BOARD QUESTION PAPER: MARCH 2019
MATHS (PART - II)

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

Note:

i. *All* questions are compulsory.

ii. Use of calculator is not allowed.

iii. Figures to the right of questions indicate full marks.

iv. Draw proper figures for answers wherever necessary.

v. The marks of construction should be clear and distinct. Do not erase them.

vi. While writing any proof, drawing relevant figure is necessary. Also the proof should be consistent with the figure.

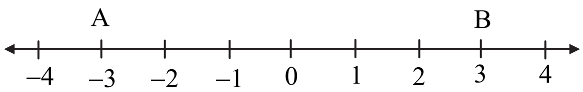
1. (A) Solve the following questions (Any four): **[4]**

i. If $\Delta ABC \sim \Delta PQR$ and $\angle A = 60°$, then $\angle P$ = ?

ii. In right-angled ΔABC, if $\angle B = 90°$, AB = 6, BC = 8, then find AC.

iii. Write the length of largest chord of a circle with radius 3.2 cm.

iv. From the given number line, find d(A, B):



v. Find the value of $\sin 30° + \cos 60°$.

vi. Find the area of a circle of radius 7 cm.

(B) Solve the following questions (Any two): **[4]**

i. Draw seg AB of length 5.7 cm and bisect it.

ii. In right-angled triangle PQR, if $\angle P = 60°$, $\angle R = 30°$ and PR = 12, then find the values of PQ and QR.

iii. In a right circular cone, if perpendicular height is 12 cm and radius is 5 cm, then find its slant height.

2. (A) Choose the correct alternative: **[4]**

i. ΔABC and ΔDEF are equilateral triangles. If $A(\Delta ABC) : A(\Delta DEF) = 1 : 2$ and AB = 4, then what is the length of DE?

(A) $2\sqrt{2}$ (B) 4 (C) 8 (D) $4\sqrt{2}$

ii. Out of the following which is a Pythagorean triplet?

(A) (5, 12, 14) (B) (3, 4, 2) (C) (8, 15, 17) (D) (5, 5, 2)

iii. $\angle ACB$ is inscribed in arc ACB of a circle with centre O. If $\angle ACB = 65°$, find m(arc ACB) :

(A) 130° (B) 295° (C) 230° (D) 65°

iv. $1 + \tan^2 \theta$ = ?

(A) $\sin^2 \theta$ (B) $\sec^2 \theta$ (C) $\operatorname{cosec}^2 \theta$ (D) $\cot^2 \theta$

(B) Solve the following questions (Any two): **[4]**

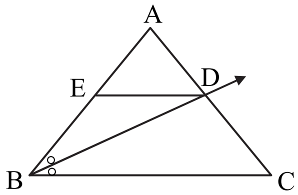
i. Construct tangent to a circle with centre A and radius 3.4 cm at any point P on it.

ii. Find slope of a line passing through the points A(3, 1) and B(5, 3).

iii. Find the surface area of a sphere of radius 3.5 cm.

3. (A) Complete the following activites (Any two): **[4]**

i.



In ΔABC, ray BD bisects $\angle ABC$.

If A–D–C, A–E–B and seg ED || side BC, then prove that: $\dfrac{AB}{BC} = \dfrac{AE}{EB}$.

Proof:

In ΔABC, ray BD is bisector of $\angle ABC$.

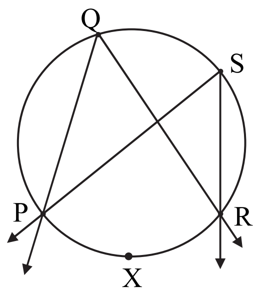
$\therefore \quad \dfrac{AB}{BC} = \boxed{\dfrac{}{}}$ …(i)(By angle bisector theorem)

In ΔABC, seg DE || side BC

$\therefore \quad \dfrac{AE}{EB} = \dfrac{AD}{DC}$ …(ii) $\boxed{\phantom{\text{Basic proportionality theorem}}}$

$\therefore \quad \dfrac{AB}{\boxed{}} = \dfrac{\boxed{}}{EB}$ …[From (i) and (ii)]

ii.



Prove that, angles inscribed in the same arc are congruent.

Given: $\angle PQR$ and $\angle PSR$ are inscribed in the same arc. Arc PXR is intercepted by the angles.

To prove: $\angle PQR \cong \angle PSR$

Proof:

$m\angle PQR = \dfrac{1}{2} m(\text{arc } PXR)$ …(i) $\boxed{\phantom{\text{Inscribed angle theorem}}}$

$m\angle \boxed{} = \dfrac{1}{2} m(\text{arc } PXR)$ …(ii) $\boxed{\phantom{\text{Inscribed angle theorem}}}$

$\therefore \quad m\angle \boxed{} = m\angle PSR$ …[From (i) and (ii)]

$\therefore \quad \angle PQR \cong \angle PSR$ …(Angles equal in measure are congruent)

iii. How many solid cylinders of radius 6 cm and height 12 cm can be made by melting a solid sphere of radius 18 cm?

Activity: Radius of the sphere, r = 18 cm

For cylinder, radius R = 6 cm, height H = 12 cm

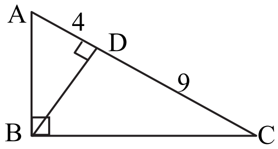
$\therefore$ Number of cylinders can be made $= \dfrac{\text{Volume of the sphere}}{\boxed{\phantom{\text{Volume of one cylinder}}}}$

$$= \dfrac{\frac{4}{3}\pi r^3}{\boxed{}}$$

$$= \dfrac{\frac{4}{3} \times 18 \times 18 \times 18}{\boxed{}}$$

$$= \boxed{}$$

(B) Solve the following questions (Any two): **[4]**

i. 

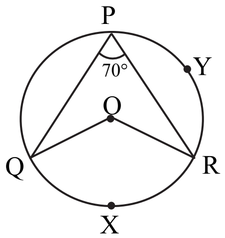
In right-angled ΔABC, $BD \perp AC$.
If $AD = 4$, $DC = 9$, then find BD.

ii. Verify whether the following points are collinear or not:
A (1, –3), B (2, –5), C (–4, 7).

iii. If $\sec\theta = \dfrac{25}{7}$, then find the value of $\tan\theta$.

4. Solve the following questions (Any three): **[9]**

i. In ΔPQR, seg PM is a median, $PM = 9$ and $PQ^2 + PR^2 = 290$. Find the length of QR.

ii. 

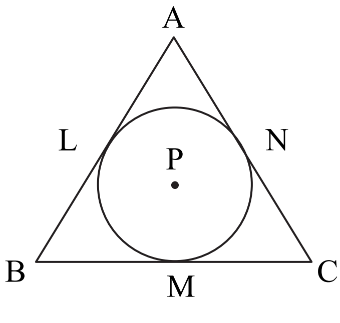
In the given figure, O is centre of circle. $\angle QPR = 70°$ and m(arc PYR) = 160°, then find the value of each of the following:

(a) m(arc QXR)
(b) $\angle QOR$
(c) $\angle PQR$

iii. Draw a circle with radius 4.2 cm. Construct tangents to the circle from a point at a distance of 7 cm from the centre.

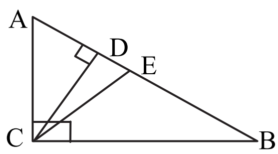
iv. When an observer at a distance of 12 m from a tree looks at the top of the tree, the angle of elevation is 60°. What is the height of the tree? ($\sqrt{3} = 1.73$)

5. Solve the following questions (Any one): **[4]**

i. 

A circle with centre P is inscribed in the ΔABC. Side AB, side BC and side AC touch the circle at points L, M and N respectively. Radius of the circle is r.

Prove that: $A(\Delta ABC) = \dfrac{1}{2}(AB + BC + AC) \times r$.

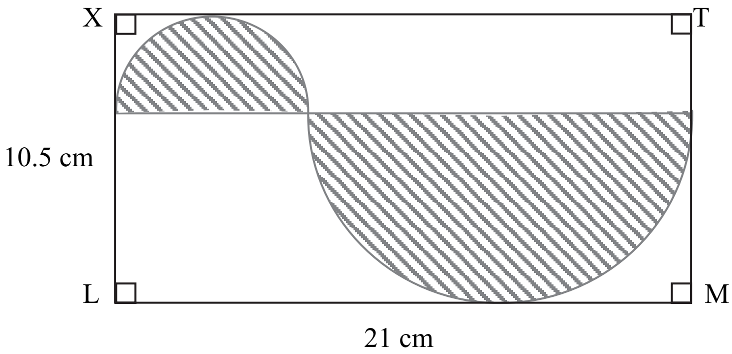
ii. 

In ΔABC, $\angle ACB = 90°$. seg $CD \perp$ side AB and seg CE is angle bisector of $\angle ACB$.

