

Practice Paper 2020-21

Class X Subject Mathematics

Time Allowed: 3hrs

Maximum Marks: 80

General Instructions:

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.
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Part A

(Section I)

1. Find HCF of ab^4 & a^3b^2 .
2. Explain, why $7 \times 11 \times 13 \times 15 + 15$ is a composite number?
3. Write degree of polynomial $(x+1)(x^2 - x - x^4 + 1)$.

OR

If α, β are zeroes of $x^2 + 6x + 5$, then find $\alpha^2 + \beta^2$.

4. Examine if $5x - 3y = 11$ and $-10x + 6y = -22$ are consistent or inconsistent.
5. Find k if $3x + 2ky = 2$ and $2x + 5y + 1 = 0$ are parallel lines.
6. Write a quadratic polynomial whose sum and product of zeroes are 2 and -15 respectively.

OR

Write a quadratic polynomial if two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

7. Find p if $px^2 + 8x - 2 = 0$ has real and equal roots.
8. Which term of AP 14, 11, 8 is -1?

OR

Find sum of first 10 natural numbers.

9. $\Delta ABC \sim \Delta PQR$ and areas of ΔABC and ΔPQR are 25cm^2 and 49cm^2 respectively. If $QR = 9.8\text{ cm}$ then find BC .
10. Find the mid-point of line segment joining the points $A(-2, 8)$ and $B(-6, -4)$.

OR

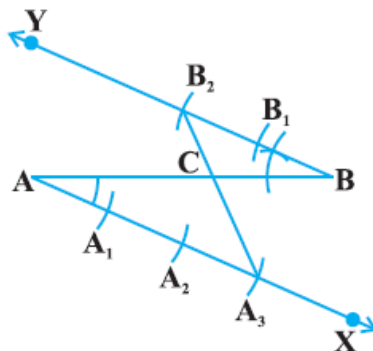
In which quadrant, the point which divides the line segment joining $(7, -6)$ and $(3, 4)$ in ratio $1:2$, would lie?

11. If $\tan \theta = \frac{3}{4}$, find $\sec \theta$.
12. Evaluate $2 \sin^2 30^\circ - 3 \cos^2 45^\circ + \tan^2 60^\circ$
13. Tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 80° find $\angle POA$.
14. Find the length of tangent drawn from a point 8 cm away from centre of a circle of radius 6 cm .

OR

A point P is 13 cm away from centre of circle. The length of tangent from P is 12 cm ; find the radius of the circle.

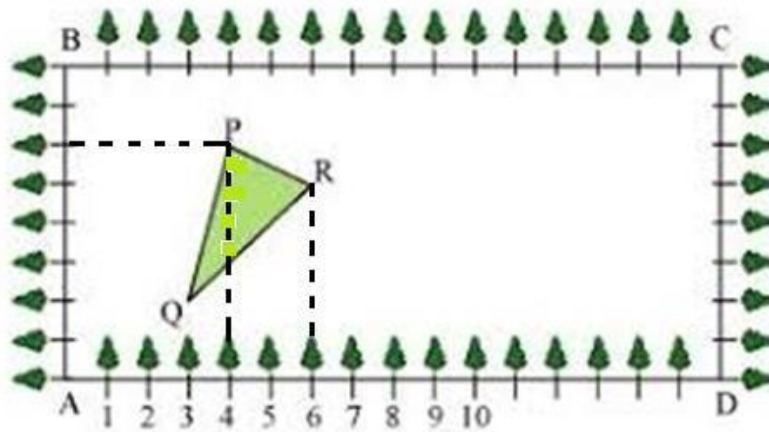
15. What is the ratio $AC: CB$ in the following figure?



16. An arc of a circle of radius 15 cm subtends an angle of 60° at centre; find the area of major sector.

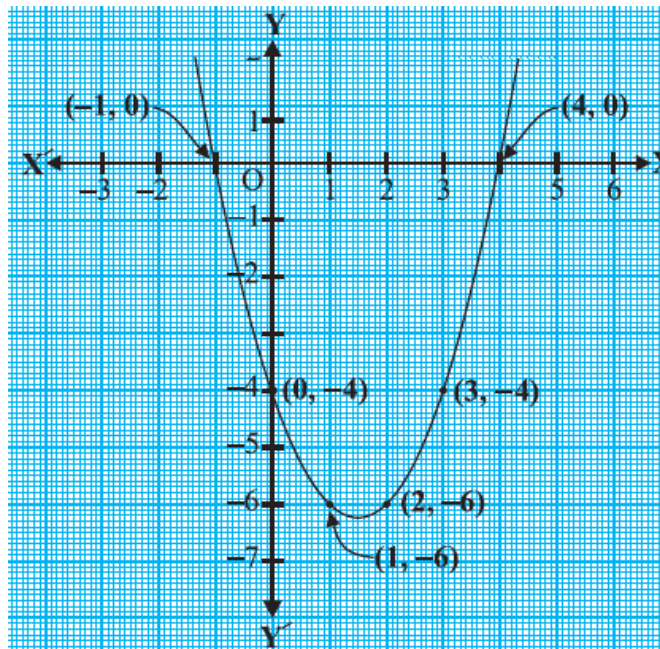
(Section II)

