



COMMON PRE-BOARD EXAMINATION 2023-24

Subject: MATHEMATICS STANDARD (041)

Class X



Time: 3 Hrs.

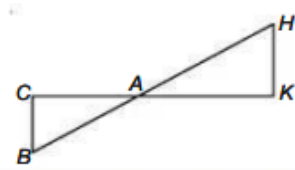
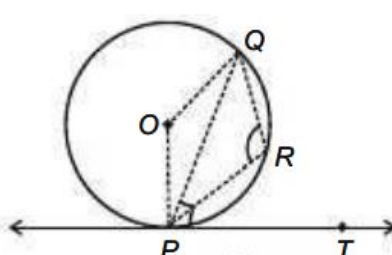
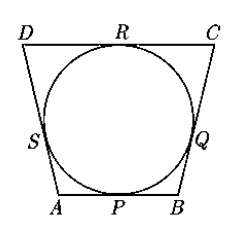
Max. Marks: 80

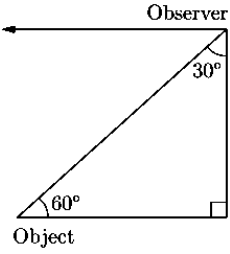
General Instructions:

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 $\pi = 22/7$ wherever required if not stated.

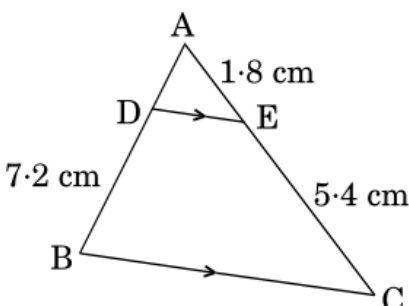
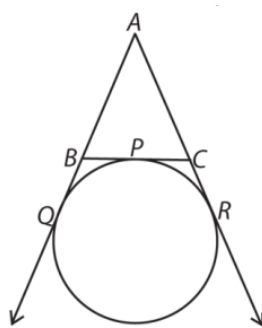
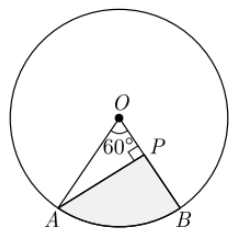
SECTION A		
Section A consists of 20 questions of 1 mark each.		
1.	If two positive integers a and b are written as $a=x^3y^2$ and $b=xy^3$, where x,y are prime numbers, then the result obtained by dividing the product of given positive integers by HCF(a,b) is a) xy b) xy^2 c) x^3y^3 d) x^2y^2	1
2.	One equation of a pair of dependent linear equations is $-5x + 7y = 2$. The second equation can be a) $10x + 14y + 4 = 0$ b) $-10x - 14y + 4 = 0$ c) $-10x + 14y + 4 = 0$ d) $10x - 14y = -4$	1

3.	<p>For what values of k the following system of equations will be inconsistent?</p> $4x + 6y = 11$ $2x + ky = 7$ <p>a) 1 b) 2 c) 3 d) 4</p>	1
4.	<p>If α and β are the roots of $ax^2 - bx + c = 0$ ($a \neq 0$), then value of $\alpha + \beta$ is</p> <p>a) $\frac{b}{a}$ b) $\frac{a}{b}$ c) $\frac{2a}{b}$ d) $\frac{a}{2b}$</p>	1
5.	<p>There are 60 terms in an AP of which the first term is 8 and the last term is 185. The 31st term is</p> <p>a) 56 b) 94 c) 85 d) 98</p>	1
6.	<p>The coordinates of the point P dividing the line segment joining the points A(1,3) and B(4,6) in the ratio 2:1 are _____</p> <p>a) (2,4) b) (3,5) c) (4,2) d) (5,3)</p>	1
7.	<p>A point (x,y) is at a distance of 5 units from the origin. How many such points lie in the third quadrant?</p> <p>a) 0 b) 1 c) 2 d) infinitely many</p>	1