Prove that: $\dfrac{AD}{BD} = \dfrac{AE^2}{BE^2}$.

6. **Solve the following questions (Any one):** **[3]**

i. Show that the points (2, 0), (–2, 0) and (0, 2) are the vertices of a triangle. Also state with reason the type of the triangle.

ii. 

In the above figure, □XLMT is a rectangle. LM = 21 cm, XL = 10.5 cm. Diameter of the smaller semicircle is half the diameter of the larger semicircle. Find the area of non-shaded region.

BOARD QUESTION PAPER: July 2019

Maths Part - II

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

Note:

i. *All* questions are compulsory.

ii. Use of calculator is not allowed.

iii. Figures to the right of questions indicate full marks.

iv. Draw proper figures for answers wherever necessary.

v. The marks of construction should be clear and distinct. Do not erase them.

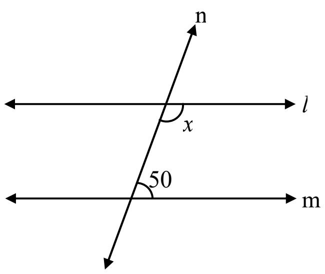
vi. While writing any proof, drawing relevant figure is necessary. Also the proof should be consistent with the figure.

1. (A) Solve the following questions (Any four): **[4]**

i. Point M is the mid-point of segment AB. If AB = 8.6 cm, then find AM.

ii. Write the equations of x-axis and y-axis.

iii.



In the above figure, line $l \parallel$ line m and line n is a transversal. Using the given information find the value of x.

iv. If $\sin \theta = \frac{1}{2}$, then find the value of θ.

v. If the side of a cube is 5 cm, then find its volume.

vi. In Δ DEF, if $\angle E = 90°$, then find the value of $\angle D + \angle F$.

(B) Solve the following questions (Any two): **[4]**

i. Draw seg AB = 6.8 cm and draw perpendicular bisector of it.

ii. If $\Delta ABC \sim \Delta DEF$, then write the corresponding congruent angles and also write the ratio of corresponding sides.

iii. Perpendicular height of a cone is 12 cm and its slant height is 13 cm. Find the radius of the base of cone.

2. (A) Choose the correct alternative: **[4]**

i. In right-angled triangle PQR, if hypotenuse PR = 12 and PQ = 6, then what is the measure of $\angle P$?

(A) 30° (B) 60° (C) 90° (D) 45°

ii. If $\Delta ABC \sim \Delta PQR$ and $4A(\Delta ABC) = 25\, A(\Delta PQR)$, then AB : PQ = ?

(A) 4 : 25 (B) 2 : 5 (C) 5 : 2 (D) 25 : 4

iii. If the points, A, B, C are non-collinear points, then how many circles can be drawn which passes through points A, B and C ?
(A) two (B) three (C) one (D) infinite

iv. $\sin\theta \times \operatorname{cosec}\theta = ?$
(A) $\sqrt{2}$ (B) $\frac{1}{2}$ (C) 0 (D) 1

(B) Solve the following questions (Any two): **[4]**

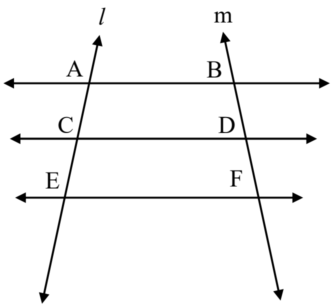
i. Construct a tangent to a circle with centre O and radius 3.5 cm at a point P on it.

ii. Find the slope of the line passing through the points A(4 , 7) and B (2, 3).

iii. If the length of an arc of sector of a circle is 20 cm and if radius is 7 cm, find the area of the sector.

3. (A) Complete the following activities (Any two): **[4]**

i.



In the above figure, line AB || line CD || line EF , line *l* and line *m* are its transversals. If AC = 6, CE = 9. BD = 8, then complete the following activity to find DF.

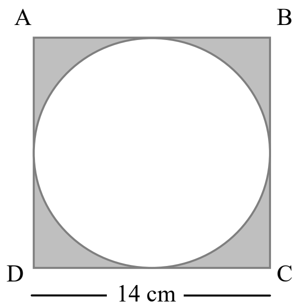
Activity:

$\frac{AC}{\square} = \frac{\square}{DF}$ (Property of three parallel lines and their transversal)

$\therefore \frac{6}{9} = \frac{\square}{DF}$

$\therefore$ DF = $\square$

ii.



A circle is inscribed in square ABCD of side 14 cm. Complete the following activity to find the area of shaded portion.

Activity:

Area of square ABCD = $\square$

$= 14^2$

$= 196\ cm^2$

Area of circle = πr^2

$= \frac{22}{7} \times 7^2$

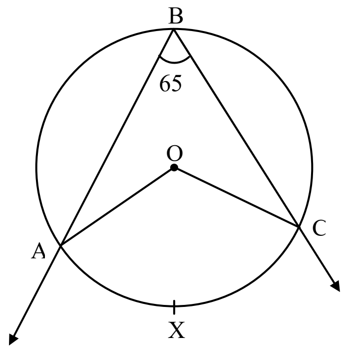
$= \square$ cm^2

Area of shaded portion = Area of square ABCD – Area of circle

$= 196 - \square$

$= \square$ cm^2

iii. In the following figure, O is the centre of the circle. $\angle$ ABC is inscribed in arc ABC and $\angle$ ABC = 65°. Complete the following activity to find the measure of $\angle$ AOC.



$\angle ABC = \frac{1}{2}$ m $\square$ (Inscribed angle theorem)

$\square$ **× 2 =** m(arc AXC)

m(arc AXC) = $\square$

$\angle$ AOC = m(arc AXC) (Definition of measure of an arc)

$\angle$ AOC = $\square$

(B) Solve the following questions (Any two): **[4]**

i. Find the side and perimeter of a square whose diagonal is $13\sqrt{2}$ cm.

ii. Find the co-ordinates of the centroid of the Δ PQR, whose vertices are P(3, –5), Q(4, 3) and R(11, –4)

iii. If $\cos \theta = \frac{5}{13}$, then find $\sin \theta$.

4. Solve the following questions (Any three): **[9]**

i. Verify that the points A(–2, 2), B(2, 2) and C(2, 7) are the vertices of right-angled triangle.

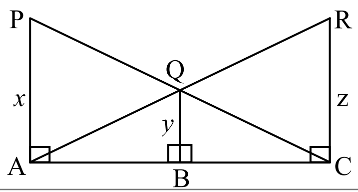
ii. Prove that: $\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sec\theta - \tan\theta$

iii. In Δ ABC, seg AP is a median. If BC = 18, AB^2 + AC^2 = 260, then find the length of AP.

iv. Δ ABC ~ Δ LMN. In Δ ABC, AB = 5.5 cm, BC = 6 cm, CA = 4.5 cm. If MN = 4.8 cm, then construct Δ ABC and Δ LMN.

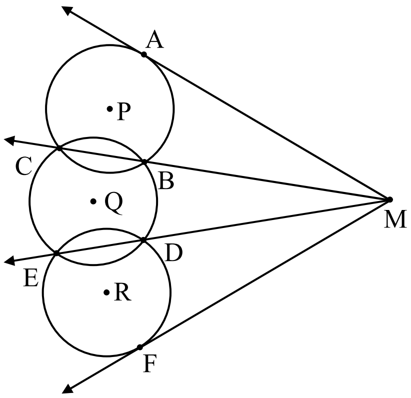
5. Solve the following questions (Any one): **[4]**

i.



In the above figure, seg PA, seg QB and RC are perpendicular to seg AC. From the information given in the figure, prove that: $\frac{1}{x}+\frac{1}{z}=\frac{1}{y}$.

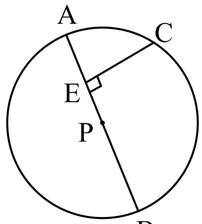
ii.



In the above figure, the circles with P, Q and R intersect at points B, C, D and E as shown. Lines CB and ED intersect in point M. Lines drawn from point M touch the circles at points A and F. Prove that MA = MF.

6. Solve the following questions (Any one): [3]

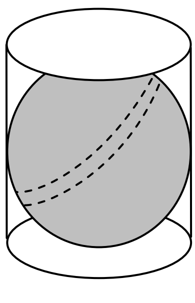
i.



In the above figure, seg AB is a diameter of a circle with centre P. C is any point on the circle. seg CE $\perp$ seg AB. Prove that CE is the geometric mean of AE and EB. Write the proof with the help of following steps:

a. Draw ray CE. It intersects the circle at D.
b. Show that CE = ED.
c. Write the result using theorem of intersection of chords inside a circle.
d. Using CE = ED, complete the proof.

ii.



