GREENLAWNS SCHOOL, WORLI
MATHEMATICS
PRELIM EXAM – 2023 - 24

STD: X **Marks: 80**
Date:08/01/2024 **Time: 2hrs**

Attempt **all** questions from **Section A** and **any four** questions from **Section B All *working, including rough work, must be clearly shown, and must be done on the same sheet as the rest of the answer.***

Omission of essential working will result in loss of marks. The intended marks for questions or parts of questions are given in brackets [ ]

SECTION A

(*Attempt **all** questions from this Section)*

Question 1. Choose the correct answers to the questions from the given options. [15]
(Do not copy the questions, write the correct answer only)

i. If A = [5 −2] and B = $\begin{bmatrix} 7 \\ 11 \end{bmatrix}$, which of the following operation is/are possible

1. A – B 2. A + B 3. AB 4. BA

a. Only 3 b. Both 1 and 2
c. Only d. Both 3 and 4

ii. If $x^2 + kx - 28 = (x - 7)(x + 4)$ for all values of x, then the value of k is

a. – 11 b. −3
c. 3 d. 11

iii. A retailer purchased an item for ₹2500 from a wholesaler and sells it to a customer at 12% profit. The sales are intrastate and the rate of GST is 18%. The amount of tax paid by the customer to the central government is

a. ₹252.00 b. ₹504.00
c. ₹27.00 d. ₹54.00

iv. If the roots of the quadratic equation $x^2 + 12x - k = 0$ are real and different, then the values of k are

a. > 36 b. > −36
c. < 36 d. < −36

v. Which of the following is/are an Arithmetic Progression (A.P.)?

1. $8, 1, -6, -13, \ldots\ldots$
2. $5, 5, 5, 5, \ldots\ldots$
3. $\sqrt{3}, \sqrt{12}, \sqrt{27}, \sqrt{48}$

a. Only 1 b. Only 1 and 2
c. Only 2 d. All 1, 2 and 3

vi. The table shows the values of x & y, where x is proportional to y

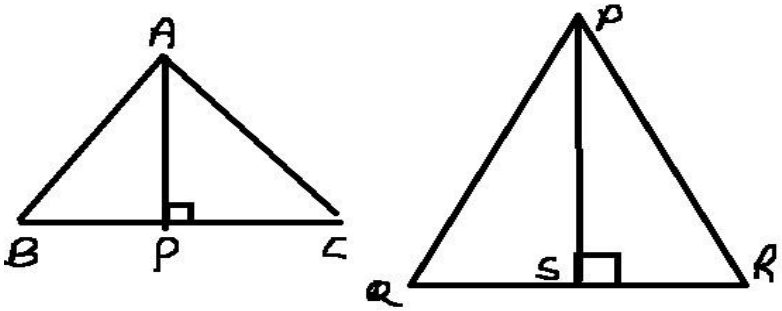
x	M	12	4
y	9	18	N

What are the values of M and N?

a. M = 6 and N = 9 b. M = 9 and N = 6

c. M = 9 and N = 9 d. M = 6 and N = 6

vii. In the given figure, $\Delta ABC \sim \Delta PQR$ and $\frac{AP}{PS} = \frac{5}{11}$. The ratio of Perimeter (ΔAPC):Perimeter (ΔPQR) is



a. 11 : 5 b. 5 : 6

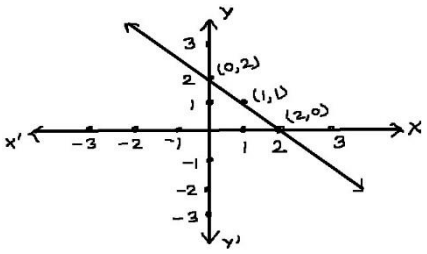
c. 5 : 11 d. 6 : 11

viii. A cylindrical vessel of diameter 4cm is partly filled with water. 300 lead balls are dropped in it. The rise in water level is 0.8cm. The diameter of each ball is

a. 0.8cm b. 0.4cm

c. 0.5cm d. 0.2cm

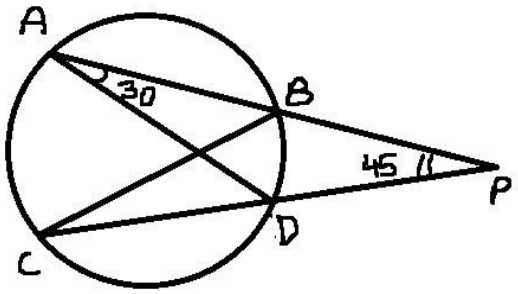
ix. Choose the equation whose graph is shown in the given figure