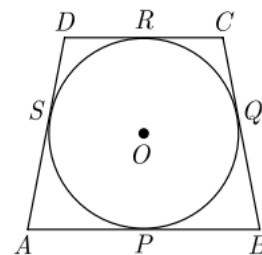
8.	<p>In the below figure, $\Delta AHK \sim \Delta ABC$. If $AK=10\text{cm}$, $BC=3.5\text{cm}$ and $HK=7\text{cm}$, find AC.</p>  <p>a) 7 b) 14 c) 5 d) 10</p>	1
9.	<p>In the following figure, PQ is a chord of a circle with centre O and PT is a tangent. If $\angle QPT = 60^\circ$, then $\angle PRQ = \underline{\hspace{2cm}}$.</p>  <p>a) 60° b) 30° c) 90° d) 120°</p>	1
10.	<p>In the given figure, a circle touches all the four sides of quadrilateral $ABCD$ with $AB=6\text{cm}$, $BC=7\text{cm}$ and $CD=4\text{cm}$, then length of AD is _____</p>  <p>a) 3cm b) 1cm c) 2cm d) 10cm</p>	1
11.	<p>If θ is an acute angle and $\sin\theta = \cos\theta$, then the value of $2\tan^2\theta + \sin^2\theta - 1$ is:</p> <p>a) $\frac{1}{2}$ b) 1 c) $\frac{3}{2}$ d) 2</p>	1
12.	<p>If $3x = \operatorname{cosec}\theta$ and $\frac{3}{x} = \cot\theta$, then the value of $3\left(x^2 - \frac{1}{x^2}\right)$.</p> <p>a) $\frac{1}{3}$ b) $\frac{1}{9}$ c) 1 d) 3</p>	1

13.	<p>In the given figure, the positions of the observer and the object are mentioned, the angle of depression is</p> <p>a) 30° b) 90° c) 60° d) 45°</p> 	1
14.	<p>A pendulum swings through an angle of 30° and describes an arc 8.8cm in length. Find the length of the pendulum.</p> <p>a) 15.5cm b) 16.8cm c) 17.4cm d) 18.6cm</p>	1
15.	<p>In a circle of radius 14cm, an arc subtends an angle of 45° at the centre, then the area of the sector is</p> <p>a) 71cm^2 b) 76cm^2 c) 77cm^2 d) 154cm^2</p>	1
16.	<p>If the median of a data exceeds the mean by 3, then by what number the mode exceeds its mean?</p> <p>a) 5 b) 7 c) 9 d) 11</p>	1
17.	<p>There are 1000 selected envelopes in a box. 10 of them contain a cash prize of ₹ 100 each, 100 of them contain a cash prize of ₹ 50 each and 200 of them contain a cash prize of ₹ 10 each and rest do not contain any cash prize. If they are well-shuffled and an envelope is picked up out, then the probability that it contains no cash prize is</p> <p>a) 0.65 b) 0.69 c) 0.54 d) 0.57</p>	1
18.	<p>An event is very unlikely to happen. Its probability is closest to</p> <p>a) 0.0001 b) 0.001 c) 0.01 d) 0.1</p>	1

19.	<p>DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R).</p> <p>Choose the correct option</p> <p>Statement A (Assertion): If sum of the first n terms of an AP is given by $S_n = 3n^2 - 4n$. Then its n^{th} is $a_n = 6n - 7$.</p> <p>Statement R(Reason) : if a_n is the n^{th} term of an AP, whose sum to n terms is S_n, is given by $a_n = S_n - S_{n-1}$</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
20.	<p>DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R).</p> <p>Choose the correct option</p> <p>Statement A (Assertion): A cone with radius “a” , slant height “l”and height “h” is attached to a hemisphere of radius “a”. The total surface area of the solid is $\pi a(l + 2a)$</p> <p>Statement R(Reason) : for a cone with radius ‘a’, height ‘h’ and slant height ‘l’, we have $l = \sqrt{a^2 + h^2}$</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
	SECTION B	
	Section B consists of 5 questions of 2 marks each.	
21.	Prove that $5 + 2\sqrt{3}$ is an irrational number, given $\sqrt{3}$ is an irrational number.	2

