4. Quadratic Equations - Board Exam Questions

The detailed solution for all the questions can be found at pschool.in/math/ncert/g10/chap-4

1 Mark Questions (MCQ)

1) The roots of the quadratic equation $(x-1)^2 = 16$ are:
2) If the roots of the quadratic equation $\sqrt{3}x^2 - kx + 2\sqrt{3} = 0$ are real and equal, then the value(s) of k is/are:
3) If the quadratic equation $9x^2 + 8kx + 16 = 0$ has real and equal roots, then the value of k is
4) The value of k for which the equation $kx^2 - 6x - 4 = 0$ has real and equal roots, is
5) The value of p for which roots of the quadratic equation $x^2 - px + 6 = 0$ are rational, is
   (a) 1 (b) −5
   (c) 25 (d) $\sqrt{5}$
6) If $(1-p)$ is a root of the quadratic equation $x^2 + px + 1 - p = 0$, then its roots are:
7) The quadratic equation whose roots are 7 and $\frac{1}{7}$ is:
8) If $\frac{x}{12} - \frac{3}{x} = 0$, then the values of x are:
9) The value of 'a' for which $ax^2 + x + a = 0$ has equal and positive roots is:
10) Which of the following equations is a quadratic equation?
    (a) $x^2 + 1 = (x-1)^2$ (b) $\left(x + \sqrt{x}\right)^2 = 2x\sqrt{x}$
    (c) $x^3 + 3x^2 = (x+1)^3$ (d) $(x+1)(x-1) = (x+1)^2$
11) If $x^2 + bx + b = 0$ has two real and distinct roots, then the value of b can be
    (a) 0 (b) 4
    (c) 3 (d) −3
12) Which of the following quadratic equations has real and equal roots?
    (a) $(x+1)^2 = 2x + 1$ (b) $x^2 + x = 0$

(c) $x^2 - 4 = 0$ (d) $x^2 + x + 1 = 0$

13) Which one of the following is not a quadratic equation?
(a) $(x + 2)^2 = 2(x + 3)$ (b) $x^2 + 3x = (-1)(1 - 3x)^2$
(c) $x^3 - x^2 + 2x + 1 = (x + 1)^3$ (d) $(x + 2)(x + 1) = x^2 + 2x + 3$

14) If the roots of equation $ax^2 + bx + c = 0$, $a \neq 0$ are real and equal, then which of the following relation is true?
(a) $a = \dfrac{b^2}{c}$ (b) $b^2 = ac$
(c) $ac = \dfrac{b^2}{4}$ (d) $c = \dfrac{b^2}{a}$

15) The quadratic equation $x^2 + x + 1 = 0$ has _____ roots.
(a) real and equal (b) irrational
(c) real and distinct (d) not-real

16) If the discriminant of the quadratic equation $3x^2 - 2x + c = 0$ is 16, then the value of c is:

17) The ratio of the sum and product of the roots of the quadratic equation $5x^2 - 6x + 21 = 0$ is:

18) The roots of the quadratic equation $x^2 + x - 1 = 0$ are
(a) Irrational and distinct (b) not real
(c) rational and distinct (d) real and equal

19) The least positive value of k, for which the quadratic equation $2x^2 + kx - 4 = 0$ has rational roots, is

20) Which of the following quadratic equations has sum of its roots as 4?
(a) $2x^2 - 4x + 8 = 0$ (b) $-x^2 + 4x + 4 = 0$
(c) $\sqrt{2}x^2 - \dfrac{4}{\sqrt{2}}x + 1 = 0$ (d) $4x^2 - 4x + 4 = 0$

21) The roots of the equation $x^2 + 3x - 10 = 0$ are:

22) A quadratic equation whose roots are $(2 + \sqrt{3})$ and $(2 - \sqrt{3})$ is:

23) If the quadratic equation $ax^2 + bx + c = 0$ has two real and equal roots, then 'c' is equal to

24) The nature of roots of the quadratic equation $9x^2 - 6x - 2 = 0$ is:
(a) No real roots (b) 2 equal real roots
(c) 2 distinct real roots
(d) More than 2 real roots

25) Let p be a prime number. The quadratic equation having its roots as factors of p is

Assertion and Reason

1) ASSERTION (A): If $5+\sqrt{7}$ is a root of a quadratic equation with rational co-efficients, then its other root is $5-\sqrt{7}$.
REASON (R): Surd roots of a quadratic equation with rational co-efficients occur in conjugate pairs.

