KENDRIYA VIDYALAYA GACHIBOWLI, GPRA CAMPUS HYD – 32
SAMPLE PAPER TEST 11 FOR CLASS X BOARD EXAM 2021

CLASS: X **MAX. MARKS: 80**

SUBJECT: MATHEMATICS (STANDARD) **DURATION: 3 hrs**

General Instruction:

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

Part – A:

1. It consists two sections- I and II.
2. Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.
3. Section II has 4 questions on case study. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

Part – B:

1. Question No 21 to 26 are Very short answer Type questions of 2 mark 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.
4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

PART - A
SECTION-I
Questions 1 to 16 carry 1 mark each.

1. Find the HCF of 8624 and 21658 using the Fundamental Theorem of Arithmetic.

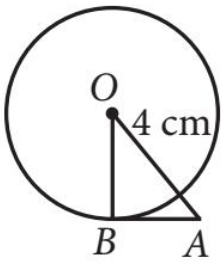
OR

Find the decimal expansion of 13/8.

2. If the ratio of areas of two similar triangles is 4 : 9, then find the ratio of their corresponding sides.

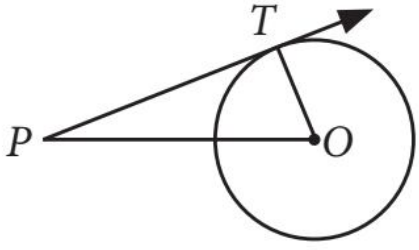
3. Prove that $\sec^4 A - \sec^2 A = \tan^2 A + \tan^4 A$

4. In the given figure, if $\angle OAB = 60°$, then find the radius of the circle.



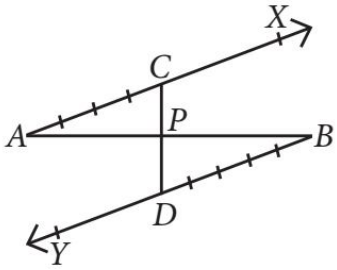
OR

In the given figure, point P is 13 cm away from the centre 0 of a circle and the length PT of the tangent drawn from P to the circle is 12 cm. Then find the radius of the circle.



5. Find the value of cot10°.cot20°.cot30°. cot40° cot90°.

6. In the figure, ∠BAX = ∠ABY. Find the ratio in which P divides AB internally.



7. In a swimming pool measuring 90 m x 40 m, 150 men take a dip. If the average displacement of water by a man is 8 m3, then how much will the water level rise?

8. In a circle of radius 28 cm, an arc subtends an angle of 45° at the centre, then find the length of the arc (in cm).

9. Check whether the lines $3x + y = 7$ and $6x + 2y = 8$ intersect at a point, are parallel or coincident.

10. If α, β are roots of the equation $x^2 - 5x + 6 = 0$, where $\alpha > \beta$, then find the value of $\alpha^2 - \beta^2$.

11. Find the roots of the quadratic equation $2x^2 - 2\sqrt{6}\,x + 3 = 0$.

OR

Show that $x = \frac{3 \pm \sqrt{10}}{4}$ are roots of the quadratic equation $16x^2 = 24x + 1$.

12. If α and β are the zeroes of $f(x) = 2x^2 + 8x - 8$, then prove that $\alpha + \beta - \alpha\beta = 0$.

13. If 21, a, b and -3 are in A.P., then find the value of (a + b).

14. Find the number of solutions of pair of equations $ax + by = c$, $lx + my = n$, where $am \neq bl$.

15. Suppose to draw a pair of tangents to a circle which are inclined to each other at an angle of 30°, it is required to draw tangents at end points of those two radii of the circle which makes angle θ at the centre of circle. What should be the value of θ?

OR

State whether the following statement is True or False. Give reason also. "A pair of tangents can be constructed to a circle inclined at an angle of 185°".

16. All spades of king, queen and jack are removed from a well shuffled pack of 52 cards and a card is drawn at random from the remaining cards. Find the probability of getting a black face card.