17. Class X students of a secondary school in Krishinagar have been allotted a rectangular plot of a land for gardening activity. Saplings of Gulmohar are planted on the boundary at a distance of 1 m from each other. There is a triangular grassy lawn in the plot as shown in the fig. The students are to sow seeds of flowering plants on the remaining area of the plot.



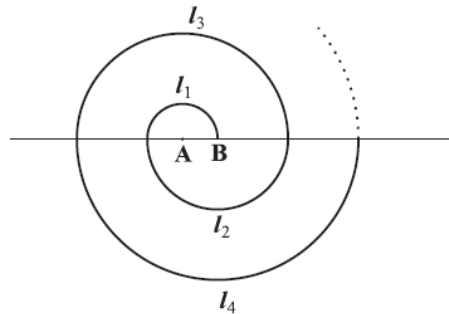
- (i) Considering A as the origin, what are the coordinates of A?
 a) (0, 1) b) (1, 0) c) (0, 0) d) (-1, -1)
- (ii) What are the coordinates of P?
 a) (4, 6) b) (6, 4) c) (4, 5) d) (5, 4)
- (iii) What are the coordinates of R?
 a) (6, 5) b) (5, 6) c) (6, 0) d) (7, 4)
- (iv) What is the length PQ?
 a) 17 unit b) 7 units c) $\sqrt{17}$ units d) 4 units
- (v) What are the coordinate of P if D is taken as the origin?
 a) (12, 2) b) (-12, 6) c) (12, 3) d) (6, 10)

18. Due to heavy storm an electric wire got bent as shown in the figure. It followed a mathematical shape. Answer the following questions below.



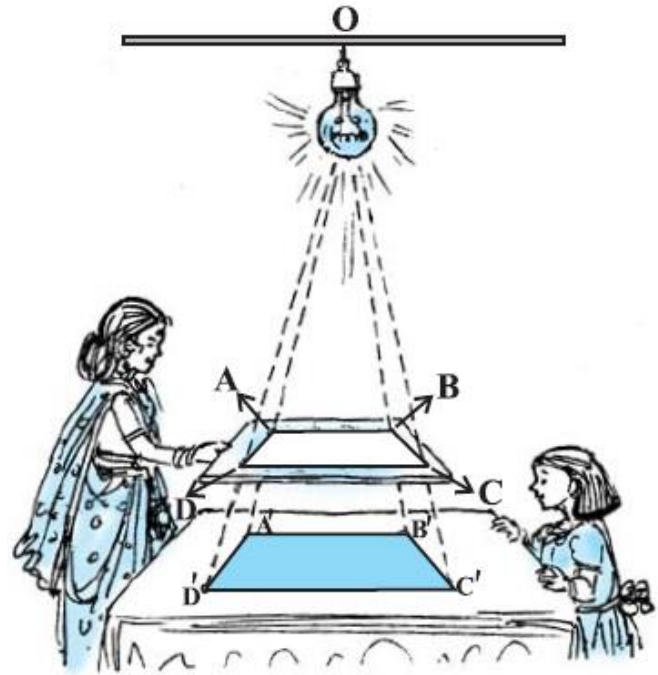
- (i) Name the shape in which the wire is bent
 a) Spiral b) ellipse c) linear d) Parabola
- (ii) How many zeroes are there for the polynomial (i.e. shape of the wire)
 a) 2 b) 3 c) 1 d) 0
- iii) The zeroes of the polynomial are:
 a) -1, 4 b) -1, 3 c) 3, 5 d) -4, 2
- (iv) What will be the expression of the polynomial?
 (a) $x^2 - 3x - 4$ (b) $x^2 - 5x + 4$
 (c) $x^2 + 5x + 4$ (d) $x^2 - 5x - 4$
- (v) What is the value of the polynomial $x^2 - 3x - 4$ if $x = -1$?
 a) 6 b) -18 c) 18 d) 0

