SSC **MARCH 2022**

MATHEMATICS
GEOMETRY – PART II

Time allowed: 2 hours **Maximum marks: 40**

General Instructions:

(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 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) of answers with sub question number is:

1. (A) For every sub question four alternative answers are given. Choose the correct answer and write the alphabet of it: **[4]**

(i) If $\Delta ABC \sim \Delta DEF$ and $\angle A = 48°$, then $\angle D =$ ___________________.

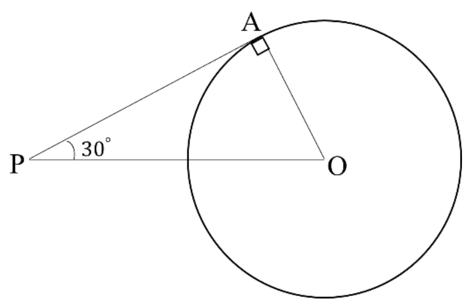
A) 48° B) 83°
C) 49° D) 132°

Sol: If $\Delta \mathrm{ABC} \sim \Delta \mathrm{DEF}$ *and* $\angle \mathrm{A} = 48^{\circ}$, then $\angle \mathrm{D} = 48^{\circ}$.
(The corresponding angles in a triangle have the same measure.)

(ii) AP is a tangent at A drawn to the circle with centre O from an external point P. OP = 12 cm and $\angle \mathrm{OPA} = 30^{\circ}$, then the radius of a circle is ___________.

A) $12\ cm$ B) $6\sqrt{3}\ cm$
C) $6\ cm$ D) $12\sqrt{3}\ cm$

Sol: Give OP = 12 cm, $\angle \mathrm{OPA} = 30^{\circ}$
As tangent will be perpendicular to radius of the circle
So, $\angle \mathrm{OPA} = 90^{\circ}$
In $\Delta APO, \angle \mathrm{OAP} = 90^{\circ}$
$\therefore \sin 30^{\circ} = \dfrac{OA}{OP}$
$\Rightarrow \dfrac{1}{2} = \dfrac{OA}{12} \Rightarrow OA = 6\ cm$



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

A) (-3, 1) (B) (5, 1) (C) (3, 0) (D) (-5, 3)

Sol: Co – ordinates of point A are (1, 3), then the co – ordinates of the point B can be (-5, 3) as y co – ordinate should be same if seg AB is parallel to X – axis.

(iv) The value of 2tan $45^{\circ} - 2\sin 30^{\circ}$ is ___________.

(A) 2 (B) 1 (C) $\frac{1}{2}$ (D) $\frac{3}{4}$

Sol: We know that tan $45^{\circ} = 1$ and sin $30^{\circ} = \frac{1}{2}$

Thus, we get 2 tan $45^{\circ} = 2$ sin 30° = $2 \times 1 - 2 \times \frac{1}{2}$

= 2 – 1 = 1

1. (B)

(i) In $\Delta ABC, \angle ABC = 90^{\circ}, \angle BAC = \angle BCA = 45^{\circ}$. If AC = 9 $\sqrt{2}$, then find the value of AB.

Sol: Given, in ΔABC

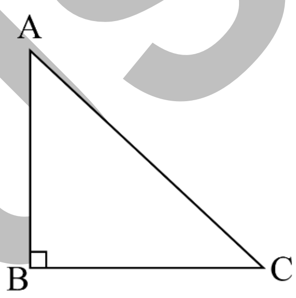
$\angle ABC = 90^{\circ}, \angle BAC = \angle BCA = 45^{\circ}$, AC = 9 $\sqrt{2}$

Now, AB = $\frac{1}{\sqrt{2}} \times AC$

$[Property\ of\ 45^{\circ} - 45^{\circ} - 90^{\circ}\ triangle]$

$\therefore AB = \frac{1}{\sqrt{2}} \times 9\sqrt{2}$

$\therefore AB = 9$



(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.)

