KENDRIYA VIDYALAYA GACHIBOWLI, GPRA CAMPUS HYD – 32
SAMPLE TEST PAPER 04 FOR CLASS X (2020-21)

Max. marks: 80   **Time Allowed: 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 three 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.** Check whether 307 is a term of the list of numbers 6, 13, 20, 27, …..

OR

Find how many two-digit numbers are divisible by 9.

2. Find the zeroes of $p(x) = x^2 – 27$.

3. The cost of 3 pens and 5 pencil boxes is Rs. 120 and that of 4 pens and 7 pencil boxes is Rs. 250. Represent the situation algebraically.

4. Find the values of m for which system $3x + my = 1$, $2x – 7y = 5$ will have a unique solution.

5. The decimal expansion of the rational number $\dfrac{23}{2^5 \times 5^4}$ will terminate after how many places of decimals?

OR

Find the missing numbers in the following factor tree:
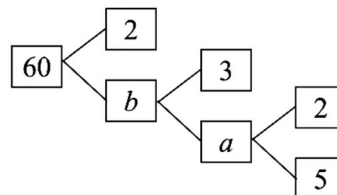
6. For what value of m, the quadratic equation $x^2 – mx + 9 = 0$ have real roots?

7. Find the discriminant of the quadratic equation $3x^2 – 5x + 7 = 0$ and hence find the nature of its roots.
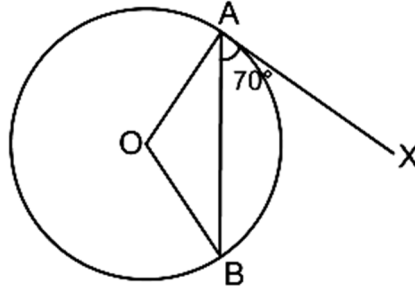
OR

Find the roots of the equation $x^2 – 5x + 6 = 0$.

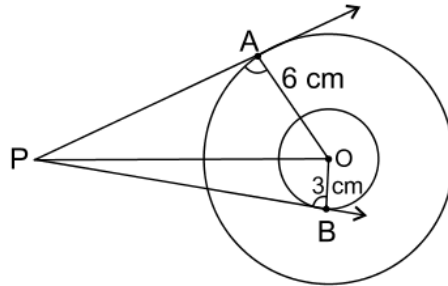8. If $4\sec\theta = 5$, then find the value of $\sin\theta$.

9. A point P is 23 cm away from the centre of a circle and the length of tangent drawn from P to the circle is 20 cm. Find the radius of the circle.

10. In the below figure, O is the centre of a circle, AB is a chord and the tangent AX at A makes an angle of 70° with AB. Find AOB.

OR

In the below figure, if AP = 10 cm, AO = 6cm and OB = 3 cm, then find BP.

11. Find the area of the sector of a circle with radius 7 cm and of central angle 60°.

12. Find the maximum volume of a cone that can be carved out of a solid hemisphere of radius r.

13. In ΔMRS, PQ || RS and $\dfrac{MP}{PR} = \dfrac{2}{3}$. If MS = 4.5 cm, find MQ.

14. In the below figure, if $C_1, C_2, C_3, \ldots$ and $D_1, D_2, D_3, \ldots$ have been marked at equal distances. In what ratio Q divides CD?
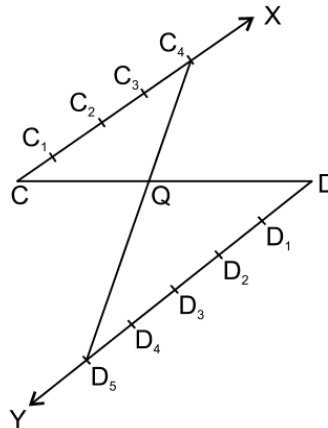
15. If $p = 3\sec^2\theta$ and $q = 3\tan^2\theta - 1$, then find p – q.

**16.** Find the probability of getting a non-face card from a well shuffled deck of 52 playing cards.

OR

A boy calculates that the probability of his winning the first prize in a lottery is 7/100. How many tickets has he bought is 2000 tickets are sold?

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: Safety Board
A group of students to volunteer are working in making a safety board for school. They prepared once triangular safety board for their school with title "School Ahead" and "Drive Slow" in two parts of the triangular board as shown in below figure.

