

SAMPLE PAPER-CLASS X (2020-21)
MATHEMATICS - STANDARD

Time allowed -3 Hours

Max. Marks - 80

General Instructions:

- (i) The question paper consists of 36 questions divided into two parts;
Part A and Part B
- (ii) **Part A :**
- It consists of two sections **Section I** and **II**.
 - **Section I** has 16 questions of 1 mark each. Internal choice is provided in 5 questions.
 - **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.
- (iii) **Part – B:**
- It consists of three sections **Section III, IV** and **V**.
 - **Section III** : Question No 21 to 26 are Very short answer Type questions of 2 mark each
 - **Section IV** : Question No 27 to 33 are Short Answer Type questions of 3 marks each
 - **Section V** : Question No 34 to 36 are Long Answer Type questions of 5 marks each.
 - Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

PART- A

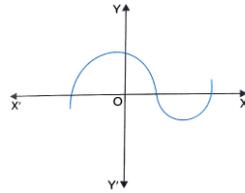
SECTION - I

1. If the LCM of 12 and 42 is $10m+4$, then find the value of m ? (1)
- OR
- Find the largest number which divides 70 and 125 leaving remainders 5 and 8 respectively..
2. Find a quadratic polynomial whose zeroes are $2 + \sqrt{3}$ and $\sqrt{3} - 2$. (1)
3. The 7th term of an A.P exceeds its 10th term by 3, then find the common difference. (1)

OR

Find the 101th term of the A.P -4, -2, 0, 2,4 ...

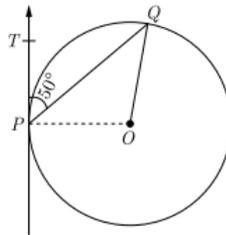
4. Find the solution of $\sqrt{2}x + \sqrt{3}y = 0$; $\sqrt{3}x - \sqrt{8}y = 0$ (1)
5. Find the value of k for which the system of linear equations $3x - 4y + 7 = 0$, $kx + 3y - 5 = 0$ has no solutions. (1)
6. Find the value of k if the equation $4x^2 + kx + 6 = 0$ has equal roots. (1)
7. Find the number of zeroes of p(x) from the graph of $y = p(x)$ given below. (1)



OR

If α and β are zeroes of the polynomial $x^2 - 9$, find $\alpha\beta$ ($\alpha + \beta$)

8. If $\Delta ABC \sim \Delta DEF$ such that $3 AB = DE$ and $BC = 9\text{cm}$, find EF . (1)
9. In figure, O is the centre of circle. PQ is a chord and PT is tangent at P which makes an angle of 50° with PQ, then find $\angle POQ$ (1)



OR

If a regular hexagon is inscribed in a circle of radius r, then find its perimeter .

10. Two concentric circles of radii a and b where $a > b$, then find the length of a chord of the larger circle which touches the other circle is (1)
11. To divide the line segment AB in the ratio 2: 3, a ray AX is drawn such that $\angle BAX$ is acute, AX is then marked at equal intervals. Find minimum number of these marks (1)
12. If $\sin \theta + \cos \theta = \sqrt{2} \cos \theta$, ($\theta \neq 90^\circ$) then find the value of $\tan \theta$ (1)
13. Given that $\sin \alpha = \sqrt{3}/2$ and $\cos \beta = 0$, then find the value of $\beta - \alpha$ (1)
14. It is proposed to build a single circular park equal in area to the sum of areas of two circular parks of diameters 16m and 12m in a locality. What would be the radius of the new park ? (1)

