



# Quadratic Equations

## SPM Practice (Quadratic Equation)

1. Solve the following quadratic equations by factorisation.

a.  $x^2 - 5x - 10 = -4$

b.  $3 - x - 2x^2 = 0$

c.  $11a = 2a^2 + 12$

d.  $\frac{2x+7}{3x-2} = x$

[Ans : (a) -1,6 (b)  $-\frac{3}{2}$ , -1 (c)  $\frac{3}{4}$ , 4 (d)  $\frac{7}{3}$ , -1]

2. Solve the following quadratic equations by completing the square.

a.  $5x^2 + 10x - 3 = 0$

b.  $2x^2 - 5x - 6 = 0$

[Ans : (a) -2.265, 0.265 (b) -0.866, 3.386]



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3. Solve the following quadratic equations by using quadratic formula. Give your answer in four significant figures.

a.  $(x+1)(x-5) = 15$

b.  $\frac{x^2 + 3x - 2}{x^2 - x - 1} = 3$

[Ans : (a) 6.899, -2.899 (b) 3.158, -0.158]

4. If the roots of  $2x^2 + 4x - 1 = 0$  are  $\alpha$  and  $\beta$ , find the equations whose roots are

a.  $\alpha^2, \beta^2$

b.  $\alpha - \beta, \beta - \alpha$

[Ans : (a)  $4x^2 - 20x + 1 = 0$  (b)  $x^2 - 6 = 0$  ]



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5. Write and simplify the equation whose roots are double the roots of  $3x^2 - 5x - 1 = 0$ , without solving the given equation.
7. Find the value of  $p$  if one root of  $x^2 + px + 8 = 0$  is the square of the other.

[Ans :  $3x^2 - 10x - 4 = 0$  ]

[Ans :  $p = -6$ ]

6. Write and simplify the equation whose roots are the reciprocals of the roots of  $3x^2 + 2x - 1 = 0$ , without solving the given equation.
8. If one root of  $2x^2 + px + 9 = 0$  is twice the other, find the values of  $p$ .

[Ans :  $x^2 - 2x - 3 = 0$  ]

[Ans :  $p = -9, 9$ ]



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9. The roots of the equation  $6x^2 + hx + 1 = 0$  are  $\alpha$  and  $\beta$ , where as  $3\alpha$  and  $3\beta$  are the roots of the equation  $2x^2 - x + k = 0$ . Find the value of  $h$  and  $k$ .

$$[\text{Ans : } h = \frac{1}{3}, k = 9]$$

11. The quadratic equation  $x^2 - 4x - 1 = 2p(x - 5)$ , where  $p$  is a constant, has two equal roots. Calculate the possible values of  $p$ .

$$[\text{Ans : } p = 1, 5]$$

10. Find the range of values of  $p$  for which the equation  $2x^2 + 5x + 3 - p = 0$  has two real distinct roots.

$$[\text{Ans : } p > -\frac{1}{4}]$$

12. Find the range of values of  $k$  for which the equation  $x^2 - 2kx + k^2 + 5k - 6 = 0$  has no real roots.

$$[\text{Ans : } k > \frac{6}{5}]$$



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13. Find the range of values of  $p$  for which the equation  $5x^2 + 7x - 3p = 6$  has no real roots.

$$[\text{Ans : } p < -2\frac{49}{60} ]$$

15. The quadratic equation  $x^2 + px + q = 0$  has roots  $-2$  and  $6$ . Find

- the value of  $p$  and of  $q$ ,
- the range of values of  $r$  for which the equation  $x^2 + px + q = r$  has no real roots.

$$[\text{Ans: a. } p=-4, q=-12, \text{ b. } r < -16]$$

14. Show that  $6x - 6 - 2kx^2 = x^2$  has no real roots if

$$k > \frac{1}{4}.$$