PRE-BOARD EXAMINATION – 2020-21
SUBJECT – MATHEMATICS - STANDARD

Class: X (CBSE) **Total Marks: 80**
Date: ……………………. **Time: 3 hours**

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 choices are provided in **5** questions.
3. Section **II** has **4** case study-based questions. Each case study has **5** case-based sub-parts. An examinee is to attempt any **4** out **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

Section I has 16 Questions of 1 Mark each. Internal choice is Provided in 5 questions

1. Given that LCM (91, 26) = 182 then, find HCF (91, 26).

OR

If $m^n = 32$, where m and n are positive integers, then find the value of n^{mn}

2. If one zero of the polynomial $p(x) = 5x^2 + 13x - m$ is reciprocal of the other, then find the value of m.

3. If $31x + 43y = 117$ and $43x + 31y = 105$ then, the find the value of $x + y$.

4. For what value of k will the following system of equations have unique solution: $2x + ky = 1$ and $3x - 5y = 7$

5. Find the roots of the equation $\sqrt{2x+9}+x=13$.

OR

Find the values of k for which the roots of the equation $4x^2+kx+9=0$ are real and equal

6. Find the roots of the equation $2x^2 - 5x + 3 = 0$, by factorisation.

7. The sum of n terms of an AP is $n^2 - n$, then find the n^{th} term.

OR

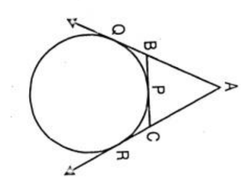
Find the 10th term from the end of the A.P. 8, 10, 12,…, 126.

8. Diagonals of a trapezium ABCD with AB || DC intersect each other at the point O. If AB = 2 CD, find the ratio of the areas of triangles AOB and COD.

9. If $\theta = 45°$, then the value of $\cos^2\theta - \sin^2\theta$ =______.

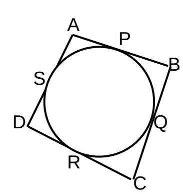
10. If $x = r\,sinA\;cosC$ and $y = r\,sinA\;sinC$ and $z = r\,cosA$, then find the value of $x^2 + y^2 + z^2$.

11. In figure, a circle touches the side BC of $\triangle$ABC at P and touches AB and AC produced at Q and R respectively. If AQ = 5cm, find the perimeter of $\triangle$ABC.



OR

In figure, a circle touches all the four sides of a quadrilateral ABCD with AB=6*cm*, BC=7*cm* and CD=4*cm*. Find AD.



12. From a point Q, the length of the tangent to a circle is 24cm and the distance of Q from the centre is 25cm. Then find the radius of the circle.

13. To draw a pair of tangents to a circle which are inclined to each other at an angle of $30°$, it is required to draw tangents at end points of those two radii of the circle, the angle between them should be:____.

14. An arc of a circle is of length $5\pi cm$ and the sector it bounds has an area of $20\pi\ cm^2$. then find its radius.

15. The surface areas of two spheres are in the ratio 16 : 9. Then find ratio of their volumes.

16. What is the probability that an ordinary year has 53 Sunday?

OR

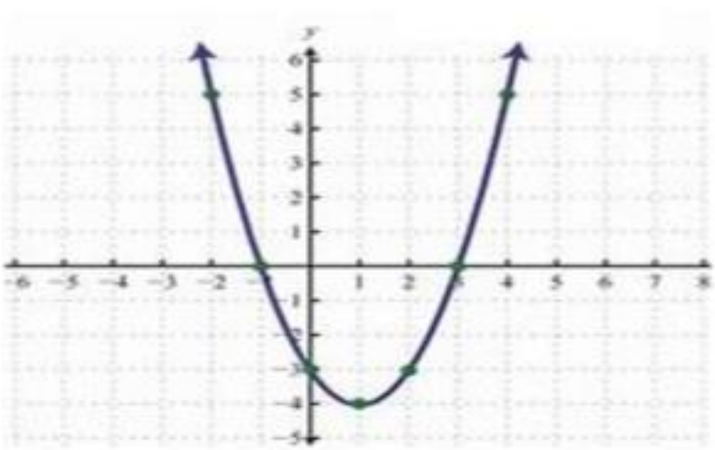
A die is thrown once. Then find the chance of getting a number which is less than 3 and greater than 2.

