

R. D. RAJPAL SCHOOL
PREBOARD EXAM - II (2020-21)

CLASS: X
TIME ALLOWED: 3HRS

SUBJECT: MATHEMATICS
MAXIMUM MARKS: 80

General Instructions:

1. All questions are compulsory.
2. This question paper contains two parts A and B.

Part A

1. It consists of two sections I and II.
2. Section I has 16 questions of 1 mark each.
3. Section II has 4 questions on case study. Each case study has four sub-parts.

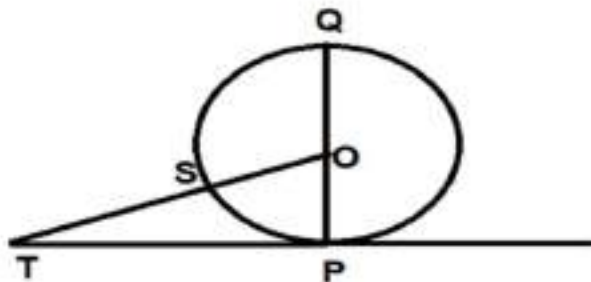
Part B

1. Question No. 21 to 26 are Very short answer type questions of 2 marks each.
2. Question No. 27 to 33 are Short answer type questions of 3 marks each.
3. Question No. 34 to 36 are Long answer type questions of 5 marks each.

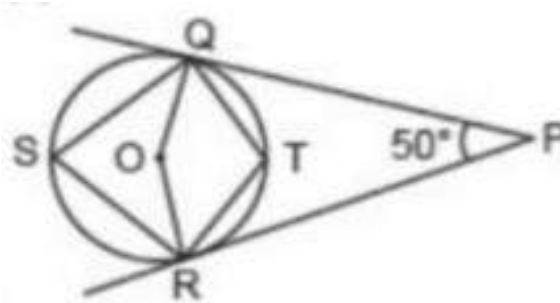
PART – A

SECTION - I

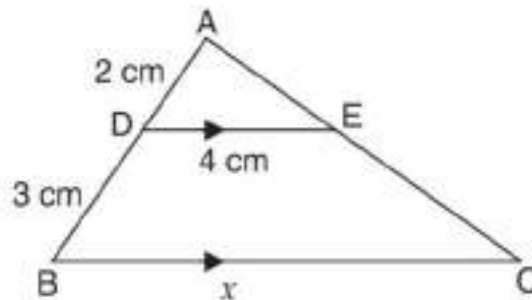
- (1) If $\text{HCF}(a,8) = 4$, $\text{LCM}(a,8) = 24$, then find the value of a .
- (2) If the sum of the zeroes of the quadratic polynomial $ky^2 + 2y - 3k$ is equal to twice their product, find k .
- (3) Do the equations $4x - 3y - 2 = 4$ and $8x - 6y = 3$ represent a pair of coincident lines? Justify.
- (4) Find the coordinate where the line $x - y = 7$ will intersect the y -axis.
- (5) Three numbers in an A.P have sum 21. Find its middle term.
- (6) Find the ratio of sum and product of the roots of the equation $3x^2 + 12 - 13x = 0$.
- (7) If a and b are the roots of the equation $x^2 + ax - b = 0$, find a and b .
- (8) TP is a tangent to a circle with centre O. If angle $\text{TOQ} = 120^\circ$, find the diameter of the circle when $\text{OT} = 10\text{cm}$.



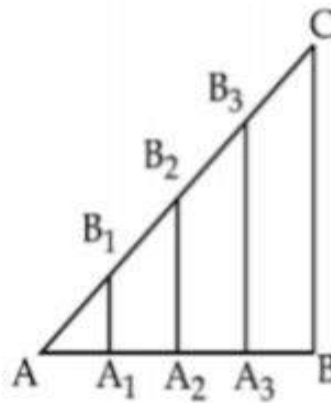
(9) In the given figure, find angle QSR.



(10) In the given figure, $DE \parallel BC$, then find the value of x .



(11) In the given figure, $AA_1 = A_1A_2 = A_2A_3 = A_3B$. If $B_1A_1 \parallel CB$, then A_1 divides BA in what ratio?



(12) Write the value of $4\tan^2\theta - \frac{4}{\cos^2\theta}$

(13) In $\triangle ABC$, right angled at B, $AB = 6\text{cm}$ and $\sin C = \frac{\sqrt{3}}{2}$. Determine the length of side AC.

(14) What is the perimeter of a sector of angle 45° of a circle with radius 7cm?

(15) Find the volume of the largest sphere that can be carved out of a cube of side 21cm.

