PRELIM 1 2020 – 21

Std: 10 **Marks: 80**

Date: 22/02/21 **Subject: MATHEMATICS** **Dur. : 2 ½ Hours**

Attempt all questions from Section A and any 4 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 bracket ().

Mathematical tables are provided.

Section A (40 marks)

[Attempt all questions from this section]

Question 1

a) If the median of 11,12,14, 18, x + 2, x + 4, 30, 32, 35, 41 is 24, find x. Also find mean. (3)

b) Find two numbers such that their mean proportion is 24 and third proportion is 1536. (3)

c) Garima Jain, buys the following items from a departmental store :-

Items	Quantity	Rate	GST %
Tata Tea	500 gm	Rs 250 / kg	5%
Ghee	1 kg	Rs 350 / kg	10%

She pays Rs 1000 to the departmental store. How much rupees were returned by the shopkeeper to Garima Jain. (4)

Question 2

a) A die is rolled once. Find the probability of getting:-
   i) A prime no
   ii) Not an even no
   iii) A factor of 4 (3)

b) Anita opened a recurring deposit account in a bank and deposited Rs 150 per month for 8 months. If she received Rs 1236 at the time of maturity, find the rate of interest. (3)

c) Use graph paper for the following.(Take 1cm = 1 unit on both the axes)
Plot the points A (3,2) and B (-3,-2). Draw two perpendiculars AM and BN on the X axis.

i) Write down the coordinates of points M and N

ii) Name the figure AMBN and find its area. (4)

Question 3

a) $A \times \begin{pmatrix} 1 & 1 \\ 0 & 2 \end{pmatrix} = \begin{pmatrix} 1 & 2 \end{pmatrix}$, A is a matrx (3)

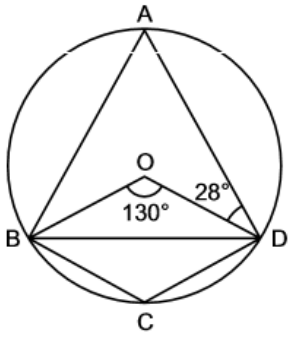
i) State the order of matrix A

ii) Find the matrix A

b) Solve the following linear in-equations and graph the solution on the number line:- (3)

$$-3\frac{1}{2} < \frac{1}{2} - \frac{4x}{3} \leq 3\frac{1}{6}, \quad x \in I$$

b) A, B, C and D are points on the circumference of the circle with centre O. $\angle BOD = 130°, \angle ADO = 28°$. Find $\angle BAD, \angle BCD, \angle OBD$ and $\angle ABO$. (4)



Question 4

a) Find the equation of the median through A in triangle ABC whose vertices are

A (-3,-4), B (2,6) and C (-6,10). (3)

b) Solve the following quadratic equation and write your answer correct to 3 significant figures:- (3)

$$x^2 - 4x - 1 = 0$$

c) The sum of the first seven terms of an AP is 63 and the sum of the next seven terms of an AP is 161. Find the 20^{th} term of this AP. (4)

Section B (40 marks)

Attempt any 4 questions from this section

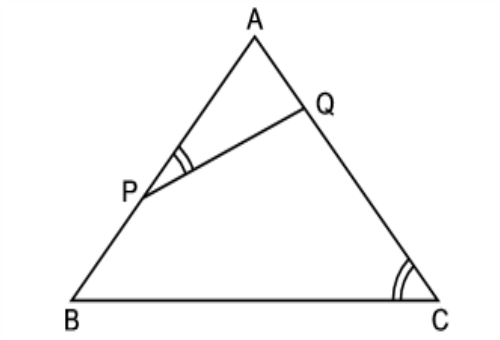
Question 5

a) In ΔABC, $\angle APQ = \angle ACB$, AP = 6 cm, AQ = 5 cm and PB = 4 cm. (3)

(i) Prove that $\Delta APQ \sim \Delta ACB$.

(ii) Find the length of QC.

(iii) Find the area of ΔAPQ : area of ΔABC.



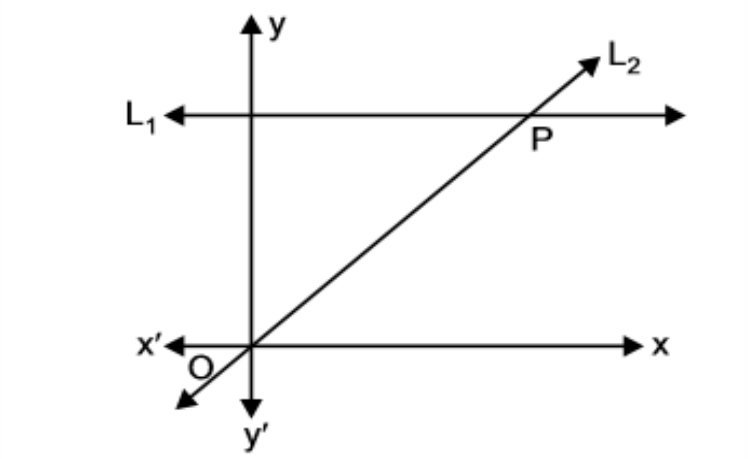
b) Find the sum of all the odd numbers between 0 and 50. (3)

c) Given equation of line L_1 is y = 4.

i) Write the slope of line L_2 if L_2 is the bisector of angle O.

ii) Write the coordinates of point P.

iii) Find the equation of L_2 . (4)



Question 6

a) In the morning assembly of a school, 480 students are arranged in rows and columns. If there are 4 more students in each row than the number of columns, find the number of students in each row. (4)

b) Draw an Ogive from the following frequency table: (6)

Class interval	8 - 10	10 - 12	12 - 14	14 - 16	16 - 18	18 – 20
Frequency	10	16	22	18	12	2

