

KENDRIYA VIDYALAYA GACHIBOWLI , GPRA CAMPUS HYD - 32
SAMPLE TEST PAPER 10 FOR CLASS X BOARD EXAM 2021

CLASS: X
SUBJECT: MATHEMATICS

MAX. MARKS: 80
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:

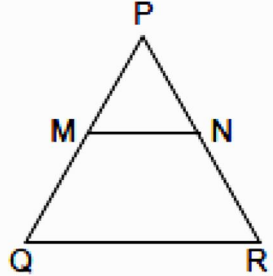
1. Question No 21 to 26 are Very short answer Type questions of 2 mark each,
2. Question No 27 to 33 are Short Answer Type questions of 3 marks each
3. Question No 34 to 36 are Long Answer Type questions of 5 marks each.
4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

PART - A
SECTION-I

Questions 1 to 16 carry 1 mark each.

1. Given that $\text{LCM}(91, 26) = 182$, then find $\text{HCF}(91, 26)$.
OR
Decompose 32760 into prime factors.
2. Find the number of solutions of the pair of equations $x + 2y - 4 = 0$ and $2x + 4y - 12 = 0$.
3. If $p - 1, p + 3, 3p - 1$ are in AP, then find p .
OR
In an AP, if $d = -2, n = 5$ and $a_n = 0$, find the value of a .
4. Find the value of k for which the equation $x^2 + 2(k + 1)x + k^2 = 0$ has equal roots
OR
Find the roots of the quadratic equation by factorisation: $x^2 - 9x + 20 = 0$
5. In $\triangle ABC$, right angled at B, $AB = 5$ cm and $\sin C = 1/2$. Determine the length of side AC.
6. If $\sec A = 15/7$ and $A + B = 90^\circ$, find the value of $\text{cosec } B$.
7. A line segment AB is to be divided in the ratio 5 : 4. Ray AX is drawn such that $\angle BAX$ is acute. Also ray BY is drawn parallel to AX and the points A_1, A_2, A_3, \dots and B_1, B_2, B_3, \dots are located at equal distances on rays AX and BY respectively. Which two points now will be joined?
8. If TP and TQ are the two tangents to a circle with centre O so that $\angle POQ = 110^\circ$, then find $\angle PTQ$.
OR
If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80° , then find $\angle POA$.
9. If the product of the zeroes of $x^2 - 3kx + 2k^2 - 1$ is 7, then find the values of k .

10. If zeroes of $p(x) = 2x^2 - 7x + k$ are reciprocal of each other, then find the value of k .
11. If the pair of linear equations $13x + ky = k$ and $39x + 6y = k + 4$ has infinitely many solutions, then find the value of k .
12. From a point Q , the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. Find the radius of the circle.
13. In the given figure, $MN \parallel QR$ and $PM = 3$ cm, $MQ = 4$ cm, $PN = 6$ cm, $PR = x$ cm, then find x



14. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.
15. A metallic sphere of radius 4.2 cm is melted and recast into the shape of a cylinder of radius 6 cm. Find the height of the cylinder.
16. A lot of 20 bulbs contain 12 good ones. One bulb is drawn at random from the lot. What is the probability that this bulb is defective?

OR

If two dice are thrown at the same time, then what will be the probability of getting even doublet?

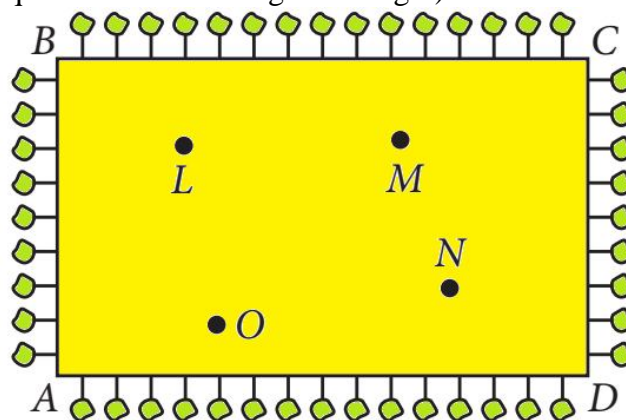
SECTION-II

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

17. Case Study based-1: Heavy Storm

On the occasions of 'Diwali' a rectangular plot have been allotted for 'Diwali Mela' to students of secondary school in Hyderabad. In order to reduce smog and pollution they decided to keep little leaf linden plant on the boundary at a distance of 1 m from each other. Four air purifier machines have also been set up at points L, M, N, O .

(Answer the following questions considering A as origin).