In the above figure, a sphere is placed in a cylinder. It touches the top, bottom and the curved surface of the cylinder. If radius of the base of cylinder is 'r', write the answer of the following questions.

a. What is the height of the cylinder in terms of 'r'?
b. What is the ratio of the curved surface area of the cylinder and the surface area of the sphere?
c. What is the ratio of volumes of the cylinder and of the sphere?

BOARD QUESTION PAPER: MARCH 2020
Mathematics Part - II

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

Notes:

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 MCQ's [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) in front of 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 and distinct. Do not erase them.
viii. Diagram is essential for writing the proof of the theorem.

Q.1. A. Four alternative answers are given for every sub-question. Select the *correct* alternative and write the alphabet of that answer: **[4]**

i. Out of the following which is the Pythagorean triplet?
(A) (1, 5, 10) (B) (3, 4, 5) (C) (2, 2, 2) (D) (5, 5, 2)

ii. Two circles of radii 5.5 cm and 3.3 cm respectively touch each other externally. What is the distance between their centres?
(A) 4.4 cm (B) 2.2 cm (C) 8.8 cm (D) 8.9 cm

iii. Distance of point (–3, 4) from the origin is _______.
(A) 7 (B) 1 (C) –5 (D) 5

iv. Find the volume of a cube of side 3 cm:
(A) 27 cm^3 (B) 9 cm^3 (C) 81 cm^3 (D) 3 cm^3

B. Solve the following questions: **[4]**

i. The ratio of corresponding sides of similar triangles is 3 : 5, then find the ratio of their areas.

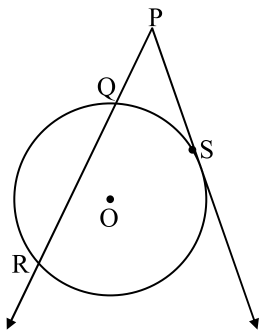
ii. Find the diagonal of a square whose side is 10 cm.

iii. □ABCD is cyclic. If $\angle B = 110°$, then find measure of $\angle D$.

iv. Find the slope of the line passing through the points A(2, 3) and B(4, 7).

Q.2. A. Complete and write the following activities (Any *two*): **[4]**

i.



In the figure given above, 'O' is the centre of the circle, seg PS is a tangent segment and S is the point of contact. Line PR is a secant.
If PQ = 3.6, QR = 6.4, find PS.
Solution:

$PS^2 = PQ \times \boxed{}$ ...(tangent secant segments theorem)

$= PQ \times (PQ \times \boxed{})$

$= 3.6 \times (3.6 + 6.4)$

$= 3.6 \times \square$

$= 36$

$\therefore$ PS = $\square$ …(by taking square roots)

ii. If $\sec\theta = \frac{25}{7}$, find the value of $\tan\theta$.

Solution:

$1 + \tan^2\theta = \sec^2\theta$

$\therefore\ 1 + \tan^2\theta = \left(\frac{25}{7}\right)^{\square}$

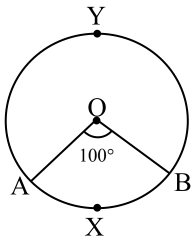
$\therefore\ \tan^2\theta = \frac{625}{49} - \square$

$= \frac{625-49}{49}$

$= \frac{\square}{49}$

$\therefore\ \tan\theta = \frac{\square}{7}$ …(by taking square roots)

iii.

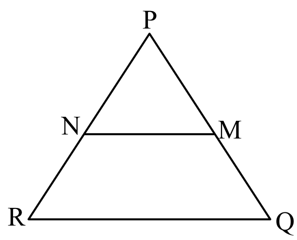


In the figure given above, O is the centre of the circle. Using given information complete the following table:

Type of arc	Name of the arc	Measure of the arc
Minor arc	$\square$	$\square$
Major arc	$\square$	$\square$

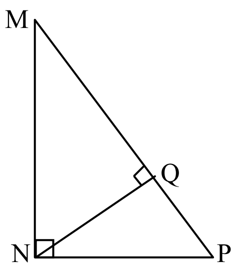
B. Solve the following sub-questions (Any *four*): **[8]**

i.



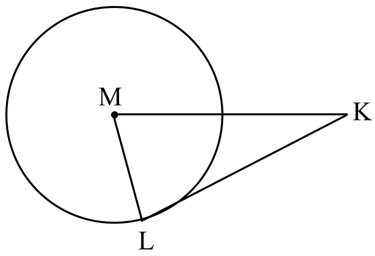
In ΔPQR, NM || RQ. If PM = 15, MQ = 10, NR = 8, then find PN.

ii.



In ΔMNP, $\angle$MNP = 90°, seg NQ $\perp$ seg MP. If MQ = 9, QP = 4, then find NQ.

iii.



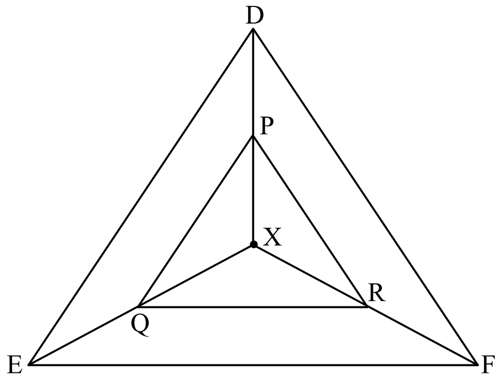
In the figure given above, M is the centre of the circle and seg KL is a tangent segment. L is a point of contact. If MK = 12, KL = $6\sqrt{3}$, then find the radius of the circle.

iv. Find the co-ordinates of midpoint of the segment joining the points (22, 20) and (0, 16).

v. A person is standing at a distance of 80 metres from a Church and looking at its top. The angle of elevation is of 45°. Find the height of the Church.

Q.3. A. Complete and write the following activities (Any *one*): **[3]**

i.



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

Proof:

In ΔXDE,

PQ || DE …(Given)

∴ $\frac{XP}{PD} = \frac{\boxed{}}{QE}$ …(Basic proportionality theorem)…(i)

In ΔXEF,

QR || EF …(Given)

∴ $\frac{XQ}{\boxed{}} = \frac{XR}{\boxed{}}$ …($\boxed{}$)…(ii)

∴ $\frac{XP}{PD} = \boxed{\frac{}{}}$ …[From (i) and (ii)]

∴ seg PR || seg DF …(By converse of basic proportionality theorem)

ii. If A(6, 1), B(8, 2), C(9, 4) and D(7, 3) are the vertices of □ABCD, show that □ABCD is a parallelogram.

Solution:

Slope of line = $\frac{y_2 - y_1}{x_2 - x_1}$

∴ Slope of line AB = $\frac{2-1}{8-6} = \boxed{}$ …(i)

∴ Slope of line BC = $\frac{4-2}{9-8} = \boxed{}$ …(ii)

∴ Slope of line CD = $\frac{3-4}{7-9} = \boxed{}$ …(iii)

$\therefore$ Slope of line DA = $\frac{3-1}{7-6}$ = $\boxed{}$ ...(iv)

$\therefore$ Slope of line AB = $\boxed{}$ ...[From (i) and (iii)]

$\therefore$ line AB || line CD

$\therefore$ Slope of line BC = $\boxed{}$ ...[From (ii) and (iv)]

$\therefore$ line BC || line DA

Both the pairs of opposite sides of the quadrilateral are parallel.

$\therefore$ □ABCD is a parallelogram.

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

i. If ΔPQR, point S is the mid-point of side QR. If PQ = 11, PR = 17, PS = 13, find QR.

ii. Prove that, tangent segments drawn from an external point to the circle are congruent.

iii. Draw a circle with radius 4.1 cm. Construct tangents to the circle from a point at a distance 7.3 cm from the centre.

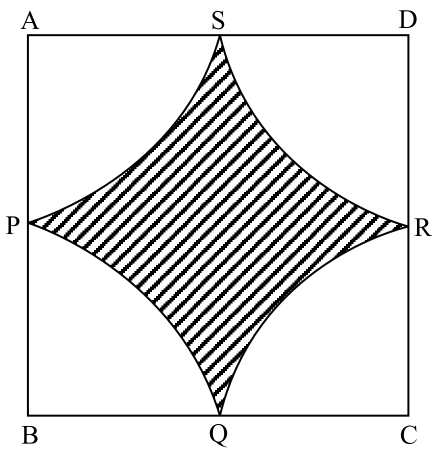
iv. A metal cuboid of measures 16 cm × 11 cm × 10 cm was melted to make coins. How many coins were made, if the thickness and diameter of each coin was 2 mm and 2 cm respectively? (π = 3.14)

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

i. In ΔABC, PQ is a line segment intersecting AB at P and AC at Q such that seg PQ || seg BC. If PQ divides ΔABC into two equal parts having equal areas, find $\frac{BP}{AB}$.

ii. Draw a circle of radius 2.7 cm and draw a chord PQ of length 4.5 cm. Draw tangents at points P and Q without using centre.

iii.



