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राज्य शैक्षणिक संशोधन व प्रशिक्षण परिषद, महाराष्ट्र
७०८ सदाशिव पेठ, कुमटेकर मार्ग, पुणे ४११०३०

संपर्क क्रमांक (०२०) २४४७ ६९३८

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Question Bank

Standard:- 10th

Subject :- Mathematics Part II

March 2021

सूचना

१. फक्त विद्यार्थ्यांना प्रश्नप्रकारांचा सराव करून देण्यासाठीच
२. सदर प्रश्नसंचातील प्रश्न बोर्डाच्या प्रश्नपत्रिकेत येतीलच असे नाही याची नोंद घ्यावी.

Class-10
Mathematics part-2
Question bank
1.Similarity

Q.1 A) MCQ (1 Mark)

1.If $\triangle ABC \sim \triangle PQR$ and $AB: PQ = 3: 4$ then $A(\triangle ABC): A(\triangle PQR) = ?$

- (A) 9:25 (B) 9:16 (C) 16:9 (D) 25:9

2.Which of the following is not a test of similarity?

- (A) AAA (B) SAS (C) SAA (D) SSS

3.If $\triangle XYZ \sim \triangle PQR$ and $A(\triangle XYZ) = 25 \text{ cm}^2$, $A(\triangle PQR) = 4 \text{ cm}^2$ then $XY:PQ = ?$

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

4.Ratio of areas of two similar triangles is 9:25. _____ is the ratio of their corresponding sides.

- (A) 3:4 (B) 3 :5 (C) 5:3 (D) 25:81

5. *Given* $\triangle ABC \sim \triangle DEF$, if $\angle A = 45^\circ$ and $\angle E = 35^\circ$ then $\angle B = ?$

- (A) 45° (B) 35° (C) 25° (D) 40°

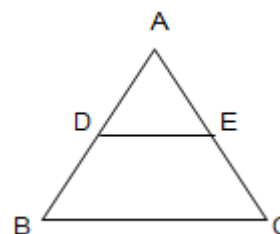
6. In fig, seg $DE \parallel$ seg BC , identify correct statement.

(A) $\frac{AD}{DB} = \frac{AE}{AC}$

(B) $\frac{AD}{DB} = \frac{AB}{AC}$

(C) $\frac{AD}{DB} = \frac{EC}{AC}$

(D) $\frac{AD}{DB} = \frac{AE}{EC}$



7. If $\triangle XYZ \sim \triangle PQR$ then $\frac{XY}{PQ} = \frac{YZ}{QR} = ?$

(A) $\frac{XZ}{PR}$

(B) $\frac{XZ}{PQ}$

(C) $\frac{XZ}{QR}$

(D) $\frac{YZ}{PQ}$

8. If $\triangle ABC \sim \triangle LMN$ and $\angle A = 60^\circ$ then $\angle L = ?$

(A) 45°

(B) 60°

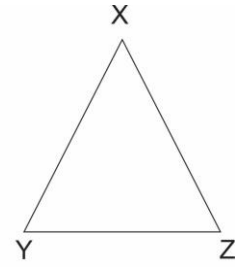
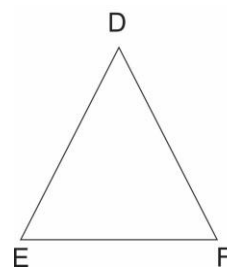
(C) 25°

(D) 40°

9. In $\triangle DEF$ and $\triangle XYZ$, $\frac{DE}{XY} = \frac{FE}{YZ}$ & $\angle E \cong \angle Y$ _____ test gives similarity between $\triangle DEF$ & $\triangle XYZ$.

(A) AAA (B) SAS

(C) SAA (D) SSS



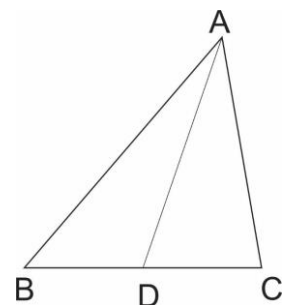
10. In fig $BD=8$, $BC=12$ B-D-C then $\frac{A(\triangle ABC)}{A(\triangle ABD)} = ?$

(A) 2:3

(B) 3:2

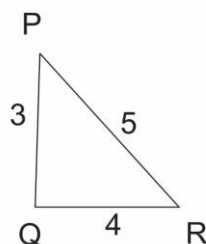
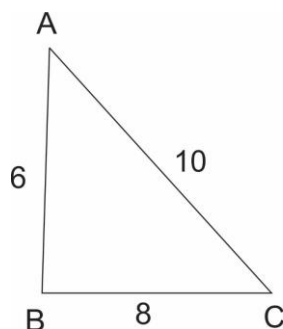
(C) 5:3

(D) 3:4

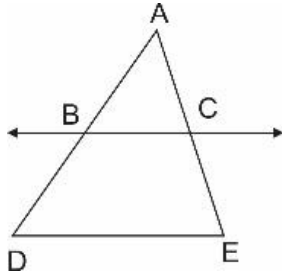


Q.1 B) Solve 1 mark

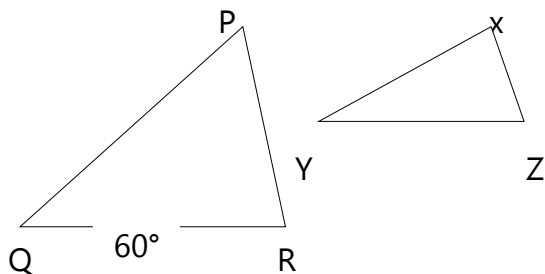
B.1 Are triangles in figure similar? If yes then write the test of similarity.



2. In fig line $BC \parallel$ line DE , $AB=2$, $BD=3$, $AC=4$ and $CE= x$, then find the value of x .



3. State whether the following triangles are similar or not : If yes , then write the test of similarity.



$\angle P = 35^\circ$, $\angle x = 35^\circ$ and $\angle Q = 60^\circ$, $\angle Y =$

4. If $\triangle ABC \sim \triangle LMN$ & $\angle B = 40^\circ$ then $\angle M = ?$ Give reason .

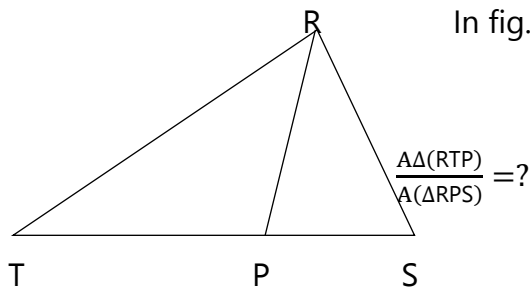
5. Areas of two similar triangles are in the ratio 144:49. Find the ratio of their corresponding sides.

6. $\triangle PQR \sim \triangle SUV$ write pair of congruent angle.

7. $\triangle ABC \sim \triangle DEF$ write ratio of their corresponding sides.

8.

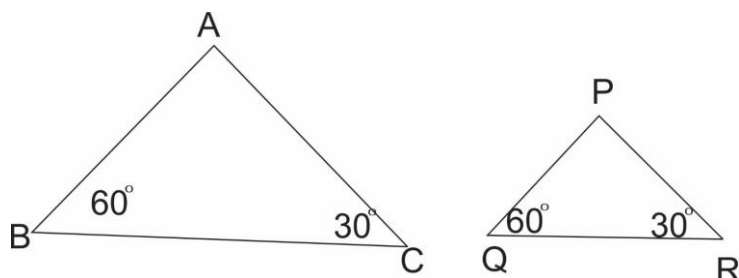
In fig. $TP = 10$ cm $PS = 6$ cm



$$\frac{A(\triangle RTP)}{A(\triangle RPS)} = ?$$

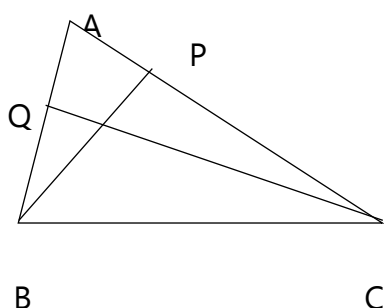
9. Ratio of corresponding sides of two similar triangles is 4:7 then find the ratio of their areas = ?