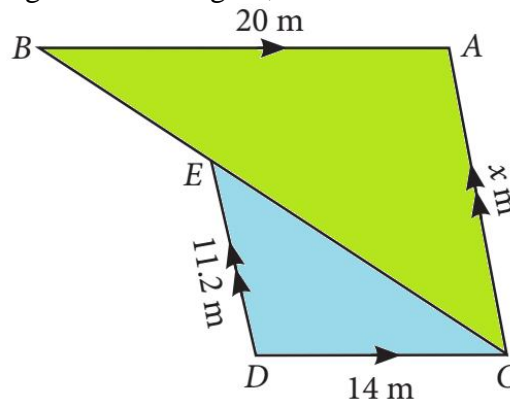


- (i) What are the coordinates of L ?
- (a) (4, 7) (b) (7, 4) (c) (7, 3) (d) (4, 8)
- (ii) What are the coordinates of N ?
- (a) (3, 12) (b) (12, 5) (c) (12, 3) (d) None of these

- (iii) Distance between L and O is
 (a) $\sqrt{26}$ units (b) 5 units (c) $\sqrt{29}$ units (d) None of these
- (iv) Considering D as origin, what are the coordinates of M?
 (a) (-6, 7) (b) (7, 6) (c) (-7, 7) (d) (6, 6)
- (v) Find the mid point of the segment joining the points L and N.
 (a) (5, 8) (b) (8, 6) (c) (6, 8) (d) (8, 5)

18. Case Study based-2:

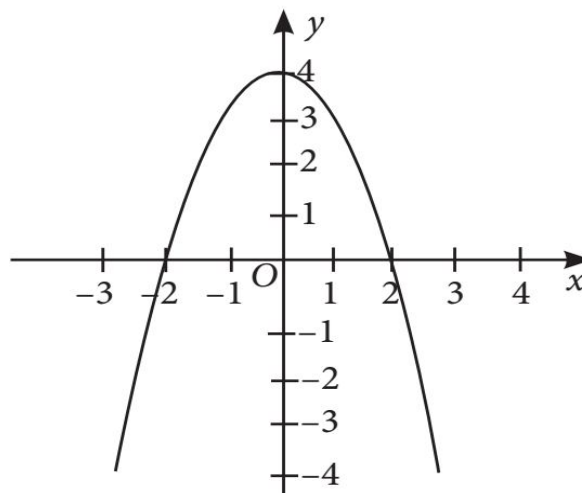
One triangular agricultural land is there and adjacent to it one triangular pond is there. The figure of the same is shown below in which $AB \parallel CD$ and $DE \parallel CA$. Triangles are said to be similar if they are of same shape. Also, the corresponding sides of similar triangles are proportions. Based on the above information and given below figure, answer the following questions.



- (i) Which similarity criterion has been used in the given figure?
 (a) SAS (b) AA similarity (c) SSS (d) None of these
- (ii) In the given similar triangles, $\angle ABC =$
 (a) $\angle EDC$ (b) $\angle DEC$ (c) $\angle DCE$ (d) None of these
- (iii) The value of x is
 (a) 16 m (b) 14 m (c) 7 m (d) 12.6 m
- (iv) If perimeter of $\triangle ABC$ is 50 cm, then $CE =$
 (a) 14 m (b) 9.2 m (c) 10.5 m (d) 9.8 m
- (v) Length of BE is equal to
 (a) 9.8 m (b) 4.2 m (c) 5.6 m (d) 3.5 m

19. Case Study based-3:

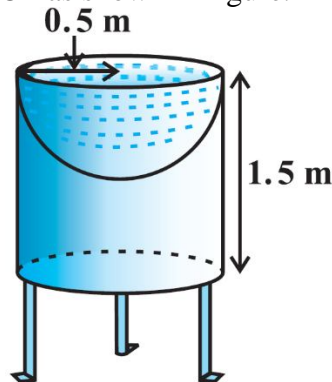
Anish and his father who is an architect by profession, visited Switzerland. They went to see Gotthard Base Tunnel which is world's longest tunnel and has a parabolic cross-section. The mathematical representation of the tunnel is shown in figure.



