QUADRATIC EQUATION

1. If $\frac{1}{2}$ is a root of the equation $x^2 + kx - \frac{5}{4} = 0$, then the value of k is

   (a) 2   (b) −2   (c) $\frac{1}{4}$ (d) $\frac{1}{2}$

2. The non-zero root of $3x - 5x^2 = 0$ is

   (a) $\frac{3}{5}$ (b) $\frac{5}{3}$ (c) $\frac{5}{9}$ (d) $\frac{9}{5}$

3. Which constant should be added and subtracted to solve the quadratic equation $4x^2 - \sqrt{3}x - 5 = 0$ by the method of completing the square ?

   (a) $\frac{9}{16}$ (b) $\frac{3}{16}$ (c) $\frac{3}{4}$ (d) $\frac{\sqrt{3}}{4}$

4. The product of two successive positive integral multiples of 5 is 300. Then the numbers are
   (a) 25, 30   (b) 15, 20   (c) 10, 15   (d) 30, 35

5. Value of 'k' for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is
   (a) 0 only   (b) 4   (c) 8 only   (d) 0, 8

6. If $ax^2 + bx + c = 0$ has equal roots, then c =

   (a) $\frac{-b}{2a}$ (b) $\frac{b}{2a}$ (c) $\frac{-b^2}{4a}$ (d) $\frac{b^2}{4a}$

7. If 2 is a root of the equation $x^2 + bx + 12 = 0$ and the equation $x^2 + bx + q = 0$ has equal roots, then q =
   (a) 8   (b) −8   (c) 16   (d) −16

8. If x = 1 is a common root of the equation $ax^2 + ax + 3 = 0$ and $x^2 + x + b = 0$ then $x =$ _____
   (a) 3   (b) 3.5   (c) 6   (d) −3

9. The value of c for which the equation $ax^2 + 2bx + c = 0$ has equal roots is

   (a) $\frac{b^2}{a}$ (b) $\frac{b^2}{4a}$ (c) $\frac{a^2}{b}$ (d) $\frac{a^2}{4b}$

10. If the sum and product of the roots of the equation $kx^2 + 6x + 4k = 0$ are equal then k =

    (a) $-\frac{3}{2}$ (b) $\frac{3}{2}$ (c) $\frac{2}{3}$ (d) $-\frac{2}{3}$

11. If one root of the equation $4x^2 - 2x + (\alpha - 4) = 0$ be the reciprocal of the other then $\alpha =$
    (a) 8   (b) −8   (c) 4   (d) −4

12. Find two positive consecutive odd integers, sum of whose squares is 290
    (a) 13, 14   (b) 11, 13   (c) −12, 11   (d) 7, 8

13. If $\sqrt{\frac{x}{1-x}} + \sqrt{\frac{1-x}{x}} = 2\frac{1}{6}$ the value of x are

    (a) $\frac{4}{13}, \frac{9}{13}$ (b) $\frac{5}{13}, \frac{7}{13}$ (c) $\frac{7}{13}, \frac{9}{13}$ (d) None of these

14. If α, β are the roots of $x^2 + px + 23 = 0$ and $\alpha - \beta = 1$ then
    (a) $p = \pm 3$ (b) $p = \pm 5$ (c) $p = \pm 7$ (d) $p = \pm 8$

15. The sum of a number and its square is 240. The number is
    (a) 4   (b) 5   (c) 6   (d) 15

16. The roots of the quadratic equation $3x^2 - 2\sqrt{6}x + 2 = 0$ are

    (a) $\sqrt{\frac{2}{3}}, \sqrt{\frac{2}{3}}$ (b) $\sqrt{\frac{3}{2}}, \sqrt{\frac{3}{2}}$ (c) $\sqrt{\frac{1}{3}}, \sqrt{\frac{1}{3}}$ (d) $\sqrt{\frac{4}{3}}, \sqrt{\frac{4}{3}}$

17.   The difference of two numbers is 5 and the difference of their reciprocals is $\dfrac{1}{10}$, then numbers are

(a) $\pm5, \pm10$ (b)   5, 10   (c)   10, 5   (d) $-5, -10$

18.   The altitude of a right $\triangle$ is 7 cm less than the base x and the hypotenuse is 13 cm. The quadratic representation of above equation is