10. Write the test of similarity for triangles given in figure.



Q.2 A. Complete the activity 2marks

1.



in fig. $BP \perp AC, CQ \perp AB$ A-P-C

& A-Q-B then show that

$\triangle APB$ & $\triangle AQC$ are similar

In $\triangle APB$ & $\triangle AQC$ $\angle APB = [\quad]^\circ \dots (I)$

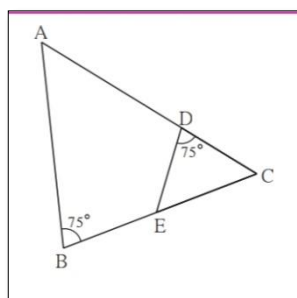
$\angle AQC = [\quad]^\circ \dots (II)$

$\angle APB \cong \angle AQC$ (I) & (II)

$\angle PAB \cong \angle QAC$ [.....]

$\triangle APB \sim \triangle AQC$ [.....]

2. Observe the figure & complete following activity.



in fig $\angle B = 75^\circ, \angle D = 75^\circ$

$\angle B \cong [\dots]$ each of 75°

$\angle C \cong \angle C$ [.....]

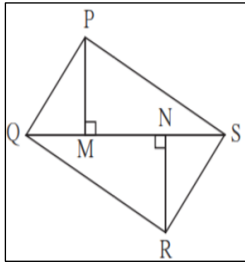
$\triangle ABC \sim \triangle [\dots]$

....[.....]similarity test

3. $\triangle ABC \sim \triangle PQR$, $A(\triangle ABC) = 80 \text{ sqcm}$ $A(\triangle PQR) = 125 \text{ sqcm}$ then complete

$$\frac{A(\triangle ABC)}{A(\triangle PQR)} = \frac{80}{125} = \frac{[\dots]}{[\dots]} \text{ hence } \frac{AB}{PQ} = \frac{[\dots]}{[\dots]}$$

4. in fig. $PM = 10 \text{ cm}$ $A(\triangle PQS) = 100 \text{ sqcm}$ $A(\triangle QRS) = 110 \text{ sqcm}$ then $NR = ?$



$\triangle PQS$ & $\triangle QRS$ having seg QS common base

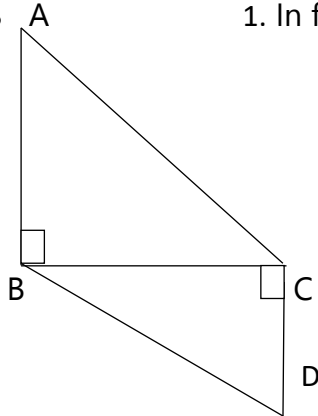
Areas of two triangles whose base are common, are in proportion of their corresponding [.....]

$$\frac{A(\triangle PQS)}{A(\triangle QRS)} = \frac{[\dots]}{NR} , \frac{100}{110} = \frac{[\dots]}{NR} , NR = [\dots] \text{ cm}$$

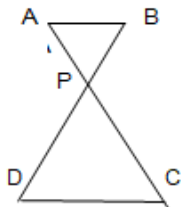
Q.2 B A

1. In fig $AB \perp BC$ and $DC \perp BC$ $AB = 6$, $DC = 4$

$$\text{then } \frac{A(\triangle ABC)}{A(\triangle BCD)} = ?$$



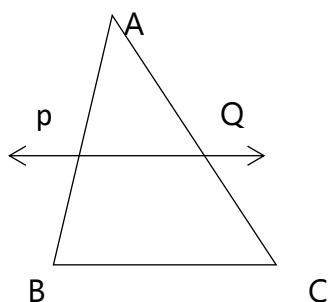
2. In fig seg AC & seg BD intersect each other at point p



$$\frac{AP}{PC} = \frac{BP}{PD} \text{ then prove that } \triangle ABP \sim \triangle DPC$$

3. $\triangle ABP \sim \triangle DEF$ & $A(\triangle ABP) : A(\triangle DEF) = 144 : 81$ then $AB : DE = ?$

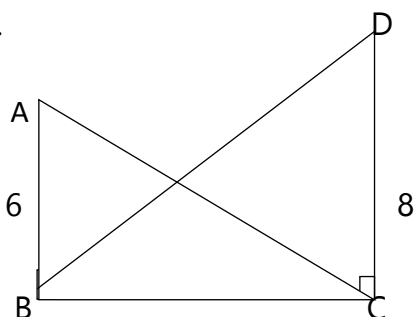
4. From given information is $PQ \parallel BC$?



$$AP=2, PB=4 \quad AQ=3, QC=6$$

5. Areas of two similar triangles are 225 cm^2 and 81 cm^2 if side of smaller triangle is 12cm. find corresponding side of major triangle

6.

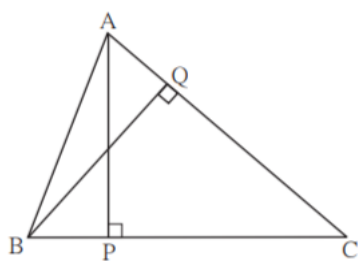


from adjoining figure

$$\angle ABC = 90^\circ \quad \angle DCB = 90^\circ \quad AB = 6,$$

$$DC=8 \quad \text{then} \quad \frac{A(\triangle ABC)}{A(\triangle BCD)} = ?$$

Q.3A) Complete the following activity 3 marks



1. $\triangle ABC$ AP perpendicular BC & BQ perpendicular AC, B-P-C, A-Q-C
then show that $\triangle CPA \sim \triangle CQB$ if $AP=7, BQ=8, BC=12$
then $AC=?$ In $\triangle CPA$ and $\triangle CQB$ $\angle CPA \cong \angle CQB$ (each 90°)

$$\angle ACP \cong \angle BCB \text{ (common angle)}$$

$$\triangle CPA \sim \triangle CQB \text{ (.....similarity test)}$$

$$\frac{AP}{BQ} = \frac{CP}{CQ} \text{ (corresponding sides of similar triangle)}$$

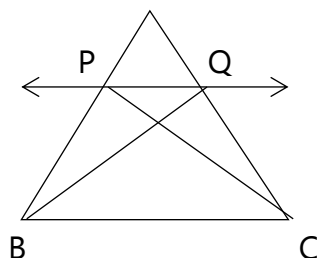
$$\frac{7}{8} = \frac{CP}{12}$$

$$AC \times \frac{7}{8} = 7 \times 12 \quad AC = 10.5$$

2. A line is parallel to one side of triangle which intersects remaining two sides in two distinct point then that line divides sides in same proportion.

