2m-1)(m-2) = 0$

$m = \frac{1}{2}, 2$

**Q5**  $10m^2 - 40m - 210 = 0$

$10(m^2 - 4m - 21) = 0$

$\therefore m^2 - 4m - 21 = 0$

$\therefore (m+3)(m-7) = 0$

$m = -3, 7$

**Q4** (a)  $\log y = 3 + \frac{1}{2}$

$\therefore (y+1)(2y-1)$

$y = -\frac{1}{2}, \frac{1}{2}$

(b)  $-\frac{5}{m} = -2 - \frac{2}{m}$   
same as Q3 (vi) part

(c)  $x^2 - 5x + \frac{2}{3} = 0$

$(2x-3)(x+1) = 0$

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

(d)  $-18 = -5y + \frac{35}{y}$

$5y^2 - 18y - 35 = 0$

$(5y+7)(y-5) = 0$

$y = -7/5, 5$

(e)  $\frac{3x-7}{2x-3} = \frac{x+3}{x+2}$

$x^2 - 4x - 5 = 0$

$(x+1)(x-5) = 0$

$x = -1, 5$

(f)  $\frac{m}{m+1} + \frac{m+1}{m} = \frac{34}{15}$

$4m^2 + 4m - 15 = 0$

$(2m-3)(2m+5) = 0$

$m = \frac{3}{2}, -\frac{5}{2}$

**Q6**  $25x^2 - 11x^2 - 251x = 0$

$11x(2x^2 - x - 21) = 0$

$2x^2 - x - 21 = 0$

$(2x-7)(x+3) = 0$

$x = \frac{7}{2}, -3$

**Q7**  $a^2 - a - 156 = 0$

$(a+12)(a-13) = 0$

$a = -12, 13$

**Q8**  $24m^2 - 41m + 12 = 0$

$(8m-3)(3m-4) = 0$

$m = 3/8, 4/3$

**Q9**  $80m^2 - 220m - 210 = 0$

$10(8m^2 - 22m - 21) = 0$

$m = -3/4, 7/2$