DE || BC
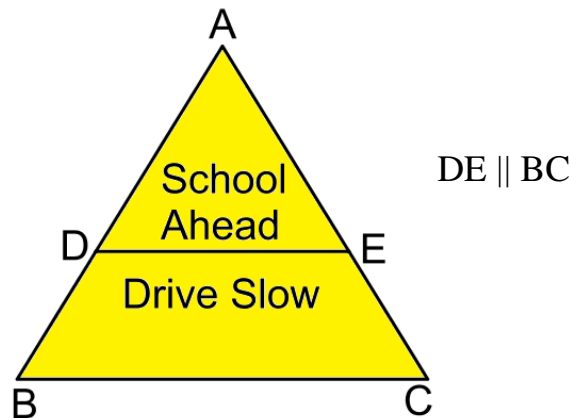
(a) If AD = 2 cm, BD = 5 cm and AE = 3 cm, then EC = ?
   (i) $\dfrac{15}{2}$ (ii) $\dfrac{3}{5}$ (iii) $\dfrac{1}{5}$ (iv) $\dfrac{6}{5}$

(b) If AD = 3 cm, Ab = 9 cm, BC = 6 cm, then DE = ?
   (i) 4 cm   (ii) 3 cm   (iii) 1 cm   (iv) 2 cm

(c) If ∠A = 60⁰ and ∠ADE = 50⁰, then ∠C = ?
   (i) 70⁰   (ii) 75⁰   (iii) 85⁰   (iv) 40⁰

(d) Which of the following is correct?
   (i) ΔADE ~ ΔABC   (ii) ΔADE ≅ ΔABC   (iii) Both (i) and (ii)   (iv) none of these

(e) What is the ratio of ar(ΔADE) to ar(ΔABC)?
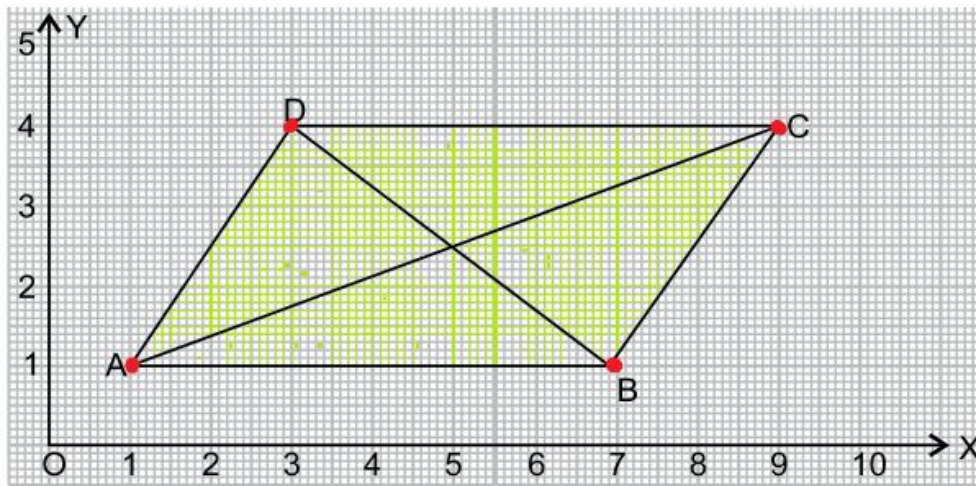   (i) AD²/AB²   (ii) AD/AB   (iii) 1   (iv) none of these

18. Case Study based-2: GARDEN
On day, Mohan visited his friend's apartment. From his balcony, he observed that there is flower bed on the ground which is in the shape of a parallelogram. Four red colour poles are there at the corners of the garden. He draws the sketch of the flower bed on a graph paper as shown in below figure.

