



COMMON PRE-BOARD EXAMINATION 2022-23



Subject: Mathematics (Standard) (041)

Class: X

Time: 3 Hours

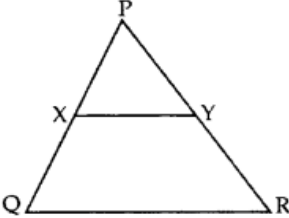
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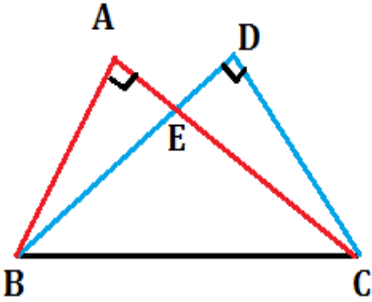
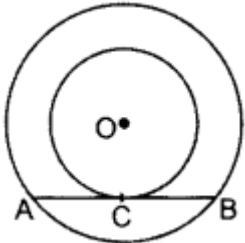
Max. Marks: 80

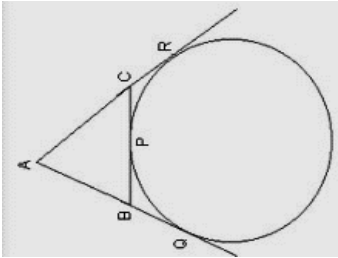
General Instructions:

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E.
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

Q.No.		Marks
	SECTION - A	
	(Section A consists of 20 questions of 1 mark each)	
1.	The sum of the exponents of prime factorization of 2160 is: (a) 4 (b) 5 (c) 6 (d) 7	1
2.	If α and β are the zeros of a polynomial $x^2 - 5x + 4$, then the value of $\alpha + \beta - 2\alpha\beta$ is: (a) 5 (b) 4 (c) 3 (d) -3	1
3.	The discriminant of the quadratic equation $3x^2 - \sqrt{3}x - k = 0$ is zero, then the value of k is: (a) $\frac{1}{4}$ (b) $\frac{-1}{4}$ (c) 2 (d) $\frac{4}{5}$	1
4.	The pair of equations $x = 0$ and $x = 5$ has: (a) no solution (b) unique/one solution (c) two solutions (d) infinitely many solutions	1
5.	The distance of the point P(- sin θ , cos θ) from the origin is: (a) 2units (b) $\sqrt{2}$ units (c) 1unit (d) 5units	1
6.	ABCD is a trapezium with AD \parallel BC and AD = 4.5 cm. If the diagonals AC and BD intersect each other at O such that $\frac{AO}{CO} = \frac{DO}{BO} = \frac{1}{2}$, then BC = (a) 6cm (b) 9cm (c) 8cm (d) 7cm	1
7.	If $\sin \theta = \frac{1}{\sqrt{2}}$, then the value of $(2\cot^2\theta + 2)$ is: (a) 4 (b) 6 (c) 5 (d) 3	1