Given : In $\triangle ABC$ line $l \parallel$ side BC & line l intersect side AB in P & side

AC in Q



Given: $\frac{AP}{PB} = \frac{AQ}{QC}$ construction : draw CP & BQ

Proof: $\triangle APQ$ & $\triangle PQB$ have equal height

$$\frac{A(\triangle APQ)}{A(\triangle PQB)} = \frac{[...]}{PB} \text{ (areas in proportion of base)}$$

$$\frac{A(\triangle APQ)}{A(\triangle PQC)} = \frac{[...]}{QC} \text{ (areas in proportion of base)}$$

$\triangle PQC$ & $\triangle PQB$ have [...] is common base
 $Seg PQ \parallel$ $Seg BC$ hence height of:
 $\triangle APQ$ & $\triangle PQB$

$$A(\triangle PQC) = A(\triangle PQB) \dots\dots\dots (III)$$

$$\frac{A(\triangle APQ)}{A(\triangle PQB)} = \frac{A(\triangle PQC)}{A(\triangle PQB)} \dots\dots\dots [(I), (II) \& (III)]$$

$$\frac{AP}{PB} = \frac{AQ}{QC} \dots\dots\dots [(I) \& (II)]$$

From fig. $seg PQ \parallel$ side BC

$$AP = x + 3, PB = x - 3, AQ = x + 5, QC = x - 2$$

then complete the activity to find the value of x

in $\triangle PQB$, $PQ \parallel$ side BC

$$\frac{AP}{PB} = \frac{AQ}{QC} \dots\dots\dots [(I), (II) \& (III)]$$

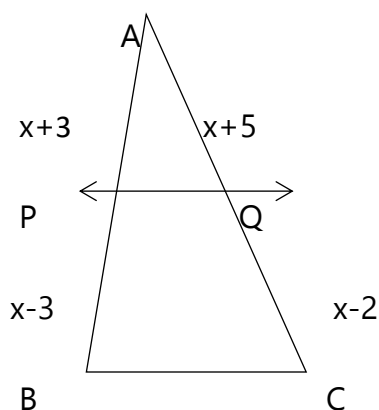
$$\frac{x + 3}{x - 3} = \frac{x + 5}{x - 2}$$

$$(x + 3)[...] = (x + 5)(x - 3)$$

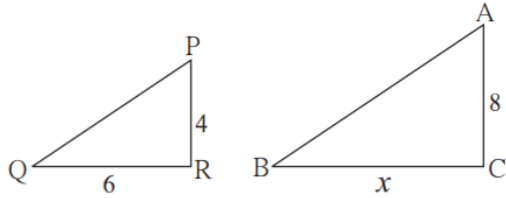
$$x^2 + x - [...] = x^2 + 2x - 15$$

$$x = [...]$$

3.

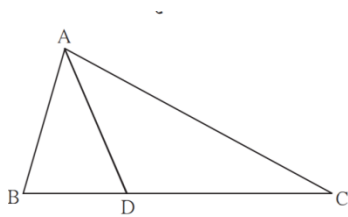


Q.3 B 3 marks



1. There are two poles having heights 8m & 4m on plane ground as shown in fig. Because of sunlight shadow of smaller pole is 6m long then find the length of shadow of longer pole.

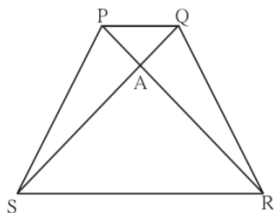
2. In $\triangle ABC$ B-D-C & BD=7, BC=20 then find the following ratio



1) $\frac{A(\triangle ABD)}{A(\triangle ADC)}$

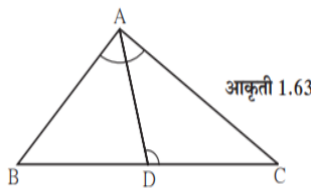
2) $\frac{A(\triangle ABD)}{A(\triangle ABC)}$

3) $\frac{A(\triangle ADC)}{A(\triangle ABC)}$



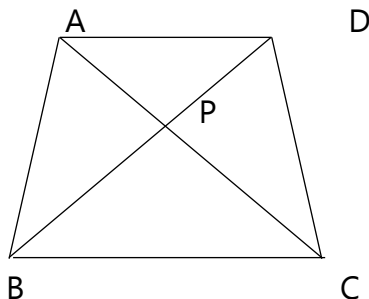
3. In given fig. quadrilateral PQRS side $PQ \parallel$ side SR, $AR = 5AP$, then prove that, $SR = 5PQ$

4.



In triangle ABC point D is on side BC (B-D-C) such that $\angle BAC = \angle ADC$ then prove that $CA^2 = CB \times CD$

5.



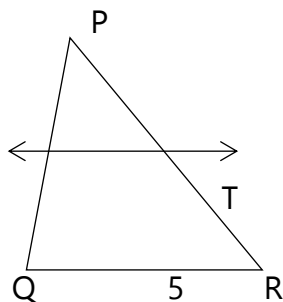
In Quadrilateral ABCD Side $AD \parallel BC$ diagonal AC & BD intersect in point P then prove that $\frac{AP}{PD} = \frac{PC}{BP}$

Q.4 4 marks

1. Side of equilateral triangle PQR is 8 cm then find the area of triangle whose side is half of side of triangle PQR
2. Areas of two similar triangle are equal then prove that triangles are congruent
3. Two triangles are similar. Smaller triangle sides are 4 cm, 5 cm, 6 cm perimeter of larger triangle is 90 cm then find the sides of larger triangle.

Q.5 3 marks

1. In fig, $PS = 2$, $SQ = 6$, $QR = 5$, $PT = x$ & $TR = y$. then find the pair of value of x & y such that $ST \parallel$ side QR .



2. An architecture have model of building, length of building is 1m then length of model is 0.75cm then find length & height of model building whose actual length is 22.5m & height is 10m.

2. PYTHAGORAS THEOREM

Que. 1 (A). Choose the correct alternative from those given below

(1 mark each)

1. Out of given triplets, which is a Pythagoras triplet ?

(A) (1,5,10) (B) (3,4,5) (C) (2,2,2) (D) (5,5,2)

2. Out of given triplets, which is not a Pythagoras triplet ?

(A) (5,12,13) (B) (8,15,17) (C) (7,8,15) (D) (24,25,7)

3. Out of given triplets, which is not a Pythagoras triplet ?

(A) (9,40,41) (B) (11,60,61) (C) (6,14,15) (D) (6,8,10)

4. In right angled triangle, if sum of square of sides of right angle is 169 then what is the length of hypotenuse?

(A) 15 (B) 13 (C) 5 (D) 12

5. A rectangle having length of a side is 12 and length of diagonal is 20 then what is length of other side?

(A) 2 (B) 13 (C) 5 (D) 16

6. If the length of diagonal of square is $\sqrt{2}$ then what is the length of each side ?

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

7. If length of both diagonals of rhombus are 60 and 80 then what is the length of side?

(A)100 (B)50 (C) 200 (D) 400

8. If length of sides of triangle are a, b, c and $a^2 + b^2 = c^2$ then which type of triangle it is ?

(A) Obtuse angled triangle (B) Acute angled triangle
(C) Equilateral triangle (D) Right angled triangle

9. In $\triangle ABC$, $AB = 6\sqrt{3}$ cm, $AC = 12$ cm, and $BC = 6$ cm then $m\angle A = ?$

(A) 30° (B) 60° (C) 90° (D) 45°

10. The diagonal of a square is $10\sqrt{2}$ cm then its perimeter is

(A) 10 cm. (B) $40\sqrt{2}$ cm. (C) 20 cm. (D) 40 cm.

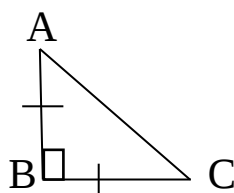
11. Out of all numbers from given dates, which is a Pythagoras triplet ?