a. $x + y - 2 = 0$ b. $x - y - 2 = 0$

c. $2x + 3y - 6 = 0$ d. $2x - 3y + 6 = 0$

x. Two chords AB and CD of a circle cut each other when produced outside the circle at P. AD and BC are joined. If $\angle PAD = 30°$ and $\angle CPA = 45°$, then find $\angle CBP$



a. 105° b. 115°

c. 125° d. 135°

xi. Evaluate (sec θ – tan θ) (sec θ + tan θ).

b. 0 b. 1

c. 2 d. 3

xii. Which of the following is a better investment?

1. 10% ₹50 shares quoted at ₹80
2. 5% ₹100 shares at a discount of ₹20
3. 15% ₹30 shares at par

a. Only 1 b. Only 2

c. Only 3 d. Both 1 and 2

xiii. A (−3, 4), B (−3, −2) and C (1,−2) are the vertices of a right angled triangle, right angled at B. Find the coordinates of its orthocenter.

a. (−3, 4) b. (−3,−2)

c. (1, −2) d. (−1,1)

xiv. A point A (p , q) is invariant when reflected about a line $x = p$, the coordinate of the reflected point is

a. (p , q) b. ($-p$, q)

c. ($-p$, $-q$) d. (p , $-q$)

xv. For the given 49 variables $x_1, x_2, x_3, \ldots \ldots \ldots x_{49}$

Assertion (A): To find median of the given data, the variable needs to be arranged in ascending or descending order

Reason (R): The median is the central most term of the arranged data.

a. A is true, R is false b. A is false, R is true

c. Both A and R are true d. Both A and R are false.

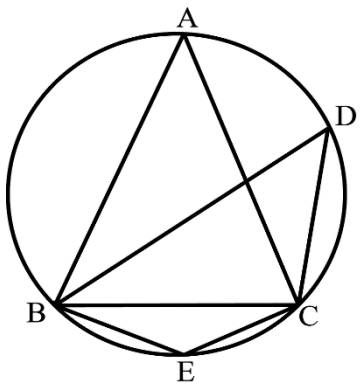
Question 2.

i. In the figure, ∠DBC = 58°. BD is a diameter of the circle. Calculate:

(a) ∠BDC

(b) ∠BEC

(c) ∠BAC



[4]

ii. In a recurring deposit account for 2 years, the total amount deposited by Arsh is ₹14400. If the interest earned is three-eighth of his total deposit. Find

a. The interest he earns

b. His monthly deposit

c. The rate of interest .

[4]

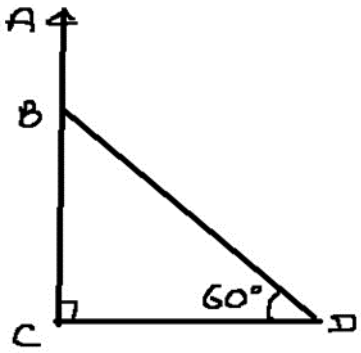
iii. Prove the following trigonometric identity.

$$\sqrt{\frac{1-\cos A}{1+\cos A}} + \sqrt{\frac{1+\cos A}{1-\cos A}} = 2 \ cosec \ A$$

[4]

Question 3.

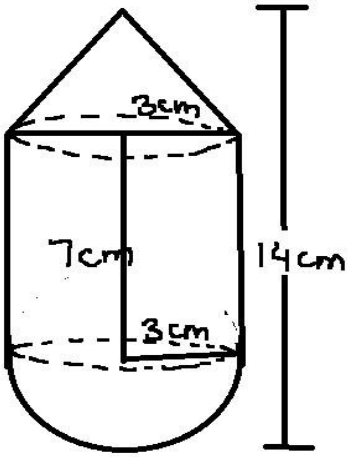
i. An electrician has to repair an electric fault on a pole of height 5m. He has to reach a point 1.6m below the top of the pole to undertake the repair work. How far from the foot of the pole should he place the foot of the ladder? (Take √**3 = 1.7**)



[3]

ii. The adjoining figure shows a model of a toy, which has a hemispherical base surmounted by a cylinder and a cone. If the height of the cylindrical part is 7cm, and the total height of the toy is 14cm. Find

a. Volume of the toy to the nearest cm^3
b. Surface area of the toy.
c. If the scale factor is 1:20, find the volume of the toy in m^3. [Take π = 3.1]