In the figure given above □ABCD is a square of side 50 m. Points P, Q, R, S are midpoints of side AB, side BC, side CD, side AD respectively. Find area of shaded region.

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

i. Circles with centres A, B and C touch each other externally. If AB = 3 cm, BC = 3 cm, CA = 4 cm, then find the radii of each circle.

ii. If $\sin\theta + \sin^2\theta = 1$
show that: $\cos^2\theta + \cos^4\theta = 1$

BOARD QUESTION PAPER: JULY 2020

Maths - II

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

Notes:

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 MCQ's [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]**

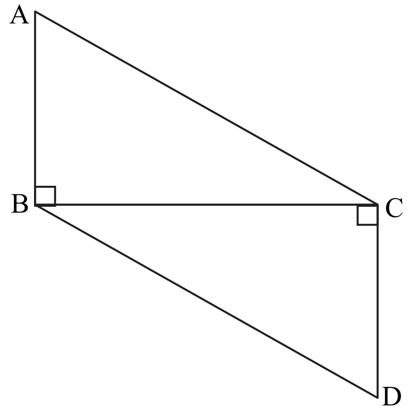
1. $\Delta ABC \sim \Delta PQR$ and $\angle A = 45°$, $\angle Q = 87°$, then $\angle C$ = _______.
(A) 45° (B) 87° (C) 48° (D) 90°

2. $\angle PRQ$ is inscribed in the arc PRQ of a circle with centre 'O'.
If $\angle PRQ = 75°$, then m(arc PRQ) = _______.
(A) 75° (B) 150° (C) 285° (D) 210°

3. A line makes an angle of 60° with the positive direction of X-axis, so the slope of a line is _______.
(A) $\frac{1}{2}$ (B) $\frac{\sqrt{3}}{2}$ (C) $\sqrt{3}$ (D) $\frac{1}{\sqrt{3}}$

4. Radius of a sector of a circle is 5 cm and length of arc is 10 cm, then the area of a sector is _______.
(A) 50 cm^2 (B) 25 cm^2 (C) 25 m^2 (D) 10 cm^2

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

1.


In the above figure, seg AB $\perp$ seg BC and seg DC $\perp$ seg BC.
If AB = 3 cm and CD = 4 cm, then find $\frac{A(\Delta ABC)}{A(\Delta DCB)}$.

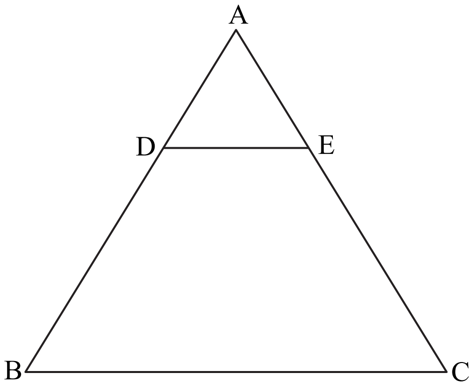
2. In cyclic $\square$ABCD, $\angle B = 75°$, then find $\angle D$.

3. Point A, B, C are collinear. If slope of line AB is $-\frac{1}{2}$, then find the slope of line BC.

4. If $3 \sin \theta = 4 \cos \theta$, then find the value of $\tan \theta$.

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

1.



In ΔABC, seg DE $\parallel$ side BC. If AD = 6 cm, DB = 9 cm, EC = 7.5 cm, then complete the following activity to find AE.

Activity: In ΔABC, seg DE $\parallel$ side BC ….. (given)

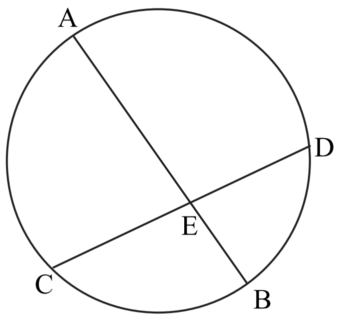
$\therefore \quad \frac{AD}{DB} = \frac{AE}{EC}$ ……. $\square$

$\therefore \quad \frac{6}{9} = \frac{AE}{\square}$

$\therefore \quad AE = \frac{6 \times 7.5}{\square}$

$\therefore \quad AE = \square$

2.



In the above figure, chord AB and chord CD intersect each other at point E. If AE = 15, EB = 6, CE = 12, then complete the activity to find ED.

Activity:

Chord AB and chord CD intersect each other at point E …… (given)

$\therefore \quad CE \times ED = AE \times EB$ ….. $\square$

$\therefore \quad \square \times ED = 15 \times 6$

$\therefore \quad ED = \frac{\square}{12}$

$\therefore \quad ED = \square$

3. If C(3, 5) and D(–2, –3), then complete the following activity to find the distance between points C and D.

Activity:

Let $C(3, 5) \equiv (x_1, y_1)$, $D(-2, -3) \equiv (x_2, y_2)$

$CD = \sqrt{\left(x_2 - \square\right)^2 + \left(y_2 - y_1\right)^2}$ …. (formula)

$\therefore \quad CD = \sqrt{\left(-2 - \square\right)^2 + \left(-3 - 5\right)^2}$

$\therefore \quad CD = \sqrt{\square + 64}$

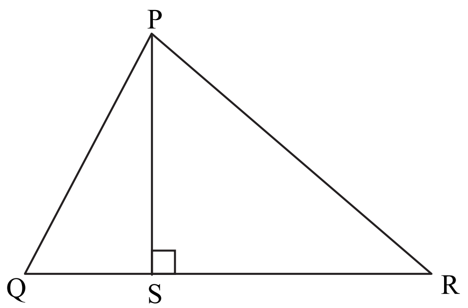
$\therefore \quad CD = \sqrt{\square}$

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

1. $\Delta ABC \sim \Delta PQR$, $A(\Delta ABC) = 81\ cm^2$, $A(\Delta PQR) = 121\ cm^2$.
   If BC = 6.3 cm, then find QR.
2. In ΔPQR, $\angle P = 60°$, $\angle Q = 90°$ and $QR = 6\sqrt{3}$ cm, then find the values of PR and PQ.
3. Find the slope of a line passing through the points A(2, 5) and B(4, –1).
4. Draw a circle with centre 'O' and radius 3.2 cm. Draw a tangent to the circle at any point P on it.
5. Find the surface area of a sphere of radius 7 cm.

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

1.



In ΔPQR, seg $PS \perp$ side QR, then complete the activity to prove $PQ^2 + RS^2 = PR^2 + QS^2$.

Activity:

In ΔPSQ, $\angle PSQ = 90°$

$\therefore \quad PS^2 + QS^2 = PQ^2$ ……. (Pythagoras theorem)

$\therefore \quad PS^2 = PQ^2 - \square$ ……… (I)

Similarly,

In ΔPSR, $\angle PSR = 90°$

$\therefore \quad PS^2 + \square = PR^2$ ……… (Pythagoras theorem)

$\therefore \quad PS^2 = PR^2 - \square$ ……… (II)

$\therefore \quad PQ^2 - \square = \square - RS^2$ …….. from (I) and (II)

$\therefore \quad PQ^2 + \square = PR^2 + QS^2$

2. Measure of arc of a circle is 36° and its length is 176 cm. Then complete the following activity to find the radius of circle.

Activity:

Here, measure of arc = θ = 36°

Length of arc = l = 176 cm

$\therefore \quad$ Length of arc $(l) = \dfrac{\theta}{360} \times \square$ ……. (formula)

$\therefore \quad \square = \dfrac{36}{360} \times 2 \times \dfrac{22}{7} \times r$

$\therefore \quad 176 = \dfrac{1}{\square} \times \dfrac{44}{7} \times r$

$\therefore \quad r = \dfrac{176 \times \square}{44}$

$\therefore \quad r = \square \times 70$

Radius of circle (r) = $\square$ cm

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

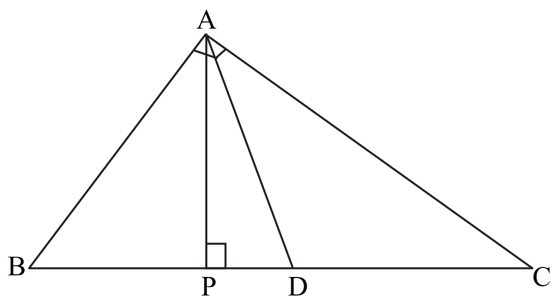
1. Prove that, "The ratio of the intercepts made on a transversal by three parallel lines is equal to the ratio of the corresponding intercepts made on any other transversal by the same parallel lines."

2. Draw a circle with centre 'O' and radius 3.4 cm. Draw a chord MN of length 5.7 cm in it. Construct tangents at points M and N to the circle.

