

CBSE Board
Class X Mathematics
Sample Paper 4 (Standard)

Time: 3 hrs

Total 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**. Each subpart carries **1 mark**.

Part – B:

1. It consists **three sections** – III, IV and V
 2. **Section III: Question No 21 to 26** are **Very short answer** Type questions of **2 marks** each.
 3. **Section IV: Question No 27 to 33** are **Short Answer Type** questions of **3 marks** each.
 4. **Section V: Question No 34 to 36** are **Long Answer Type** questions of **5 marks** each.
 5. 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

Section I has 16 questions of 1 mark each.

(Internal choice is provided in 5 questions)

1. The decimal expansion of the rational number $\frac{2^3}{2^2 \cdot 5}$ will terminate after how many decimal places?

OR

What is an irrational number

2. A letter is chosen at random from the word “PROBABILITY”. Find the probability that it is a vowel.

3. If the system of equations $2x + 3y = 5$, $4x + ky = 10$ has infinitely many solutions, then find the value of.

OR

If the point $(3, a)$ lies on the line represented by $2x - 3y = 5$ then find the value of a .

4. Find the value of $\frac{2 \tan 30^\circ}{1 - \tan^2 30^\circ} =$

5. What is the value of $\tan \theta$, if θ and $2\theta - 45^\circ$ are acute angles such that $\sin \theta = \cos (2\theta - 45^\circ)$?

6. Find the mid-point of the line segment joining $P(-2, 8)$ and $Q(-6, -4)$.

OR

Find the value of x , for which the points $(x, -1)$, $(2, 1)$ and $(4, 5)$ lie on a line.

7. The ordinate of a point is twice its abscissa. If its distance from the point $(4, 3)$ is $\sqrt{10}$, then find the coordinates of the point.

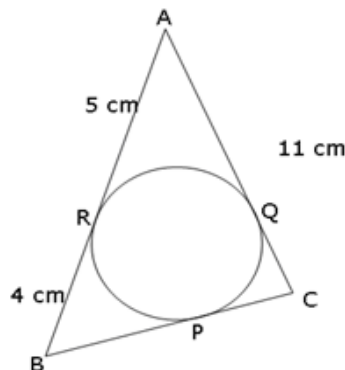
8. What is the maximum volume of a cone that can be carved out of a solid hemisphere of radius r ?

9. If the sum of the zeros of the polynomial $f(x) = 2x^3 - 3kx^2 + 4x - 5$ is 6, then find the value of k .

10. If $\triangle ABC \sim \triangle DEF$. If $BC = 3$ cm, $EF = 4$ cm and $\text{ar}(\triangle ABC) = 54 \text{ cm}^2$ then find $\text{ar}(\triangle DEF)$.

OR

In the given figure, $AR = 5$ cm, $BR = 4$ cm and $AC = 11$ cm. What is the length of BC ?

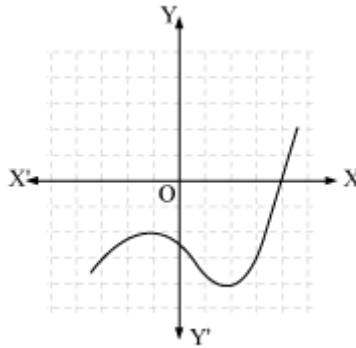


11. What is the value of 10^{th} term of an A.P., if its first term is p and common difference is q ?

OR

Find the value of x for which $2x$, $x + 10$, and $3x + 2$ are in A.P.

12. Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively: $\frac{1}{4}$ and -1
13. What is the LCM of $2^3 \times 3 \times 5$ and $2^4 \times 5 \times 7$?
14. Find the condition on k if the equation $x^2 + 4x + k = 0$ has real and distinct roots.
15. The graph of $y = p(x)$ is given in the following figure for some polynomial $p(x)$. What is/are the number of zeroes of $p(x)$?



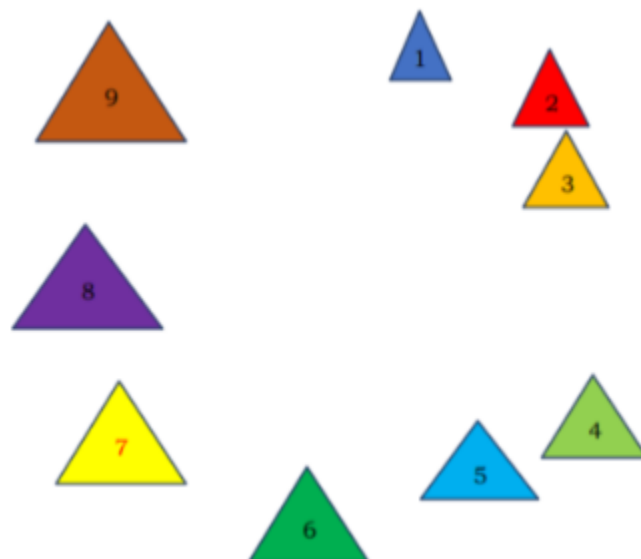
16. Determine the set of values of p for which the quadratic equation $px^2 + 6x + 1 = 0$ has real roots.