(A) 15/8/17 (B) 16/8/16 (C) 3/5/17 (D) 4/9/15

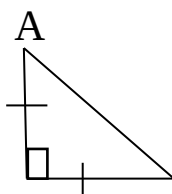
Que. 1 (B). Solve the following questions : (1 mark each)

1. Height and base of a right angled triangle are 24 cm and 18 cm find the length of its hypotenuse ?

2. From given figure, In $\triangle ABC$, $AB \perp BC$, $AB = BC$ then $m\angle A = ?$

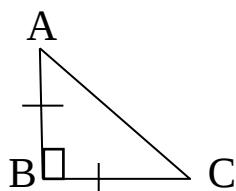


3. From given figure, In $\triangle ABC$, $AB \perp BC$, $AB = BC$, $AC = 2\sqrt{2}$ then $l(AB) = ?$



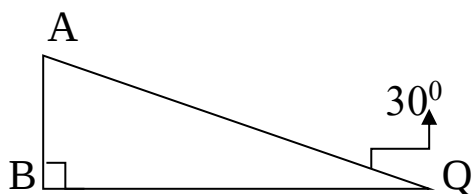
B C

4. From given figure, In ΔABC , $AB \perp BC$, $AB = BC$, $AC = 5\sqrt{2}$ then what is the height of ΔABC ?



5. Find the height of an equilateral triangle having side 4 cm. ?

6. From given figure, In ΔABQ , If $AQ = 8$ cm. then $AB = ?$



7. In right angled triangle, if length of hypotenuse is 25 cm. and height is 7 cm. then what is the length of its base ?

8. If a triangle having sides 50 cm., 14 cm, and 48 cm., then state wheather given triangle is right angled triangle or not.

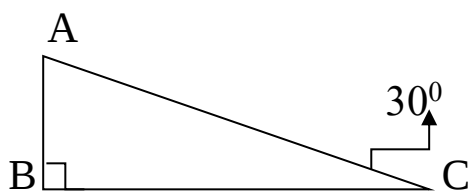
9. If a triangle having sides 8 cm., 15 cm., and 17 cm., then state wheather given triangle is right angled triangle or not.

10. A rectangle having dimensions 35 m X 12 m, then what is the length of its diagonal ?

Que. 2 (A). Complete the following activities (2 marks each)

*** (Write complete answers, don't just fill the boxes)**

1. From given figure, In ΔABC , If $AC = 12$ cm. then $AB = ?$



Activity : From given figure, In ΔABC , $\angle ABC = 90^\circ$, $\angle ACB = 30^\circ$

$$\therefore \angle BAC = \boxed{}$$

$\therefore \Delta ABC$ is $30^\circ - 60^\circ - 90^\circ \Delta$.

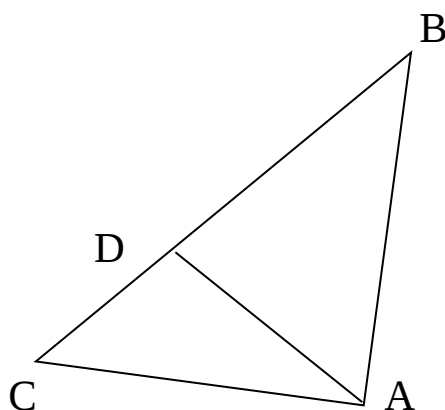
$\therefore$ In ΔABC by Property of $30^\circ - 60^\circ - 90^\circ \Delta$.

$$\therefore AB = \frac{1}{2}AC \text{ and } \boxed{} = \frac{\sqrt{3}}{2} AC.$$

$$\therefore \boxed{} = \frac{1}{2} \times 12 \text{ And } BC = \frac{\sqrt{3}}{2} \times 12$$

$$\therefore \boxed{} = 6 \text{ \& } BC = 6\sqrt{3}.$$

2. From given figure, In ΔABC , $AD \perp BC$, then prove that $AB^2 + CD^2 = BD^2 + AC^2$ by completing activity.



Activity : From given figure, In ΔABC , By pythagoras theorem

$$AC^2 = AD^2 + \boxed{}$$

$$\therefore AD^2 = AC^2 - CD^2 \dots\dots (I)$$

Also, In ΔABD , by pythagoras theorem,

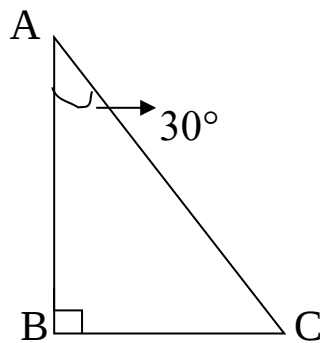
$$AB^2 = \boxed{} + BD^2$$

$$\therefore AD^2 = AB^2 - BD^2 \dots\dots\dots (II)$$

$$\therefore \boxed{} - BD^2 = AC^2 - \boxed{}$$

$$\therefore AB^2 + CD^2 = AC^2 + BD^2$$

3. From given figure, In ΔABC , If $\angle ABC = 90^\circ$ $\angle CAB = 30^\circ$, $AC = 14$ then for finding value of AB and BC , complete the following activity.



Activity : In ΔABC , If $\angle ABC = 90^\circ$ $\angle CAB = 30^\circ$

$$\therefore \angle BCA = \boxed{}$$

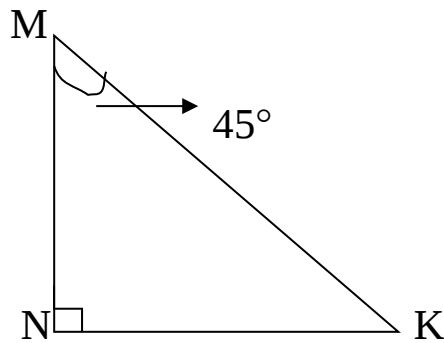
By theorem of $30^\circ - 60^\circ - 90^\circ \Delta^{le}$,

$$\therefore \boxed{} = \frac{1}{2}AC \quad \text{and} \quad \boxed{} = \frac{\sqrt{3}}{2}AC$$

$$\therefore BC = \frac{1}{2} \times \boxed{} \quad \& \quad AB = \frac{\sqrt{3}}{2} \times 14$$

$$\therefore BC = 7 \quad \& \quad AB = 7\sqrt{3}.$$

4. From given figure, In ΔMNK , If $\angle MNK = 90^\circ$ $\angle M = 45^\circ$, $MK = 6$ then for finding value of MK and KN , complete the following activity.



Activity : In ΔMNK , If $\angle MNK = 90^\circ$ $\angle M = 45^\circ$...(given)

$\therefore \angle K = \boxed{}$ (remaining angles of ΔMNK)

By theorem of $45^\circ - 45^\circ - 90^\circ \Delta^le$,

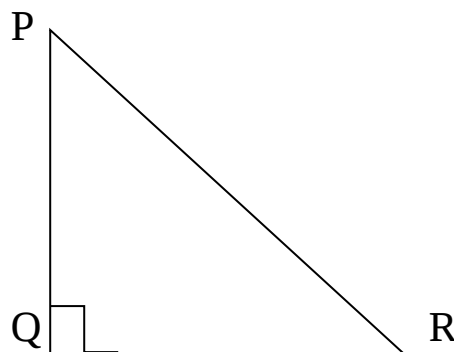
$\therefore \boxed{} = \frac{1}{\sqrt{2}} MK$ and $\boxed{} = \frac{1}{\sqrt{2}} MK$

$\therefore MN = \frac{1}{\sqrt{2}} \times \boxed{}$ & $KN = \frac{1}{\sqrt{2}} \times 6$

$\therefore MN = 3\sqrt{2}$. & $KN = 3\sqrt{2}$.