22.	<p>In the given figure, $DE \parallel BC$. Find the length of side AD, given that $AE=1.8\text{cm}$, $BD=7.2\text{cm}$ and $CE=5.4\text{cm}$.</p> 	2
23.	<p>In the given figure, a circle touches the side BC at P and touches AB & AC produced at Q & R respectively. If $AQ = 7\text{ cm}$, find the perimeter of $\triangle ABC$.</p> 	2
24.	<p>If $\cot \theta = \frac{15}{8}$, then evaluate $\frac{(2+2\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(2-2\cos\theta)}$.</p> <p style="text-align: center;">[OR]</p> <p>In a $\triangle ABC$, right-angled at C, if $\tan A = \frac{1}{\sqrt{3}}$, find the value of $\sin A \cos B + \cos A \sin B$.</p>	2
25.	<p>In the given figure, AOB is a sector of angle 60° of a circle with centre O and radius 17cm. If $AP \perp OB$ and $AP=15\text{cm}$, find the area of the shaded region.</p>  <p style="text-align: center;">[OR]</p>	2

In the given figure a quadrilateral ABCD is drawn to circumscribe a circle, with centre O, in such a way that the sides AB, BC, CD, and DA touch the circle at the points P, Q, R and S respectively. Prove that $AB + CD = BC + DA$.



SECTION C

Section C consists of 6 questions of 3 marks each

26.

In a seminar, the number of participants in Hindi, English and Mathematics are 60, 84 and 108 respectively. Find the minimum number of rooms required if in each room the same number of participants are to be seated and all of them being in the same subject.

3

27.

Find the value of k such that the polynomial $x^2 - (k + 6)x + 2(2k - 1)$ has sum of its zeros equal to half of their product.

3

28.

The sum of the digits of a two digit number is 12. The number obtained by interchanging the two digits exceeds the given number by 18. Find the number.

3

[OR]

Find the value of k for which the following pair of equation has no solution:

$$\begin{aligned} x + 2y &= 3, \\ (k - 1)x + (k + 1)y &= (k + 2) \end{aligned}$$

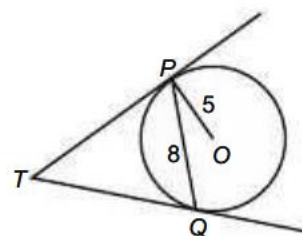
29.

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

3

[OR]

In Figure, PQ is a chord of length 8 cm of a circle of radius 5 cm and centre O. The tangents at P and Q intersect at point T. Find the length of TP.



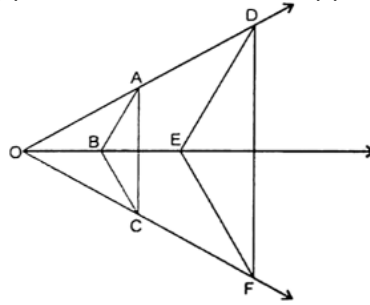
30.	Prove the following $\frac{\tan^3\theta}{1 + \tan^2\theta} + \frac{\cot^3\theta}{1 + \cot^2\theta} = \sec\theta\operatorname{cosec}\theta - 2\sin\theta\cos\theta$	3																						
31.	Find the mean of the following distribution <table><tr><td>Height (cm)</td><td>No. of students</td></tr><tr><td>Less than 75</td><td>5</td></tr><tr><td>Less than 100</td><td>11</td></tr><tr><td>Less than 125</td><td>14</td></tr><tr><td>Less than 150</td><td>18</td></tr><tr><td>Less than 175</td><td>21</td></tr><tr><td>Less than 200</td><td>28</td></tr><tr><td>Less than 225</td><td>33</td></tr><tr><td>Less than 250</td><td>37</td></tr><tr><td>Less than 275</td><td>45</td></tr><tr><td>Less than 300</td><td>50</td></tr></table>	Height (cm)	No. of students	Less than 75	5	Less than 100	11	Less than 125	14	Less than 150	18	Less than 175	21	Less than 200	28	Less than 225	33	Less than 250	37	Less than 275	45	Less than 300	50	3
Height (cm)	No. of students																							
Less than 75	5																							
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Less than 275	45																							
Less than 300	50																							
	SECTION D																							
	Section D consists of 4 questions of 5 marks each																							
32.	A shop keeper buys a number of books for ₹80. If he had bought 4 more books for the same amount, each book would have cost ₹1 less. How many books did he buy? [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 figure, $AB \parallel DE$ and $BC \parallel EF$. Prove that $AC \parallel DF$.



5

34.

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 $\frac{2}{3}$ of the volume of the hemisphere, calculate the height of the cone and the surface area of the toy.