Section II

(Q 17 to Q 20 carry 4 marks each)

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

17. **Case Study Based- 1**
Numbers and Equilateral Triangles.



Rahul and Sunil were feeling bored during the lockdown. They both created a number game. Sunil prepared nine equilateral triangles and numbered them from 1 to 9. The numbers written on the triangles also represent length of each side of the triangle (in cm).

Sunil arranged them in the form of a circle. He asked Rahul to remove alternate triangles starting from number 1, going clockwise, until only one triangle remained.

(a) The triangle which Rahul removed in the first round are in order, numbered 1, 3, 5, 7, 9. If Rahul continues in the same manner, which numbered triangle will be left in the last?

- (i) 4
- (ii) 2
- (iii) 8
- (iv) 6

(b) In the second round, Sunil started counting with triangle numbered 1 and eliminated every third triangle, until only one triangle remained. Which of the following triangle will be left in the end?

Triangle number:

- (i) 1
- (ii) 3
- (iii) 7
- (iv) 6

(c) Rahul added two more triangles in the circle and numbered these as triangle 10 and triangle 11. In this round, Rahul started counting with triangle numbered 1, but anticlockwise, and eliminated every fifth triangle, until only one triangle remained. Which triangle will be left in the end?

Triangle number:

- (i) 2
- (ii) 4
- (iii) 5
- (iv) 8

(d) If there are 9 triangles, will the perimeters of the triangles follow any pattern? If so, write the pattern?

- (i) They are multiple of 3.
- (ii) They are multiple of 6.
- (iii) They are multiple of 2.
- (iv) They are multiple of 4.

(e) Are the areas of the triangles numbered 3, 4 and 6, 8 in proportion? If yes then write down the ratio.

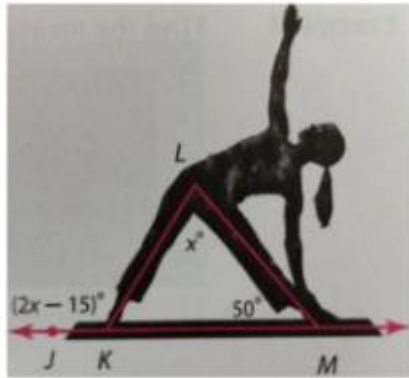
- (i) 9: 16
- (ii) 3: 4
- (iii) 7: 8
- (iv) 16: 9

18. Case Study based-2

Types of angles and angle sum property of a triangle

It is 7:00 am!

Shikha rolls out her yoga mat and starts her warm up session with stretching and bending. Anaya her daughter is sitting nearby, observing her mother's daily ritual. Anaya takes a picture of her mother while she was in a yoga posture and label it as shown.



- (a) Angles $\angle LKM$ and $\angle JKL$ are called as?
 - (i) Linear Pair of angles
 - (ii) Vertically opposite angles
 - (iii) Complementary angles
 - (iv) Corresponding angles
- (b) Find $m\angle LKM$.
 - (i) $195^\circ - x$
 - (ii) $185^\circ - 2x$
 - (iii) $195^\circ - 2x$
 - (iv) $185^\circ - x$
- (c) Find $m\angle KLM$.
 - (i) 115°
 - (ii) 65°
 - (iii) 50°
 - (iv) 180°
- (d) Which of the following is true for $\triangle LKM$?
 - (i) $\triangle LKM$ is an equilateral triangle.
 - (ii) $\triangle LKM$ is an isosceles triangle.
 - (iii) $\triangle LKM$ is a right angle triangle.
 - (iv) All of the above
- (e) What is the measurement of the $\angle LKJ$?
 - (i) 115°
 - (ii) 65°
 - (iii) 50°
 - (iv) 180°

