SUMMER HOLIDAY HOMEWORK
CLASS X
SUBJECT – MATHEMATICS

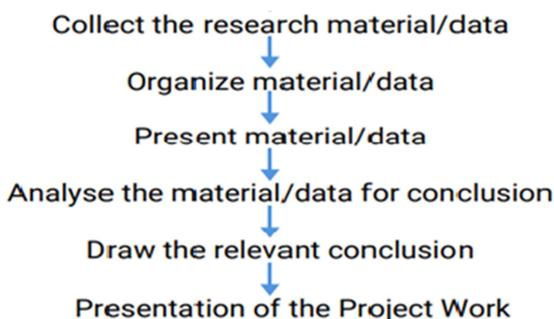**This Holiday Homework consists of two parts: PART - A and PART - B**

PART-A

One Project has to be done by each student. This Project will be a part of the Portfolio which will be evaluated as INTERNAL ASSESSMENT FOR CBSE BOARD EXAMS 2023.

Topic of the project will be one among the following. Allotment of the project will be done group wise by the subject teachers in class.

1. Development of Number system with their needs.
2. Application of Mensuration in day to day life.
3. History of Mathematics and Different Topics.
4. Mathematics and Music.
5. Mathematics and Information and Communication Technology: Writing of Mathematical programmes, flow charts, algorithm, circuit diagrams etc.

Steps involved in the conduct of the Project are as follows.

1.

Collect the research material/data
↓
Organize material/data
↓
Present material/data
↓
Analyse the material/data for conclusion
↓
Draw the relevant conclusion
↓
Presentation of the Project Work

2. Following are the pages to be included in the project work:

a) Cover page (Title of the project, Subject, Name, Class/Sec, Roll No)
b) Certificate
c) Acknowledgement
d) Contents
e) Project write ups and conclusion

** Paste photograph(s) wherever necessary

f) Bibliography
g) Use A4 size paper only

PART: B

SOLVE THE FOLLOWING QUESTIONS:

1. In each of the following, determine whether the given values of x are the solutions of the equation or not:
   (i) $2x^2 - 5x - 3 = 0; x = 3, x = 4$
   (ii) $x^2 - 4\sqrt{2}x + 6 = 0; x = 3\sqrt{2}, x = -\sqrt{2}$
   (iii) $x + \frac{1}{x} = \frac{13}{6}; x = \frac{5}{6}, x = \frac{4}{3}$

2. Find the values of a and b for which $x = \frac{3}{4}$ and x = -2 are the solutions of the equation $ax^2 + bx - 6 = 0$.

3. Find the roots of following quadratic equations by the factorization method
   (i) $2x^2 + \frac{5}{3}x - 2 = 0$
   (ii) $3\sqrt{2}x^2 - 5x - \sqrt{2} = 0$

4. The difference of two numbers is 4. If the difference of their reciprocal is $\frac{4}{21}$, find the numbers.

5. The sum of two numbers a and b is 15, and the sum of their reciprocals $\frac{1}{a}$ and $\frac{1}{b}$ is $\frac{3}{10}$. Find the numbers a and b.

6. 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.

7. Solve by factorisation method: $4x^2 - 2(a^2 + b^2)x + a^2b^2 = 0$.

8. The difference of two natural numbers is 3 and the difference of their reciprocals is $\frac{3}{28}$. Find the numbers.

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

10. 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.

11. A plane left 30 minutes later than the schedule time and in order to reach its destination 1500 km away in time it has to increase its speed by 250 km/h from its usual speed. Find its usual speed.

12. Swati can row her boat at a speed of 5km/h in still water. If it takes her 1 hour more to row the boat 5.25 km upstream than to return downstream, find the speed of the stream.

13. A car moves a distance of 2592 km with uniform speed. The number of hours taken for the journey is half the number representing the speed, in Km/hour. Find the time taken to cover the distance.