[5]

iii. Use graph paper for this question. Take 2 cm = 1 unit on both axes

a. Plot the points A(−3,0), B(1, 3), C(1,1), D(3, 1), E(3, 3) and F(7, 0)
b. Reflect the points B, C, D and E about the x-axis and name them as B', C', $and \ E'$ respectively.
c. From the above points (A to F) name the invariant point(s) after reflection about xaxis.
d. Give the geometrical name of the closed figure by joining the points $A\,B\,C\,D\,E\,F\,E'D'C'B'A$ in order.

[5]

SECTION B

(*Attempt **any four** questions from this section)*

Question 4.

i.

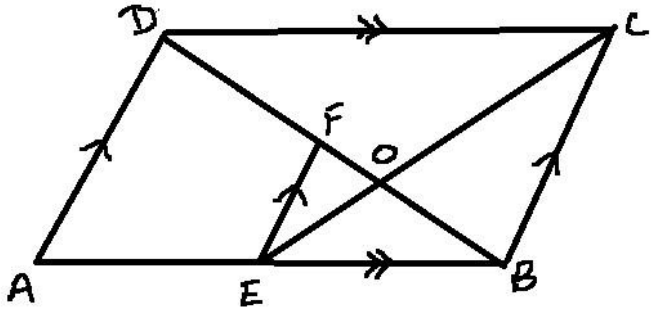
$$Given \begin{bmatrix} 2 & 1 \\ -3 & 4 \end{bmatrix} .X = \begin{bmatrix} 7 \\ 6 \end{bmatrix} .Write:$$

(i) The order of the matrix X.

(ii) The matrix X. **[3]**

ii. Solve the given equation $2x^2 - 9x - 6 = 0$ and express your answer correct to one place of decimal. **[3]**

iii. In the given figure ABCD is a parallelogram, E is a point on AB, CE intersects the diagonal BD at O and EF || BC. If AE: EB = 2 : 3, find



a. EF : AD

b. ar($\Delta A\ B\ D$): $a\ r$ (. $\Delta E\ F$)

c. Prove that: $\Delta F\ E\ O \sim \Delta B\ C\ O$

d. ar($\Delta F\ E\ O$): $a\ r$ ($\Delta B\ C\ O$) **[4]**

Question 5.

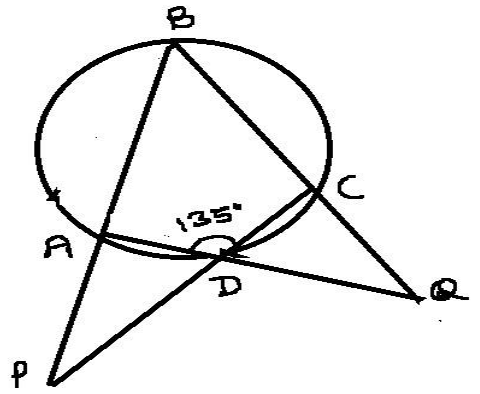
i. Use step-deviation method to find the mean of the following distribution. **[3]**

Monthly Wages (in ₹1000)	90 – 110	110 – 130	130 – 150	150 – 170	170 – 190
Number of Men	4	6	4	8	18

ii. DTDC has three types of courier service for its premium clients. An industrial house has given following orders. Find the amount of the bill. **[3]**

Types of Services	Plus	Gold	Platinum
Number of Services	45	18	16
Cost of each service (in ₹)	150	200	300
Discount (%)	Net	10%	20%
GST	12%	18%	28%

iii. In the given figure ABCD is cyclic quadrilateral, $\angle A\ D\ C$ = 135°. Sides BA and CD are produced to meet at P, sides AD and BC are produced to meet at Q, if $\angle P$: $\angle Q$ = 2 : 1, find:



[4]

a. $\angle P$

b. $\angle Q$

c. $\angle D\ C\ B$

Question 6.

i. Find the geometric progression whose 5th term is 48 and 8th term is 384. **[3]**

ii. Two circles with radii 25 cm and 9 cm touch each other externally. Find the length of the direct common tangent. **[3]**

iii. The following table shows the expenditure of 60 boys on books

Expenditure (in ₹)	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50
No. of Students	14	7	12	6	3	18

