COMMON PRE-BOARD EXAMINATION 2023-24

Subject: MATHEMATICS BASIC (241)

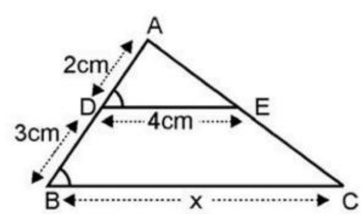
Class X

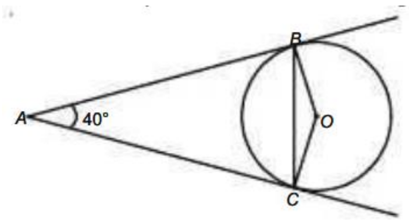
Time: 3 Hrs. **Max. Marks: 80**

General Instructions:

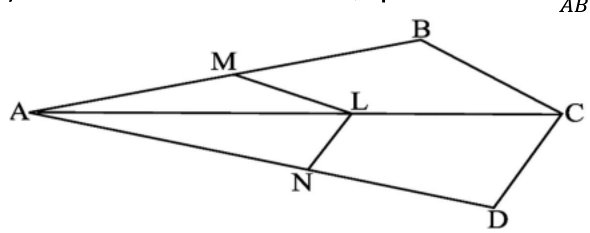
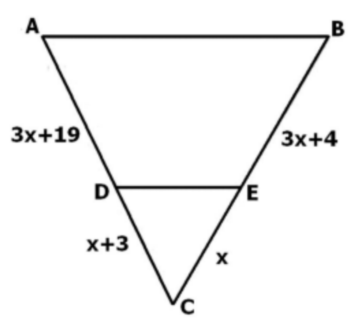
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case-based integrated 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 π =22/7 wherever required if not stated.

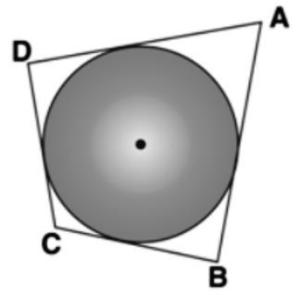
	SECTION A	
	Section A consists of 20 questions of 1 mark each.	
1.	If the product of two positive integers $a \text{ and } b$ is given as $ab = x^5y^3 \text{ and } HCF(a,b) = xy^2$: x, y are prime numbers, then LCM(a,b) is a) xy b) x^4y^2 c) x^4y d) x^6y^5	1
2.	What is the LCM of smallest prime number and smallest composite number a) 0 b) 1 c) 2 d) 4	1

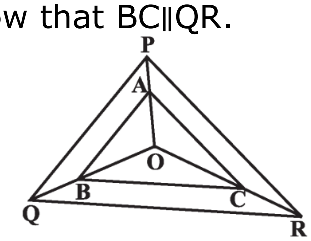
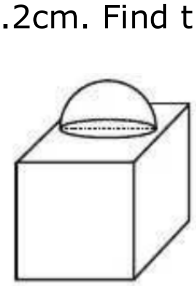
3.	If $(x+a)$ is a factor of $2x^2+2ax+5x+10$, find a. a) 0 b) 1 c) 2 d) 3	1
4.	The pair of equations $x = 0\ and\ x = -2$ has: a) one solution b) two solutions c) infinitely many solutions d) no solution	1
5.	The roots of the polynomial $x^2+7x+10=0$ are a) Real and equal b) Real and distinct c) Not real d) None of these	1
6.	In a circle of diameter 42cm ,if an arc subtends an angle of 60^0 at the centre where π=22/7,then the length of the arc is a) 22/7 cm b) 11cm c) 22 cm d) 44 cm	1
7.	Distance of the point $A(x,y)$ from the origin is a) x b) y c) $\sqrt{x^2-y^2}$ d) $\sqrt{x^2+y^2}$	1
8.	In the given figure, if DE‖ BC, then x equals a) 6cm b) 10cm c) 8cm d) 12.5cm  	1
9.	If in triangles ABC and DEF, $\frac{AB}{DE}=\frac{BC}{FD}$, then they will be similar, when a) $\angle B=\angle E$ b) $\angle A=\angle D$ c) $\angle B=\angle D$ d) $\angle A=\angle F$	1