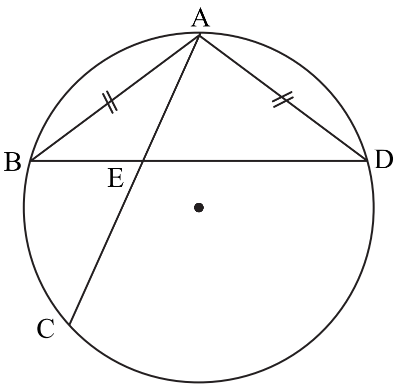
3. Prove that:
$$\frac{1}{\sec\theta - \tan\theta} = \sec\theta + \tan\theta.$$

4. Radii of the top and base of frustum are 14 cm and 8 cm respectively. Its height is 8 cm. Find its curved surface area.($\pi = 3.14$)

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

1. 

In ΔABC, $\angle BAC = 90°$, seg $AP \perp$ side BC, B-P-C. Point D is the mid-point of side BC, then prove that $2AD^2 = BD^2 + CD^2$.

2. 

In the above figure, chord AB $\cong$ chord AD. Chord AC and chord BD intersect each other at point E. Then prove that:
$AB^2 = AE \times AC$.

3. A straight road leads to the foot of the tower of height 48 m. From the top of the tower the angles of depression of two cars standing on the road are 30° and 60° respectively. Find the distance between the two cars.($\sqrt{3}$ =1.73)

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

i. Let M be a point of contact of two internally touching circles. Let line AMB be their common tangent. The chord CD of the bigger circle touches the smaller circle at point N. The chord CM and chord DM of bigger circle intersect the smaller circle at point P and R respectively.
   a. From the above information draw the suitable figure.
   b. Draw seg NR and seg NM and write the two pairs of congruent angles in smaller circle considering tangent and chord.
   c. By using the property which is used in (b) write the two pairs of congruent angles in the bigger circle.

ii. Draw a circle with centre 'O' and radius 3 cm. Draw a tangent segment PA having length $\sqrt{40}$ cm from an exterior point P.

BOARD QUESTION PAPER: MARCH 2022

Mathematics - 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-questions four alternative answers are given. Choose the correct alternative and write its alphabet: **[4]**

i. If $\Delta ABC \sim \Delta DEF$ and $\angle A = 48°$, then $\angle D =$ _______.
(A) 48° (B) 83° (C) 49° (D) 132°

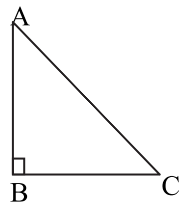
ii. AP is a tangent at A drawn to the circle with center O from an external point P. OP = 12 cm and $\angle OPA = 30°$, then the radius of a circle is _______.
(A) 12 cm (B) $6\sqrt{3}$ cm (C) 6 cm (D) $12\sqrt{3}$ cm

iii. Seg AB is parallel to X-axis and co-ordinates of the point A are (1, 3), then the co-ordinates of the point B can be _______.
(A) (–3, 1) (B) (5, 1) (C) (3, 0) (D) (–5, 3)

iv. The value of 2tan 45° – 2sin 30° is_______.
(A) 2 (B) 1 (C) $\frac{1}{2}$ (D) $\frac{3}{4}$

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

i. In Δ ABC, $\angle ABC = 90°$, $\angle BAC = \angle BCA = 45°$.
If AC = $9\sqrt{2}$, then find the value of AB.



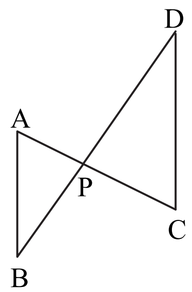
ii. Chord AB and chord CD of a circle with centre O are congruent. If m(arc AB) =120°, then find the m(arc CD).

iii. Find the Y-co-ordinate of the centroid of a triangle whose vertices are (4, –3), (7, 5) and (–2, 1).

iv. If sinθ = cosθ, then what will be the measure of angle θ ?

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

i. In the above figure, seg AC and seg BD intersect each other in point P. If $\frac{AP}{CP}=\frac{BP}{DP}$, then complete the following activity to prove $\Delta ABP \sim \Delta CDP$.



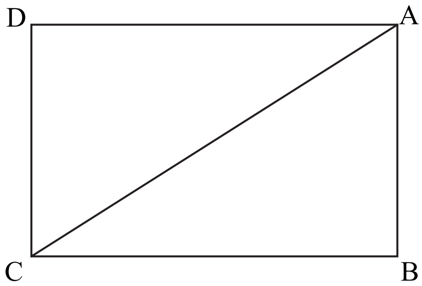
Activity: In ΔAPB and ΔCDP

$\frac{AP}{CP}=\frac{BP}{DP}$ .... $\boxed{}$

$\therefore$ $\angle APB \equiv$ $\boxed{}$ .... vertically opposite angles

$\therefore$ $\boxed{}$ $\sim\Delta CDP$....... $\boxed{}$ test of similarity.

ii. In the above figure, □ABCD is a rectangle. If AB = 5, AC = 13, then complete the following activity to find BC.



Activity:

ΔABC is $\boxed{}$ triangle.

$\therefore$ By Pythagoras theorem

$AB^2 + BC^2 = AC^2$

$\therefore$ $25 + BC^2 = \boxed{}$ $\quad\therefore$ $BC^2 = \boxed{}$

$\therefore$ $BC = \boxed{}$

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

Activity:

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

$$= \frac{\cos\theta}{\sin\theta} + \frac{\boxed{}}{\cos\theta} = \frac{\boxed{} + \sin^2\theta}{\sin\theta \times \cos\theta}$$

$$= \frac{1}{\sin\theta \times \cos\theta} \text{........} \because \boxed{} = \frac{1}{\sin\theta} \times \frac{1}{\cos\theta}$$

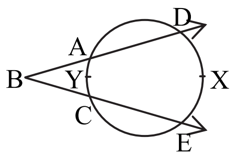
$$= \boxed{} \times \sec\theta$$

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

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

i. If $\Delta ABC \sim \Delta PQR$, $AB : PQ = 4 : 5$ and $A(\Delta PQR) = 125\text{ cm}^2$, then find $A(\Delta ABC)$.

ii.



In the above figure, m(arc DXE) = 105°, m(arc AYC) = 47°, then find the measure of $\angle DBE$.

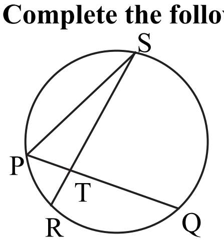
iii. Draw a circle of radius 3.2 cm and centre 'O'. Take any point P on it. Draw tangent to the circle through point P using the centre of the circle.

iv. If $\sin\theta = \frac{11}{61}$, then find the value of $\cos\theta$ using trigonometric identity.

v. In ΔABC, AB = 9 cm, BC = 40 cm, AC = 41 cm. State whether ΔABC is a right-angled triangle or not? Write reason.

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

i.



In the above figure, chord PQ and chord RS intersect each other at point T. If $\angle STQ = 58°$ and $\angle PSR = 24°$, then complete the following activity to verify: $\angle STQ = \frac{1}{2}$[m(arc PR) + m(arc SQ)]

Activity:

In ΔPTS,

$\angle SPQ = \angle STQ - \boxed{}$ $\quad\because$ Exterior angle theorem

$\therefore$ $\angle SPQ = 34°$

$\therefore$ m(arc QS) $= 2 \times \boxed{}° = 68°$ ....$\because$ $\boxed{}$

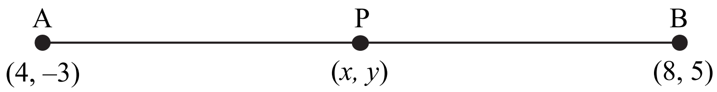
Similarly m(arc PR) $= 2\angle PSR = \boxed{}°$

$\therefore$ $\frac{1}{2}$[m(arc QS) + m(arc PR)] $= \frac{1}{2} \times \boxed{}° = 58°$ .... (I) but $\angle STQ = 58°$ .... (II) given

$\therefore \quad \frac{1}{2}[m(\text{arc PR}) + m(\text{arc QS})] = \boxed{\angle....}$ .... from (I) and (II)

ii. Complete the following activity to find the co-ordinates of point P which divides seg AB in the ratio 3 : 1 where A(4, –3) and B(8, 5).

Activity:



$\therefore$ By section formula,

$$x = \frac{mx_2 + nx_1}{\boxed{}}, \quad y = \frac{\boxed{}}{m+n}$$

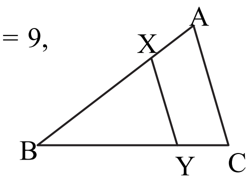
$$\therefore \quad x = \frac{3\times 8 + 1\times 4}{3+1}, \; y = \frac{3\times 5 + 1\times(-3)}{3+1}$$

$$\therefore \quad = \frac{\boxed{}+4}{4} \quad = \frac{\boxed{}-3}{4}$$

$$\therefore \quad x = \boxed{} \qquad \therefore y = \boxed{}$$

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

i. In ΔABC, seg XY || side AC. If 2AX = 3BX and XY = 9, then find the value of AC.