5. A ladder 10 m long reaches a window 8m above the ground. Find the distance of the foot of the ladder from the base of wall. Complete the given activity.

Activity : as shown in fig. suppose



PR is the length of ladder = 10 m

At P – window, At Q – base of wall, At R – foot of ladder

$$\therefore PQ = 6 \text{ m}$$

$$\therefore QR = ?$$

In ΔPQR , $\angle PQR = 90^\circ$

By Pythagoras Theorem,

$$\therefore PQ^2 + \boxed{} = PR^2 \dots\dots (I)$$

Here, $PR = 10$, $PQ = \boxed{}$

From equation (I)

$$8^2 + QR^2 = 10^2$$

$$QR^2 = 10^2 - 8^2$$

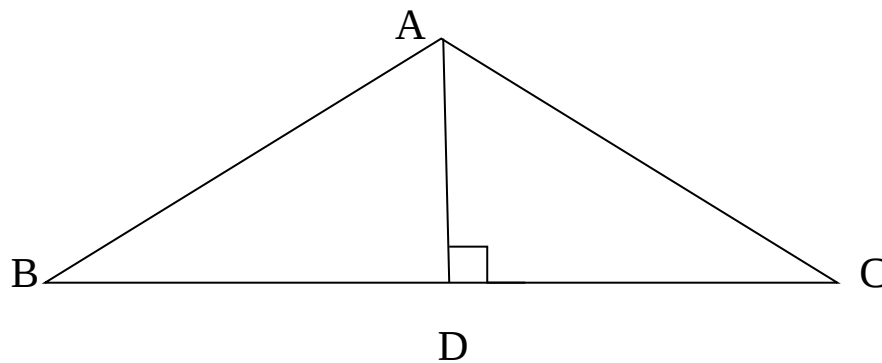
$$QR^2 = 100 - 64$$

$$QR^2 = \boxed{}$$

$$QR = 6$$

$\therefore$ The distance of foot of the ladder from the base of wall is 6 m.

6. From the given figure, In ΔABC , If $AD \perp BC$, $\angle C = 45^\circ$, $AC = 8\sqrt{2}$, $BD = 5$ then for finding value of AD and BC , complete the following activity.



Activity : In ΔADC , If $\angle ADC = 90^\circ$ $\angle C = 45^\circ$... (given)

$\therefore \angle DAC =$ (remaining angles of ΔADC)

By theorem of $45^\circ - 45^\circ - 90^\circ \Delta^{le}$,

$\therefore$ $= \frac{1}{\sqrt{2}} AC$ and $= \frac{1}{\sqrt{2}} AC$

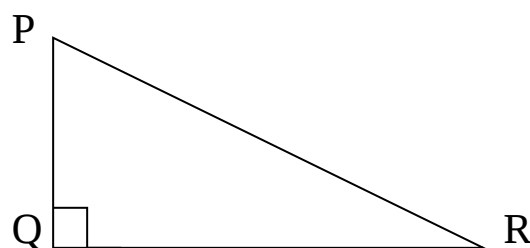
$\therefore AD = \frac{1}{\sqrt{2}} \times$ & $DC = \frac{1}{\sqrt{2}} \times 8\sqrt{2}$

$\therefore AD = 8$ & $DC = 8$

$\therefore BC = BD + DC = 5 + 8 = 13$

7. Complete the following activity to find the length of hypotenuse of right angled triangle, if sides of right angle are 9 cm and 12 cm.

Activity : In ΔPQR , $m \angle PQR = 90^\circ$



By Pythagoras Theorem,

$$\therefore PQ^2 + \boxed{} = PR^2 \dots\dots (I)$$

$$\therefore PR^2 = 9^2 + 12^2$$

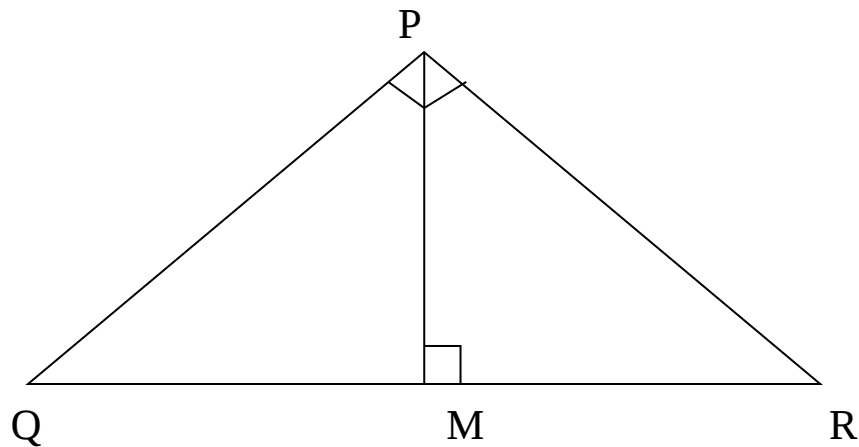
$$\therefore PR^2 = \boxed{} + 144$$

$$\therefore PR^2 = \boxed{}$$

$$\therefore PR = 15$$

$\therefore$ Length hypotenuse of triangle PQR is $\boxed{}$ cm.

8. From given figure, In ΔPQR , If $\angle QPR = 90^\circ$, $PM \perp QR$, $PM = 10$, $QM = 8$ then for finding the value of QR , complete the following activity.



Activity : In ΔPQR , If $\angle QPR = 90^\circ$, $PM \perp QR$, ..., (given)

In ΔPMQ , By Pythagoras Theorem,

$$\therefore PM^2 + \boxed{} = PQ^2 \dots\dots (I)$$

$$\therefore PQ^2 = 10^2 + 8^2$$

$$\therefore PQ^2 = \boxed{} + 64$$

$$\therefore PQ^2 = \boxed{}$$

$$\therefore PQ = \sqrt{164}$$

Here, $\Delta QPR \sim \Delta QMP \sim \Delta PMR$

$$\therefore \Delta QMP \sim \Delta PMR$$

$$\therefore \frac{PM}{RM} = \frac{QM}{PM}$$

$$\therefore PM^2 = RM \times QM$$

$$\therefore 10^2 = RM \times 8$$

$$RM = \frac{100}{8} = \boxed{}$$

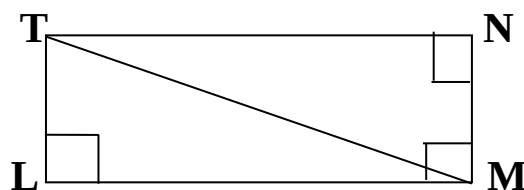
And,

$$QR = QM + MR$$

$$QR = \boxed{} + \frac{25}{2} = \frac{41}{2}$$

9. Find the diagonal of a rectangle whose length is 16 cm and area is 192 sq.cm. Complete the following activity.

Activity :



As shown in fig. $\square$ LMNT is rectangle

$$\therefore \text{Area of rectangle} = \text{length} \times \text{breadth}$$

$$\therefore \text{Area of rectangle} = \boxed{} \times \text{breadth}$$

$$\therefore 192 = \boxed{} \times \text{breadth}$$

$$\therefore \text{Breadth} = 12 \text{ cm.}$$

Also, $\angle TLM = 90^\circ$ (each angle of rectangle is right angle)

In ΔTLM , By Pythagoras theorem

$$\therefore TM^2 = TL^2 + \boxed{}$$

$$\therefore TM^2 = 12^2 + \boxed{}$$

$$\therefore TM^2 = 144 + \boxed{}$$

$$\therefore TM^2 = 400$$

$$\therefore TM = 20$$

10. In ΔLMN , $l = 5$, $m = 13$, $n = 12$ then complete the activity to show that wheather given traingle is right angled traingle or not.