10.	In the given figure, AB and AC are tangents to the circle with center O such that $\angle BAC = 40^0$. Then $\angle BOC$ is equal to a) 40^0 b) 50^0 c) 140^0 d) 160^0  	1
11.	The value of $\frac{2tan\ 30^0}{1-tan^2 30^0}$. a) $Sin60^0$ b) $Cos60^0$ c) $Tan60^0$ d) $Sin30^0$	1
12.	Given 15cotA=8, then sinA= a) $\frac{3}{5}$ b) $\frac{4}{3}$ c) 1 d) $\frac{15}{17}$	1
13.	$\sqrt{3}cos^2A + \sqrt{3}sin^2A$ is equal to a) 1 b) $\frac{1}{\sqrt{3}}$ c) $\sqrt{3}$ d) 0	1
14.	If the height of the tower is equal to the length of its shadow, then the angle of elevation of the sun is _____ a) 30° b) 45° c) 60° d) 90°	1
15.	The minute hand of a clock is 12cm long. Find the area of the face of the clock described by the minute in 35 minutes. a) $265cm^2$ b) $266cm^2$ c) $264cm^2$ d) $274cm^2$	1

16.	The radius (in cm) of the largest right circular cone that can be cut out from a cube of edge 4.2cm is a) 4.2cm b) 2.1cm c) 8.4cm d) 1.05cm	1
17.	Find mode , if mean and median are 10.5 and 9.6 respectively. a) 17.8 b) 7.8 c) 5.8 d) 8.7	1
18.	A card is drawn from a well-shuffled deck of 52 playing cards. The probability that the card will not be an ace is a) ½ b) $\frac{4}{13}$ c) $\frac{1}{6}$ d) $\frac{12}{13}$	1
19.	**DIRECTION:** In the question number 19 and 20, a statement of **assertion (A)** is followed by a statement of **Reason (R).** Choose the correct option **Statement A (Assertion):** If HCF of 510 and 92 is 2, then the LCM of 510 & 92 is 32460 **Statement R(Reason)** : HCF(a,b) x LCM(a,b) = a x b (a) Both assertion (A) and reason (R) are true and reason(R) is the correct explanation of assertion (A) (b) Both assertion (A) and reason (R) are true and reason(R) is not the correct explanation of assertion (A) (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true.	1

20.	**DIRECTION:** In the question number 19 and 20, a statement of **assertion (A)** is followed by a statement of **Reason (R).** Choose the correct option **Statement A (Assertion):** The ratio in which the line segment joining (2, -3) and (5, 6) internally divided by x axis is 1:2. **Statement R(Reason)** : formula for the internal division is $\left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n}\right)$ a) Both assertion (A) and reason (R) are true and reason(R) is the correct explanation of assertion (A) b) Both assertion (A) and reason (R) are true and reason(R) is not the correct explanation of assertion (A) c) Assertion (A) is true but reason (R) is false. d) Assertion (A) is false but reason (R) is true.	1
	SECTION B	
	Section B consists of 5 questions of 2 marks each.	
21.	For what values of k will the following pair of linear equations have infinitely many solutions? kx + 3y – (k – 3) = 0 12x + ky – k = 0	2
22.	In the given figure ,if $LM \parallel CB$ and $LN \parallel CD$, prove that $\frac{AM}{AB} = \frac{AN}{AD}$  **[OR]** In the given figure , if DE∥ AB, find the value of x. 	2

23.	In the given figure, a circle touches all the four sides of a quadrilateral ABCD whose sides are AB=6cm, BC=9cm and CD=8cm, find the length of side AD. 	2
24.	If $\cot\theta = \frac{7}{8}$, evaluate $\frac{(1+\sin\theta)\ (1-\sin\theta)}{(1+\cos\theta)\ (1-\cos\theta)}$	2
25.	Find the perimeter of a quadrant of a circle of radius 14 cm. **[OR]** Find the diameter of a circle whose area is equal to the sum of the areas of the two circles of radii 24 cm and 7 cm.	2
	SECTION C	
	Section C consists of 6 questions of 3 marks each	
26.	The taxi charges in a city consist of fixed charge together with the charge for the distance covered. For a distance of 10km, the charge paid is ₹ 105 and for a journey of 15km, the charge paid is ₹ 155. What are the fixed charges and the charge per km? How much does a person have to pay for travelling a distance of 25km? **[OR]** The coach of a cricket team buys 4 bats and 1 ball for Rs. 2050. Later, she buys 3 bats and 2 balls for 1600. Find the cost of each bat and each ball.	3
27.	Prove that $\sqrt{3}$ is an irrational number	3
28.	If $\alpha\ and\ \beta$ are the zeroes of the quadratic polynomial $f(x) = x^2 - 2x + 3$, then find a quadratic polynomial whose zeroes are $\alpha + 2\ and\ \beta$ +2.	3
29.	Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.	3