19. 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 figure. (Take $\pi = \frac{22}{7}$)



- (i) What is the length of first semicircle i.e. l_1 ?
 a) 2π b) 3π c) 0.5π d) π
- (ii) If l_1 and l_2 represent length of first and second semicircles then what is the value of $l_2 - l_1$?
 a) 2π b) 3π c) 0.5π d) π
- (iii) What is the radius of the semicircle l_4 ?
 a) 0.5 unit b) 1 unit c) 1.5 units d) 2 units
- (iv) What will be the length of 13th semicircle in the above spiral?
 a) 6.5π b) 2π c) 13π d) 21π
- (v) What is the total length of such a spiral made up of thirteen consecutive semicircles?
 a) 143 cm b) 35 cm c) 144 cm d) 28 cm

20. Radha placed a lighted bulb at a point O on the ceiling and directly below it a table. She cut a quadrilateral ABCD, from a plane cardboard and placed it parallel to the ground between the lighted bulb and the table. Then a shadow of ABCD is casted on the table. She marked the outline of this shadow as A'B'C'D'. Considering the figure given alongside answer the following questions:



- (i) What special property do you observe in quadrilaterals ABCD and A'B'C'D'?
- a) They are congruent. b) They are similar.
c) Both are rectangle. d) None of these

(ii) If $AB = 5$ cm, $A'B' = 10$ cm, $A'D' = 20$ cm, then what is the length of AD?

- a) 2.5 cm b) 5 cm c) 10 cm d) 20 cm

(iii) Considering the bulb at point O what kind of $\triangle OAB$ and $\triangle OA'B'$ are?

- a) They are congruent. b) They are similar.
c) Both are equilateral triangles. d) None of these

(iv) If in quadrilateral $\angle A = 100^\circ$ then what is the value of $\angle A'$ in quadrilateral A'B'C'D'?

- a) 50° b) 100° c) 120° d) None of these

(v) What is the ratio BC: B'C'?

- a) 1: 2 b) 1: 4 c) 2:1 d) 4:1

Part B

21. Given that $HCF(306, 657) = 9$, find $LCM(306, 657)$.

22. If (1, 2), (4, y), (x, 6) and (3, 5) are vertices of parallelogram taken in order, find x, y .

23. Find a relation between x & y such that the point (x, y) is equidistant from (3, 6) and (-3, 4).

OR

Find y for which the distance between P(2, -3) and Q(10, y) is 10 units.

24. If $\sin(A - B) = \frac{1}{2}$, $\cos(A + B) = \frac{1}{2}$, $0^\circ < A + B \leq 90^\circ$, $A > B$, find A & B.

OR

If $\operatorname{cosec}(A - B) = 2$, $\cot(A + B) = \frac{1}{\sqrt{3}}$, $0^\circ < A + B \leq 90^\circ$, $A > B$, then find A&B.

25. Find x if given,

$$2 \operatorname{cosec}^2 30^\circ + x \sin^2 60^\circ - \frac{3}{4} \tan^2 30^\circ = 10$$

26. Prove that the length of tangents drawn from an external point to a circle are equal.

27. Prove that $\sqrt{5}$ is an irrational number.

28. Solve the following quadratic equation.

$$\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}; a+b \neq 0$$

OR

$$12abx^2 - (9a^2 - 8b^2)x - 6ab = 0$$

29. If α and β are the zeroes of the polynomial $6y^2 - 7y + 2 = 0$, find a quadratic polynomial

whose zeroes are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$.

For what values of k the quadratic equation $(k+4)x^2 + (k+1)x + 1 = 0$ has equal roots.

30. State and prove Basic Proportionality Theorem.

OR

In an equilateral triangle ABC, D is a point on side BC such that $BD = \frac{1}{3}BC$. Prove that

$$9AD^2 = 7AB^2$$

31. From the top of a 7m high building the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 45° . Determine the height of tower.

32. Prove that the parallelogram circumscribing a circle is a rhombus.

33. To warn ships for underwater rocks a light house spreads a red coloured light over a sector of angle 80° to a distance of 16.5 km. Find that area of the sea over which the ship are warned.

34. A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours it can go 40 km upstream and 55km downstream. Determine the speed of stream and that of the boat in still water.

35. Draw a line segment AB of length 8 cm. Taking A as center draw a circle of radius 4 cm and taking B as centre draw another circle of radius 3cm. Construct tangents to each circle from the centre of the other circle.
36. The angles of depression of the top and the bottom of an 8 m tall building from the top of a multistorey building are 30° and 45° respectively. Find the height of building and the distance between the two buildings.

OR

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.