8.	If $\cos A = \frac{12}{13}$, then the value of $(\tan^2 A + 1)$ is : (a) $\frac{13}{12}$ (b) $\frac{169}{144}$ (c) $\frac{144}{169}$ (d) $\frac{5}{13}$	1												
9.	In the given figure, $XY \parallel QR$, $\frac{PQ}{XQ} = \frac{7}{3}$ and $PR = 6.3$ cm, $YR =$  (a) 1.7 cm (b) 2.7 cm (c) 3cm (d) 4.2 cm	1												
10.	$\Delta ABC \sim \Delta PQR$ such that, $AB:PQ = 3:5$, if $QR = 10$ cm, then the side BC is equal to: (a) 8 cm (b) 9 cm (c) 15 cm (d) 6 cm	1												
11.	If tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 78° , $\angle AOB = 3x$, then the value of x is: (a) 30° (b) 36° (c) 34° (d) 45°	1												
12.	If the perimeter of a semicircular protractor is 72 cm where $\pi = \frac{22}{7}$, then the diameter of protractor is: (a) 7 cm (b) 10 cm (c) 14 cm (d) 22 cm	1												
13.	3 cubes each of volume 27 cm^3 are joined end to end. Then the surface area of the resulting cuboid is: (a) 54 cm^2 (b) 104 cm^2 (c) 126 cm^2 (d) 88 cm^2	1												
14.	Construction of a cumulative frequency table is useful in determining the (a) Mean (b) Median (c) Mode (d) all the above	1												
15.	In the AP $-20, -17, -14, -11, \dots$, the value of $a_{20} - a_{15}$ is: (a) 59 (b) 78 (c) -42 (d) 69	1												
16.	For the following distribution, <table border="1" data-bbox="224 1266 1260 1350"> <tbody> <tr> <td>Class</td> <td>0-5</td> <td>5-10</td> <td>10-15</td> <td>15-20</td> <td>20-25</td> </tr> <tr> <td>Frequency</td> <td>10</td> <td>15</td> <td>12</td> <td>20</td> <td>9</td> </tr> </tbody> </table> the class mark of the modal class is (a) 11.5 (b) 12.5 (c) 1.50 (d) 15.5	Class	0-5	5-10	10-15	15-20	20-25	Frequency	10	15	12	20	9	1
Class	0-5	5-10	10-15	15-20	20-25									
Frequency	10	15	12	20	9									
17.	A single letter is selected at random from the word PROBABILITY. Then the probability for selecting a vowel is: (a) $\frac{4}{11}$ (b) $\frac{5}{11}$ (c) $\frac{1}{11}$ (d) $\frac{6}{11}$	1												
18.	$(\sin A + \cos A)^2 - (\sin A - \cos A)^2$ (a) $\sin A \cdot \cos A$ (b) $4 \sin A \cdot \cos A$ (c) $2 \sin A \cdot \cos A$ (d) $3 \sin A \cdot \cos A$	1												
19.	<u>DIRECTION:</u> In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option. <u>Statement A (Assertion):</u> The HCF of two numbers is 5 and their product is 150, then their LCM is 30 <u>Statement R(Reason) :</u> For any two positive integers a and b, $\text{HCF}(a,b) \times \text{LCM}(a,b) = a \times b$.	1												

	<p>(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).</p> <p>(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A).</p> <p>(c) Assertion (A) is true but reason (R) is false.</p> <p>(d) Assertion (A) is false but reason (R) is true.</p>	
20.	<p>Statement A (Assertion): The point $(-1, 6)$ divides the line segment joining the points $(-3, 10)$ and $(6, -8)$ in the ratio $2 : 7$ internally.</p> <p>Statement R(Reason) : Given three points, i.e. A, B, C form an equilateral triangle, then $AB = BC = AC$.</p> <p>(a)Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).</p> <p>(b)Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A).</p> <p>(c)Assertion (A) is true but reason(R) is false.</p> <p>(d)Assertion (A) is false but reason(R) is true</p>	1
	<p>SECTION-B (Section B consists of 5 questions of 2 marks each)</p>	
21.	If the system of equations $\alpha x + 3y = \alpha - 3$, $12x + \alpha y = \alpha$ has no solution, find the value of α .	2
22.	<p>In the given figure, two triangles ABC and DBC are on the same base BC in which $\angle A = \angle D = 90^\circ$. If CA and BD meet each other at E, show that $AE \times CE = BE \times DE$.</p> 	2
23.	<p>In the figure, the chord AB of the larger of the two concentric circles, with centre O, touches the smaller circle at C. Prove that $AC = CB$.</p> 	2
24.	A pendulum swings through an angle of 30° and describes an arc 17.6 cm in length. Find the length of pendulum.	2

