



# MATHS

## BOOKS - CBSE COMPLEMENTARY

### MATERIAL MATHS (HINGLISH)

## QUADRATIC EQUATIONS

Very Short Answer Type Questions Multiple Choice Questions

1. Which of the following is not a Quadratic Equation ?

A.  $2(x - 1)^2 = 4x^2 - 2x + 1$

B.  $3x - x^2 = x^2 + 6$

C.  $(\sqrt{3}x + \sqrt{2})^2 = 2x^2 - 5x$

D.  $(x^2 + 2x)^2 = x^4 + 3 + 4x^2$

**Answer: D**



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2. Which of the following equations has 2 as a root?

A.  $x^2 + 4 = 0$

B.  $x^2 - 4 = 0$

C.  $x^2 + 3x - 12 = 0$

D.  $2x^2 - 6x - 2 = 0$

**Answer: B**



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3. If  $\frac{1}{2}$  is a root of  $x^2 + px - \frac{5}{4} = 0$  then value of p is

A. 2

B. -2

C.  $\frac{1}{4}$

D.  $\frac{1}{2}$

**Answer: A**



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**4. Every Quadratic Equation can have at most**

A. Three roots

B. One root

C. Two roots

D. Any number of roots

**Answer: C**



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5. Roots of Quadratic equation  $x^2 - 7x = 0$  will be

A. 7

B. 0, -7

C. 0, 5

D. 0, 7

**Answer: D**



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## Very Short Answer Type Questions Fill In The Blanks

1. If  $px^2 + qx + r = 0$  has equal roots then value of r will be \_\_\_\_\_.



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2. The quadratic equation  $x^2 - 5x - 6 = 0$  if expressed as  $(x + p)(x + q) = 0$  then value of  $p$  and  $q$  respectively are \_\_\_\_\_ and \_\_\_\_\_.



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3. The value of  $k$  for which of roots of quadratic equation are real  $x^2 + 4x + k = 0$



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4. If roots of  $4x^2 - 2x + c = 0$  are reciprocal of each other then the value of  $c$  is \_\_\_\_\_.



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5. If in a quadratic equation  $ax^2 + bx + c = 0$ , value of  $a$  is zero then it become a \_\_\_\_\_ equation.



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**Very Short Answer Type Questions True Or False**



1. Write whether the following statements are true or false. Justify your answers.

(i) Every quadratic equation has exactly one root.

(ii) Every quadratic equation has atleast one real root.

(ii) Every quadratic equation has atleast two roots.

(iv) Every quadratic equations atmost two roots.

(v) If he coefficient of  $x^2$  and the constnat term of a quadratic equation have opposite sigh, then the quadratic equation has real roots.

(vi) If the coefficient of  $x^2$  and the constant term have the same sign and if the coefficient of  $x$

term is zero, then the quadratic equation has no real roots.



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2. Write whether the following statements are true or false. Justify your answers.

- (i) Every quadratic equation has exactly one root.
- (ii) Every quadratic equation has atleast one real root.
- (ii) Every quadratic equation has atleast two roots.
- (iv) Every quadratic equations atmost two roots.

(v) If the coefficient of  $x^2$  and the constant term of a quadratic equation have opposite signs, then the quadratic equation has real roots.

(vi) If the coefficient of  $x^2$  and the constant term have the same sign and if the coefficient of  $x$  term is zero, then the quadratic equation has no real roots.



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3. 0.3 is root of  $x^2 - 0.9 = 0$ .



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#### 4. Graph of Quadratic Polynomial



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5. The discriminant of  $(x - 2)^2 = 0$  is positive.



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**Very Short Answer Type Questions Matching**

# 1. Match the following :

(i) Roots of  $3x^2 - 27 = 0$

(a)  $169/9$

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

(b)  $0$

(iii) Sum of roots of  $8x^2 + 2x - 3 = 0$

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

(iv) A quadratic equation with roots  $a$  and  $b$

(d)  $3, -3$

(v) The product of roots of  $x^2 + 8x = 0$

(e)  $\frac{-1}{4}$



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## Short Answer Type Questions I

1. If the quadratic equation

$$px^2 - 2\sqrt{5}px + 15 = 0$$
 has two equal roots, then

find the value of  $p$



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2. Solve for x by factorisation

$$8x^2 - 22x - 21 = 0$$



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3. Solve for x by factorisation

$$3\sqrt{5}x^2 + 25x + 10\sqrt{5} = 0$$



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4. Solve by factorization:  $3x^2 - 2\sqrt{6}x + 2 = 0$