30.	Prove the following: $(cosecA - sinA)(secA - cosA) = \frac{1}{tanA+cotA}$ **[OR]** Prove that: $(1 + cotA - cosecA)(1 + tanA + secA) = 2$	3
31.	A card is drawn from a well shuffled deck of 52 cards. Find the probability of getting i) A king of red colour ii) A face card iii) The queen of diamond	3
	SECTION D	
	Section D consists of 4 questions of 5 marks each	
32.	Two water taps together can fill a tank in $1\frac{7}{8}$ hours. The tap with longer diameter takes 2 hours less than the tap with smaller one to fill the tank separately. Find the time in which each tap can fill the tank separately. **[OR]** A train travels 180 km at a uniform speed. If the speed had been 9 km/hour more, it would have taken 1 hour less for the same journey. Find the speed of the train.	5
33.	State and prove Thale's Theorem (Basic Proportionality Theorem). Using the above theorem prove the following: In the below figure A,B and C are points on OP,OQ and OR respectively such that AB∥PQ and AC∥PR. Show that BC∥QR. 	5
34.	A decorative block which is made of two solids- a cube and a hemisphere the base of the block is a cube with edge 5cm and the hemisphere, fixed on the top, has a diameter of 4.2cm. Find the total surface area of the block.  **[OR]**	5

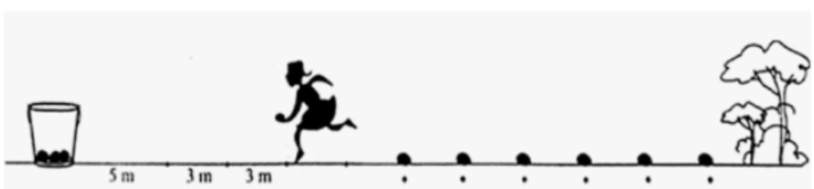
	A toy is in the form of a hemisphere surmounted by a right circular cone of the same base radius as that of the hemisphere. If the radius of base of the cone is 21 cm and its volume is 2/3 of the volume of the hemisphere, calculate the height of the cone and the surface area of the toy.	
35.	If the median of the following frequency distribution is 32.5. Find the values of f_1 *and* f_2.	5

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	total
frequency	f_1	5	9	12	f_2	3	2	40

SECTION E

36. **Case study-1** — 4

On occasion of Sports Day school has planned to conduct some sports events for primary classes. They have planned to conduct a potato race, in which a bucket is placed at the starting point, which is 5m from the first potato and other potatoes are placed 3m apart in a straight line. There are ten potatoes in the line. A competitor starts from the bucket, picks up the nearest potato, runs back with it, drops it in the bucket, runs back to pick up the next potato, runs to the bucket to drop it in and she continues in the same way until all the potatoes are in the bucket.



Based on the above information, answer the following questions:

i) Write the AP form from the above information — 1

ii) What is the last term of the AP — 1

iii) What is the distance covered by her after picking the 8th potato and dropping in the basket? — 2

[OR]

What is the total distance covered by the Competitor?