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 Question- I**

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 real zeroes are there for the polynomial (shape of the wire)?

a) 2 b) 3 c) 1 d) 0

iii) The zeroes of the polynomial are

a) -1, 5 b) -1, 3 c) 3, 5 d) -4, 2

iv) What will be the expression of the polynomial?

a) $x^2 + 2x - 3$ b) $x^2 - 2x + 3$ c) $x^2 - 2x - 3$ d) $x^2 + 2x + 3$.

v) What is the value of the polynomial if $x = -1$?

a) 6 b) -18 c) 18 d) 0

18. **<u>Case study-based Question- II</u>**

<u>100m RACE</u>

A stopwatch was used to find the time that it took a group of students to run 100 m.

Time (in sec)	0-20	20-40	40-60	60-80	80-100
No. of students	8	10	13	6	3

i) Estimate the mean time taken by a student to finish the race.

a) 54 b) 63 c) 43 d) 50

ii) What will be the upper limit of the modal class?

a) 20 b) 40 c) 60 d) 80

iii) The construction of cumulative frequency table is useful in determining the

a) Mean b) Median c) Mode d) All of the above

iv) The sum of lower limits of median class and modal class is

a) 60 b) 100 c) 80 d) 140

v) How many students finished the race within 1 minute?

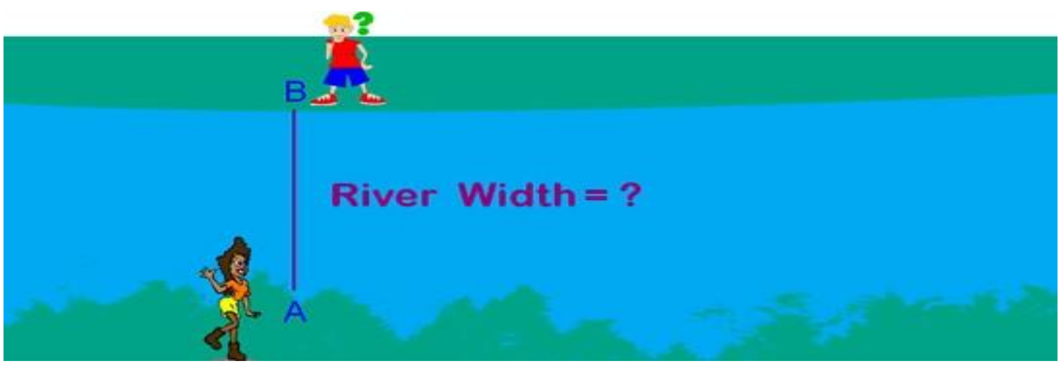
a) 18 b) 37 c) 31 d) 8

19. **<u>Case study-based Question- III</u>**

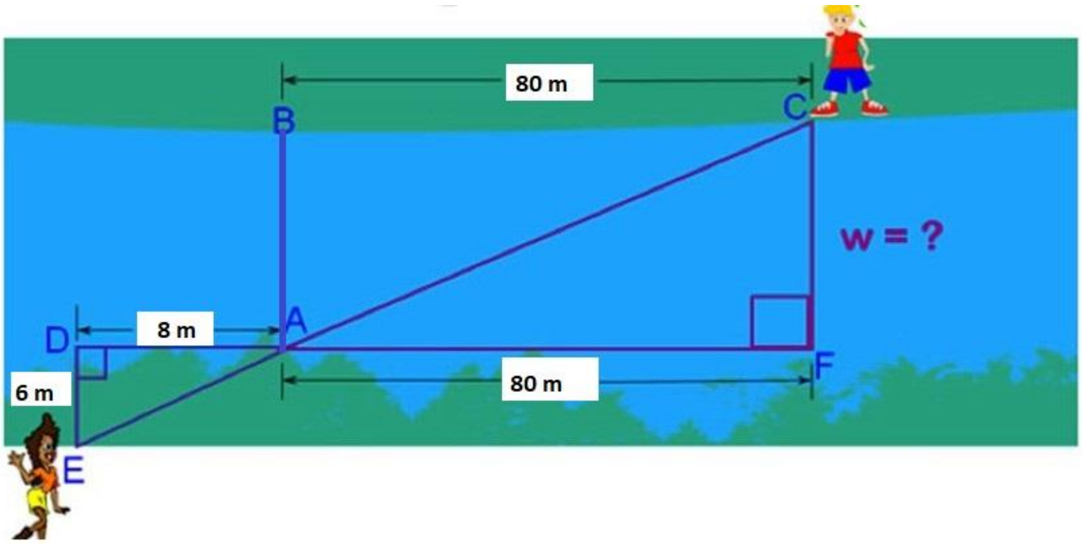
<u>Similar Triangle- River Width</u>

