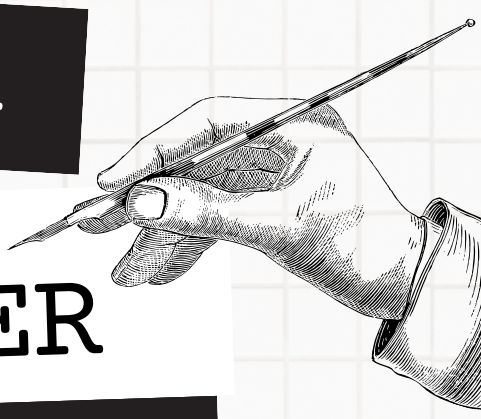
2024

# Pre-Board



# SAMPLE PAPER

CBSE BOARD / STATE BOARDS

NCERT Based Syllabus




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# Sample Paper

## Class- X Exam - 2023-24

## Mathematics - Basic

**Time Allowed: 3 Hours** **Maximum Marks : 80**

**General Instructions :**

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

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# Section - A

**Section A consists of 20 questions of 1 mark each.**

**1.** The zeroes of the polynomial $x^2 - 3x - m(m+3)$ are

(a) $m, m+3$ (b) $-m, m+3$

(c) $m, -(m+3)$ (d) $-m, -(m+3)$

**2.** The value of $k$ for which the system of equations $x + y - 4 = 0$ and $2x + ky = 3$, has no solution, is

(a) $-2$ (b) $\neq 2$

(c) 3 (d) 2

**3.** If $\cos 9\alpha = \sin\alpha$ and $9\alpha < 90^\circ$, then the value of $\tan 5\alpha$ is

(a) $\frac{1}{\sqrt{3}}$ (b) $\sqrt{3}$

(c) 1 (d) 0

h223

**4.** Consider the following frequency distribution of the heights of 60 students of a class

| Height (in cm) | 150-155 | 155-160 | 160-165 | 165-170 | 170-175 | 175-180 |
|---|---|---|---|---|---|---|
| Number of students | 15 | 13 | 10 | 8 | 9 | 5 |

The upper limit of the median class in the given data is

(a) 165 (b) 155

(c) 160 (d) 170

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**5.** The first term of AP is $p$ and the common difference is $q$, then its 10th term is

(a) $q+9p$ (b) $p-9q$

(c) $p+9q$ (d) $2p+9q$

**6.** A card is drawn from a deck of 52 cards. The event $E$ is that card is not an ace of hearts. The number of outcomes favourable to $E$ is

(a) 4 (b) 13

(c) 48 (d) 51

**7.** Two poles of height 6 m and 11 m stand vertically upright on a plane ground. If the distance between their foot is 12 m, then distance between their tops is

(a) 12 m (b) 14 m

(c) 13 m (d) 11 m

f201

**8.** If a circular grass lawn of 35 m in radius has a path 7 m wide running around it on the outside, then the area of the path is

(a) $1450\,m^2$ (b) $1576\,m^2$

(c) $1694\,m^2$ (d) $3368\,m^2$

l190

**9.** $C$ is the mid-point of $PQ$, if $P$ is $(4,x)$, $C$ is $(y,-1)$ and $Q$ is $(-2,4)$, then $x$ and $y$ respectively are

(a) $-6$ and 1 (b) $-6$ and 2

(c) 6 and $-1$ (d) 6 and $-2$

**10.** Two chords $AB$ and $CD$ of a circle intersect at $E$ such that $AE=2.4\,cm$, $BE=3.2\,cm$ and $CE=1.6\,cm$. The length of $DE$ is

(a) 1.6 cm (b) 3.2 cm

(c) 4.8 cm (d) 6.4 cm

**11.** What is the common difference of an AP in which $a_{18}-a_{14}=32$?

(a) 8 (b) $-8$

(c) $-4$ (d) 4

e255

**12.** The pair of equations $3^{x+y}=81$, $81^{x-y}=3$ has

(a) no solution

(b) unique solution

(c) infinitely many solutions

(d) $x=2\frac{1}{8}, y=1\frac{7}{8}$

c191

**13.** If one root of the quadratic equation $ax^2+bx+c=0$ is the reciprocal of the other, then

(a) $b=c$ (b) $a=b$

(c) $ac=1$ (d) $a=c$

d253

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**14.** If one zero of a quadratic polynomial $(kx^2 + 3x + k)$ is 2, then the value of $k$ is