* (l , m , n are opposite sides of $\angle L$, $\angle M$, $\angle N$ respectively)

Activity :

In ΔLMN मध्ये, $l = 5$, $m = 13$, $n = \boxed{}$

$$\therefore l^2 = \boxed{} ; \quad m^2 = 169 ; \quad n^2 = 144.$$

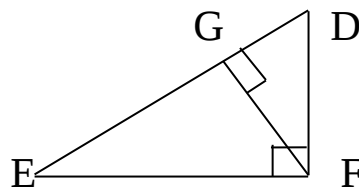
$$\therefore l^2 + n^2 = 25 + 144 = \boxed{}$$

$$\therefore \boxed{} + l^2 = m^2$$

$\therefore$ By Converse of Pythagoras theorem, ΔLMN is right angled triangle.

Que. 3 (B). Solve the following questions : (3 marks each)

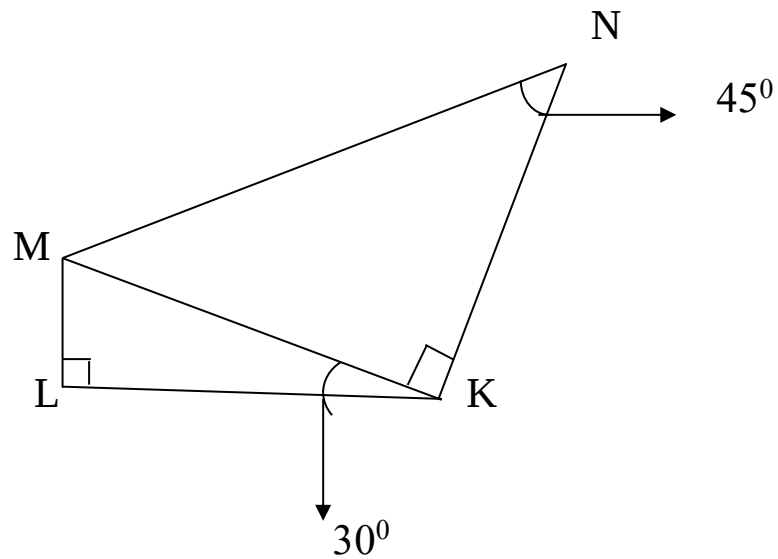
1. As shwon in figure, $\angle DFE = 90^\circ$, $FG \perp ED$, If $GD = 8$, $FG = 12$, then (1) $EG = ?$ (2) $FD = ?$ (3) $EF = ?$



2. A congruent side of an isosceles right angled triangle is 7 cm ,Find its perimeter .

Que. 4. Solve the following questions : (Challenging question 4 marks each)

1. As shown in figure, $LK = 6\sqrt{2}$ then 1) $MK = ?$ 2) $ML = ?$ 3) $MN = ?$

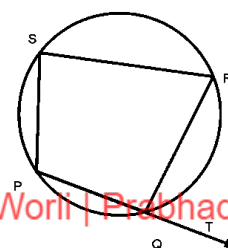


3 Circle.

**Q.1. Four alternative answers for each of the following questions are given.
Choose the correct alternative.**

- 1) Two circles intersect each other such that each circle passes through the centre of the other. If the distance between their centres is 12, what is the radius of each circle ?
(A) 6 cm (B) 12 cm (C) 24 cm (D) can't say
- 2) A circle touches all sides of a parallelogram. So the parallelogram must be a,
(A) rectangle (B) rhombus (C) square (D) trapezium
- 3) $\angle ACB$ is inscribed in arc ACB of a circle with centre O . If $\angle ACB = 65^\circ$, find $m(\text{arc } ACB)$.
(A) 65° (B) 130° (C) 295° (D) 230°
- 4) In a cyclic $\square ABCD$, twice the measure of $\angle A$ is thrice the measure of $\angle C$. Find the measure of $\angle C$?
(A) 36 (B) 72 (C) 90 (D) 108
- 5) How many circles can draw passing through three non-collinear points?
(A) 0 (B) Infinite (C) 2 (D) One and only one(unique)
- 6) Two circles of radii 5.5 cm and 4.2 cm touch each other externally. Find the distance between their centres
(A) 9.7 (B) 1.3 (C) 2.6 (D) 4.6
- 7) What is the measurement of angle inscribed in a semicircle?
(A) 90° (B) 120° (C) 100° (D) 60°
- 8) Two circles having diameters 8 cm and 6 cm touch each other internally. Find the distance between their centres.
(A) 2 (B) 14 (C) 7 (D) 1
- 9) Points A, B, C are on a circle, such that $m(\text{arc } AB) = m(\text{arc } BC) = 120^\circ$. No point, except point B , is common to the arcs. Which is the type of $\triangle ABC$?
(A) Equilateral triangle (B) Scalene triangle
(C) Right angled triangle (D) Isosceles triangle
- 10) In $\square PQRS$ if $\angle RSP = 80^\circ$ then find $\angle RQT$?

- (A) 100° (B) 80°
(C) 70° (D) 110°

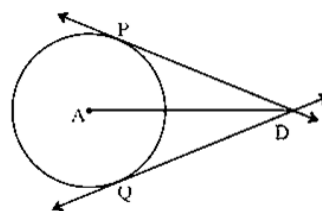


Q.2 Solve the following sub-questions. (1 mark question)

1) How many circles can be drawn passing through a point?

2) Segment DP and segment DQ are tangent segments to the circle with center A,

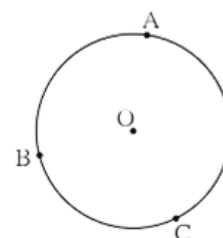
If $DP = 7$ cm. So find the length of the segment DQ?



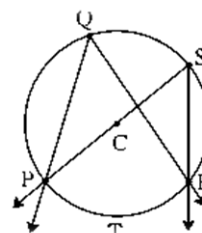
3) Two circles having radii 3.5 cm and 4.8 cm touch each other internally. Find the distance between their centres.

4) What is the measure of a semi circular arc?

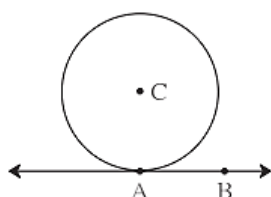
5) A, B, C are any points on the circle with centre O. If $m \text{ arc } (BC) = 110^\circ$ and $m \text{ arc } (AB) = 125^\circ$, find measure arc AC



6) In the figure if $\angle PQR = 50^\circ$ then find $\angle PSR$

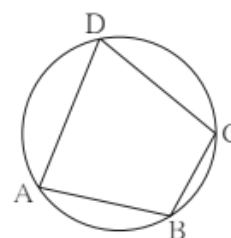


7)

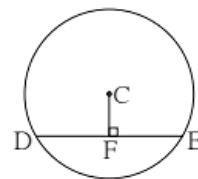


In the adjoining figure the radius of a circle with centre C is 6 cm, line AB is a tangent at A. What is the measure of $\angle CAB$? Why?

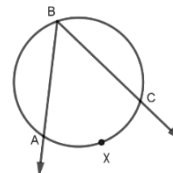
8) In the figure quadrilateral ABCD is a cyclic, if $\angle DAB = 75^\circ$ then find measure of $\angle DCB$



- 9) In the adjoining figure, seg DE is the chord of the circle with center C. seg $CF \perp$ seg DE and $DE = 16$ cm, then find the length of DF?