Two Instructors want to set a Flying Fox straight across a river for an outdoor educational camp.

First, they need to know the width of the river, so that they can set ropes long enough to make their crossing.



Draw a line from the lady at the point ‘E’ to the boy at the other side of the river at ‘C’, then you will find a pair of Similar Triangle.



i) From the above figure $\Delta\, ADE \sim \Delta\, AFC$. Which similarity criteria is used for this?

a) ASA b) RHS c) AAA d) SSS

ii) What is the width of the river?

a) 80m b) 60m c) 43m d) 50m

iii) From the above figure, what is the length of EC?

a) 110m b) 100m c) 154m d) 160m

iv) A student in the education camp tries to cross the river using the Flying Fox at an average speed of **9 km/hr**. Find the time taken by the student to cross the river.

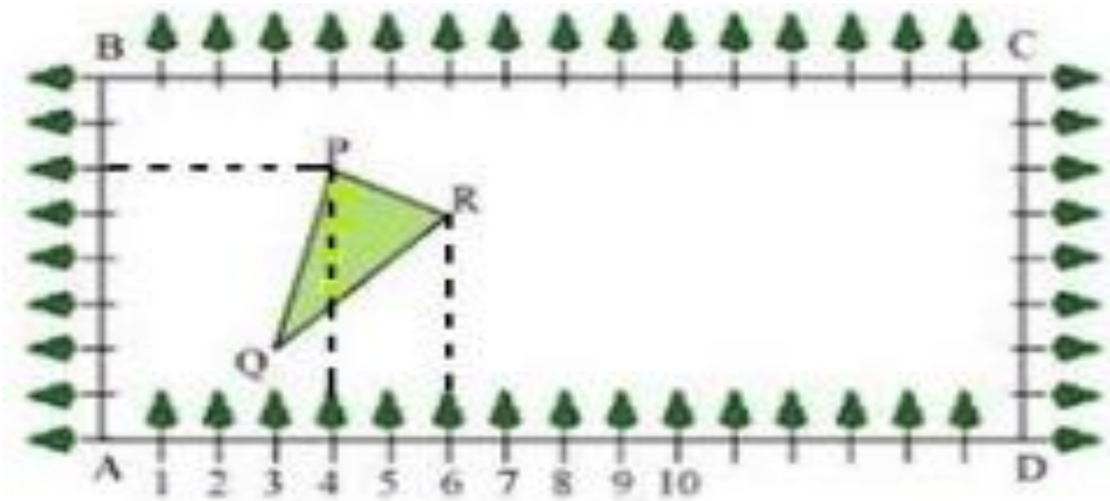
a) 12 seconds b) 3.3 seconds c) 24 seconds d) None of these

v) Which one of the following is not a similarity criterion?

a) AAA b) SAS c) SSA d) SSS

20. **Case study-based Question- IV**

Class **X** students of a secondary school in Krishnagar have been allotted a rectangular plot of a land for gardening activity. Sapling of Gulmohar are planted on the boundary at a distance of **1m** 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.