(a) $\frac{5}{6}$ (b) $-\frac{5}{6}$

(c) $\frac{6}{5}$ (d) $-\frac{6}{5}$

b172

**15.** The co-ordinates of the point which is reflection of point $(-3, 5)$ in $x$-axis are

(a) (3, 5) (b) (3, −5)

(c) $(-3, -5)$ (d) $(-3, 5)$

**16.** If the perimeter of one face of a cube is 20 cm, then its surface area is

(a) 120 $cm^2$ (b) 150 $cm^2$

(c) 125 $cm^2$ (d) 400 $cm^2$

m224

**17.** The ratio of the length of a rod and its shadow is $1:\sqrt{3}$ then the angle of elevation of the sun is

(a) 90° (b) 45°

(c) 30° (d) 75°

**18.** The centroid of the triangle whose vertices are $(3, -7), (-8, 6)$ and (5, 10) is

(a) (0, 9) (b) (0, 3)

(c) (1, 3) (d) (3, 5)

g240

**19.** **Assertion :** The HCF of two numbers is 5 and their product is 150, then their LCM is 30
**Reason :** For any two positive integers $a$ and $b$, $\text{HCF}(a, b) + \text{LCM}(a, b) = a \times b$.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

**20.** **Assertion :** $4x^2 - 12x + 9 = 0$ has repeated roots.
**Reason :** The quadratic equation $ax^2 + bx + c = 0$ have repeated roots if discriminant $D > 0$.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

# Section - B

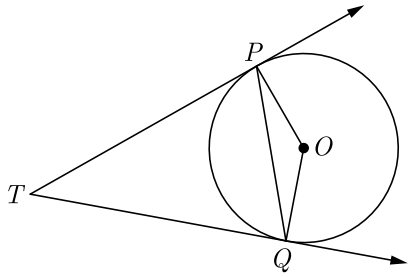
**Section B consists of 5 questions of 2 marks each.**

**21.** In a rectangle $ABCD$, $E$ is a point on $AB$ such that $AE = \frac{2}{3}AB$. If $AB = 6$ km and $AD = 3$ km, then find $DE$.

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**22.** In the given figure $PQ$ is chord of length 6 cm of the circle of radius 6 cm. $TP$ and $TQ$ are tangents to the circle at points $P$ and $Q$ respectively. Find $\angle PTQ$.




**23.** Find the value of $\sin 30^\circ \cos 60^\circ + \cos 30^\circ \sin 60^\circ$ is it equal to $\sin 90^\circ$ or $\cos 90^\circ$ ?

**24.** Find the mode of the following frequency distribution.

| Class | 0- 10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |
|---|---|---|---|---|---|---|---|
| Frequency | 8 | 10 | 10 | 16 | 12 | 6 | 7 |

**OR**

The data regarding marks obtained by 48 students of a class in a class test is given below. Calculate the modal marks of students.

| Marks obtained | 0-5 | 5- 10 | 10-15 | 15-20 | 20-25 | 25-30 | 30-35 | 35-40 | 40-45 | 45-50 |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of students | 1 | 0 | 2 | 0 | 0 | 10 | 25 | 7 | 2 | 1 |

**25.** Show that 571 is a prime number.

**OR**

If two positive integers $p$ and $q$ are written as $p = a^2b^3$ and $q = a^3b$, where $a$ and $b$ are prime numbers than verify $\text{LCM}(p, q) \times \text{HCF}(q, q) = pq$

# Section - C

**Section C consists of 6 questions of 3 marks each.**

**26.** Find the middle term of the AP 7, 13, 19, ...., 247.

**27.** Prove that $(\sin\theta + \text{cosec}\,\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$

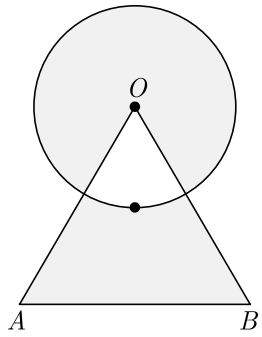
**28.** The circumference of a circle exceeds the diameter by 16.8 cm. Find the radius of the circle. Use $\pi = \frac{22}{7}$.

**OR**

Find the area of shaded region shown in the given figure where a circular arc of radius 6 cm has been drawn with vertex $O$ of an equilateral triangle $OAB$ of side 12 cm as centre.

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**29.** The marks obtained by 110 students in an examination are given below

| Marks | 30-35 | 35-40 | 40-45 | 45-50 | 50-55 | 55-60 | 60-65 |
|---|---|---|---|---|---|---|---|
| Number of Students | 14 | 16 | 28 | 23 | 18 | 8 | 3 |

Find the mean marks of the students.