(a) $x(x - 7) = 13$ (b) $x^2 + (x - 7)^2 = 13^2$
(c) $x^2 + (x + 7)^2 = 13^2$ (d)   None of these

SA-1

1.   Does $(x - 1)^2 + 2(x + 1) = 0$ have a real root ? Justify your answer.
2.   Is $x(x + 1) + 8 = (x + 2)(x + 3)$ quadratic equation ? Justify it.
3.   State whether the quadratic equation $(x - 1)(x + 2) + 2 = 0$ has two distinct real roots. Justify it.
4.   Is 0.2 a root of the equation $x^2 - 0.4 = 0$? Justify it.
5.   If one root of the quadratic equation $2x^2 - 3x + p = 0$ is 3, find the other root of the quadratic equation. Also find the value of 'p'.
6.   Find the value of 'c' such that equation $4x^2 - 2(c + 1)x + (c + 4) = 0$ has real and equal roots.
7.   Is it possible to design a rectangular park of perimeter 80 m and area 400 m^2 ? If so find its length and breadth.
8.   If one root of quadratic equation with rational co-efficient is $2 + \sqrt{3}$. Find the other root.
9.   The sum of a number and its reciprocal is $2\dfrac{1}{2}$. Find the number.
10.   Find 'k' so that $x^2 - 2x(1 + 3k) + 7(3 + 2k) = 0$ have equal roots.
11.   Form a quadratic equation whose roots are $-\dfrac{1}{3}$ and $\dfrac{5}{2}$.
12.   Find the nature of roots of $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$

SA-II

1.   Find the roots of the quadratic equation $2x^2 - \sqrt{5}x - 2 = 0$ using the quadratic formula.
2.   The difference of square of two natural numbers is 45. The square of the smaller number is four times the larger number. Find the number.
3.   Solve : $a^2b^2x^2 + b^2x - a^2x - 1 = 0$
4.   If a student had walked 1 km/hr faster, he would have taken 15 minutes less to walk 3 km. Find the rate at which he was walking.
5.   Determine the roots of $9x^2 - 9(a + b)x + (2a^2 + 5ab + 2b^2) = 0$
6.   Solve for x : $\left(\dfrac{4x-3}{2x+1}\right) - 10\left(\dfrac{2x+1}{4x-3}\right) = 3$, $x \ne -\dfrac{1}{2}$, $x \ne \dfrac{3}{4}$
7.   For what value of 'm', the equation $2mx^2 - 2(1 + 2m)x + (3 + 2m) = 0$ have real but distinct roots ? When will the roots be equal ?
8.   Find the roots of the quadratic equation by using the quadratic formula in each of the following :
(i) $-3x^2 + 5x + 12 = 0$
(ii) $x^2 - 3\sqrt{5}x + 10 = 0$
(iii) $\dfrac{1}{2}x^2 - \sqrt{11}x + 1 = 0$
9.   Find the roots of the following quadratic equations by the factorization method.
(a) $\dfrac{2}{5}x^2 - x - \dfrac{3}{5} = 0$
(b) $3\sqrt{2}x^2 - 5x - \sqrt{2} = 0$

(c) $21x^2 - 2x + \dfrac{1}{21} = 0$

10. Find the discriminant of the equation $3x^2 - 2x + \dfrac{1}{3} = 0$ and hence find the nature of its roots. Find them, if they are real.

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

12. The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.

LONG ANSWER TYPE QUESTIONS

1. Rs.6500 is 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.

2. 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 than its original speed. If it takes 3 hours to complete the total journey, what is its original average speed.

3. A plane left 40 minutes late due to bad weather and in order to reach its destination 1600 km away in time, it had to increase its speed by 400 km/hr from its usual speed. Find the usual speed of the plane.

4. If the roots of the equation $(a^2 + b^2)x^2 - 2(ac + bd)x + (c^2 + d^2) = 0$ are equal, prove that $\dfrac{a}{b} = \dfrac{c}{d}$

5. A natural number, when increased by 12, equal 160 times its reciprocal. Find the number.

6. At present Asha's age (in years) is 2 more than the square of her daughter Nisha's age. When Nisha grows to her mother's present age, Asha's age would be one year less than 10 times the present age to Nisha. Find the present ages of both Asha and Nisha.