2 Mark Questions

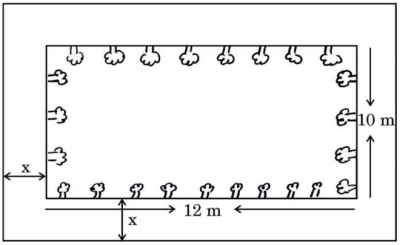
1) Find the sum and product of the roots of the quadratic equation $2x^2-9x+4=0$.
2) Find the discriminant of the quadratic equation $4x^2-5=0$ and hence comment on the nature of roots of the equation.
3) Find the value(s) of 'k' so that the quadratic equation $4x^2+kx+1=0$ has real and equal roots.
4) Verify that roots of the quadratic equation $(p-q)x^2+(q-r)x+(r-p)=0$ are equal when $q+r=2p$.

3 Mark Questions

1) Find the value of 'p' for which the quadratic equation $px(x-2)+6=0$ has two equal real roots.
2) If α and β are roots of the quadratic equation $x^2-7x+10=0$, find the quadratic equation whose roots are α^2 and β^2.
3) Find two consecutive negative integers, sum of whose squares is 481.
4) In a 2-digit number, the digit at the unit's place is 5 less than the digit at the ten's place. The product of the digits is 36. Find the number.
5) The sum of two numbers is 18 and the sum of their reciprocals is $\frac{9}{40}$. Find the numbers.
6) The sum of two numbers is 15. If the sum of their reciprocals is $\frac{3}{10}$, find the two numbers.

4 Mark Questions

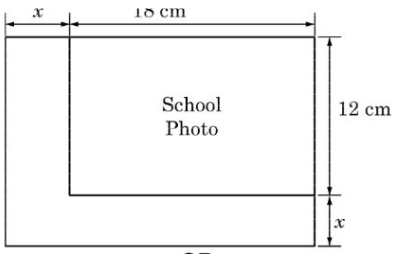
1) A garden designer is planning a rectangular lawn that is to be surrounded by a uniform walkway.



The total area of the lawn and the walkway is 360 square metres.
The width of the walkway is same on all sides. The dimensions of the lawn itself are 12 metres by 10 metres.
(i) Formulate the quadratic equation representing the total area of the lawn and the walkway, taking width of walkway as x m. (1)
(ii) (a) Solve the quadratic equation to find the width of the walkway 'x'. (2)
OR (b) If the cost of paving the walkway at the rate of ₹50 per square metre is ₹12,000, calculate the area of the walkway.
(iii) Find the perimeter of the lawn. (1)

2) A rectangular floor area can be completely tiled with 200 square tiles. If the side length of each tile is increased by 1 unit, it would take only 128 tiles to cover the floor.
(i) Assuming the original length of each side of a tile be x units, make a quadratic equation from the above information. (1)
(ii) Write the corresponding quadratic equation in standard form. (1)
(iii) (a) Find the value of x, the length of side of a tile by factorisation. (2)
OR (b) Solve the quadratic equation for x, using quadratic formula.

3) While designing the school year book, a teacher asked the student that the length and width of a particular photo is increased by x units each to double the area of the photo. The original photo is 18 cm long and 12 cm wide.



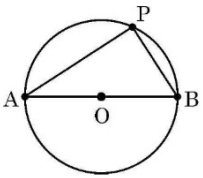
(I) Write an algebraic equation depicting the above information. (1)
(II) Write the corresponding quadratic equation in standard form. (1)
(III) What should be the new dimensions of the enlarged photo? (2)
OR Can any rational value of x make the new area equal to $220\ \text{cm}^2$?

