daMakers

QUADRATIC EQUATION

(Ref: FM-QAH2022019)

TYPE I: Solving and forming quadratic equation

- (a) Solve: x² 5x + 6 = 0
 (b) Solve: x² x + 6 = 0.
- 2. (a) Find the equation whose roots are 3 and 4.
 (b) Find the quadratic equation having rational coefficients and one root as 2 √3.
- 3. Form the cubic equation whose roots are 1, 2 and 3.

TYPE I: Sum & Product of roots

- 4. Find the value of k
 - (a) If Roots of equation $2x^2 5x + (7k + 3) = 0$ are reciprocals of each others.
 - (b) $2x^2 (5k + 4) x + 7 = 0$ are equal in magnitude but opposite in sign.
- 5. If p and q are the roots of $x^2 3x 5 = 0$ then find (a) $\frac{p}{q} + \frac{q}{p}$ (b) $p^3 + q^3$
- 6. The equation $x^2 + 5x + 2 = 0$ has roots α and β . Find the equation whose roots are $\left(1 + \frac{\alpha}{\beta}\right)$ and $\left(1 + \frac{\beta}{\alpha}\right)$.
- 7. If α , β and γ are the roots of the equation $x^3 2x^2 + 3x 6 = 0$, the value of $\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\gamma}$ is
- 8. If p, q, and r are roots of $2x^3 3x^2 x 1 = 0$. Final (1-p)(1-q)(1-r).
- 9. If p, q, and r are roots of $x^3 5x 4 = 0$. Find the value of $\frac{1}{p+q} + \frac{1}{q+r} + \frac{1}{r+p}$.
- 10. If a quadratic function have roots 3 & 4 and f(1) = 5. Find f(10).
- 11. If 3, 4, 5 are roots of cubic function, when co-efficient of x^3 is equal to 3. Find the value of function at x = 1.
- 12. "A" is a single-digit prime number and "B" is a natural number. How many equations of the form $x^2 4\sqrt{A}x + 3B = 0$ will have real roots?

TYPE III : Change of Roots

- 13. (a) Find the equation whose roots are one more than the roots of the equation $x^2 + 12x + 21 = 0$.
 - (b) Find the equation whose roots are one less than the roots of the equation $x^2 + 12x + 21 = 0$.
 - (c) Find the equation whose roots are twice the roots of the equation $x^2 + 12x + 21 = 0$.

- (d) Find the equation whose roots are half the roots of the equation $x^2 12x + 21 = 0$.
- (e) Find the equation whose roots are reciprocals of the roots of the equation $x^2 12x + 21 = 0$.

TYPE IV: Nature of roots

- 14. (a) Find the nature of the roots of the equation $3x^2 + 4x 14 = 0$.
 - (b) If a is real, what is the nature of the roots of x^2 + 2(a + 1) x + 2a = 0?
- 15. (a) If the roots of x^2 ax + 64 = 0 are real, what value(s) can a take?
 - (b) If the roots of x^2 ax + 25 = 0 are not real, what value(s) can a take?
- 16. Equation $x^2 4x + c = 0$ has single roots/same root. Find c.
- 17. Equation $x^2 + 6x c = 0$ has rational roots. Find least value of c.

TYPE V: Error Based amakers.com

18. Ram finds roots of a Q.E as 3, 5 with mistake in xcoefficient and finds roots as 4, 10 with mistake in constant term. Find the actual equation.

TYPE VI: Common Roots

- 19. Equation $x^2 x 6 = 0 & 2x^2 kx + 3 = 0$ have a common root. Find k.
- 20. Equation $ax^2 + 2cx + b = 0$ and $ax^2 + 2bx + c = 0$ have exactly one common root. Find a + 4(b + c).
- 21. Equation $x^2 + ax + 10 = 0$ and $x^2 + bx 10 = 0$ have one common root. Find $a^2 b^2$.
- 22. For $a \neq b \neq c$, if two equation $ax^2 + bx + c = 0$ and $(b + c) x^2 + (a + c) x + (a + b) = 0$ have both roots common, then find a + c.
- 23. Equation $x^2 3x + 9 = 0$ and $ax^2 + 12x + c = 0$ has a common root. Find a + c.