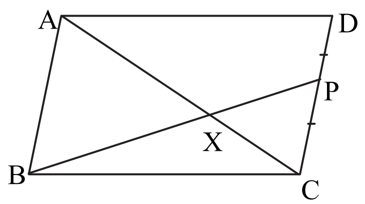
ii. Prove that, "Opposite angles of cyclic quadrilateral are supplementary".

iii. $\Delta ABC \sim \Delta PQR$. In ΔABC, AB = 5.4 cm, BC = 4.2 cm, AC = 6.0 cm, AB : PQ = 3 : 2, then construct ΔABC and ΔPQR

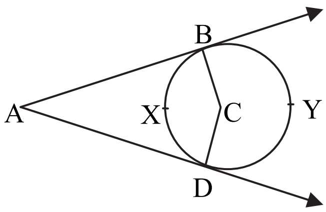
iv. Show that: $\frac{\tan A}{(1+\tan^2 A)^2} + \frac{\cot A}{(1+\cot^2 A)^2} = \sin A \times \cos A.$

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

i. □ABCD is a parallelogram. Point P is the midpoint of side CD. Seg BP intersects diagonal AC at point X, then prove that:
3AX = 2AC



ii.



In the above figure, seg AB and seg AD are tangent segments drawn to a circle with centre C from exterior point A, then prove that: $\angle A = \frac{1}{2}[m(\text{arc BYD}) - m(\text{arc BXD})]$

iii. Find the co-ordinates of centroid of a triangle if points D(–7, 6), E(8, 5) and F(2,–2) are the mid-points of the sides of that triangle.

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

i. If a and b are natural numbers and a > b. If $(a^2 + b^2)$, $(a^2 - b^2)$ and 2ab are the sides of the triangle, then prove that the triangle is right angled.
Find out two Pythagorean triplets by taking suitable values of a and b.

ii. Construct two concentric circles with centre O with radii 3 cm and 5 cm. Construct tangent to a smaller circle from any point A on the larger circle. Measure and write the length of tangent segment. Calculate the length of tangent segment using Pythagoras theorem.

BOARD QUESTION PAPER: MARCH 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 the proper figures for answers wherever necessary.
vii. The marks of construction should be clear and distinct. Do not erase them.
viii. Diagram is essential for writing the proof of the theorem.

Q.1. (A) Four alternative answers are given for every subquestion. Select the correct alternative and write the alphabet of that answer: **[4]**

1. If a, b, c are sides of a triangle and $a^2 + b^2 = c^2$, name the type of triangle:
(A) Obtuse angled triangle (B) Acute angled triangle
(C) Right angled triangle (D) Equilateral triangle

2. Chords AB and CD of a circle intersect inside the circle at point E. If AE = 4, EB = 10, CE = 8, then find ED:
(A) 7 (B) 5 (C) 8 (D) 9

3. Co-ordinates of origin are _______.
(A) (0, 0) (B) (0, 1) (C) (1, 0) (D) (1, 1)

4. If radius of the base of cone is 7 cm and height is 24 cm, then find its slant height:
(A) 23 cm (B) 26 cm (C) 31 cm (D) 25 cm

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

1. If ΔABC ~ ΔPQR and $\frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{16}{25}$, then find AB : PQ.

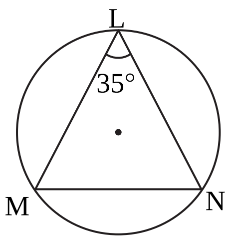
2. In ΔRST, ∠S = 90°, ∠T = 30°, RT = 12 cm, then find RS.

3. If radius of a circle is 5 cm, then find the length of longest chord of a circle.

4. Find the distance between the points O(0, 0) and P(3, 4).

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

1.



In the above figure, ∠L = 35°, find:
i. m(arc MN)
ii. m(arc MLN)

Solution:

i. $\angle L = \frac{1}{2}$ m(arc MN) …(By inscribed angle theorem)

∴ $\boxed{} = \frac{1}{2}$ m(arc MN)

∴ 2×35 = m(arc MN)

∴ m(arc MN) = $\boxed{}$

ii. m(arc MLN) = $\boxed{}$ – m(arc MN) …(Definition of measure of arc)

= 360° – 70°

∴ m(arc MLN) = $\boxed{}$

2. Show that, $\cot\theta + \tan\theta = \operatorname{cosec}\theta \times \sec\theta$

Solution:

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

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

$$= \frac{\boxed{} + \boxed{}}{\sin\theta \times \cos\theta}$$

$$= \frac{1}{\sin\theta \times \cos\theta} \quad \ldots \boxed{}$$

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

$= \operatorname{cosec}\theta \times \sec\theta$

L.H.S = R.H.S

∴ $\cot\theta + \tan\theta = \operatorname{cosec}\theta \times \sec\theta$

3. Find the surface area of a sphere of radius 7 cm.

Solution:

Surface area of sphere $= 4\pi r^2$

$$= 4 \times \frac{22}{7} \times \boxed{}^2$$

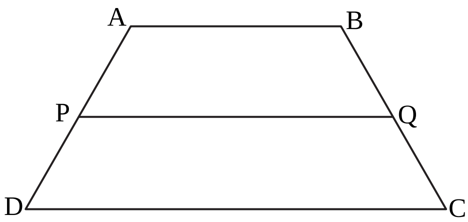
$$= 4 \times \frac{22}{7} \times \boxed{}$$

$$= \boxed{} \times 7$$

∴ Surface area of sphere = $\boxed{}$ sq.cm.

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

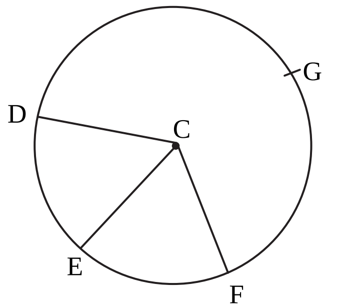
1.



In trapezium ABCD side AB || side PQ || side DC. AP = 15, PD = 12, QC = 14, find BQ.

2. Find the length of the diagonal of a rectangle whose length is 35 cm and breadth is 12 cm.

3.



In the given figure points G, D, E, F are points of a circle with centre C, $\angle ECF = 70°$, m(arc DGF) = 200°.

Find:

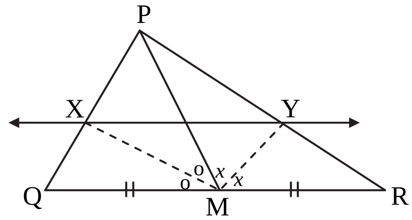
i. m(arc DE) ii. m(arc DEF).

4. Show that points A(–1, –1), B(0, 1), C(1, 3) are collinear.

5. A person is standing at a distance of 50 m from a temple looking at its top. The angle of elevation is of 45°. Find the height of the temple.

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

1.



In ΔPQR, seg PM is a median. Angle bisectors of $\angle$PMQ and $\angle$PMR intersect side PQ and side PR in points X and Y respectively. Prove that XY || QR.
Complete the proof by filling in the boxes.

Solution:

In ΔPMQ,

Ray MX is the bisector of $\angle$PMQ

$\therefore$ $\frac{MP}{MQ} = \frac{\boxed{}}{\boxed{}}$ ….(I) [Theorem of angle bisector]

Similarly, in ΔPMR, Ray MY is bisector of $\angle$PMR

$\therefore$ $\frac{MP}{MR} = \frac{\boxed{}}{\boxed{}}$ ….(II) [Theorem of angle bisector]

But $\frac{MP}{MQ} = \frac{MP}{MR}$ …(III) [As M is the midpoint of QR]

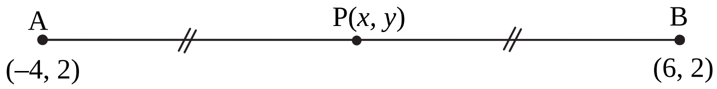
Hence MQ = MR

$\therefore$ $\frac{PX}{\boxed{}} = \frac{\boxed{}}{YR}$ …[From (I), (II) and (III)]

$\therefore$ XY || QR …[Converse of basic proportionality theorem]

2. Find the co-ordinates of point P where P is the midpoint of a line segment AB with A(–4, 2) and B(6, 2).

Solution:



Suppose, (–4, 2) = (x_1, y_1) and (6, 2) = (x_2, y_2) and co-ordinates of P are (x, y)