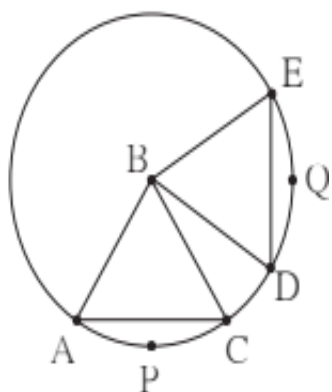


- 10) In the figure, if $\angle ABC = 35^\circ$ then find $m(\text{arc } AXC)$?



Q.3 Complete the following activities (2 marks each).

The chords corresponding to congruent arcs of a circle are congruent. Prove the theorem by completing following activity.



Given : In a circle with centre B

$\text{arc } APC \cong \text{arc } DQE$

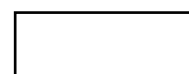
To Prove : Chord $AC \cong$ chord DE

Proof : In $\triangle ABC$ and $\triangle DBE$,

side $AB \cong$ side DB



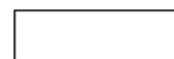
side $BC \cong$ side



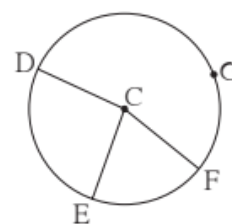
$\angle ABC \cong \angle DBE$

(measure of congruent arcs)

$\triangle ABC \cong \triangle DBE$



- 2) In figure , points G, D, E, F
are concyclic points of a circle with centre C.
 $\angle ECF = 70^\circ$, $m(\text{arc } DGF) = 200^\circ$
find $m(\text{arc } DEF)$ by completing activity.



$$m(\text{arc EF}) = \angle ECF \quad \dots \quad (\text{Definition of measure of arc})$$

$$\therefore m(\text{arc EF}) = \boxed{}$$

$$\text{But; } m(\text{arc DE}) + m(\text{arc EF}) + m(\text{arc DGF}) = \boxed{} \quad (\text{measure of a complete circle})$$

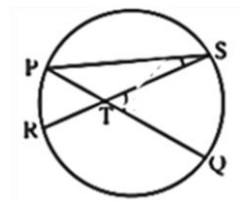
$$\therefore m(\text{arc DE}) = \boxed{}$$

$$\therefore m(\text{arc DEF}) = m(\text{arc DE}) + m(\text{arc EF})$$

$$\therefore m(\text{arc DEF}) = \boxed{}$$

3)

In the figure if the chord PQ and chord RS intersect at point T Prove that :
 $m\angle STQ = \frac{1}{2} [m(\text{arc PR}) + m(\text{arc SQ})]$ for any measure of $\angle STQ$ by filling out the boxes.



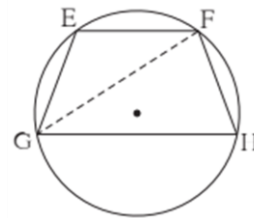
$$\text{Proof: } m\angle STQ = m\angle SPQ + \boxed{} \quad \dots (\text{Theorem of the external angle of a triangle})$$

$$= \frac{1}{2} m(\text{arc SQ}) + \boxed{} \quad \dots \dots (\text{inscribed angle theorem})$$

$$= \frac{1}{2} [+]$$

- 4) In figure, chord $EF \parallel$ chord GH . Prove that, chord $EG \cong$ chord FH . Fill in the blanks and write the proof.

Proof : Draw seg GF .



$$\angle EFG = \angle FGH \quad \dots \quad \boxed{} \quad (I)$$

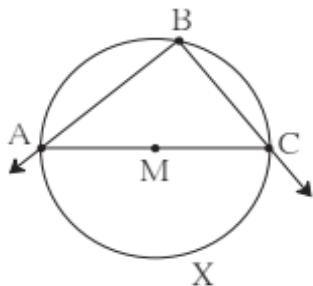
$$\angle EFG = \boxed{} \quad \dots (\text{inscribed angle theorem}) \quad (II)$$

$$\angle FGH = \boxed{} \quad \dots (\text{inscribed angle theorem}) \quad (III)$$

$$\therefore m(\text{arc } EG) = \boxed{} \quad \dots [\text{By (I) , (II) \& (III) }]$$

chord $EG \cong$ chord FH (corresponding chords of congruent arcs)

The angle inscribed in the semicircle is a right angle Prove the result by completing the following activity .



Given: $\angle ABC$ is inscribed angle in a semicircle with center M .

To prove : $\angle ABC$ is a right angle.

Proof: segment AC is a diameter of the circle.

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

Arc AXC is intercepted by the inscribed angle $\angle ABC$.

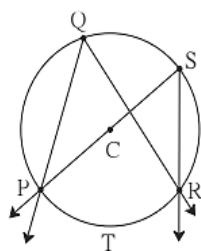
$$\angle ABC = \boxed{} \quad \dots (\text{Inscribed angle theorem})$$

$$= \frac{1}{2} \times \boxed{}$$

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

$\therefore \angle ABC$ is a right angle.

- 6) Prove that angles inscribed in the same arc are congruent.



Given: In a circle with centre C, $\angle PQR$ and $\angle PSR$ is inscribed in same arc PQR. Arc PTR is intercepted by the angles.

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

Proof : $m\angle PQR = \frac{1}{2} \times [m(\text{arc PTR})]$ (i)

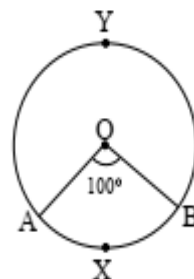
$m\angle$ $= \frac{1}{2} \times [m(\text{arc PTR})]$

$m\angle$ $= m\angle PSR$ By(i) &(ii)

$\therefore \angle PQR \cong \angle PSR$

- 7) If O is the center of the circle in the figure alongside , then complete the table from the given information.

The type of arc

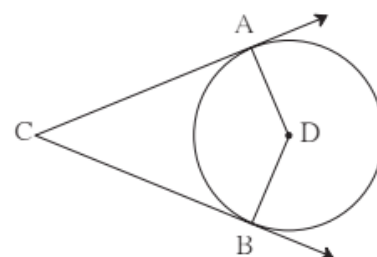


Type of circular arc	Name of circular arc	Measure of circular arc
Minor arc		
Major arc		

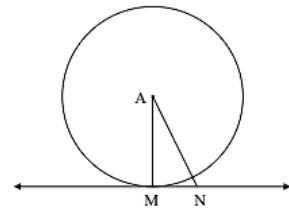
Q.4. Solve the following sub-questions. (2 marks question)

1)

In the adjoining figure circle with Centre D touches the sides of $\angle ACB$ at A and B. If $\angle ACB = 52^\circ$, find measure of $\angle ADB$.

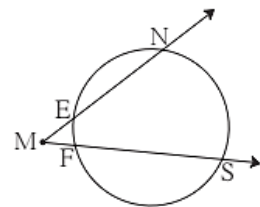


- 2) In the adjoining figure, the line MN touches the circle with center A at point M. If AN = 13 and MN = 5 then find the radius of the circle?



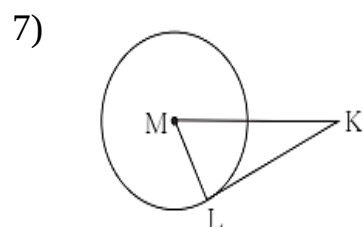
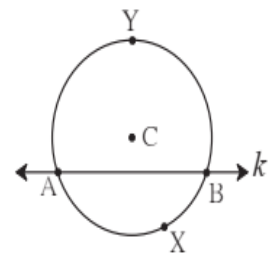
- 3) What is the distance between two parallel tangents of a circle having radius 4.5 cm? Justify your answer.