Considering **A** as origin, answer question (i) to (v)

i) 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 are the coordinates of **D**?

a) (16, 0) b) (0, 0) c) (0, 16) d) (16, 1)

v) What is the coordinate of **P** if **D** is taken as the origin?

a) (12, 2) b) (-12, 6) c) (12, 3) d) (6, 10)

Part-B

Section-III (2 Marks each)

21. Express 5050 as product of its prime factors. Is it unique?
22. If the point (x, y) is equidistant from the points $(a+b, b-a)$ and $(a-b, a+b)$, prove that $bx = ay$.

OR

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

23. If α and β are the zeroes of the quadratic polynomial $p(x)=x^2+12x+35$, form a quadratic polynomial whose zeroes are 2α, 2β.

24. Two tangents TP and TQ are drawn to a circle with centre O from an external T. Prove that: $\angle$PTQ=2$\angle$OPQ

25. Construct a tangent to a circle of radius 4 cm from a point on the concentric circle of radius 6 cm and measure its length. Also verify the measurement by actual calculation.

26. In ΔOPQ right angled at P, OP = 7 cm, OQ – PQ = 1 cm. Determine the values of sin Q and cos Q.

OR

Find acute angles A and B, $sin\ (A+2B)=\frac{\sqrt{3}}{2}$ and $cos\ (A+4B)=0,\ A>B$.

Section-IV (3 Marks each)

27. If S_n denote the sum of the first n terms of an A.P., prove that $S_{30}=3(S_{20}-S_{10})$.

OR

In an A.P., the sum of its first ten terms is **-80** and the sum of its next ten terms is **-280**. Find the A.P.

28. If $a\cos\theta-b\sin\theta=c$, prove that $a\sin\theta+b\cos\theta=\pm\sqrt{a^2+b^2-c^2}$

29. If the median of the following data is **32.5**, find the missing frequencies

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
Frequency	x	5	9	12	y	3	2	40

30. Prove that $\sqrt{2}+\sqrt{3}$ is an irrational number.

31. State and Prove Basic Proportionality Theorem.

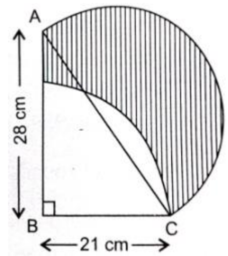
OR

State and Prove Pythagoras Theorem.

32. The king of hearts, queen of diamonds, jack of clubs and ace of spades are removed from a deck of 52 playing cards and then well shuffled. One card is selected from the remaining cards. Find the probability of getting:

(a) a club (b) a king (c) a red card.

33. In the figure, ABC is a right-angled triangle, $\angle B = 90^0$, AB = 28cm and BC = 21cm. With AC as diameter, a semicircle is drawn and with BC as radius a quarter circle is drawn. Find the area of the shaded region.



Section-V (5 Marks each)

34. Water in a canal, 6 m wide and 1.5 m deep, is flowing with a speed of 10 km/h. How much area will it irrigate in 30 minutes, if 8 cm of standing water is needed?

35. The area of a rectangle gets reduced by 9 square units, if its length is reduced by 5 units and breadth is increased by 3 units. If we increase the length by 3 units and the breadth by 2 units, the area increases by 67 square units. Find the area and perimeter of the rectangle.

36. The angle of elevation of a cloud from a point h meters above a lake is α and the angle of depression of its reflection in the lake be β, prove that the height of the cloud from the lake is $\dfrac{h(\tan\alpha + \tan\beta)}{\tan\beta - \tan\alpha}$.

OR

From the top of a tower **100m** high, a man observes two cars on the opposite sides of the tower and in same straight line with its base, with angles of depression **30°** and **45°** respectively. Find the distance between the cars. [Take $\sqrt{\mathbf{3}} = \mathbf{1.732}$]

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