Sol: Given, chord AB = Chord CD
m (arc AB) = 120°
We know that,
Arc AB ≅ arc CD
[Corresponding arcs of congruent chord of a circle are congruent]

⟹ m (arc AB) = m (arc CD)
⟹ 120° = m (arc CD)
∴ m (arc CD) = 120°

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

Sol: Vertices of the triangle,
(4, - 3), (7, 5), and (-2, 1) ……. [Given]
$x_1 = 4, x_2 = 7, x_3 = -2$
$y_1 = -3,\ y_2 = 5, y_3 = 1$
By using the centroid formula,

Co – ordinate of centroid = $\left[\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right]$

Now, Y – coordinate of centroid = $\frac{y_1 + y_2 + y_3}{3}$

$= \frac{-3+5+1}{3} = \frac{3}{3} = 1$

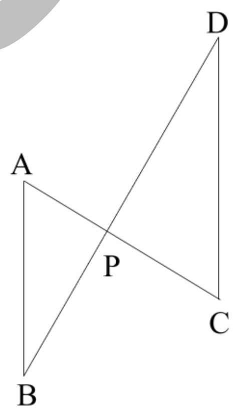
$\therefore$ Y − coordinate of centroid = 1.

(iv) If $\sin\theta = \cos\theta$, then what will be the measure of angle θ ?

Sol: Given, $\sin\theta = \cos\theta$
We know that,
$\sin\theta = \cos(90^\circ - \theta)$
$\therefore \cos\theta = \cos(90^\circ - \theta)$
$\Rightarrow \theta = 90^\circ - \theta$
$\Rightarrow \theta + \theta = 90^\circ$
$\Rightarrow 2\theta = 90^\circ$
$\Rightarrow \theta = \frac{90^\circ}{2}$
$\therefore \theta = 45^\circ$

2. (A)

(i) In the given 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 ΔABP ~ ΔCDP.



Sol: Activity: In ΔAPB and ΔCDP

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

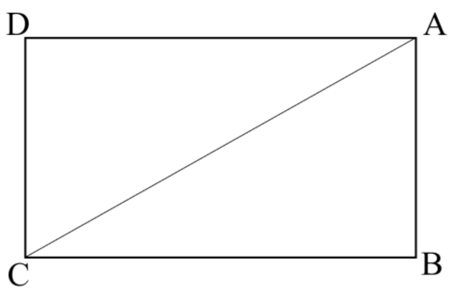
$\therefore \angle APB \cong \boxed{\angle DPC}$ ……. Vertically opposite angles

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

(ii) In the given figure, $\square$ ABCD is a rectangle. If AB = 5, AC = 13, then complete the following activity to find BC.

Sol: Activity:

ΔAPB is $\boxed{right - angled}$ triangle.



$\therefore$ By Pythagoras theorem

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

$\therefore 25 + BC^2 = \boxed{169}$

$\therefore BC^2 = \boxed{144}$

$\therefore\ BC = \boxed{12}$

(iii) Complete the following activity to prove: cot θ + tan θ = cosec θ × sec θ

Sol: Activity:

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

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

$= \frac{1}{sin\ \theta \times cos\ \theta}$ ... ... $\boxed{\because\ cos^2\ \theta + sin^2\ \theta = 1}$

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

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

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

2. (B)

(i) If ΔABC ~ ΔPQR, AB: PQ = 4 : 5 and A (Δ PQR) = 125 cm², then find A (ΔABC).

Sol: Given: ΔABC ~ ΔPQR

We know that,

$\frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{(AB)^2}{(PQ)^2}$ ... ... [Theorem of area of similar triangles]

$\Longrightarrow \frac{A(\Delta ABC)}{125} = \frac{(4)^2}{(5)^2}$

$\Longrightarrow \frac{A(\Delta ABC)}{125} = \frac{16}{25}$

$\Longrightarrow A(\Delta ABC) = \frac{16}{25} \times 125$

$\therefore A\ (\Delta ABC) = 80\ cm^2$

(ii) In the given figure, m (arc DXE) = 105°, m (arc AYC) = 47° then find the measure of ∠DBE.

Sol: From Figure.

Chord AD and CE intersect externally at point B.

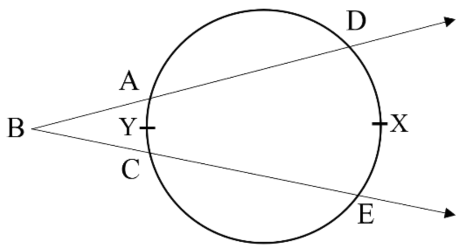
$\therefore m\ (arc\ DEX) = \frac{1}{2}\ [m\ (arc\ DXE) - m(arc\ AYC)]$

…….. [By inscribed angle theorem]

$\therefore m\ (arc\ DEX) = \frac{1}{2}\ [105^{\circ} - 47^{\circ}]$

$\therefore m\ (arc\ DEX) = \frac{1}{2}\ [58^{\circ}]$

$\therefore m\ (arc\ DEX) = \ 29^{\circ}$



(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.