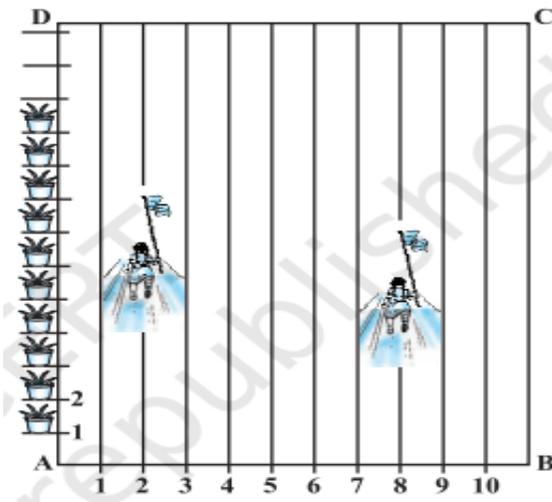
15. A sphere is melted and half of the melted liquid is used to form 11 identical cubes, whereas the remaining half is used to form 7 identical smaller spheres. Find ratio of the side of the cube to the radius of the new small sphere? (1)
16. Two coins are tossed simultaneously. Find the probability of getting at most one head . (1)
- OR
- If a card is selected from a deck of 52 cards, then find the probability of its being a red face card.

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**

To conduct Sports Day activities, in your rectangular shaped school ground ABCD, lines have been drawn with chalk powder at a distance of 1m each. 100 flower pots have been placed at a distance of 1m from each other along AD, as shown in Fig. Niharika runs $\frac{1}{4}$ th the distance AD on the 2nd line and posts a green flag. Preet runs $\frac{1}{5}$ th the distance AD on the eighth line and posts a red flag.



- (a) What is the position of the green flag?
 (i) (25,2) (ii) (8,20) (iii) (20,8) (iv) (2,25)
- (b) What is the position of the red flag?
 (i) (25,2) (ii) (8,20) (iii) (20,8) (iv) (2,25)
- (c) What is the distance between both the flags?

- (i) $\sqrt{61}$ (ii) $\sqrt{60}$ (iii) $\sqrt{62}$ (iv) $\sqrt{63}$

(d) If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag?

- (i) (5, 22) (ii) (5,22.5) (iii) (22.5,5) (iv) (0,0)

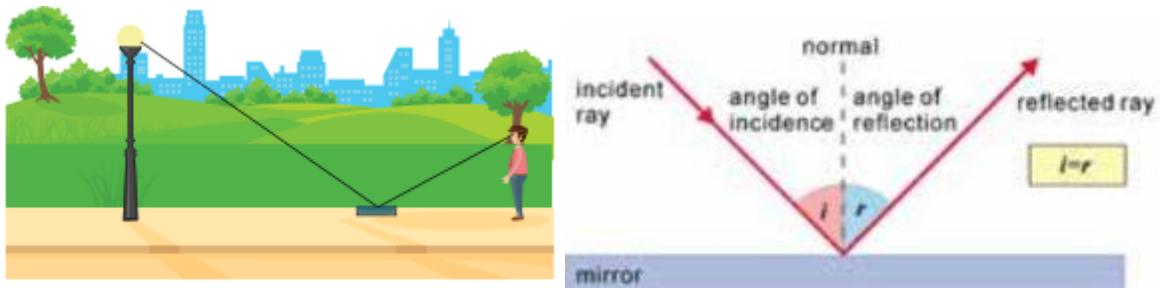
(e) Rashmi has to move to which line?

- (i) 4th (ii) 1st (iii) 5th (iv) 6th

18. **Case Study based – 2**

SCALE FACTOR AND SIMILARITY

Ramesh places a mirror on level ground to determine the height of a pole (with traffic light fired on it). He stands at a certain distance so that he can see the top of the pole reflected from the mirror. Ramesh's eye level is 1.5 m above the ground. The distance of Ramesh and the pole from the mirror are 1.8 m and 6 m respectively.



(a) Which criterion of similarity is applicable to similar triangles seen in the above figure?

- (i) SSA (ii) ASA (iii) SSS (iv) AA

(b) What is the height of the pole?

- (i) 6 metres (ii) 8 metres (iii) 5 metres (iv) 4 metres

(c) If angle of incidence is i , which of the following is correct relation?