19. Case Study Based- 3

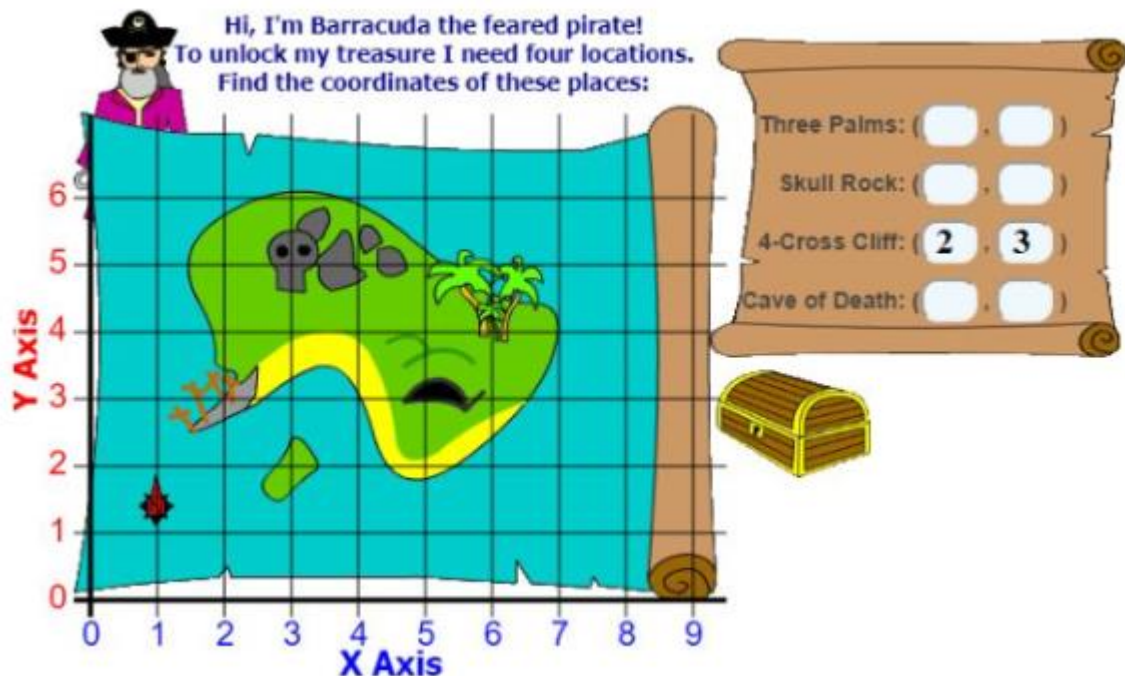
THE TREASURE ISLAND

Understanding Graphs:

On the graph sheet, a point is located using a pair of numbers such as (x, y)

- The first number 'x' shows the horizontal distance of the point (i. e left or right) on the horizontal line.
- The second number 'y' shows the vertical distance of the point (i. e up of down) right) on the vertical line.
- The point where X – axis and Y – axis cross each other at 90° called the Origin denoted by (0, 0).
- Clearly the X – axis and Y – axis divide the plane is known as Cartesian plane.
- We measure everything on the Cartesian plane with respect to Origin.

Rita and Renu are playing a board game of Treasure Island.



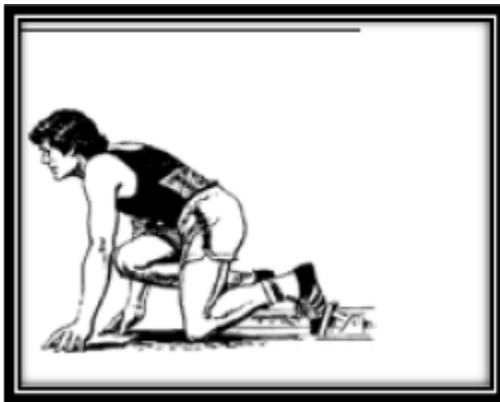
- (a) The coordinate of CAVE of DEATH
- (3, 5)
 - (3, 3)
 - (5, 5)
 - (5, 3)
- (b) The coordinate of THREE PALMS
- (6, 3)
 - (3, 6)
 - (5, 2)
 - (9, 5)

- (c) The distance between FOUR CROSS CLIFF and the CAVE of DEATH is
- (i) 3 units
 - (ii) 5 units
 - (iii) 2 units
 - (iv) None of these
- (d) What is the distance of SKULL ROCK from x – axis?
- (i) 3 units
 - (ii) 5 units
 - (iii) 2 units
 - (iv) None of the
- (e) The mid – point of CAVE of DEATH and THREE PALMS is
- (i) (5.5, 3.5)
 - (ii) (5, 3)
 - (iii) (3.5, 5.5)
 - (iv) (3, 5)

20. Case Study Based- 4

110m RACE

A stopwatch was used to find the time that it took a group of students to run 110m.



Time(in sec)	20 – 40	40 – 60	60 – 80	80 – 100	100 – 120
No. of students	7	10	15	5	3

- (a) Estimate the mean time taken by a student to finish the race.
- (i) 54.6
 - (ii) 63.5
 - (iii) 43.5
 - (iv) 50.5
- (b) What will be the lower limit of the modal class?
- (i) 20
 - (ii) 40

- (iii) 60
- (iv) 80
- (c) Which of the following are measures of Central Tendency?
 - (i) Mean
 - (ii) Median
 - (iii) Mode
 - (iv) All of the above
- (d) The sum of upper limits of median class and modal class is
 - (i) 60
 - (ii) 120
 - (iii) 80
 - (iv) 160
- (e) How many students finished the race within 1 min?
 - (i) 18
 - (ii) 37
 - (iii) 17
 - (iv) 8