OR

Find the probability of getting 53 Mondays in a leap year.

SECTION-II

Case study based questions are compulsory. Attempt any four sub parts of each question. Each subpart carries 1 mark

17. Case Study based-1:

Quadratic polynomial can be used to model the shape of many architectural structures in the world. The tallest memorial, Gate Arch of USA is one such structure. The graph of a quadratic polynomial is a U-shaped with a maximum or minimum point called vertex.

(i) If the Arch is represented by $6x^2 – 7x - 3$, then its zeroes are
(a) 1/2, -3/2 (b) -1/3, 3/2 (b) -1/2, 1/3 (d) -1/3, 2/3

(ii) The zeroes of the polynomial are the points where its graph
(a) intersect the x-axis (b) intersect the y-axis (c) intersect either of the axes (d) Can't say

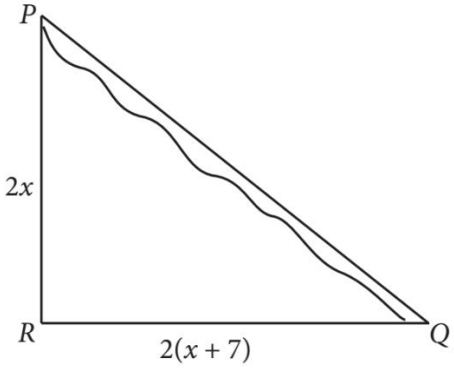
(iii) The quadratic graph whose sum of zeroes is 0 and that of its product is -1 is given by
(a) $y = x^2 – x$ (b) $y = x^2 + x$ (c) $y = x^2 – 1$ (d) $y = x^2 + 1$

(iv) Which of the following has -1/2 and 2/5 as their zeroes?
(a) $5x^2 – 4x + 5$ (b) $2x^2 – x + 10$ (c) $10x^2 – 7x + 1$ (d) $10x^2 + x – 2$

(v) The sum of zeroes of the polynomial $3x^2 - 3\sqrt{2}x + 1$ is
(a) $-3\sqrt{2}$ (b) 1 (c) $\sqrt{2}$ (d) -1/3

18. Case Study based-2:

Minister of a state went to city Q from city P. There is a route via city R such that PR ⊥ RQ. PR = $2x$ km and RQ = $2(x + 7)$ km. He noticed that there is a proposal to construct a 26 km highway which directly connects the two cities P and Q. Based on the above information, answer the following questions.



(i) Which concept can be used to get the value of x?
(a) Thales theorem (b) Pythagoras theorem
(c) Converse of thales theorem (d) Converse of Pythagoras theorem

(ii) The value of x is
(a) 4 (b) 6 (c) 5 (d) 8

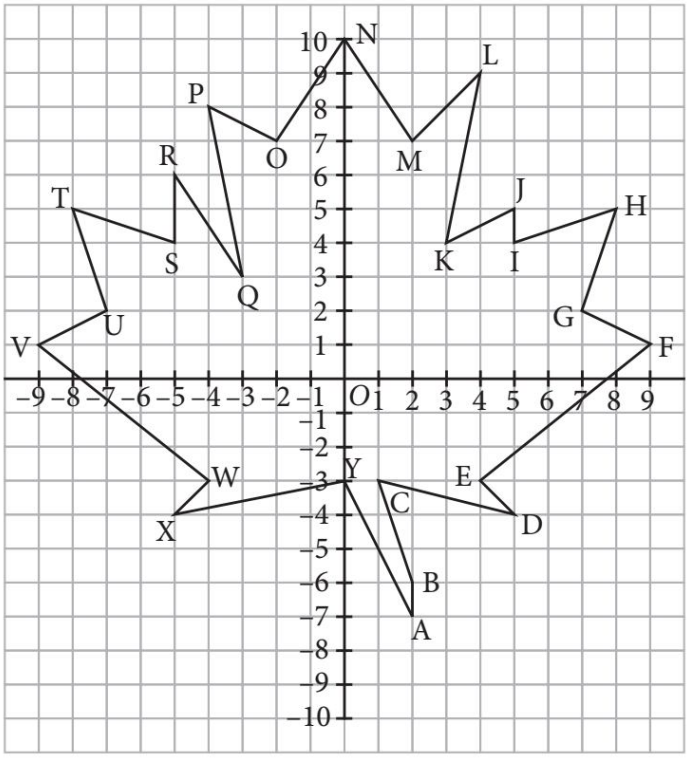
(iii) The value of PR is
(a) 10 km (b) 20 km (c) 15 km (d) 25 km

