CBSE
Solved Paper 2019

Mathematics
Class X

Time : 3 hrs **MM : 80**

General Instructions

(ii) All questions are compulsory.
(ii) The question paper consists of **30** questions divided into four sections— A, B, C and D.
(iii) Section A contains **6** questions of **1** mark each. Section B contains **6** questions of 2 marks each, Section C contains **10** questions of **3** marks each and Section D contains **8** questions of **4** marks each.
(iv) There is no overall choice. However, an internal choice has been provided in **two** questions of **1** mark each, **two** questions of **2** marks each, **four** questions of **3** marks each and **three** questiosns of **4** marks each. You have to attempt only **one** of the alternatives in all such questions.
(v) Use of calculators is **not** permitted.

Section A

1. Find the value of k for which the quadratic equation kx (x–2) + 6 = 0 has two equal roots. (1)

2. Find the number of terms in the A.P.: 18, $15\frac{1}{2}, 13, ..., -47$. (1)

3. Evaluate :

$$\frac{\tan 65°}{\cot 25°}$$

OR (1)

Express (sin 67° + cos 75°) in terms of trigonometric ratios of the angle between 0° and 45°.

4. Let $\Delta ABC \sim \Delta DEF$ and their areas be respctively, 64 cm^2 and 121 cm^2. If EF = 15.4 cm, find BC. (1)

5. Find the distance between the points (a, b) and (–a, –b). (1)

6. Find a rational number between $\sqrt{2}$ and $\sqrt{7}$.

OR (1)

Write the number of zeroes in the end of a number whose prime factorization is $2^2 \times 5^3 \times 3^2 \times 17$.

SECTION B

7. How many multiples of 4 lie between 10 and 205?

OR (2)

Determine the A.P. Whose third term is 16 and 7^{th} term exceeds the 5^{th} term by 12.

8. The point R divides the line segment AB, where A(–4, 0) and B(0, 6) such that $AR = \frac{3}{4}AB$.

Find the coordinates of R. (2)

9. Use Euclid's division algorithm to find the HCF of 255 and 867. (2)

10. Three different coins are tossed simultaneously. Find the probability of getting exactly one head. (2)

11. A card is drawn at random from a pack of 52 playing cards. Find the probability of drawing a card which is neither a spade nor a king. (2)

12. Find the solution of the pair of equations:

$$\frac{3}{x}+\frac{8}{y}=-1;\frac{1}{x}-\frac{2}{y}=2, x, y \neq 0$$

OR (2)

Find the value (s) of k for which the pair of equations $\begin{cases} kx + 2y = 3 \\ 3x + 6y = 10 \end{cases}$

has a unique solution.

SECTION C

13. Prove that $(3 + 2\sqrt{5})$ is an irrational number, given that $\sqrt{5}$ is an irrational number. (3)

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

15. If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 - 4x + 3$, find the value of $(\alpha^4\beta^2 + \alpha^2\beta^4)$. (3)

16. Prove that :

$(\sin\theta + 1 + \cos\theta)(\sin\theta - 1 + \cos\theta).\sec\theta \operatorname{cosec}\theta = 2$

OR (3)

$$\sqrt{\frac{\sec\theta-1}{\sec\theta+1}}+\sqrt{\frac{\sec\theta+1}{\sec\theta-1}}=2\operatorname{cosec}\theta$$

17. In what ratio does the point P (–4, y) divide the line segment joining the points A (–6, 10) and B (3, –8)? Hence find the value of y.

OR (3)

Find the value of p for which the points (–5, 1), (1, p) and (4, –2) are collinear.