From the given Ogive, calculate:-

i) the median ii) the upper and lower quartile iii) the inter quartile range

Question 7

a) Find the equation of the line which is parallel to $3x - 2y + 5 = 0$ and passes through the point (5, -6). (3)

b) The diameter of roller is 84 cm and its length is 1.5 m. If it takes 100 revolutions to level a playground, find the cost of levelling this ground at the rate of Rs 0.50 per square meter. (3)

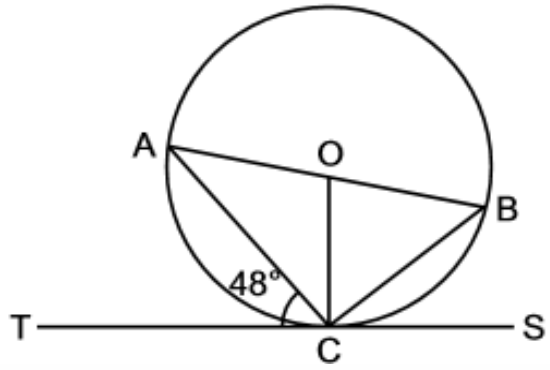
c) The following table shows the age distribution of cases of certain disease admitted during a year in particular hospital.

Age (yrs)	5 - 14	15 – 24	25 - 34	35 - 44	45 - 54	55 – 64
No of cases	6	11	21	23	14	5

Draw histogram and hence find the mode from the graph. (4)

Question 8

a) AB is a diameter of the circle. TS is a tangent to the circle at C and O is the centre. $\angle ACT = 48^0$. Find $\angle A$, $\angle B$ and $\angle BOC$. (3)



b) Evaluate :- (3)

$$\begin{bmatrix} 2\sin 30^\circ & 4\cos 60^\circ \\ 2\cos 0^\circ & \sqrt{3}\tan 30^\circ \end{bmatrix} \begin{bmatrix} 8 \\ 9 \end{bmatrix}$$

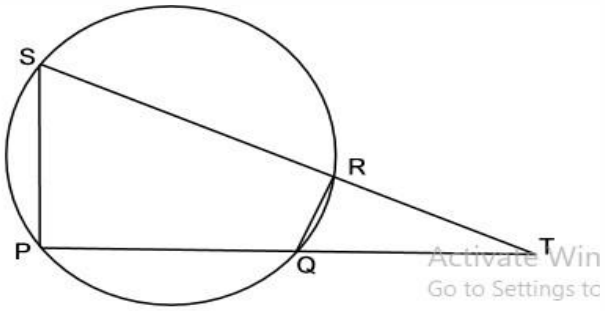
c) From a point P on the ground, the angles of elevation of a 30 m tall building and a helicopter, hovering at some height above the top of the building are 30° and 60° respectively. Find the height at which the helicopter is hovering above the ground. (4)

Question 9

a) There were 50 questions in an examination paper numbered 1 to 50. Write down the probability that the number of question chosen will
   (i) contain more than one digit.
   (ii) contain at least one figure 3.
   (iii) Not be divisible by either 2 or 3. (3)

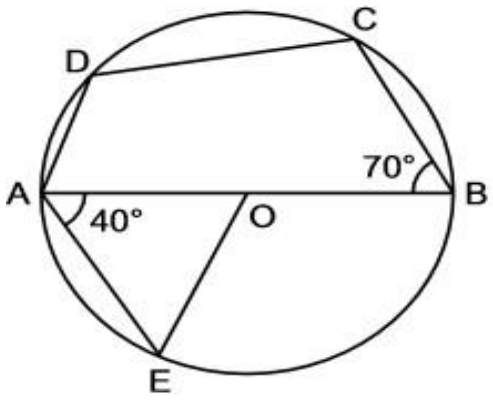
b) A pillar consists of a cylinder 4 m high surmounted by a cone of height 40 cm and both of diameter 60 cm. Find the cost of painting the pillar at Rs 10 per m^2 [Take π = 3.14] (3)

c) In the given figure PQRS is a cyclic quadrilateral PQ and SR produced meet at T.
   (i) Prove ΔTPS ~ ΔTRQ.
   (ii) Find SP if TP = 18 cm, RQ = 4 cm and TR = 6 cm.
   (iii) Find area of quadrilateral PQRS if area of ΔPTS = 27 cm^2 (4)



Question 10

a) In the figure, O is the centre and ∠ABC = 70°, ∠OAE = 40°. Calculate
   (i) ∠ADC (ii) ∠CAB (iii) ∠EOB. (3)



b) Solve the linear in-equations and graph the solution on the number line (3)

$$-1\frac{1}{6} \leq \frac{x}{2} + \frac{5}{6} < 2,\ x \in R$$

c) A manufacturer sells binoculars for Rs 3750 to a wholesaler, who sells it to a retailer at a profit of 12%. The retailer sells it to the customer at a profit of Rs 600. If the rate of GST is 18% and all sales are intra-state, find

(i) the GST paid by the wholesaler to the Central Government.

(ii) the price paid by the retailer inclusive of tax.

iii) the total GST received by the State Government.

iv) the price paid by the customer. (4)

Question 11

a) $ax^3 + bx^2 - 24x + 45$ has $(x + 3)$ as a factor and leaves a remainder -15 when divided by $(x - 2)$. Find a and b. (3)

b) Prove the following identity:- (3)

$$\frac{1 + (\sec A - \tan A)^2}{\operatorname{cosec} A\,(\sec A - \tan A)} = 2 \tan A.$$

c) Calculate the mean of the following frequency distribution by Step-deviation method :- (4)

Class	0 - 25	25 - 50	50 - 75	75 - 100	100 -125	125 - 150
Frequency	4	8	16	13	6	3