BOARD QUESTION PAPER: JULY 2023

Mathematics Part - II

Time: 2 Hours **Max. Marks: 40**

Note:

i. *All* questions are compulsory.
ii. Use of calculator is not allowed.
iii. The numbers to the right of the questions indicate full marks.
iv. In case of MCQs [Q. No. **1(A)**] only the first attempt will be evaluated and will be given credit.
v. For every MCQ, the correct alternative (A), (B), (C) or (D) with sub-question number is to be written as an answer.
vi. Draw proper figures for answers wherever necessary.
vii. The marks of construction should be clear. Do not erase them.
viii. Diagram is essential for writing the proof of the theorem.

Q.1. (A) For each of the following sub-question four alternative answers are given. Choose the correct alternative and write its alphabet: **[4]**

1. The volume of a cube of side 10 cm is _______.
   (A) 1 cm^3 (B) 10 cm^3 (C) 100 cm^3 (D) 1000 cm^3

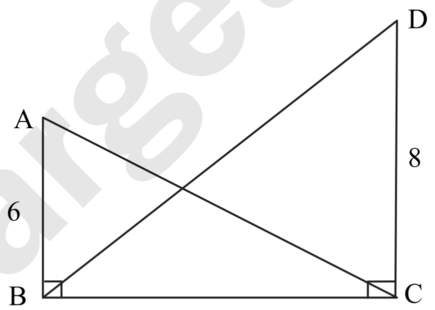
2. A line makes an angle of 30° with positive direction of X-axis, then the slope of the line is ________.
   (A) $\frac{1}{2}$ (B) $\frac{\sqrt{3}}{2}$ (C) $\frac{1}{\sqrt{3}}$ (D) $\sqrt{3}$

3. $\angle$ACB is inscribed in arc ACB of a circle with centre O. If $\angle ACB = 65^\circ$, find m(arc ACB) :
   (A) 65° (B) 130° (C) 295° (D) 230°

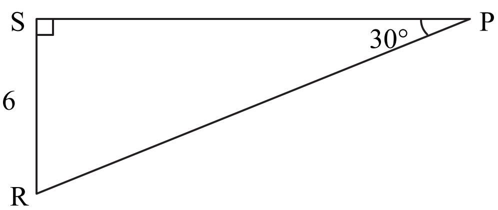
4. Find the perimeter of a square if its diagonal is $10\sqrt{2}$ cm.
   (A) 10 cm (B) $40\sqrt{2}$ cm (C) 20 cm (D) 40 cm

(B) Solve the following sub-questions: **[4]**

1. In the following figure, $\angle ABC = \angle DCB = 90^\circ$, AB = 6, DC = 8, then $\frac{A(\Delta ABC)}{A(\Delta DCB)} = ?$



2. In the following figure, find the length of RP using the information given in Δ PSR.

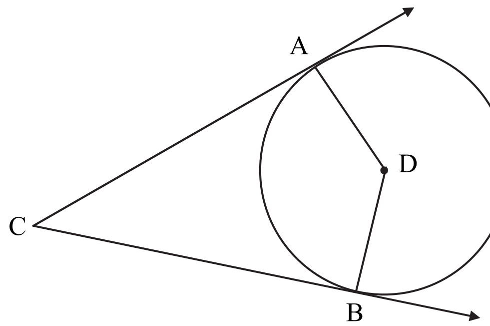


3. What is the distance between two parallel tangents of a circle having radius 4.5 cm?

4. Find the co-ordinates of midpoint of the segment joining the points A(4, 6) and B(–2, 2).

Q.2. (A) Complete the following activities and rewrite it (any *two*): **[4]**

1.



In the above figure, circle with centre D touches the sides of $\angle$ACB at A and B. If $\angle ACB = 52^{\circ}$, complete the activity to find the measure of $\angle$ADB.