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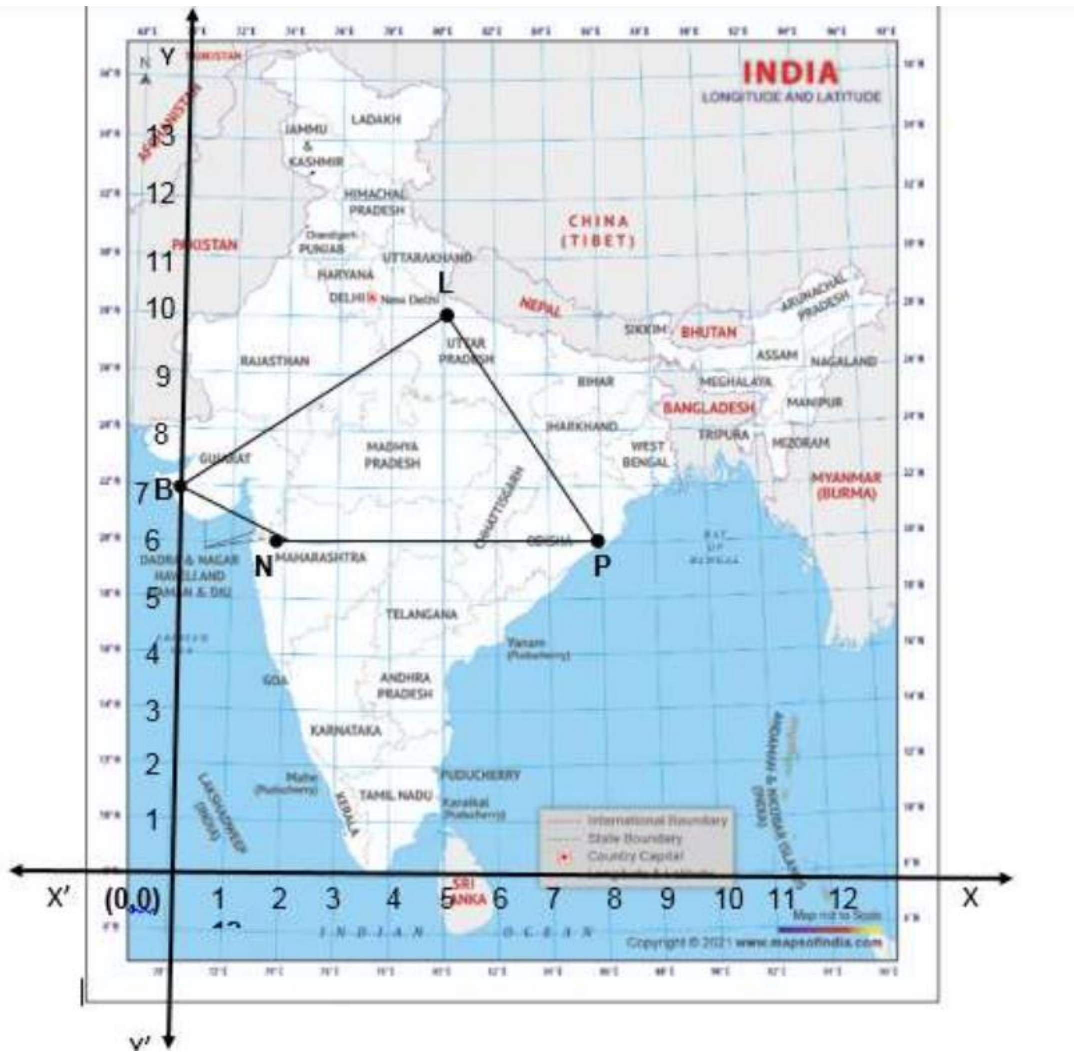
Case Study – 2



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

i) Find the distance between Lucknow (L) to Bhuj(B).

ii) If Kota (K), internally divide the line segment joining Lucknow (L) to Bhuj (B) into 3 : 2 then find the coordinate of Kota (K).

iii) 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).

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Case study 3:

Lakshaman Jhula is located 5 kilometers north-east of the city of Rishikesh in the Indian state of Uttarakhand. The bridge connects the villages of Tapovan to Jonk. Tapovan is in Tehri Garhwal district, on the west bank of the river, while Jonk is in Pauri Garhwal district, on the east bank. Lakshman Jhula is a pedestrian bridge also used by motorbikes. It is a landmark of Rishikesh. A group of Class X students visited Rishikesh

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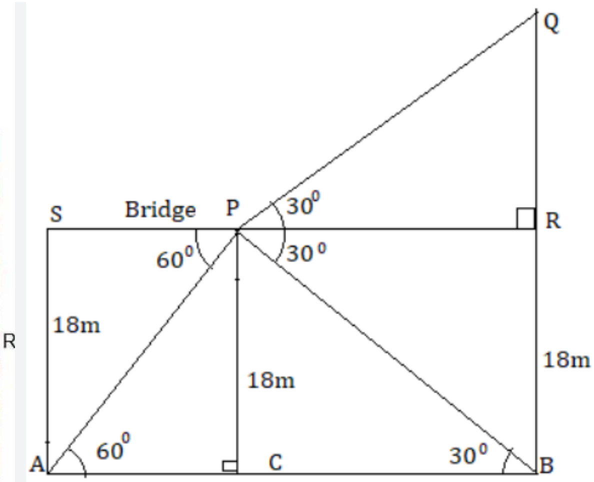
in Uttarakhand on a trip. They observed from a point (P) on a river bridge that the angles of depression of opposite banks of the river are 60° and 30° respectively. The height of the bridge is about 18 meters from the river.



Based on the above information answer the following questions.

i) Find the distance PA. 1

ii) Find the distance PB 1

iii) Find the width AB of the river. 2

[OR]

Find the height BQ if the angle of the elevation from P to Q be 30°.

End of the question paper