[OR]

Due to heavy floods in a state, thousands were rendered homeless. 50 schools collectively decided to provide place and the canvas for 1500 tents and share the whole expenditure equally. The lower part of each tent is cylindrical with base radius 2.8 m and height 3.5 m and the upper part is conical with the same base radius, but of height 2.1 m. If the canvas used to make the tents costs ₹120 per m^2 , find the amount shared by each school to set up the tents.

5

35.

The median of the following data is 525. Find the values of x and y , if the total frequency is 100.

Class interval	Frequency
0–100	2
100–200	5
200–300	x
300–400	12
400–500	17
500–600	20
600–700	y
700–800	9
800–900	7
900–1000	4

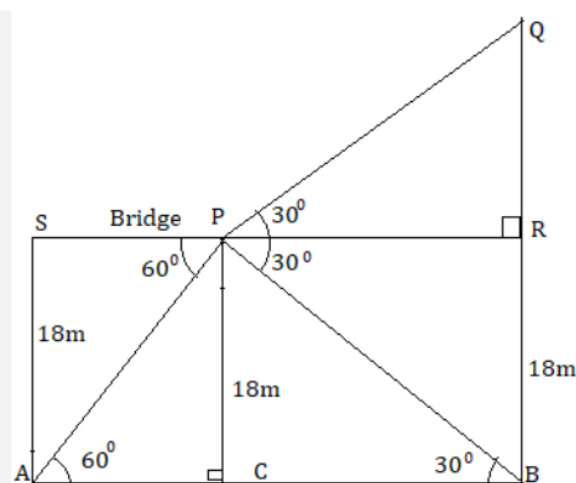
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SECTION E

36. Case study 1:

4

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 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.
- ii) Find the distance PB
- iii) Find the width AB of the river.

[OR]

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

1

1

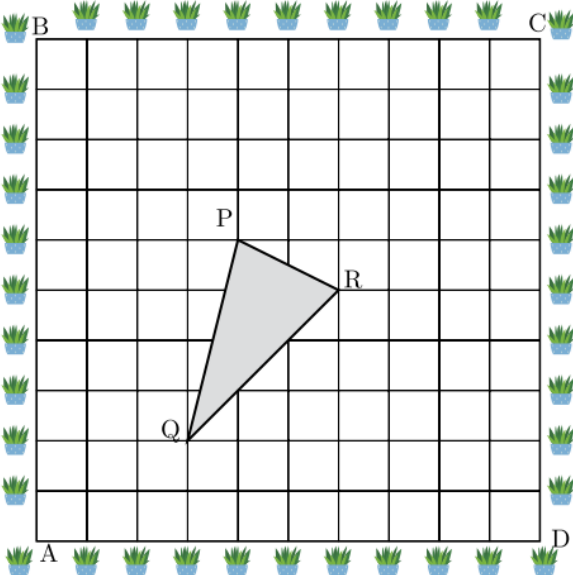
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37. Case Study – 2

4

In the month of April to June 2022, the exports of passenger cars from India increased by 26% in the corresponding quarter of 2021–22, as per a report. A car manufacturing company planned to produce 1800 cars in 4th year and 2600 cars in 8th year. Assuming that the production increases uniformly by a fixed number every year.



	<p>(i) Find the production in the 1st year.</p> <p>(ii) Find the production in the 12th year.</p> <p>(iii) Find the total production in first 10 years.</p> <p>[OR]</p> <p>In how many years will the total production reach 31200 cars?</p>	<p>1</p> <p>1</p> <p>2</p>
38.	<p>Case study-3</p> <p>A garden is in the shape of rectangle. Gardener grew sapling of Ashoka tree on the boundary of garden at the distance of 1 meter from each other. He want to decorate the garden with rose plants. He choose triangular region inside the park to grow rose plants. Gardener took help from the students of class 10th. They made a chart for it which looks as the above figure</p>  <p>i) If A is taken as origin, What are the coordinates of triangle PQR ?</p> <p>ii) If D is taken as origin, what is the co-ordinate of point P ?</p> <p>iii) If A is taken as origin, find the midpoint of the PR ?</p> <p>[OR]</p> <p>What is distance between P and Q if origin is taken as A?</p>	<p>4</p> <p>1</p> <p>1</p> <p>2</p>

End of the question paper