- (i) $\tan i = 5/6$ (ii) $\tan i = 6/5$ (iii) $\tan i = 3/5$ (iv) $\tan i = 5/3$

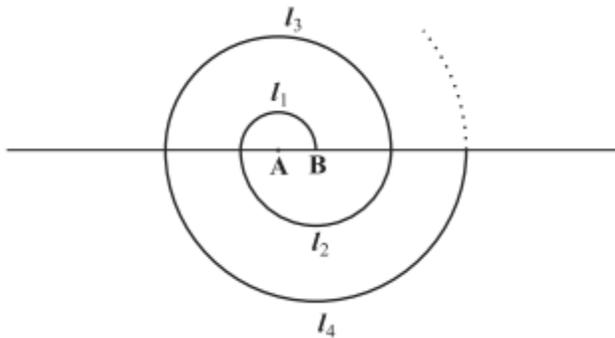
(d) Now Ramesh moves behind such that distance between pole and Ramesh is 13 meters. He places a mirror between him and pole to see the reflection of light in right position. What is the distance between mirror and Ramesh ?

- (i) 7 metres (ii) 3 metres (iii) 5 metres (iv) 4 metres

(e) What is the distance between mirror and pole?

- (i) 9 metres (ii) 8 metres (iii) 12 metres (iv) 10 metres

19. **Case Study based – 3**



A spiral is made up of successive semicircles, with centres alternately at A and B, starting with centre at A, of radii 0.5 cm, 1.0 cm, 1.5 cm, 2.0 cm, . . . as shown in Fig. (Take $\pi = 22.7$)

- (a) Which of the following forms an A.P for the lengths of successive semicircles.
 (i) $0.5\pi, \pi, 1.5\pi, 2\pi, \dots$ (ii) 0.5, 1.0, 1.5, 2... (iii) $2 \times (0.5\pi, \pi, 1.5\pi, 2\pi, \dots)$
- (b) What is the common difference of the A.P mentioned in (a)
 (i) π (ii) 0.5π (iii) 0.5 (iii) none of these
- (c) Which of following term is not in the A.P of the above given situation.
 (i) 2.5π (ii) 3π (iii) -0.5π (iv) 3.5π
- (d) The 10th term of an A.P. 11, 15, 19,... is given by
 (i) 40 (ii) 47 (iii) 50 (iv) -47
- (e) If the common difference of an A.P is d, then $a_3 - a_1$
 (i) d (ii) 2d (iii) 3d (iv) 4d

20. **Case Study based – 4**

A survey regarding the heights (in cm) of 51 girls of Class X of a school was conducted and the following data was obtained:

Height (in cm)	Number of girls
Less than 140	4
Less than 145	11
Less than 150	29
Less than 155	40
Less than 160	46
Less than 165	51

- (a) What is the frequency of the class interval 140- 145.
 (i) 4 (ii) 18 (iii) 7 (iv) 11
- (b) What will be the upper limit of the modal class ?

- (i) 150 (ii)140 (iii) 155 (iv) 145
- (c) The construction of cumulative frequency table is useful in determining the
 (i)Mean (ii)Median (iii)Mode (iv)All of the above
- (d) The sum of upper limit of median and modal class is
 (i) 155 (ii)150 (iii) 400 (iv)300
- (e) How many girls have height less than 155cm?
 (i)11 (ii) 29 (iii)40 (iv) 51

Part –B

All questions are compulsory. In case of internal choices, attempt any one.

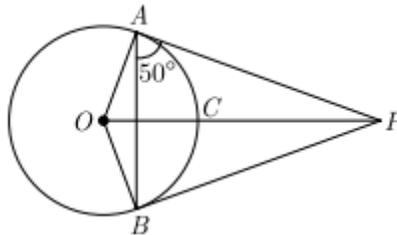
Section III

21. Given that $\text{LCM}(26,169) = 338$, find $\text{HCF}(26,169)$ (2)
22. If m and n are the zeros of the polynomial $3x^2 - 11x - 4$, find the value $\frac{m}{n} + \frac{n}{m}$. (2)
23. If the mid-point of the line segment joining the points $A(3, 4)$ and $B(k, 6)$ is $P(x, y)$ and $x + y - 10 = 0$, find the value of k . (2)

OR

Find a relation between x and y such that the point $P(x, y)$ is equidistant from the points $A(-5, 3)$ and $B(7, 2)$.