(iv) The value of RQ is
(a) 12 km (b) 24 km (c) 16 km (d) 20 km

(v) How much distance will be saved in reaching city Q after the construction of highway?
(a) 10 km (b) 9 km (c) 4 km (d) 8 km

19. Case Study based-3:

Meera embroidered a leaf by knitting on her table cloth. Her son traced the design on a coordinate plane as shown below.



(i) The ratio in which C divides the line joining W and E is
(a) 1 : 1 (b) 2 : 5 (c) 5 : 3 (d) 5 : 4

(ii) Find the ratio in which x-axis divides the line joining P and D.
(a) 8 : 3 (b) 2 : 1 (c) 4 : 5 (d) 1 : 1

(iii) Find the ratio in which y-axis divides the line joining L and U.
(a) 4 : 7 (b) 9 : 2 (c) 1 : 4 (d) 7 : 9

(iv) Find the distance of K from the origin.
(a) 3 unit (b) 10 units (c) 5 units (d) 7 units

(v) The midpoint of which of the following pairs doesn't lie on y-axis?
(a) U and G (b) P and L (c) Q and K (d) None of these

20. Case Study based-4:

A group of 71 people visited to a museum on a certain day. The following table shows their ages.

Age (in years)	Number of persons
Less than 10	3
Less than 20	10
Less than 30	22
Less than 40	40
Less than 50	54
Less than 60	71

Based on the above information, answer the following questions.

(i) If true class limits have been decided by making the classes of interval 10, then first class must be

(a) 5-15 (b) 0-10 (c) 10-20 (d) none of these

(ii) The median class for the given data will be

(a) 20-30 (b) 10-20 (c) 30-40 (d) 40-50

(iii) The cumulative frequency of class preceding the median class is

(a) 22 (b) 13 (c) 25 (d) 35

(iv) The median age of the persons visited the museum is

(a) 30 years (c) 34 years (b) 32.5 years (d) 37.5 years

(v) If the price of a ticket for the age group 30-40 is Rs. 30, then the total amount spent by this age group is

(a) Rs. 360 (b) Rs. 420 (c) Rs. 540 (d) Rs. 340

PART – B

(Question No 21 to 26 are Very short answer Type questions of 2 mark each)

21. If PA and PB are tangents from an external point P to a circle, such that AP = 12 cm and LAPB = 60°. Find the length of chord AB.

22. Let ABC be a right angled triangle in which AB = 12 cm, BC = 5 cm and ∠B = 90°. BD is the perpendicular from B on AC. The circle through B, C and D is drawn. Construct the tangents from A to this circle.

23. If point P(k - 1, 2) is equidistant from the points A(3, k) and B(k, 5), then find the value(s) of k.

OR

If P(a/3, 4) is the mid point of the line segment joining the points Q (-6, 5) and R (-2, 3), then find the value of a.

24. If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and -3, then find the values of a and b.

25. If cot θ = $1/\sqrt{3}$, then find the value of $\frac{1-\cos^2\theta}{2-\sin^2\theta}$.

OR

If (1 – sin A) (1 – sin B) (1 – sin C) = (1 + sin A) (1 + sin B) (1 + sin C), then prove that each side is equal to cos A cos B cos C.