(a) The coordinates of the vertex D are
   (i) (3, 4)   (ii) (4, 3)   (iii) (3, 3)   (iv) (4, 4)

(b) The coordinates of the point of intersection of the diagonals are:
   (i) (5, 5)   (ii) (5/2, 5/2)   (iii) (5, 5/2)   (iv) (5/2, 5)

(c) The length of the side AB is:
   (i) 7 units   (ii) 6 units   (iii) 5 units   (iv) none of these

(d) The length of the side AD is
   (i) $\sqrt{13}$ units   (ii) 13 units   (iii) 14 units   (iv) $\sqrt{14}$ units

(e) If we take A as the origin and AB as x-axis then the cooridnates of M are
   (i) (4, 3/2)   (ii) (3/2, 4)   (iii) (4,4)   (iv) (3/2, 3/2)

19. Case Study based-3: SCALE FACTOR

A scale drawing of an object is the same shape at the object but a different size. The scale of a drawing Is a comparison of the length used on a drawing to the length it represents. The scale is written as a ratio. The ratio of two corresponding sides in similar figures is called the scale factor

$$\text{Scale factor } = \frac{\text{length in image}}{\text{corresponding length in object}}$$

If one shape can become another using revising, then the shapes are similar. Hence, two shapes are similar when one can become the other after a resize, flip, slide or turn.
In the photograph below showing the side of a train engine. Scale is 1 : 200.

This means that a length of 1 cm on the photograph above corresponds to a length of 200 cm, or 2 metres, on the actual engine. The scale can also be written as the ratio of two lengths.

(a) The overall length of the engine in the photograph above, including the couplings if the length of the model is 11 cm is :
(i) 22 cm   (ii) 220 cm   (iii) 220 m   (iv) 22 m

(b) What will affect the similarity of any two polygons?
(i) They are flipped horizontally
(ii) They are dilated by a scale factor
(iii) They are translated down
(iv) They are not the mirror image of one another

(c) What is the actual width of the door if the width of the door in photograph is 0.35 cm?
(i) 0.7 m   (ii) 0.7 cm   (iii) 0.07 cm   (iv) 0.07 m

(d) If two similar triangles have a scale factor of 5 : 3, which statement regarding the two triangles is true?
(i) The ratio of their perimeters is 15 : 1
(ii) Their altitudes have a ratio 25 : 15
(iii) Their medians have a ratio 10 : 4
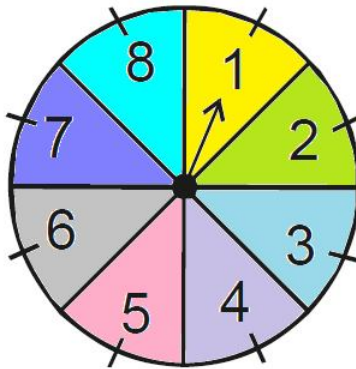(iv) Their angle bisectors have a ratio 11 : 5

(e) The length of AB in the given figure is :
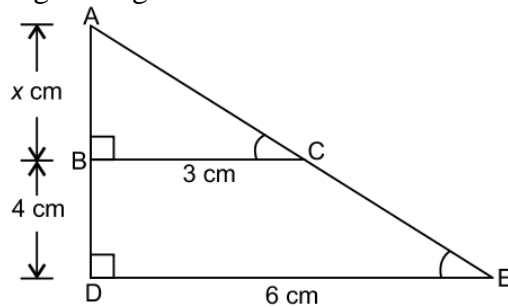
(i) 8 cm   (ii) 6 cm   (iii) 4 cm   (iv) 10 cm

20. Case Study based-4:

One day Rahul visited park along with his friend. There he saw a game of chance that consists of spinning an arrow (as shown in below figure) that comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 and these are equally likely outcomes.

(a) Find the probability that the arrow will point at 2.
(i) $\dfrac{1}{2}$ (ii) $\dfrac{1}{8}$ (iii) $\dfrac{3}{8}$ (iv) $\dfrac{5}{8}$

(b) Find the probability that the arrow will point at an even number.
(i) $\dfrac{1}{2}$ (ii) $\dfrac{1}{8}$ (iii) $\dfrac{3}{8}$ (iv) $\dfrac{1}{4}$

(c) Find the probability that the arrow will point at a prime number.
(i) $\dfrac{1}{2}$ (ii) $\dfrac{1}{8}$ (iii) $\dfrac{3}{8}$ (iv) $\dfrac{5}{8}$

(d) Find the probability that the arrow will point at a number divisible by 3.

(i) $\frac{1}{2}$ (ii) $\frac{1}{8}$ (iii) $\frac{3}{8}$ (iv) $\frac{1}{4}$

(e) Find the probability that the arrow will point at a number greater than 2.