(16) Cards bearing number 13 to 102 are placed in a bag and mixed thoroughly. A card is taken out from the bag at random. What is the probability that the number on the card taken out is an even number?

CASE STUDY QUESTIONS
SECTION – II

- (17) Using Cartesian coordinates we mark a point on a graph by how far along and how far up it is.

The left-right (horizontal) direction is commonly called X-axis.

The up-down (vertical) direction is commonly called Y-axis.

In Green Park, New Delhi Ramesh is having a rectangular plot ABCD as shown in the figure. Saplings of Gulmohar are planted on the boundary at a distance of 1m from each other. In the plot, Ramesh builds his house in the rectangular area PQRS. In the remaining part of plot, Ramesh wants to plant grass.



- (i) The coordinates of vertices P and S of rectangle PQRS are respectively:
- (2,3) , (6,3)
 - (3,2) , (3,6)
 - (6,3) , (2,3)
 - (3,6) , (3,2)
- (ii) The coordinates of midpoint of diagonal QS is given by
- (13/2, 4)
 - (13/4, 2)
 - (4, 13/2)
 - (2, 13/4)
- (iii) The coordinates of vertices R and Q of rectangle PQRS are respectively:
- (10,6) , (10,2)
 - (2,10) , (10,6)
 - (10,2) , (10,6)
 - (2,10) , (6,1)
- (iv) The area of rectangle PQRS is
- 28m²
 - 28km²
 - 280m²
 - 208m²

(18) Pictures of large or small objects are often drawn to scale. The scale of the drawing is the ratio of the distance measured on the drawing to the corresponding actual distance.

Make a scale drawing of rectangle with sides of 6cm by 8cm.

For rectangle A, use a scale of 1 unit = 1cm

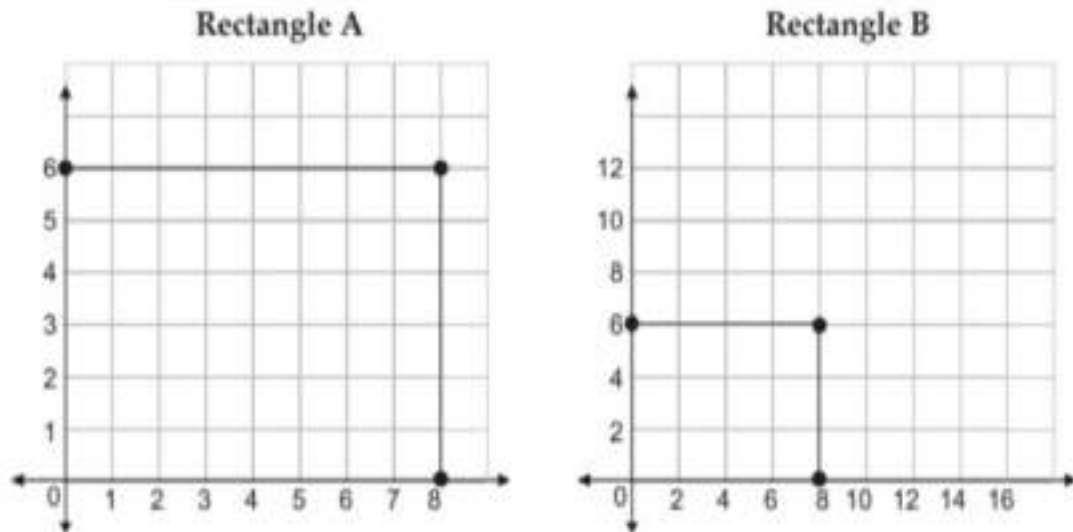
For rectangle B, use a scale of 1 unit = 2cm

Calculate the area of each rectangle in square units.

Area of rectangle A = 48 sq.units

Area of rectangle B = 12 sq.units

So, area of rectangle B is $\frac{1}{4}$ of the area of the rectangle A.

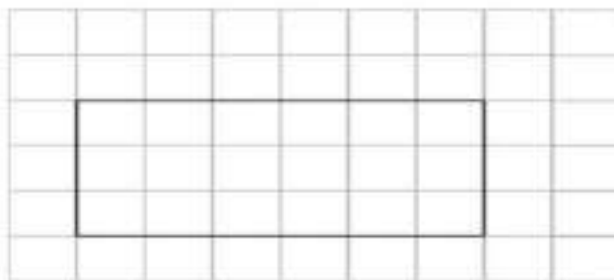


(i) A map is made on the scale 1:2000. The distance between two cities on the map is 10 cm.