Sol: **Given:** Radius of the circle = 3.2 cm

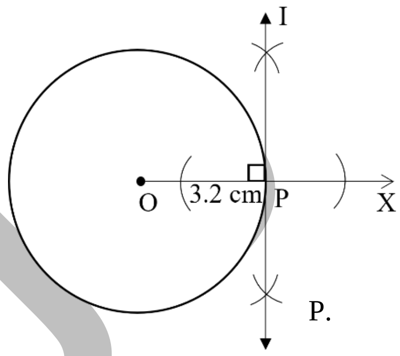
Construction:

(i) With O as the centre draw a circle of radius 3.2 cm.

(ii) Take a point P on the circle and draw ray OP.

(iii) Draw line 1 Perpendicular to ray OX through point P.

(iv) Line 1 is the required tangent to the circle at point P.



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

Sol: We know $sin^2\ \theta + \ cos^2\ \theta = 1$

$\Longrightarrow\ cos^2\ \theta = 1 - \ sin^2\ \theta$

$\Longrightarrow\ cos^2\ \theta = 1 - \left(\frac{11}{61}\right)^2$

$\Longrightarrow\ cos^2\ \theta = 1 - \left(\frac{121}{3721}\right) = \frac{3721-121}{3721} = \frac{3600}{3721}$

$\Longrightarrow\ cos^2\ \theta = \sqrt{\left(\frac{60}{61}\right)^2} = \frac{60}{61}$

Thus the value of cos θ *is* $\frac{60}{61}$.

(v) In $\Delta ABC, AB = 9\ cm, BC = 40\ cm, and\ AC = 41\ cm$. State whether ΔABC is a right – angled triangle or not? Write reason.

Sol: Side of $\Delta ABC\ are\ AB = 9\ cm, BC = 40\ cm, AC = 41\ cm$

The triangle's longest side measures 41 cm.

$\therefore 41^2 = 1681$ …….. (i)

Now, the sum of the square of the remaining sides is

$9^2 + 40^2 = 81 + 1600$

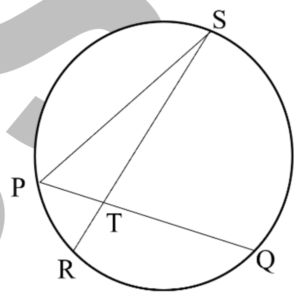
= 1681 …….. (ii)

From equations (i) and (ii), as the square of the longest side equals the sum of the squares of the remaining two sides, by suing converse of Pythagoras theorem the given sides from a right – angle triangle.

3. (A)

(i) In the given figure, chord PQ and chord RS intersect each other at point T. If $\angle STQ = 58^\circ$ and $\angle PSR = 24^\circ$, then complete the following activity to verify:

$\angle \mathbf{STQ} = \frac{1}{2}[\mathbf{m(arc\ PR) + m(arc\ SQ)}]$



Sol: **Activity:**

In ΔPTS,

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

$\angle SPQ = 34^\circ$

$\therefore m(arc\ QS) = 2 \times \boxed{34}^\circ = 68^\circ$ …..$\boxed{\because \text{ Inscribed angle theorem}}$

Similarly m (arc PR) = 2 $\angle PSR = \boxed{48}^\circ$

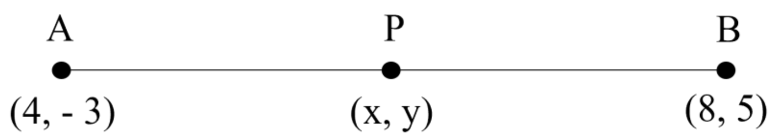
$\therefore \frac{1}{2}[m\ (arc\ QS) + m(arc\ PR)] = \frac{1}{2} \times \boxed{116}^\circ = 58^\circ$ ………(I)

But $\angle STQ = 58^\circ$ … … . . (II)given

$\therefore \frac{1}{2}[\text{m (arc PR)} + \text{m (arc QS)}] = \boxed{\angle STQ}$ … … …. [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 (4, -3) and B (8, 5).