$\therefore$ According to midpoint theorem,

$$x = \frac{x_1 + x_2}{2} = \frac{\boxed{} + 6}{2} = \frac{\boxed{}}{2} = \boxed{}$$

$$y = \frac{y_1 + y_2}{2} = \frac{2 + \boxed{}}{2} = \frac{4}{2} = \boxed{}$$

$\therefore$ Co-ordinates of midpoint P are $\boxed{}$

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

1. In ΔABC, seg AP is a median. If BC = 18, $AB^2 + AC^2 = 260$, find AP.

2. Prove that, “Angles inscribed in the same are congruent”.

3. Draw a circle of radius 3.3 cm. Draw a chord PQ of length 6.6 cm. Draw tangents to the circle at points P and Q.

4. The radii of circular ends of a frustum are 14 cm and 6 cm respectively and its height is 6 cm. Find its curved surface area. (π = 3.14)

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

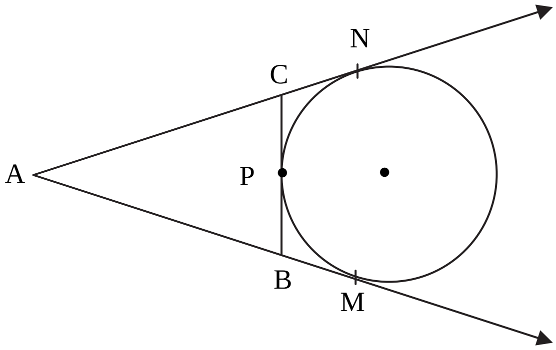
1. In ΔABC, seg DE $\parallel$ side BC. If 2A (ΔADE) = A (□ DBCE), find AB : AD and show that BC = $\sqrt{3}$ DE.

2. ΔSHR ~ ΔSVU. In ΔSHR, SH = 4.5 cm, HR = 5.2 cm, SR = 5.8 cm and $\frac{SH}{SV} = \frac{3}{5}$, construct ΔSVU.

3. An ice-cream pot has a right circular cylindrical shape. The radius of the base is 12 cm and height is 7 cm. This pot is completely filled with ice-cream. The entire ice-cream is given to the students in the form of right circular ice-cream cones, having diameter 4 cm and height is 3.5 cm. If each student is given one cone, how many students can be served?

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

1.



A circle touches side BC at point P of the ΔABC, from out-side of the triangle. Further extended lines AC and AB are tangents to the circle at N and M respectively. Prove that: AM = $\frac{1}{2}$ (Perimeter of ΔABC)

2. Eliminate θ if $x = r \cos \theta$ and $y = r \sin \theta$.

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

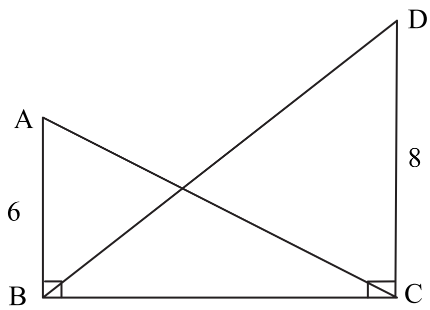
2. A line makes an angle of 30^o with positive direction of X-axis, then the slope of the line is ________.
   (A) $\frac{1}{2}$ (B) $\frac{\sqrt{3}}{2}$ (C) $\frac{1}{\sqrt{3}}$ (D) $\sqrt{3}$

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

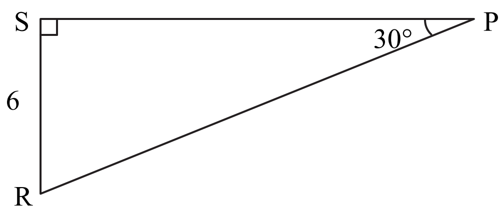
4. Find the perimeter of a square if its diagonal is $10\sqrt{2}$ cm.
   (A) 10 cm (B) $40\sqrt{2}$ cm (C) 20 cm (D) 40 cm

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

1. In the following figure, $\angle ABC = \angle DCB = 90^o$, 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.

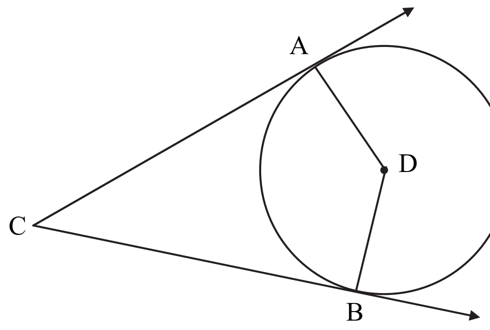


3. What is the distance between two parallel tangents of a circle having radius 4.5 cm?

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

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

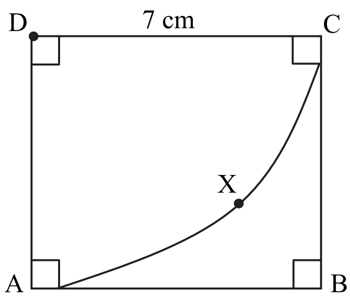
$\therefore$ $52^\circ + 90^\circ + 90^\circ + \angle ADB = 360^\circ$

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

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

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

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

$= (7)^2$

$= 49\ cm^2$

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

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

$= 38.5\ cm^2$

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.

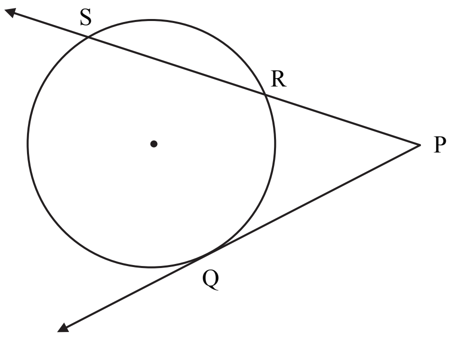
$\therefore$ $\cot\theta + \tan\theta = \operatorname{cosec}\theta \times \sec\theta$

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

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

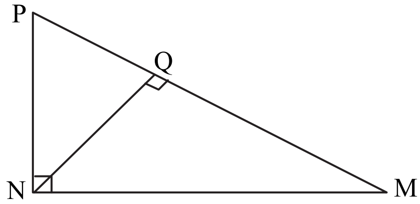
2. Find slope of line EF, where co-ordinates of E are (–4, –2) and co-ordinates of F are (6, 3).

3.



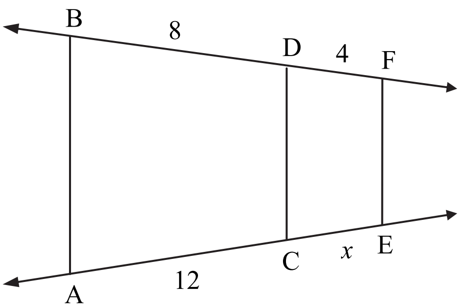
In the above figure, ray PQ touches the circle at point Q.
If PQ = 12, PR = 8, find the length of seg PS.

4.



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

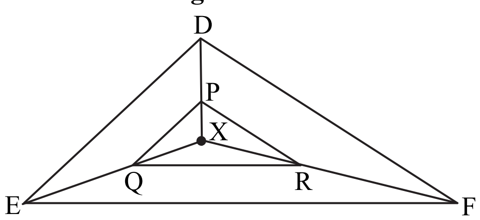
5.



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)

$\therefore \dfrac{XP}{\square} = \dfrac{\square}{QE}$ ....(I) Basic proportionality theorem

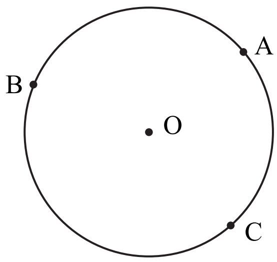
In ΔXEF, QR || EF ....(given)

$\therefore \dfrac{XQ}{QE} = \dfrac{\square}{RF}$ ....(II) $\boxed{}$

$\therefore \dfrac{XP}{PD} = \dfrac{\square}{\square}$ ....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) + $\square$

$= \square^{\circ} + 110°$

$= 235°$

m(arc AC) = 360° – m(arc $\square$)

$= 360° - \square^{\circ}$

$= 125°$

Similarly

m(arc ACB) = 360° – $\square$

$= 235°$

and m(arc BAC) = 360° – $\square$

$= 250°$

(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. ΔPQR ~ ΔLTR. In ΔPQR, PQ = 4.2 cm, QR = 5.4 cm, PR = 4.8 cm. Construct ΔPQR and ΔLTR such that $\dfrac{PQ}{LT} = \dfrac{3}{4}$.

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. $\left(\pi = \dfrac{22}{7}\right)$

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. $\square$ 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).

BOARD QUESTION PAPER: MARCH 2024

Mathematics Part - II

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

Note:

i. *All* questions are compulsory.
ii. Use of a 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. Draw proper figures wherever necessary.
vi. The marks of construction should be clear. Do not erase them.
vii. Diagram is essential for writing the proof of the theorem.