7. A motor-boat takes 2 hours more to cover a distance of 30 km upstream than it takes to cover the same distance down stream. If the speed of the stream is 2 km/hr, find the speed of the boat in still water.

8. The perimeter of right angled triangle is five times the length of its side. The numerical value of the area of the triangle is 15 times the numerical value of the length of the shortest side. Find the lengths of the three sides of the triangle.

9. Check whether the equation $6x^2 - 7x + 2 = 0$ has real roots and if it has find then by the method of completing the squares.

10. If twice the area of a smaller square is subtracted from the area of a larger square, the result is 14 sq cm. However, if twice the area of large square is added to three times the area of the smaller square, the result is 203 sq. cm. Find the sides of the two squares.

11. 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 original duration of the flight.

12. In a class test, the sum of the marks obtained by p in Mathematics and Science is 28. Had he got 3 more marks in Mathematics and 4 marks less in Science, the product of marks obtained in the two subjects would have been 180. Find the marks obtained in the two subjects separately.

13. The diagonal of a rectangular field is 60 m more than the shorter side. If the longer side is 30 m more than the shorter side, find the sides of the field.

14. The difference of squares of two numbers is 180. The square of the smaller number is 8 times the largest number. Find the two numbers.

15. Sum of the areas of two squares is 468 m^2. If the difference of their perimeters is 24 m, find the sides of the two squares.

16. Two water laps together can fill a tank in $9\dfrac{3}{8}$ hrs. 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.

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.

Value Based Questions.

1.	In a society, certain number of people worked for three campaigns. Some worked for " Say no to plastic". Some for "Say no to crackers" and the remaining for "Say no to child labour". A person is selected at random from the society. The probability of getting a person from first campaign is 3/10 and that of 2nd campaign is 2/5. Find the probability of getting a person who worked for the third campaign. If the number of persons in 2nd campaign was 20, find the total number of persons involved in the three campaigns.
Are such campaigns helpful in spreading awareness among the people? Give your views.

2.	If the price of petrol is increased by Rs. 2 per litre, a person will have to buy 1 litre less petrol for Rs. 1740. Find the original price of petrol at a time.
	a)	Why do you think the price of petrol is increasing day by day?
	b)	What should we do to save petrol?

3.	One fourth of a group of people claim they are creative, twice the square root of the group claim to be caring and the remaining 15 claim they are optimistic. Find the total number of people in the group.
	a)	How many persons in the group are creative?
	b)	According to you, which one of the above three values is more important for development of a society?

4.	In the centre of a rectangular plot of land of dimensions 120 m x 100 m a rectangular portion is to be covered with trees so that the area of the remaining part of the plot is $10500m^{2.}$ Find the dimensions of the area to be planted.
	a)	Which social act is being discussed here? Give its advantages.

5.	Mr. Ahuja has two square plots of land which he utilizes for two different purposes – one for providing free education to the children below the age of 14 years and the other to provide free medical services for the needy villagers. The sum of the areas of two square plots is 15425 m^{2}. If the difference of their perimeters is 60 m, find the sides of the two squares.
	a)	Which qualities of Mr. Ahuja are being depicted in the question?

6.	In a class of 48 students, the number of regular students is more than the number of irregular students. Had two irregular students been regular, the product of the number of two types of students would be 380. Find the number of each type of students.
	a)	Why is regularity essential in life?
	b)	Write other values other than regularity that a student must possess.

7.	A school, apart from rewarding academically excellent student, rewards total 25 students for full attendance and creativity. If we subtract six times the number of creative students from the square of number of regular students we get 10.find the numberof each type of each type of students to be rewarded. Should there be more values for which the students can be rewarded? Justify your answer

8.	In a class, 32 students are either hardworking or confident. If two more students were hardworking instead of confident, the product of the number of two types of students would be 240.Find the number of two types of students if the class has more hardworking students than confident ones.
Which of the given two values is more helpful in the development of an individual? Justify your answer.

9.	A shopkeeper stopped using plastic bags and asked his customers to bring their own carry bags due to which his sales reduced by 20 units. If the square of new sale reduced by 400 gives 60 times the original sale, find his original sale.
	i)	Why should we ban plastic bags?
	ii)	What steps can be taken in order to ban plastic bags?
	iii)	Which trait of shopkeeper's personality is depicted here?