	OR	
	What is the perimeter of the sector with radius 10.5 cm and sector angle 60° .	
25.	If $\tan^2 45^\circ - \cos^2 30^\circ = x \tan^2 60^\circ \cos^2 45^\circ$, find the value of x. OR If $\tan \theta = \frac{1}{\sqrt{3}}$, what is the value of $\frac{\operatorname{cosec}^2 \theta - \sec^2 \theta}{\operatorname{cosec}^2 \theta + \sec^2 \theta}$.	2
	SECTION-C (Section C consists of 6 questions of 3 marks each)	
26.	Given that $9 - 5\sqrt{3}$ is irrational.	3
27.	Form the quadratic polynomial whose zeroes are $3 + \sqrt{7}$ and $3 - \sqrt{7}$.	3
28.	Solve the quadratic equation by quadratic formula: $3x^2 - 4\sqrt{3}x + 4 = 0$. OR For what value of k does the quadratic equation $(k-5)x^2 + 2(k-5)x + 2 = 0$ have equal roots.	3
29.	Prove that: $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$	3
30.	A circle touches the side BC of a $\triangle ABC$ at point P and also touches the sides AB and AC produced at Q and R respectively. Prove that $AQ = \frac{1}{2}$ (Perimeter of $\triangle ABC$) 	3
	OR	
	Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.	
31.	A box contains cards on which the numbers from 2 to 101 are marked. A card is drawn from the bag at random, find the probability that number on the card drawn is: (i) a multiple of 7 (ii) a perfect square number (iii) a two digit number.	3
	SECTION-D (Section D consists of 4 questions of 5 marks each)	
32.	A plane left 30 minutes late than its scheduled time and in order to reach the destination 1500 km away in time, it had to increase its speed by 100 km/h from the usual speed. Find its usual speed. OR In a class test, the sum of Aran's marks in Hindi and English is 30. Had he got 2 marks more in Hindi and 3 marks less in English, the product of the marks would have been 210. Find his marks in the two subjects.	5
33.	(i) ABCD is a trapezium with $AB \parallel DC$. E and F are points on non-parallel sides AD and BC respectively such that EF is parallel to AB. Show that $\frac{AE}{ED} = \frac{BF}{FC}$.	5

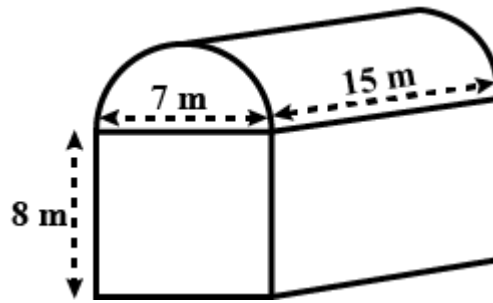
(ii) In a ΔABC , $DE \parallel BC$, $AD = 1.5$ cm, $DB = 3$ cm $AE = 1$ cm. Find the length of EC .

34.

A toy is in the shape of a right circular cylinder with a hemisphere on one end and a cone on the other end. The height and radius of the cylindrical part are 13 cm and 5 cm respectively. The radii of the hemispherical and conical parts are the same as that of the cylindrical part. Calculate the surface area of the toy if the height of the conical part is 12 cm.

OR

Shanta runs an industry in a shed which is in the shape of a cuboid surmounted by a half cylinder (see the given fig). If the base of the shed is of dimension $7\text{ m} \times 15\text{ m}$, and the height of the cuboidal portion is 8 m, find the volume of air that the shed can hold. Further, suppose the machinery in the shed occupies a total space of 300 m^3 , and there are 20 workers, each of whom occupy about 0.08 m^3 space on an average. Then, how much air is in the shed? (Use $\pi = \frac{22}{7}$)



35.

Find the missing frequency in the following distribution if $N = 100$ and median is 32.