Sol. **Activity:**



$\therefore$ By section formula,

$x = \frac{mx_2 + nx_1}{\boxed{m+n}}, y = \frac{my_2 + ny_1}{\boxed{m+n}}$

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

$\therefore x = \frac{\boxed{24} + 4}{4}, y = \frac{\boxed{15} - 3}{4},$

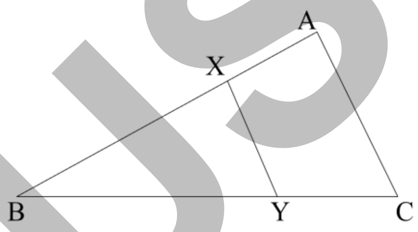
$\therefore x = \boxed{7} \ \therefore y = \boxed{3}$

3. (B)

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

Sol: Given seg XY ∥ seg AC, 2AX = 3BX and XY = 9

Consider, 2AX = 3BX



$\therefore \frac{AX}{BX} = \frac{3}{2}$

$\Rightarrow \frac{AX+BX}{BX} = \frac{3+2}{2}$ …… (By Compenendo)

$\Rightarrow \frac{AB}{BX} = \frac{5}{2}$ ……… (I)

ΔBCA ~ ΔBYX … … … .. SAS test of similarity

$\therefore \frac{\mathrm{BA}}{\mathrm{BX}} = \frac{\mathrm{AC}}{\mathrm{XY}}$ … …. corresponding sides of similar triangles

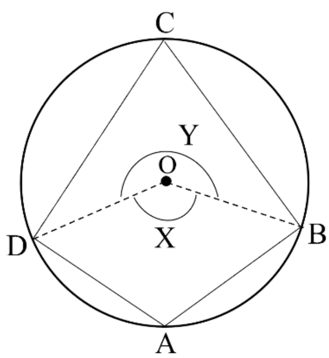
$\therefore \frac{5}{2} = \frac{\mathrm{AC}}{9}$ … … … from (I)

$\therefore \mathrm{AC} = 22.5$

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

Sol: Let O be the centre of the circle. Join O to B and D.

Let the angle subtended by the minor arc and the major arc at the centre be x and y respectively.



Proof: $x = 2\angle C$ [Angle at centre theorem] …… (i)

and y = $2\angle A$ ……. (ii)

Adding (i) and (ii), we get

$x + y = 2\angle C + 2\angle A$……. (iii)

But, x + y = 360° …….. (iv)

From (iii) and (iv), we get

$2\angle C + 2\angle A = 360^\circ$

$\Rightarrow \angle C + \angle A = 180^\circ$

But we know that angle sum property of quadrilateral

$\angle A + \angle B + \angle C + \angle D = 360^\circ$

$\Rightarrow \angle B + \angle D + 180^\circ = 360^\circ$

$\Rightarrow \angle B + \angle D = 180^\circ$

Hence proved that opposite angles of cyclic quadrilateral are supplementary.

(iii) ΔABC ~ ΔPQR. In Δ ABC, AB = 5.4 cm, BC = 4.2 cm, AC = 6.0 cm, and AB : PQ = 3: 2, then construct ΔABC and ΔPQR.

Sol: $\Delta ABC \sim \Delta PQR$.........[Given]

We know that corresponding sides of triangle which are similar are in proportion.