The actual distance between the two cities is

- a. 2km
- b. 20km
- c. 2000km
- d. 200km

(ii) Rectangle A has an area of 2 sq. units. Rectangle B is drawn as shown below.



The scale factor used to go from Rectangle A to Rectangle B is

- a. 3
- b. 2
- c. 9
- d. 6

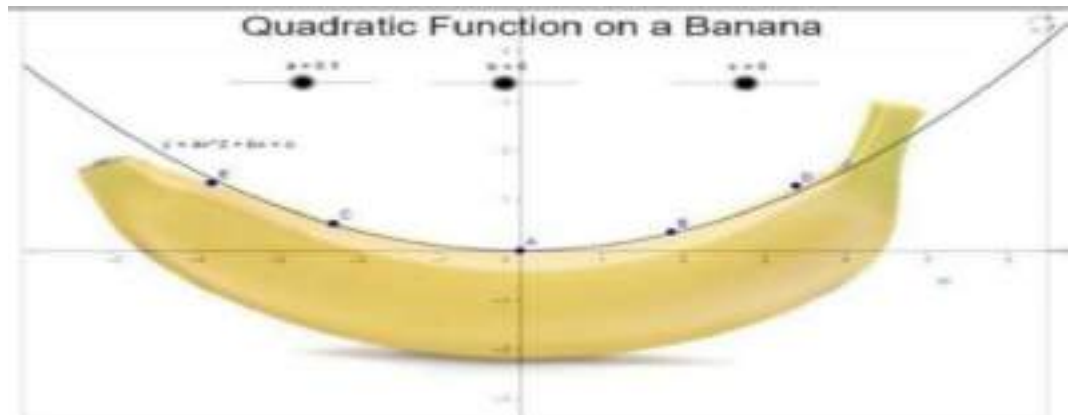
(iii) If the area of a parallelogram is 30 sq.cm and it has to be enlarged with a scale factor of 5, then the area of the enlarged parallelogram will be

- a. 750sq.cm
- b. 150 sq.cm
- c. 300sq.cm
- d. 450sq.cm

(iv) Consider a cuboid with sides of length 2cm, 3cm and 4cm. If a scale factor of 2 is used to draw an enlarged cuboid, then the volume of the new cuboid will be

- a. 24cu.cm
- b. 192cu.cm
- c. 48cu.cm
- d. 72cu.cm

(19)



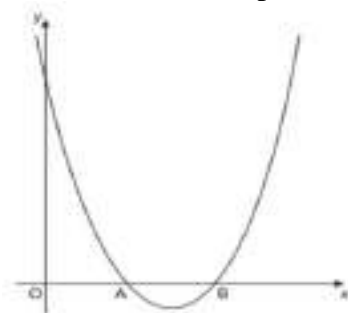
(i) If the curve of the banana is represented by $f(x) = x^2 + x - 12$. Find its zeroes.

- a. (4,-3)
- b. (3,4)
- c. (-4,-3)
- d. (-4,3)

(ii) If the representation of banana curves whose one zero is -5 and the sum of the zeroes is 0, then find the quadratic polynomials

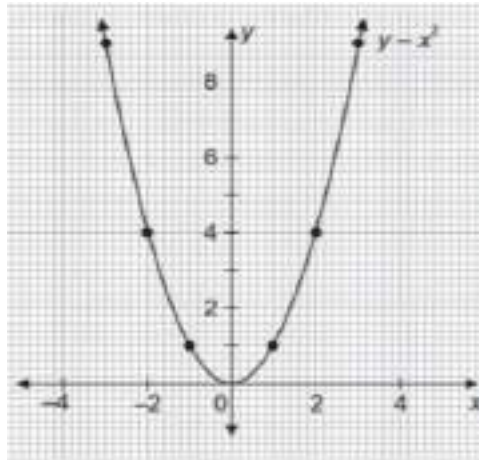
- a. $x^2 - 16$
- b. $x^2 - 4$
- c. $x^2 - 25$
- d. $x^2 + 25$

(iii) The figure given below shows a parabola described by the equation $y = x^2 - 7x + 10$. The parabola intersects the x-axis at points A and B. Find the x-coordinates of points A and B.



- a. 2 and 5
- b. 3 and 6
- c. 2 and 4
- d. 3 and 5

(iv) In the given parabola, which of these points lie on it?



- a. (2,4)
- b. (-2,2)
- c. (0.5,0.5)
- d. (-2.5,6.5)

(20) Suchandra made 88 Christmas cards. She posted all the cards on Monday to her friends and relatives. Her friends and relatives received the cards over the week. 40 cards were received on Tuesday, 28 on Wednesday, 9 on Thursday and 6 on Friday. The rest of the cards were received on Saturday.