Activity:

In $\square$ ABCD,

$\angle CAD = \angle CBD = \square^{\circ}$ ….. Tangent theorem

$\therefore$ $\angle ACB + \angle CAD + \angle CBD + \angle ADB = \square^{\circ}$

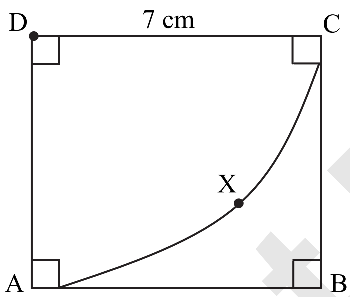
$\therefore$ $52^{\circ} + 90^{\circ} + 90^{\circ} + \angle ADB = 360^{\circ}$

$\therefore$ $\angle ADB + \square^{\circ} = 360^{\circ}$

$\angle ADB = 360^{\circ} - 232^{\circ}$

$\therefore$ $\angle ADB = \square^{\circ}$

2.



In the above figure, side of square ABCD is 7 cm with centre D and radius DA sector D-AXC is drawn.

Complete the following activity to find the area of square ABCD and sector D-AXC.

Activity:

Area of square = $\square$ ….. formula

$= (7)^2$

$= 49\ \text{cm}^2$

Area of sector (D–AXC) = $\square$ ….. formula

$$= \frac{\square}{360} \times \frac{22}{7} \times \square$$

$= 38.5\ \text{cm}^2$

3. Complete the following activity to prove $\cot\theta + \tan\theta = \operatorname{cosec}\theta \times \sec\theta$.

Activity:

L.H.S. $= \cot\theta + \tan\theta$

$$= \frac{\square}{\sin\theta} + \frac{\sin\theta}{\cos\theta}$$

$$= \frac{\square + \square}{\sin\theta \cdot \cos\theta}$$

$$= \frac{1}{\sin\theta \cdot \cos\theta} \quad (\because \sin^2\theta + \cos^2\theta = 1)$$

$$= \frac{1}{\sin\theta} \times \frac{1}{\cos\theta}$$

$$= \boxed{} \times \sec\theta$$

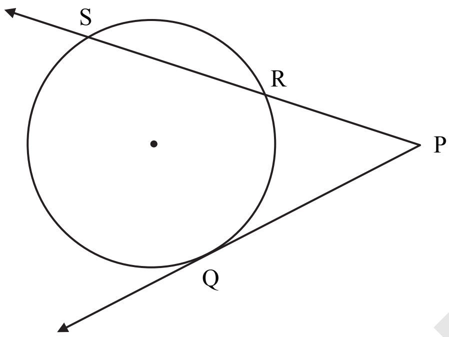
$\therefore$ L.H.S. = R.H.S.

$\therefore$ $\cot\theta + \tan\theta = \text{cosec}\,\theta \times \sec\theta$

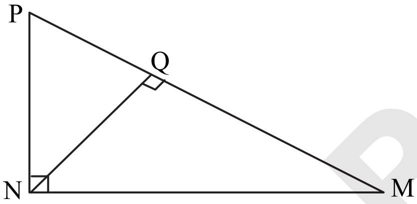
(B) Solve the following sub-questions (Any *four*): **[8]**

1. If $\cos\theta = \frac{3}{5}$, then find $\sin\theta$.

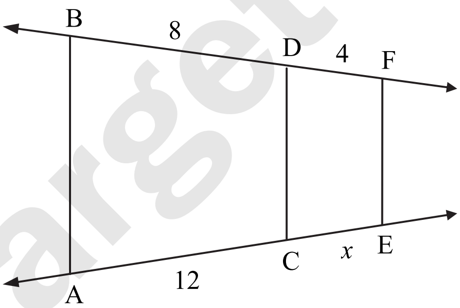
2. Find slope of line EF, where co-ordinates of E are (–4, –2) and co-ordinates of F are (6, 3).

3. 

In the above figure, ray PQ touches the circle at point Q.
If PQ = 12, PR = 8, find the length of seg PS.

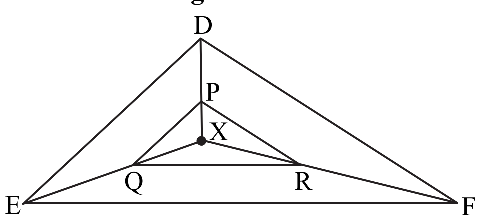
4. 

In the above figure, $\angle$MNP = 90°, seg NQ $\perp$ seg MP. MQ = 9, QP = 4. Find NQ.