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5. Solve for x by factorisation

$$2x^2 - ax + a^2 = 0 -$$



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6. Solve for x by factorisation

$$\sqrt{3}x^2 + 10x + 7\sqrt{3} = 0$$



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7. Solve for x by factorisation

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



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8. Solve for x by factorisation

$$(x - 1)^2 - 5(x - 1) - 6 = 0$$



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9. If  $-5$  is a root of the quadratic equation  $2x^2 + px - 15 = 0$  and the quadratic equation  $p(x^2 + x) + k = 0$  has equal roots, find the value of  $k$ .



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10. If  $x = \frac{2}{3}$  and  $x = -3$  are the roots of the quadratic equation  $ax^2 + 7x + b = 0$  then find the values of  $a$  and  $b$ .



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**11.** Find value of  $p$  for which the product of roots of the quadratic equation  $px^2 + 6x + 4p = 0$  is equal to the sum of the roots.



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**12.** Two squares have sides  $x\text{cm}$  and  $(x + 4)$ . The sum of their areas is  $656\text{cm}^2$ . Find the sides of the squares.



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13. Find K if the difference fo roots of the quadratic equation  $x^2 - 5x + (3k - 3) = 0$  is 11.



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## Short Answer Type Questions li

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



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2. Solve for:  $\frac{1}{2a + b + 2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$



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3. Solve for  $x$ .

$$\frac{2x}{x-3} + \frac{1}{2x+3} + \frac{3x+9}{(x-3)(2x+3)} = 0,$$
$$x \neq 3, -\frac{3}{2}$$



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4.  $\frac{1}{x-1} - \frac{1}{x+5} = \frac{6}{7}, x \neq 1, -5$



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5. Solve the following quadratic equation for

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



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6. Solve the following quadratic equations by

factorization

method:

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

$$9x^2 - 9(a + b)x + (2x^2 + 5ab + 2b^2) = 0$$



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7.

Solve:

$$\frac{2}{(x+1)} + \frac{3}{2(x-2)} = \frac{23}{5x}, x \neq 0, -1, 2.$$



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$$8. \left( \frac{2x}{x-5} \right)^2 + 5 \left( \frac{2x}{x-5} \right) - 24 = 0$$



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9. Solve by factorization:

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



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10. Solve for  $x$   $2a^2x^2 + b(6a^2 + 1)x + 3b^2 = 0$



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11.

$$3\left(\frac{7x + 1}{5x - 3}\right) - 4\left(\frac{5x - 3}{7x + 1}\right) = 11; x \neq \frac{3}{5}, -\frac{1}{7}$$



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12.

Solve:

$$\frac{1}{(x+4)} - \frac{1}{(x-7)} = \frac{11}{30}, x \neq -4, 7.$$



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13. Solve for:  $\frac{x-4}{x-5} + \frac{\overset{x-6}{=x-7} 10}{3}; x \neq 5, 7$



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14.

Solve

for

$x$

:

$$\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}, x \neq 1, -2, -4$$





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15. Solve for x

$$\frac{1}{2x - 3} + \frac{1}{x - 5} = 1, \quad x \neq \frac{3}{2}, 5$$



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16. Solve for x

$$x^2 + 5\sqrt{5}x - 70 = 0$$



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17. Solve for  $x$  :  $\frac{16}{x} - 1 = \frac{15}{x + 1}$ ,  $x \neq 0, -1$



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18. Solve the following quations by using qardratic formula:

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



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19. Find the value of  $p$  for which the quadratic equation

$$(p + 1)x^2 + - 6(p + 1)x + 3(p + 9) = 0, p \neq - 1$$

has equal roots. Hence, find the roots of the equation.



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## Long Answer Type Questions

1. A train travels at a certain average speed for a distance of 54 km and then travels a distance of 63 km at an average speed of 6 km/h more than the first speed. If it takes 3 hours to complete the total journey, what is its first speed?



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2. A natural number when increased by 12, equals 160 times its reciprocal. Find number.



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3. A thief, after committing a theft runs at a uniform speed of  $50\text{m} / \text{minute}$ . After 2 minutes, a policeman runs to catch him. He goes  $60\text{m}$  in first minute and increases his speed by  $5\text{m} / \text{minute}$

every succeeding minute. After how many minutes, the policeman will catch the thief?