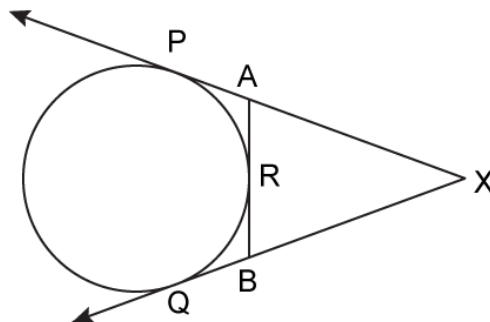
Part B

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

Section III

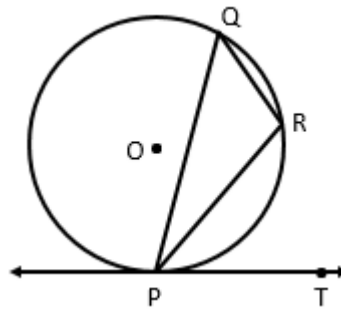
(Q 21 to Q 26 carry 2 marks each)

- 21.** Show that any number of the form 4^n , $n \in \mathbb{N}$ can never end with the digit 0.
- 22.** In the given figure, XP and XQ are tangents from X to the circle. R is a point on the circle. Prove that $XA + AR = XB + BR$.

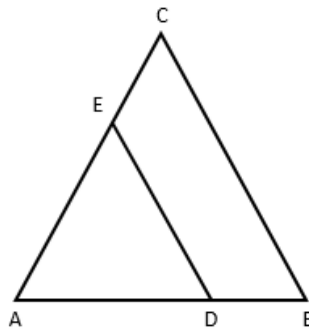


OR

In the figure, PQ is a chord of a circle with centre O and PT is a tangent. If $\angle QPT = 60^\circ$, find $\angle PRQ$.



23. A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is (i) red (ii) not red?
24. A cylinder and a cone have bases of equal radii and are of equal heights. Show that their volumes are in the ratio of 3:1.
25. In the adjoining figure, DE is parallel to BC. If $AD = x$, $DB = x - 2$, $AE = x + 2$ and $EC = x - 1$, find the value of x .



OR

Corresponding sides of two triangles are in the ratio 2:3. If the area of the smaller triangle is 48 cm^2 , determine the area of the larger triangle.

26. A solid metal cone with radius of base 12 cm and height 24 cm is melted to form solid spherical balls of diameter 6 cm each. Find the number of balls thus formed.

Section IV

(Q 27 to Q 33 carry 3 marks each)

27. Prove that: $\frac{\sec A + \tan A}{\sec A - \tan A} = \left(\frac{1 + \sin A}{\cos A} \right)^2$

OR

Without using tables evaluate:

$$\left(\frac{\sin 47^\circ}{\cos 43^\circ} \right)^2 + \left(\frac{\cos 43^\circ}{\sin 47^\circ} \right)^2 - 4 \cos^2 45^\circ$$

28. Solve for x and y:

$$\frac{x}{a} + \frac{y}{b} = 2; \quad ax - by = a^2 - b^2$$

29. Prove that $\frac{3}{2\sqrt{5}}$ is an irrational number.

OR

Find the HCF of 96 and 404 by prime factorisation method. Hence, find their LCM.

30. Cards numbered from 1 to 18 are put in a box and mixed thoroughly. One card is drawn at a random. Find the probability that the card drawn bears:

- i. a prime number
- ii. a factor of 18
- iii. a number divisible by 2 and 3

31. The 14th term of an A.P. is twice its 8th term. If its 6th term is -8, then find the sum of its first 20 terms.

32. Find all zeros of the polynomial $(2x^4 - 9x^3 + 5x^2 + 3x - 1)$ if two of its zeros are $(2 + \sqrt{3})$ and $(2 - \sqrt{3})$.

33. Find the area of the minor segment of a circle of radius 14 cm, when its central angle is 60°. Also find the area of the corresponding major segment. [Use $\pi = \frac{22}{7}$]

Section V

(Q 34 to Q 36 carry 5 marks each)

34. Construct a triangle similar to ΔABC in which $AB = 4.6$ cm, $BC = 5.1$ cm, $m \angle A = 60^\circ$ with scale factor 4: 5.

35. A man in a boat rowing away from a light house 100 m high, takes 2 minutes to change the angle of elevation of the top of the light house from 60° to 45°. Show that the speed of the boat is $50 \left(\frac{3 - \sqrt{3}}{3} \right)$ m / min.

36. By increasing the list price of a book by Rs. 10, a person can buy 10 less books for Rs. 1200. Find the original list price of the book.

OR

A motor boat, whose speed is 15km/ hr in still water, goes 30 km downstream and comes back in a total time of 4hrs 30mins. Find the speed of the stream.