14. Find the values of k for which the following equations have real and equal roots:
    (i) $x^2 + k(2x + k - 1) + 2 = 0$
    (ii) $kx(x - 3) + 9 = 0$
    (iii) $4x^2 - 2(k + 1)x + (k + 1) = 0$

15. If the equation $(1 + m^2)x^2 + 2mcx + (c^2 - a^2) = 0$ has equal roots, prove that $c^2 = a^2(1 + m^2)$.

16. Vikram wishes to fit three rods together in the shape of a right triangle. The hypotenuse is to be 2 cm longer than the base and 4 cm longer than the altitude. What should be the length of the rods?

17. 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?

18. 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 $\frac{a}{b} = \frac{c}{d}$.

19. The perimeter of a right triangle is 60 cm. Its hypotenuse is 25 cm. Find the area of the triangle.

20. A chess board contains 64 equal squares and the area of each square is 6.25 cm². A border round the board is 2 cm wide. Find the length of the side of the chess board.

21. A shopkeeper buys a number of books for Rs80/-. If he had bought four more books for the same amount, each book would have cost Rs 1/- less. How many books did he buy?

22. A takes 10 days less than the time taken by B to finish a piece of work. If both A and B together can finish the work in 12 days, find the time taken by B to finish the work.

23. If two pipes function simultaneously, a reservoir will be filled in 12 hours. One pipe fills the reservoir 10 hours faster than the other. How many hours will the second pipe take to fill the reservoir?

24. A person on tour has Rs. 360 for his expenses. If he extends his tour for 4 days, he has to cut down his daily expenses by Rs. 3. Find the original duration of the tour.

25. A piece of cloth costs Rs. 200. If the piece was 5 m longer and each meter of cloth costs Rs. 2 less the cost of the piece would have remained unchanged. How long is the piece and what is the original rate per meter?

26. 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.

27. Find the relation between x and y such that the point P(x, y) is equidistant from A(1,4) and B(-1,2).

28. Find a point on y axis which is equidistant from the point (-5,2) and (9,-2).

29. Find the mid-point of the line segment joining the points A (–2, 8) and B (– 6, – 4).

30. If P (α/3, 4) is the mid-point of the line segment joining the points Q (– 6, 5) and R (– 2, 3), then what will be the value of α?

31. The coordinates of one end of a diameter of a circle are (2, 3) and the coordinate of the centre are (-2, 5). What will be the other end of the diameter?

32. If the points A (1, 2), (0, 0) and C (a, b) are collinear, then what is the relation between a and b?

33. If the distance between the points A (4, p) and B (1, 0) is 5, what is the value of p?

34. What is the coordinate of point P which divides the line segment joining the points A (1, 3) and B (4, 6) in the ratio 2:1?

35. If A (6, 4), B (5, -2) and C (7, -2) are the vertices of a triangle ABC, find the length of median through the point A.

36. If the points A (4, 7), B (k, 3) and C (7, 3) are the vertices of a right triangle, right angled at B, find the value of k.

37. If the points A (4, 3) and B (x, 5) lie on a circle with center O (0, 3), then find the value of x.

38. If P (9a – 2, –b) divides line segment joining A (3a + 1, –3) and B (8a, 5) in the ratio 3:1, find the values of a and b.

39. If the mid-point of the line segment joining the points A (3, 4) and B (k, 6) is P (x, y) and x + y – 10 = 0, find the value of k.

40. Find the coordinate of the point P on the line segment joining A (1, 2) and B (6, 7) such that AP =   2/5 AB.

41. In what ratio does the x–axis divide the line segment joining the points (– 4, – 6) and (–1, 7)? Find the coordinates of the point of division.

42. If A (2, -1), B (3, 4), C (-2, 3) and D (-3, -2) be four points in a plane, show that ABCD is a rhombus but not square. Also find the area of the rhombus.

43. Point P divides the line segment joining the points A (2, 1) and   B (5, -8) such that AP/PB = 1/3. If P lies on the line   2x-y+k=0 find the value of k.

44. Three vertices of a parallelogram ABCD taken in order are A (3, -4), B (-1, -3) and C (-6, 2). Find the coordinates of the fourth vertex D.

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