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4. Two water taps together can fill a tank in 6 hours. The tap of larger diameter takes 9 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.



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5. IN the centre of a rectangular lawn of dimensions  $50m \times 40m$ , a rectangular pond has to be constructed, so that the area of the grass surrounding the pond would be  $1184m^2$ . Find the length and breadth of the pond.



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6. A farmer wishes to grow a  $100m^2$  rectangular vegetable garden. Since he has with the only 30 m barbed wire, he fences three sides of the rectangular garden letting compound wall of his

house act as the fourth side-fence. Find the dimensions of his garden.



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7. A peacock is sitting on the top of a pillar, which is 9m high. From a point 27m away from the bottom of the pillar, a snake is coming to its hole at the base of the pillar. Seeing the snake the peacock pounces on it. If their speeds are equal, at what distance from the hole is the snake caught?



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8. If the price of a book is reduced by Rs. 5, a person can buy 5 more books for Rs. 300. Find the original list price of the book.



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9. Rs 6500 were divided equally among a certain number of persons. Had there been 15 more persons, each would have got Rs 30 less. Find the original number of persons.



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**10.** In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. Find the duration of flight.



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**11.** A fast train takes 3 hours less than a slow train for a journey of 600 km . If the speed of the slow

train is 10 km/hr less than the fast train, find their speeds.



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**12.** The speed of a boat in still water is 15 km/hr. It can go 30 km upstream and return downstream to the original point in 4 hours 30 minutes. Find the speed of the stream.



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**13.** Sum of the areas of two squares is 400 cm. If the difference of their perimeters is 16 cm, find the sides of the two squares.



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**14.** The area of an isoscales traingle is  $60cm^2$ . The length of equal sides is 13 cm find length of its base.



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**15.** The denominator of a fraction is one more than twice the numerator. If the sum of the fraction and its reciprocal is  $2\frac{16}{21}$ , find the fraction.



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**16.** A girl is twice as old as her sister. Four years hence, the product of their ages (in years) will be 160. Find their present ages.



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**17.** A two digit number is such that the product of its digits is 18. When 63 is subtracted from the number, the digits interchange their places. Find the number.



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**18.** Three consecutive positive integers are such that the sum of the square of the first and the product of other two is 46, find the integers.



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**19.** The total cost of a certain length of a piece of wire is Rs. 200. If the piece was 5 metres longer and each metre of wire costs Rs. 2 less, the cost of the piece would have remained unchanged. How long is the piece and what is its original rate per metre?



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**20. 81.** A motor boat whose speed is 24 km/h in water takes 1 hr more to go 32 upstream than to

return downstream to the same spot. Find the speed of the stream



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21. If the roots of the equation  $(b - c)x^2 + (c - a)x + (a - b) = 0$  are equal, then prove that  $2b = a + c$ .



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22. If the equation  $(1 + m^2)x^2 + 2mcx + (c^2 - a^2) = 0$  has equal

roots, prove that  $c^2 = a^2(1 + m^2)$ .



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## Practice Test

1. The value of  $k$  is ..... if  $x = 3$  is one root of  $x^2 - 2kx - 6 = 0$ .



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2. If the discriminant of  $3x^2 + 2x + \alpha = 0$  is double the discriminant of  $x^2 - 4x + 2 = 0$  then value of  $\alpha$  is



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3. If discriminant of  $6x^2 - bx + 2 = 0$  is 1 then value of  $b$  is .....



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4.  $(x - 1)^3 = x^3 + 1$  is quadratic equation (T/F)



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5. If roots of  $x^2 + kx + 12 = 0$  are in the ratio 1:3 find k.



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6. Factorize:  $21x^2 - 2x + \frac{1}{21}$



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7. Find the value of  $k$  if the quadratic equation  $kx(x - 2) + 6 = 0$  has two equal roots.



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8. Solve  $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$



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9. For what value of  $k$ ,  $(4 - k)x^2 + (2k + 4)x + (8k + 1) = 0$  is a perfect square.



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**10.** Two water taps together can fill a tank in  $1\frac{7}{8}$  hours. The tap with longer diameter takes 2 hours less than the tap with smaller one to fill the tank separately. Find the time in which each tap can fill the tank separately.



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