- (i) The zeroes of the polynomial whose graph is given, are
 (a) -2, 2 (b) -2, -2 (c) 2, 2 (d) 2, 0
- (ii) What will be the expression of the polynomial given in diagram?
 (a) $x^2 - 2$ (b) $-x^2 + 4$ (c) $x^2 + 4$ (d) $x^2 + 2$
- (iii) What is the value of the polynomial if $x = 3$?
 (a) 0 (b) 5 (c) -5 (d) -1
- (iv) If the tunnel is represented by $-x^2 + 3x - 2$, then its zeroes are
 (a) -1, -2 (b) 1, -2 (c) -1, 2 (d) 1, 2
- (v) If one zero is -4 and sum of zeroes is 1, then representation of tunnel as a polynomial is
 (a) $x^2 - x + 24$ (b) $-x^2 + x + 20$ (c) $x^2 + x + 20$ (d) $x^2 - x + 16$

20. Case Study based-4:

Mayank wants to make a bird bath for his garden in the shape of cylinder of height 1.5 m and radius 0.5 m with a hemispherical depression at one end, stands on three cylindrical pillars of radius 7 cm and height 2 m using POP as shown in figure.



- (i) Find the curved surface area of the cylindrical part.
 (a) 4.71 m^2 (b) 4 m^2 (c) 5.3 m^2 (d) 6.9 m^2
- (ii) Find the curved surface area of hemispherical depression.
 (a) 2.57 m^2 (b) 1.57 m^2 (c) 1 m^2 (d) 2.5 m^2
- (iii) Find the volume of the three pillars.
 (a) 0.94 m^3 (b) 9.43 m^3 (c) 0.0924 m^3 (d) 9 m^3
- (iv) Curved surface area of 3 pillars is
 (a) 37.71 m^2 (b) 2.64 m^2 (c) 1.63 m^2 (d) 2 m^2
- (v) Find the volume of the hemispherical depression.
 (a) 0.82 m^3 (b) 0.72 m^3 (c) 0.26 m^3 (d) None of these

PART – B

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

- 21.** Find the largest number which divides 245 and 1037, leaving remainder 5 in each case.
- 22.** Find the ratio in which the y-axis divides the line segment joining the points $(5, -6)$ and $(-1, -4)$.

OR

Find the coordinates of the points which divide the line segment joining $A(-2, 2)$ and $B(2, 8)$ into four equal parts.

23. If the sum of the first 14 terms of an AP is 1050 and its first term is 10, find the 20th term.
24. In ΔPQR , right-angled at Q, $PR + QR = 25$ cm and $PQ = 5$ cm. Determine the values of $\sin P$, $\cos P$ and $\tan P$.
- OR**
- If $\tan(A - B) = 1/\sqrt{3}$, $\tan(A + B) = \sqrt{3}$, $0^\circ < A + B \leq 90^\circ$, $A > B$, find A and B.
25. Draw a circle of radius 6 cm. From a point 10 cm away from its centre, construct the pair of tangents to the circle.
26. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.

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

27. Prove that $\sqrt{7}$ is an irrational number.
28. Prove that: $\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \operatorname{cosec} A + \cot A$
29. Find the median of the given distribution:

Class Interval	118 – 126	127 – 135	136 – 144	145 – 153	154 – 162	163 – 171	172 – 180
Frequency	3	5	9	12	5	4	2

30. The below figure depicts a racing track whose left and right ends are semicircular. The distance between the two inner parallel line segments is 60 m and they are each 106 m long. If the track is 10 m wide, find:
- (i) the distance around the track along its inner edge
- (ii) the area of the track.

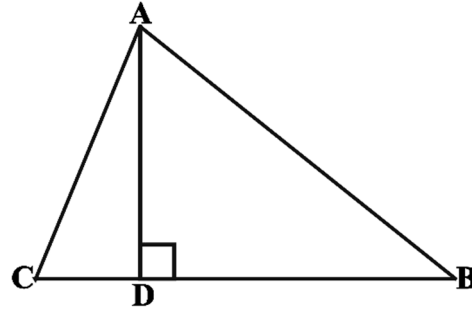


31. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting
- (i) a king of red colour (ii) a face card (iii) a spade
- OR**
- A die is thrown twice. What is the probability that
- (i) 5 will not come up either time? (ii) 5 will come up at least once?
32. A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

OR

The diagonal of a rectangular field is 60 metres more than the shorter side. If the longer side is 30 metres more than the shorter side, find the sides of the field.

33. The perpendicular from A on side BC of a ΔABC intersects BC at D such that $DB = 3 CD$ (see the below figure). Prove that $2 AB^2 = 2 AC^2 + BC^2$.



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

34. Draw the graphs of the equations $5x - y = 5$ and $3x - y = 3$. Find the solution and determine the co-ordinates of the vertices of the triangle formed by these lines and the y axis.
35. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30° , which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60° . Find the time taken by the car to reach the foot of the tower from this point.

OR

A TV tower stands vertically on a bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of the tower is 60° . From another point 20 m away from this point on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30° . Find the height of the tower and the width of the canal.

36. A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference of the volumes of the cylinder and the toy. (Take $\pi = 3.14$)