26. The HCF of 2472, 1284 and a third number Nis 12. If their LCM is $2^3 \times 3^2 \times 5 \times 103 \times 107$, then find the number N.

(Question no 27 to 33 are Short Answer Type questions of 3 marks each)

27. Find x in terms of a, b and c: $\frac{a}{x-a}+\frac{b}{x-b}=\frac{2c}{x-c}; x \neq a, b, c$

OR

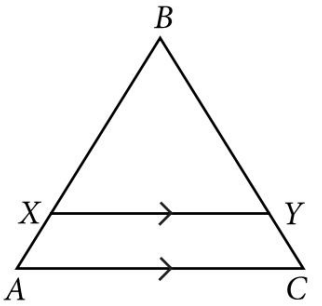
If x = -4 is a root of the equation $x^2 + 2x + 4p = 0$, find the values of k for which the equation $x^2 + px(1 + 3k) + 7(3 + 2k) = 0$ has equal roots.

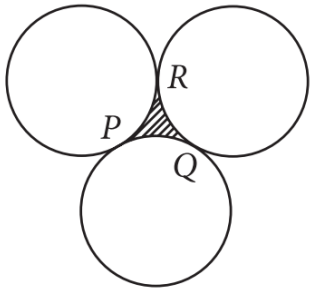
28. Find H.C.F. and L.C.M. of 404 and 96 and verify that H.C.F. x L.C.M. = Product of the two given numbers.

29. In ΔABC, $\angle B = 90°$ and $BD \perp AC$. If AC = 9 cm and AD = 3 cm, then find the length of BD.

OR

In the given figure, XY || AC and XY divides the ΔABC into two regions such that ar(ΔBXY) = 2ar(ACYX). Determine AX/AB.





30. Logo of a car company is shown in the adjoining figure, which consists of three circles each of radius 3.5 cm. If the company want to colour in the region enclosed by these circles, then find how much area is available for colouring(see above right sided figure)? [Use $\pi = 22/7$, $\sqrt{3} = 1.732$]

31. From a window (h metres high above the ground) of a house in a street, the angles of elevation and depression of the top and the foot of another house on the opposite side of the street are θ and ϕ respectively. Show that the height of the opposite house is $h(1 + \tan\theta \cot\phi)$.

32. Compare the modal ages of two groups of students appearing for an entrance test.

Age(in years)	16 – 18	18 – 20	20 – 22	22 – 24	24 – 26
Group A	50	78	46	28	23
Group B	54	89	40	25	17

33. If the median of the following frequency distribution is 45 and total frequency is 74, then find the missing frequencies.

Class Interval	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Frequency	5	8	*x*	12	*y*	10	14

(Question no 34 to 36 are Long Answer Type questions of 5 marks each.)

34. As observed from the top of a 100 m high light house from the sea-level, the angles of depression of two ships are 30^0 and 45^0. If one ship is exactly behind the other on the same side of the light house, find the distance between the two ships. [Use $\sqrt{3} = 1.732$]

OR

A statue, 1.46 m tall, stands on a pedestal. From a point on the ground the angle of elevation of the top of the statue is 60^0 and from the same point angle of elevation of the top of the pedestal is 45^0. Find the height of the pedestal. (use $\sqrt{3} = 1.73$)

35. Due to heavy floods in a state, thousands were rendered homeless. 50 schools collectively offered to the state government the place and the canvas for 1500 tents that to be fixed by the government and decided to share the whole expenditure equally. The lower part of each tent is cylindrical of base radius 2.8 m and height 3.5 m and upper part is conical of same base radius but of height 2.1 m. If the canvas used to make the tents costs Rs. 120 per sq.m, then find the amount shared by each school to set up the tents.

36. The perimeter of a rectangle is 52 cm, where length is 6 cm more than the width of the rectangle. Form the pair of linear equations for the above situation and find the dimensions of the rectangle graphically.