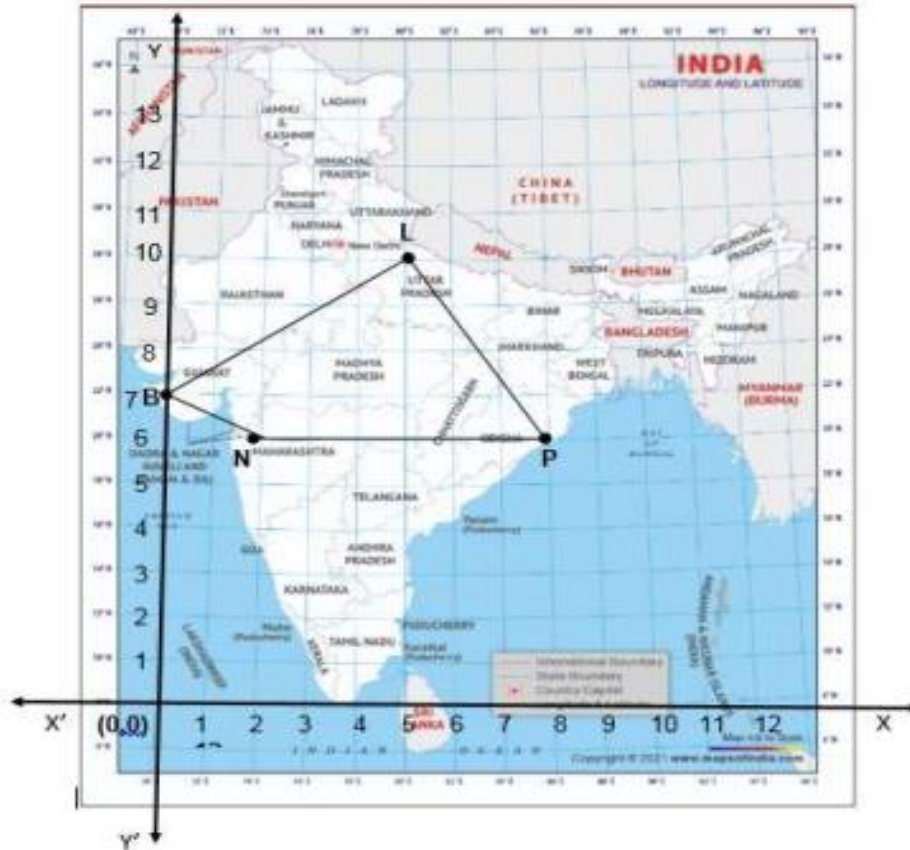
Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	10	f_1	25	30	f_2	10

SECTION-E

(Case study based questions are compulsory)

36.

In a GPS, The lines that run east-west are known as lines of latitude, and the lines running north-south are known as lines of longitude. The latitude and the longitude of a place are its coordinates and the distance formula is used to find the distance between two places. The distance between two parallel lines is approximately 150 km. A family from Uttar Pradesh planned a round trip from Lucknow (L) to Puri (P) via Bhuj (B) and Nashik (N) as shown in the given figure.



Based on the above information answer the following questions using the coordinate geometry.

1. Find the distance between Lucknow (L) to Bhuj (B).
2. If Kota (K), internally divide the line segment joining Lucknow (L) to Bhuj (B) in the ratio 3 : 2, then find the coordinate of Kota (K).
3. Name the type of triangle formed by the places Lucknow (L), Nashik (N) and Puri (P).


OR

Find a place (point) on the longitude (y-axis) which is equidistant from the points Lucknow (L) and Puri (P).

37. Your friend Veer wants to participate in a 200m race. He can currently run that distance in 51 seconds and with each day of practice it takes him 2 seconds less. He wants to do in 31 seconds.



4

	<p>Based on the above information give the answers for her questions.</p> <p>1. Form an AP for the given situation.</p> <p>2. What is the minimum number of days he needs to practice till his goal is achieved?</p> <p style="text-align: center;">OR</p> <p>In which day he completes 200 m in 35 seconds?</p> <p>3. If $2x$, $x + 10$, $3x + 2$ are three consecutive terms of an AP, find the value of x.</p>	
38.	<p>A group of students of class X visited India Gate on an education trip. The teacher and students had interest in history as well. The teacher narrated that India Gate, official name Delhi Memorial, originally called All-India War Memorial, monumental sandstone arch in New Delhi, dedicated to the troops of British India who died in wars fought between 1914 and 1919. The teacher also said that India Gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway), is about 42 metres in height.</p> <div style="text-align: center;">  </div> <p>1. What is the angle of elevation, if they are standing at a distance of 42 m away from the monument?</p> <p>2. They want to see the tower at an angle of 60°. So, they want to know the distance where they should stand and hence find the distance.</p> <p style="text-align: center;">OR</p> <p>If the altitude of the Sun is at 60°, then find the height of the vertical tower that will cast a shadow of length 20 m is</p> <p>3. The ratio of the length of a rod and its shadow is 1:1. Then find the angle of elevation of the sun.</p>	4