5 Mark Questions

1) Find the value(s) of p for which the quadratic equation given as $(p+4)x^2-(p+1)x+1=0$ has real and equal roots. Also, find the roots of the equation(s) so obtained.
2) Find the value of 'c' for which the quadratic equation $(c+1)x^2-6(c+1)x+3(c+9)=0$; c ≠ −1 has real and equal roots.
3) Find the smallest value of p for which the quadratic equation $x^2-2(p+1)x+p^2=0$ has real roots. Hence, find the roots of the equation so obtained.
4) Express the equation $\frac{x-2}{x-3}+\frac{x-4}{x-5}=\frac{10}{3}$; (x ≠ 3, 5) as a quadratic equation in standard form. Hence, find the roots of the equation so formed.
5) A 2-digit number is seven times the sum of its digits and two (2) more than 5 times the product of its digits. Find the number.
6) 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.
7) The age of a man is twice the square of the age of his son. Eight years hence, the age of the man will be 4 years more than three times the age of his son. Find their present ages.
8) The area of a right-angled triangle is $600\ \text{cm}^2$. If the base of the triangle exceeds the altitude by 10 cm, find all the three dimensions of the triangle.
9) The perimeter of a right triangle is 60 cm and its hypotenuse is 25 cm. Find the lengths of other two sides of the triangle.

10) The sides of a right triangle are such that the longest side is 4 m more than the shortest side and the third side is 2 m less than the longest side. Find the length of each side of the triangle. Also, find the difference between the numerical values of the area and the perimeter of the given triangle.

11) There is a circular park of diameter 65 m as shown in the following figure, where AB is a diameter.



An entry gate is to be constructed at a point P on the boundary of the park such that distance of P from A is 35 m more than the distance of P from B. Find distance of point P from A and B respectively.

12) The sum of the areas of two squares is $640\ \mathrm{m}^2$. If the difference in their perimeters is 64 m, find the sides of the two squares.

13) The sum of the areas of two squares is $52\ \mathrm{cm}^2$ and difference of their perimeters is 8 cm. Find the lengths of the sides of the two squares.

14) In a rectangular park measuring $50\ \mathrm{m} \times 40\ \mathrm{m}$, the gram panchayat plans to construct a rectangular swimming pool in the middle, surrounded by a uniform-width grass strip throughout the park. Find the dimensions of the swimming pool, if the area of the grassy strip is $1184\ \mathrm{m}^2$.

15) A person on a tour has ₹4,200 for expenses. If he extends his tour for 3 days, he has to cut down his daily expenses by ₹70. Find the original duration of the tour.

16) A person on tour has ₹5,400 for his expenses. If he extends his tour by 5 days, he has to cut down his daily expenses by ₹180. Find the original duration of the tour and daily expense.

17) The total cost of certain piece of cloth was ₹2,100. During special sale time, the shopkeeper offered 2 m extra cloth for free thus reducing the price of cloth per metre by ₹120. What was the original per metre price of cloth and its length?

18) A faster train takes one hour less than a slower train for a journey of 200 km. If the speed of the slower train is 10 km/hr

less than that of the faster train, find the speeds of the two trains.

19) A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken 3 hours more to cover the same distance. Find the speed of the train.

20) A train travels a distance of 90 km at a constant speed. Had the speed been 15 km/h more, it would have taken 30 minutes less for the journey. Find the original speed of the train.

21) A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/hr more than its original speed. If it takes 3 hours to complete the total journey, what is the original average speed?

22) 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 journey, what was its first average speed?

23) In a flight of 2800 km, an aircraft was slowed down due to bad weather. Its average speed is reduced by 100 km/h and by doing so, the time of flight is increased by 30 minutes. Find the original duration of the flight.

24) 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 from its usual speed and the time of the flight increased by 30 min. Find the scheduled duration of the flight.

25) The time taken by a person to travel an upward distance of 150 km was $2\frac{1}{2}$ hours more than the time taken in the downward return journey. If he returned at a speed of 10 km/h more than the speed while going up, find the speeds in each direction.

26) Venkat can row a boat in still water at the speed of 12 km/h. He ferries tourists 15 km upstream and 18 km downstream in 3 hours. Find the speed of the stream.

27) A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of stream.

28) Two pipes together can fill a tank in $\frac{15}{8}$ hours. The pipe with larger diameter takes 2 hours less than the pipe with smaller diameter to fill the tank separately. Find the time in which each pipe can fill the tank separately.

29) Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

30) To fill a swimming pool two pipes are used. If the pipe of larger diameter is used for 4 hours and the pipe of smaller diameter for 9 hours, only half of the pool can be filled. Find, how long it would take for each pipe to fill the pool separately, if the pipe of smaller diameter takes 10 hours more than the pipe of larger diameter to fill the pool?