TYPE VII: Maxima/Minima

- 24. Find the minimum value of the expression $2x^2 + 8x + 5$. Also find the value of x, where the expression attains the minimum value.
- 25. A quadratic function attains maximum value of 3 at x = 1, value of same function at x=0 is 1. Find the value of function at x = 10.
- 26. If quadratic attains minimum value at x = 7 and f(7) = -16. If p, q are roots of equation. Find |p q|.



TYPE VIII: Factor and Remainder

- 27. Q(x) is a Q.E. and Q(0) = 14. The remainder of Q(x) when divided by x + 1 is 25. The remainder of Q(x) when divided by x 2 is 10. Find Q(x).
- 28. $f(x) = ax^3 + 3x^2 4x + b$. If f(x) is divisible by $x^2 4$. Find a + b.
- 29. Find the remainder when x^{888} is divided by $x^2 5x + 6$.
- 30. Find the remainder when x^5 is divided by $x^3 4x$.

TYPE IX: Descartes Rule

- 31. Using Descartes' rule of signs, comment on the roots of $x^4 3x^3 x^2 5x + 4 = 0$
- 32. If the equation $x^5 + 15x^4 + 85x^3 + 225x^2 + 274x + a 119 = 0$ has exactly 5 negative roots, then the value of a can be a) 100 b) 85 c) 120 d) 90

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- 1. If p and q are distinct primes and $x^2 px + q = 0$ has distinct positive integral roots. Then p+q equals a) 5 b) 7 c) 19 d) 40
- 2. If the product of the roots of the equation $x^2 (A + 5) x + 3(2R 3) = 0$ is three times the sum of the roots, A =
- Bothe Ram and Shyam were trying to solve a quadratic equation. Ram copied the coefficient of x wrongly and got the roots of the equation as 12 and 6. Shyam copied the constant term wrongly and got the roots as 1 and 26. Find the roots of the correct equation.

 a) 6, 16
 b) -6, -16
 c) 24, 3
 d) -3, -24
- 4. If the roots of the equation $ax^2 + bx + c = 0$ are p & q, find the equation whose roots are p^2 and q^2 .
 - a) $a^2x^2 + (b^2 2ca)x + c^2 = 0$
 - b) $a^2x^2 b^2x 2cax + c^2 = 0$
 - c) $a^2x^2 b^2x + 2cax + c^2 = 0$
 - d) $a^2x^2 + b^2 + 2cax + c^2 = 0$
- 5. If one root of the equation $x^2 10x+16 = 0$ is half of one of the roots of $x^2 - 4Ax + 8 = 0$. The value of A such that both the equation have integral roots is
- 6. Find positive integral value(s) of A such that the equation $2x^2 + 8x + A = 0$ has rational roots a) 8 b) 4 c) 6 d) (a) or (c)
- 7. Two equations have a common root which is positive. The other roots of the equation satisfy $x^2 - 9x + 20 = 0$. The product of the sums of the roots of the two equations is 42. The common root is:
- 8. The value of b in the equation $x^2 + ax + b = 0$, where one of the roots of the equation is $(3 + \sqrt{2})$ and a and b are integers is
- 9. Find the value of A, so that one of the roots of $x^2 + 5Rx + 27 = 0$ is the square of the other root. a) -12/5 b) -7/5 c) -6/5 d) -11/5

- 10. If the roots of the quadratic equation $x^2 ax + b = 0$ are two successive multiples of 5, then the value of $a^2 - 4b$ is
- 11. Find the respective values of α and m if the roots of the quadratic equation $27x^2 87x + m = 0$ are α and 8/3 a) 5/9, 40 b) 2/9, 40 c) 4/9, 72 d) 5/9, 24

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