18. ABC is a right triangle in which $\angle B = 90°$. If AB = 8 cm and BC = 6 cm, find the diameter of the circle inscribed in the triangle. (3)

19. In figure 1, BL and CM are medians of a Δ ABC right-angled at A. Prove that $4 (BL^2 + CM^2) = 5 BC^2$.

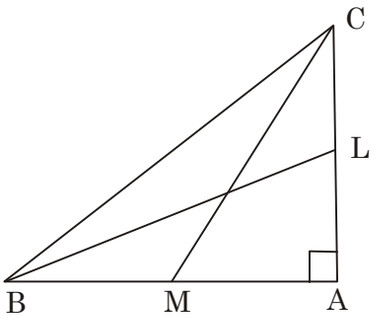

Figure 1

OR

Prove that the sum of the squares of the sides of a rhombus is equal to the sum of the squares of its diagonals. (3)

20. In figure 2, two concentric circles with centre O, have radii 21 cm and 42 cm. If $\angle AOB = 60°$, find the area of the shaded region. (3)

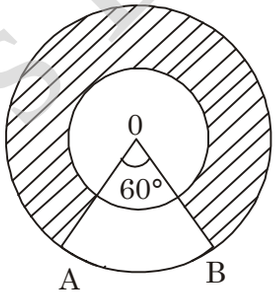

Figure 2

21. A cone of height 24 cm and radius of base 6 cm is made up of modelling clay. A child reshapes it in the form of a sphere. Find the radius of the sphere and hence find the surface area of this sphere.

OR (3)

A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank in his field which is 10 m in diameter and 2 m deep. If water flows through the pipe at the rate of 3 km/hr, in how much time will the tank be filled?

22. Calculate the mode of the following distribution: (3)

Class:	10 – 15	15 – 20	20 –25	25 –30	30 –35
Frequency:	4	7	20	8	1

SECTION D

23. Solve for x :

$$\frac{1}{2a+b+2x}=\frac{1}{2a}+\frac{1}{b}+\frac{1}{2x};x\neq 0,x\neq\frac{-2a-b}{2},a,b\neq 0$$

OR (4)

The sum of the areas of two squares is 640 m^2. If the difference of their perimeters is 64 m, find the sides of the square.

24. If the sum of the first p terms of an A.P. is the same as the sum of its first q terms (where p $\neq$ q), then show that the sum of first (p + q) terms is zero (4)

25. In Δ ABC (Figure 3), AD $\perp$ BC. Prove that
$AC^2 = AB^2 + BC^2 - 2BC \times BD$

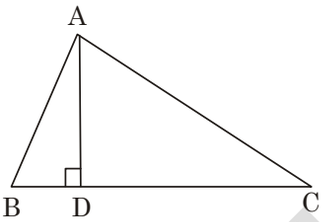

Figure3

26. A moving boat is observed from the top of a 150 m high cliff moving away from the cliff. The angle of depression of the boat changes from 60° to 45° in 2 minutes. Find the speed of the boat in m/min.

OR (4)

There are two poles, one each on either bank of a river just opposite to each other. One pole is 60 m high. From the top of this pole, the angle of depression of the top and foot of the other pole are 30° and 60° respectively. Find the width of the river and height of the other pole.

27. Construct a triangle with sides 5 cm 6 cm and 7 cm and then another triangle whose sides are $\frac{3}{5}$ of the corresponding sides of the first triangle. (4)

28. Prove that :
$\sin^8\theta - \cos^8\theta = (1 - 2\cos^2\theta)(1 - 2\sin^2\theta\cos^2\theta)$ (4)

29. A container opened at the top and made up of a metal sheet, is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm respectively. Find the cost of milk which can completely fill the container, at the rate of ₹ 50 per litre. Also find the cost of metal sheet used ot make the container, if it costs ₹ 10 per 100 cm^2 (Take π = 3.14)

30. Calculate the mean of the following frequency distribution :

Class :	10 – 30	30 –50	50 –70	70 –90	90 –110	110 –130
Frequency:	5	8	12	20	3	2

OR (4)

The following table gives production yield in kg per hectare of wheat of 100 farms of a village :

Production yield (kg/ hectare):	40 – 45	45 –50	50 – 55	55 – 60	60 – 65	65 –70
Number of farms:	4	6	16	20	30	24

Change the distribution to a 'more than type' distribution, and draw its ogive.