$\therefore \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{3}{2}$

$\Rightarrow \frac{AB}{PQ} = \frac{3}{2}$

$\Rightarrow \frac{5.4}{PQ} = \frac{3}{2}$

$\Rightarrow PQ = \frac{5.4 \times 2}{3} = 3.6\ cm$

Also, $\frac{BC}{QR} = \frac{3}{2}$

$\Rightarrow \frac{4.2}{PQ} = \frac{3}{2}$

$\Rightarrow QR = \frac{4.2 \times 2}{3}$

$\Rightarrow QR = 2.8\ cm$

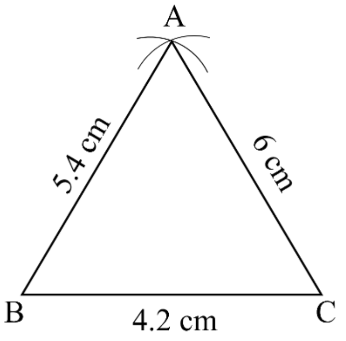
Also, $\frac{AC}{PR} = \frac{3}{2}$

$\Rightarrow \frac{6}{PR} = \frac{3}{2}$

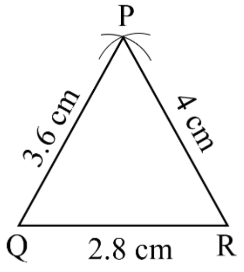
$\Rightarrow PR = \frac{6 \times 2}{3} = 4cm$

Now, draw angle ΔABC with sides AB = 5.4 cm, BC = 4.2 cm and AC = 6 cm.

Also draw triangle ΔPQR with sides PQ = 3.6 cm, QR = 2.8 cm and PR = 4 cm.



[1]



[1]

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

Sol: $\frac{\tan A}{(1+\tan^2 A)^2} + \frac{\cot A}{(1+\cot^2 A)^2}$

$= \frac{\tan A}{(\sec^2 A)^2} + \frac{\cot A}{(\csc^2 A)^2}$ $[\because 1+\tan^2 A = \sec^2 A \text{ and } 1+\cot^2 A = \text{cosec}^2 A]$

$= \frac{\sin A}{\cos A} \times cos^4 + \frac{\cos A}{\sin A} \times sin^4 A$

$= \sin A\, cos^3 A + \cos A\, sin^3 A$

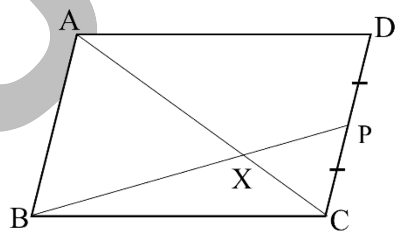
= sin A cos A

Hence proved.

4.

(i) $\square$ *ABCD* is parallelogram. Point P is the midpoint of side CD. Seg BP intersects diagonal AC at point X, then prove that: 3 AX = 2AC

Sol: From the figure, in ΔABX and ΔCPX



As, AB ∥ CD

$\angle BAX = \angle PCX$ …… [Alternate angle]

$\angle BXA = \angle PXC$ …… [Vertically opposite angles]

$\therefore$ $\Delta ABX \sim \Delta CPX$ … … . [By AA similarity theorem]

We know that,

Similar triangles have comparable side ratios that are similar to or equal.

$\therefore \frac{AX}{CX} = \frac{AB}{CP}$

But CD = AB and P is mid – point of CD.

$\therefore AB = 2CP$

$\Longrightarrow \frac{AX}{AC-AX} = \frac{2CP}{CP} = 2$

$\Longrightarrow AX = 2\,(AC - AX)$

$\Longrightarrow AX = 2AC - 2AX$

$\Longrightarrow AX + 2AX = 2AC$

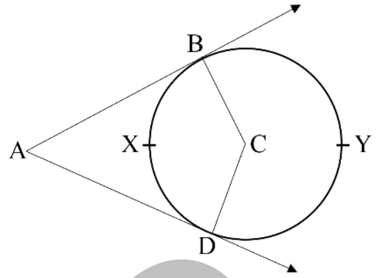
$\Longrightarrow 3AX = 2AC$

Hence proved.

(ii) In the given figure, seg AB and seg AD are tangent segments drawn to a circle with centre C from exterior point A, then prove that:

$\angle \mathbf{A} = \frac{1}{2}[\mathbf{m}\ (\mathbf{arc\ BYD}) - \mathbf{m}\ (\mathbf{arc\ BXD})]$

Sol: Proof: From figure



Seg AB ⊥ seg BC and seg AD ⊥ seg CD ……

[By tangent theorem]

$\therefore\ \angle ABC = \angle ADC = 90^\circ$

In $\square$ ABCD,

$\angle A + \angle B + \angle C + \angle D = 360^\circ$ ……. [Angle of the square]

$\therefore\ \angle A + 90^\circ + \angle C + 90^\circ = 360^\circ$

$\therefore\ \angle A + \angle C = 360^\circ - 180^\circ$

$\therefore\ \angle A + \angle C = 180^\circ$

$\therefore\ \angle \mathrm{A} + \mathrm{m}\ (\mathrm{arc\ BXD}) = 180^\circ$ [Central angle] …….. (i)