(i) How many cards were received on Saturday?

- a. 5
- b. 15
- c. 4
- d. 2

(ii) What is the modal number of days it took for the cards to arrive?

- a. Saturday
- b. Monday
- c. Tuesday
- d. Wednesday

(iii) What is the median number of Christmas cards?

- a. 6
- b. 9
- c. 5
- d. 7

(iv) Using median and mode, what is the formula for finding mean?

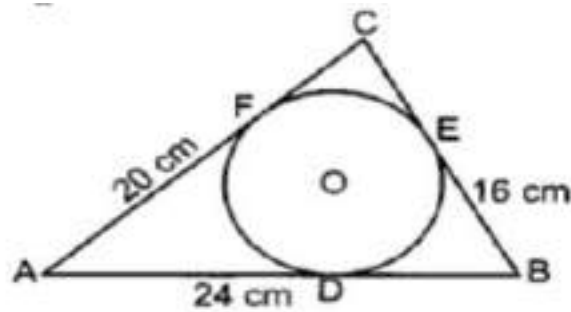
- a. $2\text{median} - 3\text{mode}$
- b. $3\text{median} - 2\text{mode}$
- c. $3\text{median} + 2\text{mode}$
- d. $3\text{median} - \text{mode}$

PART - B

SECTION - III

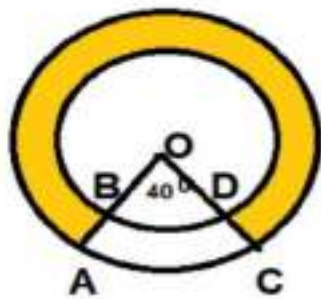
(21) Can two numbers have 18 as their HCF and 370 as their LCM? Give reasons.

- (22) If the distance of $P(x,y)$ from $A(5,1)$ and $B(-1,5)$ are equal, then prove that $3x = 2y$.
- (23) Find a quadratic polynomial one of whose zeroes are $2 + \sqrt{5}$ and sum of zeroes is 4.
- (24) Draw a circle of radius 3.5cm. Draw two tangents to the circle which are perpendicular to each other. (No need to write the steps of construction)
- (25) Prove that $\tan^2 A - \tan^2 B = (\sin^2 A - \sin^2 B) / \cos^2 A \cos^2 B$.
- (26) A circle is inscribed in a ΔABC having sides 16cm, 20cm and 24cm. Find AD, BE and CF.



SECTION – IV

- (27) Prove that $\sqrt{3} + \sqrt{5}$ is irrational.
- (28) If 3 is a root of the quadratic equation $x^2 - x + k = 0$, find the value of p so that the roots of the equation $x^2 + k(2x + k + 2) + p = 0$ are equal.
- (29) Find the area of the shaded region enclosed between two concentric circles of radii 7cm and 14cm where angle $AOC = 40^\circ$.



- (30) Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of the equilateral triangle described on one of its diagonals.
- (31) Mode of the following frequency distribution is 65 and the sum of the frequencies is 70. Find the missing frequencies x and y .

Class	0-20	20-40	40-60	60-80	80-100	100-120	120-140	140-160
Frequency	8	11	x	12	y	9	9	5

- (32) If the angles of the elevation of the top of the tree from two points at distance of a cm and b cm ($a > b$) from its base and in the same straight line from it are 30° and 60° , then find the height of the tree.
- (33) The marks obtained by 80 students of class X in a mock test of mathematics are given below in the table. Find the median of the given data.

Marks	Number of Students
0 and above	80
10 and above	77
20 and above	72
30 and above	65
40 and above	55
50 and above	43
60 and above	28
70 and above	16
80 and above	10
90 and above	8
100 and above	0

SECTION – V

- (34) Rahul has a vessel of the form of an inverted cone open at top of height 11cm and radius of the top as 2.5cm and is full of water. Metallic spherical balls of each of diameter 0.5cm are put in the vessel due to which $\frac{2}{5}$ th of the water in the vessel flows out. Find how many balls were put in the vessel.
- (35) A moving boat is observed from the top of a 150m high cliff moving away from the cliff. The angle of depression of the boat changes from 60° to 45° in 2 min. Find the speed of the boat in m/min. (Take $\sqrt{3}=1.73$)
- (36) A motor boat can travel 30km upstream and 28km downstream in 7 hours. It can travel 21km upstream and return in 5 hours. Find the speed of boat in still water and the speed of the stream.