**30.** If the point $C(-1,2)$ divides internally the line segment joining the points $A(2,5)$ and $B(x,y)$ in the ratio 3:4, find the value of $x^2+y^2$.

**OR**

Find the ratio in which the point $(-3,p)$ divides the line segment joining the points $(-5,-4)$ and $(-2,3)$.Hence find the value of $p$.

**31.** 144 cartons of Coke cans and 90 cartons of Pepsi cans are to be stacked in a canteen. If each stack is of the same height and if it equal contain cartons of the same drink, what would be the greatest number of cartons each stack would have?

# Section - D

**Section D consists of 4 questions of 5 marks each.**

**32.** Determine graphically whether the following pair of linear equations :

$$3x-y=7$$
$$2x+5y+1=0 \text{ has :}$$

unique solution
infinitely many solutions or
no solution.

**OR**

Solve the following pair of linear equations graphically:
$x+3y=12,\ 2x-3y=12$
Also shade the region bounded by the line $2x-3y=2$ and both the co-ordinate axes.

**33.** $a,b$ and $c$ are the sides of a right triangle, where $c$ is the hypotenuse. $A$ circle, of radius $r$, touches the sides of the triangle. Prove that $r=\frac{a+b-c}{2}$.

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**34.** A vertical tower stands on horizontal plane and is surmounted by a vertical flag-staff of height 6 m. At a point on the ground, angle of elevation of the bottom and top of the flag-staff are $30^\circ$ and $45^\circ$ respectively. Find the height of the tower. (Take $\sqrt{3} = 1.73$)

**OR**

From the top of tower, 100 m high, a man observes two cars on the opposite sides of the tower with the angles of depression $30^\circ$ and $45^\circ$ respectively. Find the distance between the cars. (Use $\sqrt{3} = 1.73$)

**35.** The internal and external diameters of a hollow hemispherical vessel are 16 cm and 12 cm respectively. If the cost of painting 1 $cm^2$ of the surface area is Rs. 5.00, find the total cost of painting the vessel all over. (Use $\pi = 3.14$)

# Section - E

**Case study based questions are compulsory.**

**36.** Riya has a lawn with a flowerbed and grass land. The grass land is in the shape of rectangle while flowerbed is in the shape of square. The length of the grassland is found to be 3 m more than twice the length of the flowerbed. Total area of the whole lawn is 1260 $m^2$.

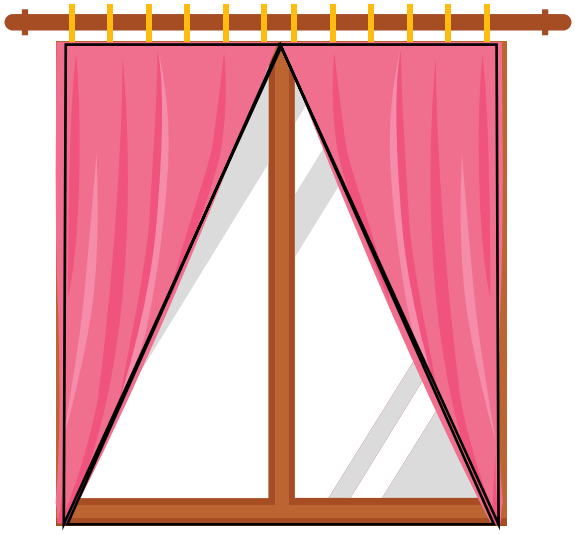


(i) If the length of the flowerbed is $x$ m then what is the total length of the lawn ?
(ii) What is the value of $x$ if the area of total lawn is 1260 $m^2$ ?
(iii) What is the area of grassland ?

**OR**

What is the ratio of area of flowerbed to area of grassland ?

**37.** Rani wants to make the curtains for her window as shown in the figure. The window is in the shape of a rectangle, whose width and height are in the ratio $2:3$. The area of the window is 9600 square cm.



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(i) What is the shape of the window that is uncovered?
(ii) What will be the ratio of two sides of each curtain (other than hypotenuse) ?
(iii) What are the dimensions of the window ?

**OR**

How much window area is covered by the curtains?

**38.** Family Structures : For a recent year, 51% of the families in the United States had no children under the age of 18; 20% had one child; 19% had two children; 7% had three children; and 3% had four or more children.



If a family is selected at random, find the following probability.
(i) Find the probability that the family has two or three children.
(ii) Find the probability that the family has more than one child.
(iii) Find the probability that the family has less than three children.

**OR**

Find the probability that the family has more than three children.

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