Now, m (arc BXD) + m (arc BYD) = 360°

…… [Two arcs contribute a complete circle] …….. (ii)

Now, multiply equation (i) by 2 on both sides

$2[\angle A + m\ (arc\ BXD)] = 2 \times 180^\circ$

$\Rightarrow 2\angle \mathrm{A} + 2 \times \mathrm{m}\ (\mathrm{arc\ BXD}) = 360^\circ$

$\Rightarrow 2\angle \mathrm{A} = 360^\circ - 2 \times \mathrm{m}\ (\mathrm{arc\ BXD})$

$\Rightarrow 2\angle \mathrm{A} = \mathrm{m}\ (\mathrm{arc\ BXD}) + m\ (arc\ BYD) - 2m\ (arc\ BXD)$

$\Rightarrow 2\angle \mathrm{A} = \mathrm{m}\ (\mathrm{arc\ BYD}) - \mathrm{m}(\mathrm{arc\ BXD})$

…..[From (ii)]

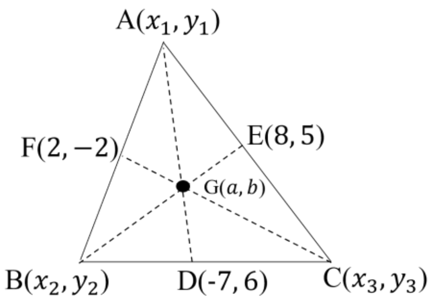
$\Rightarrow\ \angle \mathrm{A} = \frac{1}{2}[m(arc\ BYD) - m\ (arc\ BXD)]$

Hence proved.

(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 the that triangle.

Sol: Suppose A $(x_1, y_1), B\ (x_2, y_2)\ and\ C(x_3, y_3)$ are the vertices of triangle. D (-7, 6), E (8, 5) and F (2, - 2) are the midpoints of sides BC, AC and AB respectively. Let G be the centroid of ΔABC. D is the midpoint of seg BC.

By midpoint formula,



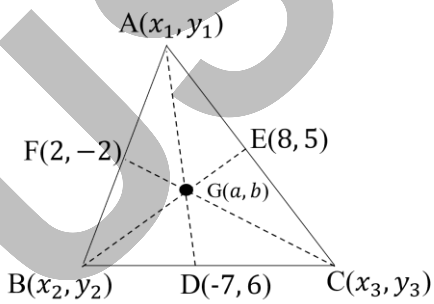
Co – ordinates of D = $\left(\frac{x_2+x_3}{2}, \frac{y_2+y_3}{2}\right)$

$\Rightarrow (-7, 6) = \left(\frac{x_2+x_3}{2}, \frac{y_2+y_3}{2}\right)$

$\Rightarrow \frac{x_2+x_3}{2} = -7, \frac{y_2+y_3}{2} = 6$

$\Rightarrow \mathrm{x_2 + x_3 = -14 \ldots. (i), y_2 + y_3 = 12 \ldots. (ii)},$

E is the midpoint of seg AC;



Co – ordinates of E = $\left(\frac{x_1+x_3}{2}, \frac{y_1+y_3}{2}\right)$

$\Rightarrow (8, 5) = \left(\frac{x_1+x_3}{2}, \frac{y_1+y_3}{2}\right)$

$\Rightarrow \frac{x_1+x_3}{2} = 16, \frac{y_1+y_3}{2} = 10$

$\Rightarrow \mathrm{x_1 + x_3 = 16 \ldots.. (iii), y_1 + y_3 = 10 \ldots (iv)}$

Similarly, as F is the midpoint of seg AB;

Co – ordinates of E = $\left(\frac{x_1+x_3}{2}, \frac{y_1+y_3}{2}\right)$

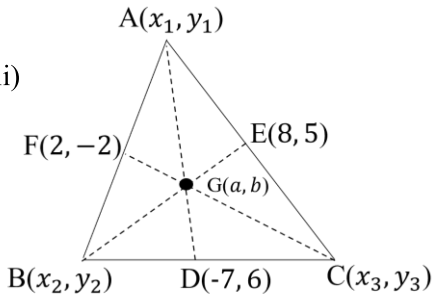
$\Rightarrow \mathrm{x_1 + x_2 = 4 \ldots \ldots (v), y_1 + y_3 = -4 \ldots.. (vi)}$