5. 

In the above figure, if AB || CD || EF, then find x and AE by using the information given in the figure.

Q.3. (A) Complete the following activities and rewrite it (any *one*): **[3]**

1. 

In the above figure, X is any point in the interior of triangle. Point X is joined to vertices of triangle seg PQ || seg DE, seg QR || seg EF. Complete the following activity to prove seg PR || seg DF.

Activity :

In ΔXDE, PQ || DE ….(given)

$\therefore \quad \frac{XP}{\boxed{}} = \frac{\boxed{}}{QE}$ ….(I) Basic proportionality theorem

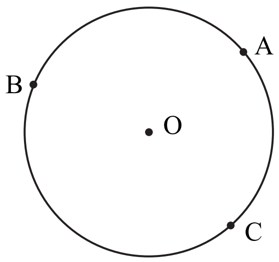
In ΔXEF, QR || EF ….(given)

$\therefore \quad \frac{XQ}{QE} = \frac{\boxed{}}{RF}$ ….(II) $\boxed{}$

$\therefore \quad \frac{XP}{PD} = \frac{\boxed{}}{\boxed{}}$ ….from (I) and (II)

$\therefore$ seg PR || seg DF ….Converse of basic proportionality theorem

2.



A, B, C are any points on the circle with centre O.
If m(arc BC) = 110° and m(arc AB) = 125°, complete the following activity to find m(arc ABC), m(arc AC), m(arc ACB) and m(arc BAC).

Activity :

m(arc ABC) = m(arc AB) + $\boxed{}$

= $\boxed{}^\circ$ + 110°

= 235°

m(arc AC) = 360° – m(arc $\boxed{}$)

= 360° – $\boxed{}^\circ$

= 125°

Similarly

m(arc ACB) = 360° – $\boxed{}$

= 235°

and m(arc BAC) = 360° – $\boxed{}$

= 250°

(B) Solve the following sub-questions (any *two*): **[6]**

1. The radius of a circle is 6 cm, the area of a sector of this circle is 15 π sq.cm. Find the measure of the arc and the length of the arc corresponding to that sector.

2. If A(3, 5) and B(7, 9), point Q divides seg AB in the ratio 2 : 3, find the co-ordinates of point Q.

3. Prove that :
"In a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of remaining two sides."

4. $\Delta PQR \sim \Delta LTR$. In ΔPQR, PQ = 4.2 cm, QR = 5.4 cm, PR = 4.8 cm. Construct ΔPQR and ΔLTR such that $\frac{PQ}{LT} = \frac{3}{4}$.

Q.4. Solve the following sub-questions (any *two*): **[8]**

1. A bucket is in the form of a frustum of a cone. It holds 28.490 litres of water. The radii of the top and the bottom are 28 cm and 21 cm respectively. Find the height of the bucket. $\left(\pi = \frac{22}{7}\right)$

2. Draw a circle with centre P and radius 3 cm. Draw a chord MN of length 4 cm. Draw tangents to the circle through points M and N which intersect in point Q. Measure the length of seg PQ.

3. In ΔPQR, bisectors of $\angle$Q and $\angle$R intersect in point X. Line PX intersects side QR in point Y, then prove that: $\frac{PQ+PR}{QR}=\frac{PX}{XY}$.

Q.5. Solve the following sub-questions (Any *one*): **[3]**

1. From top of the building, Ramesh is looking at a bicycle parked at some distance away from the building on the road.
   If
   AB $\rightarrow$ Height of building is 40 m
   C $\rightarrow$ Position of bicycle
   A $\rightarrow$ Position of Ramesh on top of the building
   $\angle$MAC is the angle of depression and $m\angle$MAC = 30°, then:
   (a) Draw a figure with the given information.
   (b) Find the distance between building and the bicycle. $\left(\sqrt{3}=1.73\right)$.

2. $\boxed{}$ ABCD is a cyclic quadrilateral where side AB $\cong$ side BC, $\angle$ADC = 110°, AC is the diagonal, then:
   (a) Draw the figure using given information
   (b) Find measure of $\angle$ABC
   (c) Find measure of $\angle$BAC
   (d) Find measure of (arc ABC).