Use graph sheet for this question. Take 2 cm = ₹5 on one axis and 2cm = 2 students on another axis.

a. Draw a histogram representing the above distribution

b. Find the mode of their expenditure. **[4]**

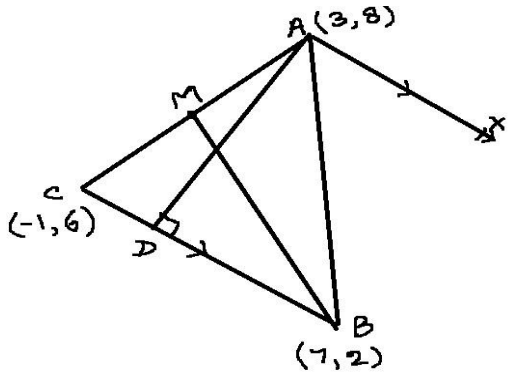
Question 7.

i. From the figure, find the equations of **[5]**

a. Altitude AD

b. Median BM

c. Line AX.



ii. The angle of depression of two cars A and B on the opposite side of a skyscraper of height 100m are respectively 42° and 54°. The line joining the two cars passes through the floor of the skyscraper. Find the distance between the two cars A and B, give your answer correct to the nearest whole number. **[5]**

Question 8.

i. Find the values of x, which satisfy the inequation:

$$-2 \leq \frac{1}{2} - \frac{2x}{3} \leq 1\frac{5}{6},\ x \in N.$$

Graph the solution on the number line. **[3]**

ii. Sachin invests ₹ 8500 in 10% ₹ 100 shares at ₹ 170. He sells the shares when the price of each share rises by ₹ 30. He invests the proceeds in 12% ₹ 100 shares at ₹ 125. Find

(i) the sale proceeds.

(ii) the number of ₹ 125 shares he buys.

(iii) the change in his annual income. **[3]**

iii. The length of a rectangular garden is 12m more than its breadth. The numerical value of its area is equal to four times the numerical value of its perimeter.

Assuming the breadth of the garden to be $'x'$. Write **[4]**

a. The expression for the area
b. The expression for the perimeter
c. Frame the equation in terms of x
d. Find the dimensions of the rectangular garden.

Question 9.

i. If $x = \frac{2ab}{a+b}$, find the value of $\frac{x+a}{x-a} + \frac{x+b}{x-b}$. **[3]**

ii. Each of the letter of the word 'HOUSEWARMING' is written on cards and put in a bag. If a card is drawn at random from the bag after shuffling, what is the probability that the letter on the card is: **[3]**

a. A vowel

b. One of the letters of the word 'SEWING'

c. Not a letter from the word 'WEAR'

iii. Construct two concentric circles of radii 3cm and 5cm. Taking a point P on the outer circle, construct the pair of tangents to the other circle. Measure and record the length of a tangent. **[4]**

Question 10.

i. The distribution of height (in cm) of 96 children is given below:

Height (in cm)	124 – 128	128 – 132	132 – 136	136 – 140	140 – 144	144 – 148	148 – 152	152 – 156	156 – 160
No. of Children	5	9	17	24	16	12	6	4	3

Use 2cm = 4cm on one axis and 2cm = 10children on another axis. **[6]**

a. Draw a less than cumulative frequency curve for the above data.

b. Calculate the median

c. Lower Quartile

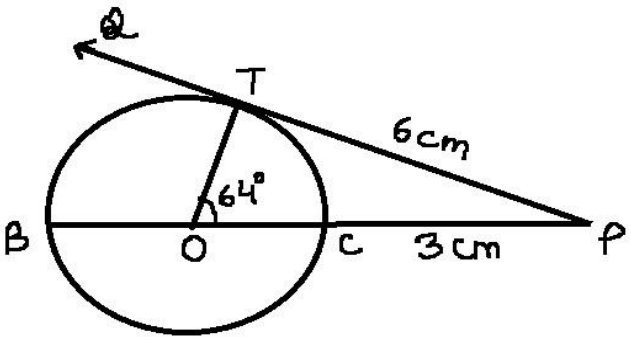
d. Upper Quartile

e. Calculate the number of children whose height is above 150cm.

ii. In the figure given, O is the center of the circle and PT is a tangent at T. If PC = 3cm, PT = 6cm and $\angle C\ O\ T$ = 64°. Find. **[4]**

a. Radius of the circle

b. $\angle Q\ T\ B$



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