Adding (i), (iii) and (v),

$x_2 + x_3 + x_1 + x_3 + x_1 + x_2 = -14 + 16 + 4$

$\Rightarrow 2x_1 + 2x_2 + 2x_3 = 6 \Rightarrow x_1 + x_2 + x_3 = 3 \ldots \text{(vii)}$

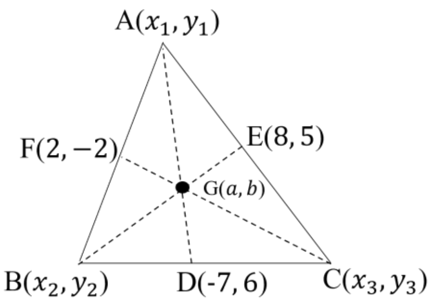
Adding (ii), (iv) and (vi),



$y_2 + y_3 + y_1 + y_3 + y_1 + y_2 = 12 + 10 - 4$

$\Rightarrow \mathrm{2y_1 + 2y_2 + 2y_3 = 18 \Rightarrow y_1 + y_2 + y_3 = 9 \ldots \ (viii)}$

G is the centroid of ΔABC. By centroid formula,



Co- ordinates of G = $\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$

$= \left(\frac{3}{3}, \frac{9}{3}\right)$ ……. From (vii)and (viii)

= (1, 3)

∴ The Co-ordinates of the centroid of the triangle are (1, 3)

5.

(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.

Sol: $a^2 + b^2$, $a^2 - b^2$, 2ab are sides of triangle.

By Pythagoras' theorem,

$(a^2 + b^2)^2 = (a^2 - b^2)^2 + (2ab)^2$

$a^4 + b^4 + 2a^2 b^2 = a^4 + b^4 - 2a^2b^2 + 4a^2b^2$

$a^4 + b^4 + 2a^2 b^2 = a^4 + b^4 + 2a^2b^2$

AS L.H.S. = R.H.S.

∴ Triangle is a right – angle triangle as it follows Pythagorean triplets As a > b ….. [Given]

Let a = 4, b = 3

$a^2 + b^2 = 4^2 + 3^2 = 16 + 9 = 25$

$a^2 - b^2 = 16 - 9 = 7$

$2ab = 2 \times 4 \times 3 = 4$

∴ $(25, 7, 24)$ is a Pythagorean triplet.

Let a = 2, b = 1

$a^2 + b^2 = 2^2 + 1^2 = 4 + 1 = 5$

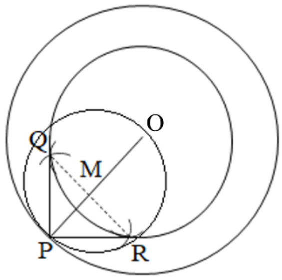
∴ $(5, 3, 4)$ is another Pythagorean triplet.

(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.

Sol: Following are the steps to draw tangents on the given circle:

Step 1: Draw a circle of 3 cm radius with centre O on the given plane.

Step 2: Draw a circle of 5 cm radius, taking O as its centre. Locate a point P on this circle and join OP.



Step 3: Bisect OP. Let M be the midpoint of PO.

Step 4: Taking M as its centre and MO as its radius, draw a circle. Let it intersect the given circle at points Q and R.

Step 5: Join PQ and PR. PQ and PR are the required tangents.

It can be observed that PQ and PR are of length 4 cm each.

Since PQ is a tangent,

$\therefore \angle PQO = 90^{\circ}\ and\ PO = 5\ cm\ and\ QO = 3\ cm$

Applying Pythagoras theorem in ΔPQO, we obtain

$\mathrm{PQ}^2 + \mathrm{QO}^2 = \mathrm{PQ}^2$

$\Rightarrow \mathrm{PQ}^2 + (3)^2 = (5)^5$

$\Rightarrow \mathrm{PQ}^2 + 9 = 25$

$\Rightarrow \mathrm{PQ}^2 = 25 - 9 = 16$

$\Rightarrow \mathrm{PQ} = 4\ \mathrm{cm}$