(i) $\frac{1}{2}$ (ii) $\frac{1}{8}$ (iii) $\frac{3}{4}$ (iv) $\frac{1}{4}$

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

21. Find the value of m, if the distance between the points X(–2, –12) and Y(m, –4) is 8 units.

OR

Find the ratio in which the x-axis divides the line segment joining the points (4, –5) and (–1, 3).

22. Show that 12^n cannot end with digit 0 or 5 for any natural number n.

23. If α and β are the zeroes of the polynomial $f(x) = x^2 - 5x + k$ such that If α – β = 1, find the value of k.

24. In the given figure, a circle is inscribed in a ΔDEF, such that it touches the sides DE, EE and DF at points A, B and C respectively. If the lengths of sides DE, EF and DF are 9 cm, 13 cm and 11 cm respectively, find the length of BE, CF and AD.
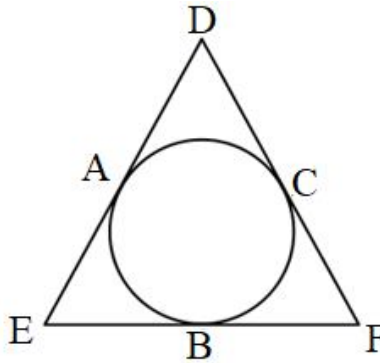
25. Draw a line segment PQ of length 7.5 cm. Find a point A and on it such that $\frac{PA}{PQ} = \frac{3}{5}$.

26. In a right triangle ABC, right angled at C, if tan A = 1, then verify that 2sin A cos A = 1.

OR

Evaluate: $2(\cos^2 45° + \tan^2 60°) - 6(\sin^2 45° - \tan^2 30°)$.

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

27. Prove that $5 - \sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is irrational.

28. The sum of squares of two positive integers is 208. If the square of the larger number is 18 times the smaller number, find the numbers.

OR

Prove that the equation $x^2(a^2 + b^2) + 2x(ac + bd) + (c^2 + d^2) = 0$ has no real root, if ad # bc.

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29. In a circle with centre 0 and radius 5 cm, AB is a chord of length 5 cm. Find the area of the sector AOB. (Take $\pi = 3.14$)

OR

An umbrella has 8 ribs which are equally spaced. Assuming the umbrella to be a flat circle of radius 45 cm, find the area between the two consecutive ribs of the umbrella.

30. Prove that: $\dfrac{\cos A}{1 - \tan A} + \dfrac{\sin A}{1 - \cot A} = \sin A + \cos A$

31. Through the midpoint X of the side RS of a parallelogram PQRS, the line QX is drawn intersecting PR at N and PS produced at E. Prove that EN = 2QN.

32. The mean of the following frequency distribution is 25.2. Find the missing frequency x.

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	8	x	10	11	9

33. The following data gives the distribution of total monthly household expenditure (in rupees) of manual workers in a city:

Expenditure (in Rs.)	1000 – 1500	1500 – 2000	2000 – 2500	2500 – 3000	3000 – 3500	3500 – 4000	4000 – 4500	4500 – 5000
Frequency	24	40	33	28	30	22	16	7

Find the average expenditure which is being done by the maximum number of manual workers.

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

34. A man on the top of a vertical tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change from 30° to 45°, how soon after this, will the car reach the tower? Give your answer to the nearest second.

OR

From the top of a building 15 m high, the angle of elevation of the top of a tower is found to be 30°. From the bottom of the same building, the angle of elevation of the top of the tower is found to be 60°. Find the height of the tower and the distance between the tower and the building.

35. A solid consisting of a right cone standing on a hemisphere is placed upright in a right circular cylinder full of water and touches the bottom. Find the volume of water left in the cylinder, if the radius of the cylinder is 30 cm and its height is 90 cm, the radius of the hemisphere is 30 cm and height of the cone is 60 cm, assuming that the hemisphere and the cone have common base.

36. A train covered a certain distance at a uniform speed. If the train would have been 6 km/hr faster, it would have taken 4 hours less than the scheduled time. And, if the train were slower by 6 km/hr, it would have taken 6 hours more than the scheduled time. Find the length of the journey.