Q.1. (A) Four alternative answers for each of the following sub-questions are given. Choose the alternative and write its alphabet: **[4]**

1. Out of the dates given below which date constitutes a Pythagorean triplet?
(A) 15/8/17 (B) 16/8/16 (C) 3/5/17 (D) 4/9/15

2. $\sin\theta \times \operatorname{cosec}\theta = ?$
(A) 1 (B) 0 (C) $\frac{1}{2}$ (D) $\sqrt{2}$

3. Slope of X-axis is ________
(A) 1 (B) –1 (C) 0 (D) Cannot be determined

4. A circle having radius 3 cm, then the length of its largest chord is ________.
(A) 1.5 cm (B) 3 cm (C) 6 cm (D) 9 cm

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

1. If $\Delta ABC \sim \Delta PQR$ and AB : PQ = 2 : 3, then find the value of $\frac{A(\Delta ABC)}{A(\Delta PQR)}$.

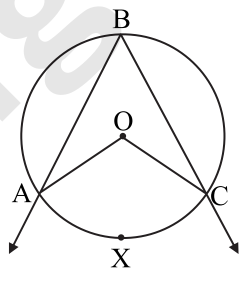
2. Two circles of radii 5 cm and 3 cm touch each other externally. Find the distance between their centres.

3. Find the side of a square whose diagonal is $10\sqrt{2}$ cm.

4. Angle made by the line with the positive direction of X-axis is 45°. Find the slope of that line.

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

1.



In the above figure, $\angle ABC$ is inscribed in arc ABC.

If $\angle ABC = 60°$, find $m\angle AOC$.

Solution:

$\angle ABC = \frac{1}{2}$ m(arc AXC) … $\boxed{}$

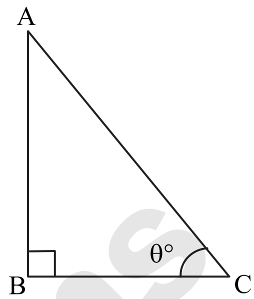
$60° = \frac{1}{2}$ m(arc AXC)

$\boxed{}$ = m(arc AXC)

But $m\angle AOC = \boxed{m(\text{arc........})}$ …[Property of central angle]

$\therefore$ $m\angle AOC = \boxed{}$

2. Find the value of $\sin^2\theta + \cos^2\theta$.



Solution:

In Δ ABC, $\angle ABC = 90°$, $\angle C = \theta°$.

$AB^2 + BC^2 = \boxed{}$ …[Pythagoras theorem]

Divide both sides by AC^2

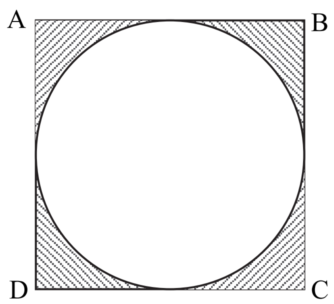
$$\frac{AB^2}{AC^2} + \frac{BC^2}{AC^2} = \frac{AC^2}{AC^2}$$

$$\therefore \quad \left(\frac{AB}{AC}\right)^2 + \left(\frac{BC}{AC}\right)^2 = 1$$

But $\frac{AB}{AC} = \boxed{}$ and $\frac{BC}{AC} = \boxed{}$

$\therefore$ $\sin^2\theta + \cos^2\theta = \boxed{}$

3.



In the figure given above, □ABCD is a square and a circle in inscribed in it. All sides of a square touch the circle.

If AB = 14 cm, find the area of shaded region.

Solution:

Area of square $= \left(\boxed{}\right)^2$ …[Formula]

$= 14^2$

$= \boxed{}$ cm^2

Area of circle $= \boxed{}$ …[Formula]

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

$= 154$ cm^2

Area of shaded portion = Area of square – Area of circle

$= 196 - 154$

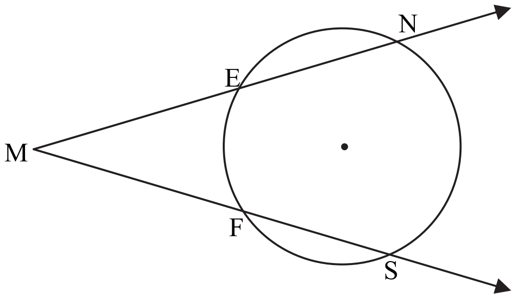
$= \boxed{}$ cm^2

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

1. Radius of a sector of a circle is 3.5 cm and length of its arc is 2.2 cm. Find the area of the sector.

2. Find the length of the hypotenuse of a right-angled triangle if remaining sides are 9 cm and 12 cm.

3.



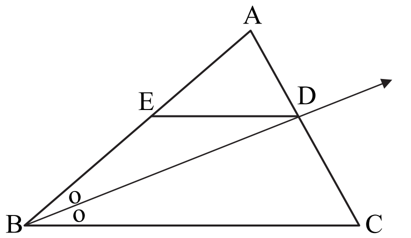
In the above figure, m(arc NS) = 125°, m(arc EF) = 37°.
Find the measure of ∠NMS.

4. Find the slope of the line passing through the points A(2, 3), B(4, 7).

5. Find the surface area of a sphere of radius 7 cm.

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

1.



In ΔABC, ray BD bisects ∠ABC, A – D – C, seg DE || side BC, A – E – B, then for showing $\frac{AB}{BC} = \frac{AE}{EB}$, complete the following activity:

Proof:

In ΔABC, ray BD bisects ∠B

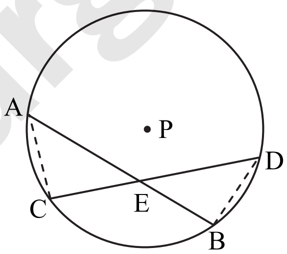
∴ $\frac{\boxed{}}{BC} = \frac{AD}{DC}$ …(I) ($\boxed{}$)

In ΔABC, DE || BC

∴ $\frac{\boxed{}}{EB} = \frac{AD}{DC}$ …(II) ($\boxed{}$)

$\frac{AB}{\boxed{}} = \frac{\boxed{}}{EB}$ …[From (I) and (II)]

2.



Given: Chords AB and CD of a circle with centre P intersect at point E.
To prove: AE × EB = CE × ED
Construction: Draw seg AC and seg BD.
Fill in the blank and complete the proof.
Proof:
In ΔCAE and ΔBDE.
∠AEC ≅ ∠DEB …. $\boxed{}$
$\boxed{}$ ≅ ∠BDE (angles inscribed in the same arc)

∴ $\Delta CAE \sim \Delta BDE$ … $\boxed{}$

∴ $\dfrac{\boxed{}}{DE} = \dfrac{CE}{\boxed{}}$ … $\boxed{}$

∴ $AE \times EB = CE \times ED$.

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

1. Determine whether the points are collinear.
   A(1, –3), B(2, –5), C(–4, 7)

2. $\Delta ABC \sim \Delta LMN$. In ΔABC, AB = 5.5 cm, BC = 6 cm, CA = 4.5 cm. Construct ΔABC and ΔLMN such that $\dfrac{BC}{MN} = \dfrac{5}{4}$.

3. Seg PM is a median of ΔPQR, PM = 9 and $PQ^2 + PR^2 = 290$, then find QR.

4. Prove that, 'If a line parallel to a side of a triangle intersects the remaining sides in two distinct points, then the line divides the side in the same proportion.'

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

1. $\dfrac{1}{\sin^2\theta} - \dfrac{1}{\cos^2\theta} - \dfrac{1}{\tan^2\theta} - \dfrac{1}{\cot^2\theta} - \dfrac{1}{\sec^2\theta} - \dfrac{1}{\operatorname{cosec}^2\theta} = -3$, then find the value of θ.

2. A cylinder of radius 12 cm contains water up to the height 20 cm. A spherical iron ball is dropped into the cylinder and thus water level raised by 6.75 cm. What is the radius of iron ball?

3. Draw a circle with centre O having radius 3 cm. Draw tangent segments PA and PB through the point P outside the circle such that $\angle APB = 70°$.

Q.5. Solve any *one* of the following sub-questions: **[3]**

1. □ABCD is trapezium, AB || CD diagonals of trapezium intersects in point P.
   Write the answers of the following questions:
   a. Draw the figure using given information.
   b. Write any one pair of alternate angles and opposite angles.
   c. Write the names of similar triangles with test of similarity.

2. AB is a chord of a circle with centre O. AOC is diameter of circle, AT is a tangent at A.
   Write answers of the following questions:
   a. Draw the figure using given information.
   b. Find the measures of $\angle CAT$ and $\angle ABC$ with reasons.
   c. Whether $\angle CAT$ and $\angle ABC$ are congruent? Justify your answer.