24. In the given figure, from an external point P , tangents PA and PB are drawn to a circle with centre O . If $\angle PAB = 50^\circ$, then find $\angle AOB$ (2)



25. Draw a line segment of length 7.5 cm and divide it in the ratio 4 : 5. (2)
26. If $\sin \theta + \sin^2 \theta = 1$, prove that $\cos^2 \theta + \cos^4 \theta = 1$ (2)

OR

If $x = r \sin \theta \cos \alpha$, $y = r \sin \theta \sin \alpha$ and $z = r \cos \theta$, prove that $x^2 + y^2 + z^2 = r^2$

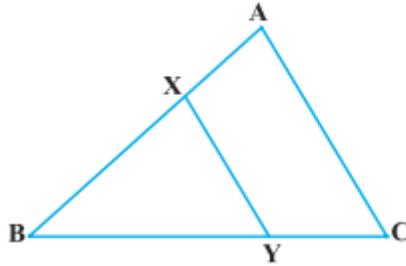
Section IV

27. Prove $\sqrt{2}$ is irrational and hence prove that $5 + 2\sqrt{2}$ is also an irrational number. (3)
28. If one root of the quadratic equation $3x^2 + px + 4 = 0$ is $2/3$, then find the value of p and the other root of the equation. (3)

OR

The roots α and β of the quadratic equation $x^2 - 5x + 3(k-1) = 0$ are such that $\alpha - \beta = 1$. Find the value k .

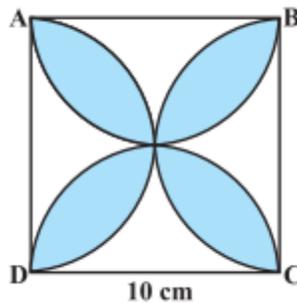
29. In Fig. , the line segment XY is parallel to side AC of ΔABC and it divides the triangle into two parts of equal areas. Find the ratio AX / AB . (3)



OR

BL and CM are medians of a triangle ABC right angled at A . Prove that $4(BL^2 + CM^2) = 5 BC^2$

30. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 45° . If the tower is 30 m high, find the height of the building. (3)
31. Find the area of the shaded design in Fig., where $ABCD$ is a square of side 10 cm and semicircles are drawn with each side of the square as diameter. (Use $\pi = 3.14$) (3)



32. Find the median of the following data. (3)

Weight of new born(kg)	1.5-1.75	1.75-2	2 - 2.25	2.25 -2.5	2.5 - 2.75	2.75 -3.0
No. of babies	1	7	10	12	6	4

33. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball at random from the bag is three times that of a red ball, find the number of blue balls in the bag. (3)

Section V

34. A motorboat covers a distance of 16km upstream and 24km downstream in 6 hours. In the same time it covers a distance of 12 km upstream and 36km downstream. Find the speed of the boat in still water and that of the stream. (5)
35. The angle of elevation of a cloud from a point 20 m above a lake is 30° and the angle of depression of its reflection in the lake is 60° . Find the height of the cloud. (use $\sqrt{3} = 1.73$) (5)
36. A milk tanker cylindrical in shape having diameter 2 m and length 4.2 m supplies milk to the two booths in the ratio of 3 :2 . One of the milk booths has cuboidal vessel having base area 3.96 sq. m. and the other has a cylindrical vessel having radius 1 m. Find the level of milk in each of the vessels. (Use $\pi = 22/7$). (5)

OR

In the given figure, the height of a cylinder is 15cm and diameter of the base is 7cm. Two equal conical holes each of radius 3cm and height 4cm are cut off as shown in the figure. Find the surface area of the remaining solid.