- 4) In figure, $m(\text{arc NS}) = 125^\circ$, $m(\text{arc EF}) = 37^\circ$, find the measure $\angle NMS$.



- 5) Length of a tangent segment drawn from a point which is at a distance 15 cm from the centre of a circle is 12 cm, find the diameter of the circle?

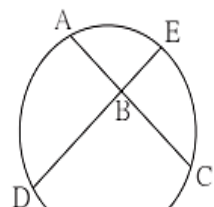
- 6) In the figure a circle with center C has $m(\text{arc AXB}) = 100^\circ$ then find central $\angle ACB$ and measure $m(\text{arc AYB})$.



In figure, M is the centre of the circle and seg KL is a tangent segment. If $MK = 12$, $KL = 6\sqrt{3}$ then find (1) Radius of the circle.

(2) Measures of $\angle K$ and $\angle M$.

- 8) In figure, chords AC and DE intersect at B. If $\angle ABE = 108^\circ$, $m(\text{arc AE}) = 95^\circ$, find $m(\text{arc DC})$.

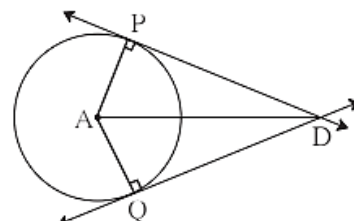


Q. 5. Complete the following activity. (3 marks each)

- 1) Tangent segments drawn from an external point to a circle are congruent, prove this theorem. Complete the following activity.

Given :

To Prove:



Proof : Draw radius AP and radius AQ and complete the following proof of the theorem.

In $\triangle PAD$ and $\triangle QAD$,

Seg PA $\cong$ (radii of the same circle.)

Seg AD $\cong$ Seg AD ()

$\angle APD \cong \angle AQD = 90^\circ$ (tangent theorem)

$\therefore \triangle PAD \cong \triangle QAD$ ()

$\therefore \text{seg DP} \cong \text{seg DQ}$ ()

2)

$\square$ MRPN is cyclic, $\angle R = (5x - 13)^\circ$, $\angle N = (4x + 4)^\circ$. Find measures of $\angle R$ and $\angle N$, by completing the following activity.

Solution : $\square$ MRPN is cyclic

The opposite angles of a cyclic square are

$$\angle R + \angle N = \text{$$

$$\therefore (5x-13)^\circ + (4x+4)^\circ = \text{$$

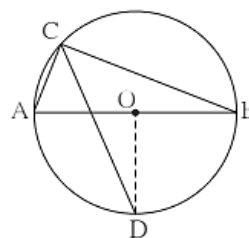
$$\therefore 9x = 189$$

$$\therefore x = \text{$$

$$\therefore \angle R = (5x-13)^\circ = \text{$$

$$\therefore \angle N = (4x+4)^\circ = \text{$$

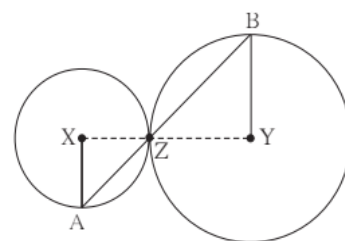
- 3) In figure , seg AB is a diameter of a circle with centre O . The bisector of $\angle ACB$ intersects the circle at point D. Prove that, seg $AD \cong$ seg BD . Complete the following proof by filling in the blanks.



Proof Draw seg OD.

$\angle ACB =$ angle inscribed in semicircle
 $\angle DCB =$ CD is the bisector of $\angle C$
 $m(\text{arc } DB) =$ inscribed angle theorem
 $\angle DOB =$ definition of measure of an arc (I)
seg $OA \cong$ seg OB (II)
 $\therefore$ line OD is of seg AB From (I) and (II)
 $\therefore$ seg $AD \cong$ seg BD

- 4) In the adjoining figure circles with centres X and Y touch each other at point Z. A secant passing through Z intersects the circles at points A and B respectively.



Prove that , radius $XA \parallel$ radius YB .
Fill in the blanks and complete the proof.

Construction : Draw segments XZ and YZ.

Proof : By theorem of touching circles, points X, Z, Y are
 $\therefore \angle XZA \cong$ opposite angles
Let $\angle XZA = \angle BZY = a$ (I)
Now, seg $XA \cong$ seg XZ (radii of the same circle.)
 $\therefore \angle XAZ =$ $= a$ (isosceles triangle theorem.) (II)
similarly, seg $YB \cong$ seg YZ (radii of the same circle.)
 $\therefore \angle BZY =$ $= a$ (isosceles triangle theorem.) (III)

∴ from (I), (II), (III),

$$\angle XAZ = \boxed{}$$

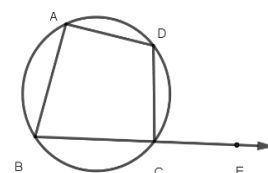
∴ radius $XA \parallel$ radius YB $\boxed{}$)

- 5) An exterior angle of a cyclic quadrilateral is congruent to the angle opposite to its adjacent interior angle, to prove the theorem complete the activity .

Given : $\square ABCD$ is cyclic ,

$\boxed{}$ is the exterior angle of $\square ABCD$

To prove : $\angle DCE \cong \angle BAD$



Proof : $\boxed{} + \angle BCD = \boxed{}$ (Angles in linear pair) (I)

$\square ABCD$ is a cyclic .

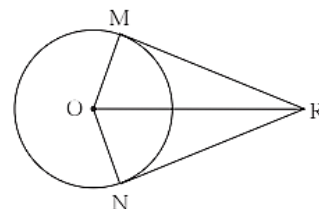
$\boxed{} + \angle BAD \boxed{}$ (Theorem of cyclic quadrilateral) (II)

By (I) and (II)

$$\angle DCE + \angle BCD \boxed{} + \angle BAD$$

$$\angle DCE \cong \angle BAD$$

- 6) Seg RM and seg RN are tangent segments of a circle with centre O . Prove that seg OR bisects $\angle MRN$ as well as $\angle MON$ with the help of activity.



Proof : In $\triangle RMO$ and $\triangle RNO$,

$$\angle RMO \cong \angle RNO = 90^\circ \quad \dots (\quad)$$

$$\text{hypt } OR \cong \text{hypt } OR \quad \dots (\quad)$$

$$\text{seg } OM \cong \text{seg } \quad \dots (\text{ radii of the same circle })$$

$$\therefore \triangle RMO \cong \triangle RNO \quad \dots (\quad)$$

$$\angle MOR \cong \angle NOR$$

$$\text{Similarly } \angle MRO \cong \quad \dots (\quad)$$

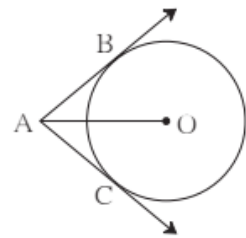
7)

In figure , O is the centre of the circle.

Seg AB, seg AC are tangent segments.

Radius of the circle is r and $\ell(AB) = r$,

Prove that, $\square ABOC$ is a square.



Proof : Draw segment OB and OC.

$$\ell(AB) = r \quad \dots (\text{Given}) \quad \text{(I)}$$

$$AB = AC \quad \dots (\quad) \quad \text{(II)}$$

$$\text{But } OB = OC = r \quad \dots (\quad) \quad \text{(III)}$$

From (I),(II) and (III)

$$AB = \quad = OB = OC = r$$

$\therefore$ Quadrilateral ABOC is $\square$.

$$\text{Similarly } \angle OBA = \quad \dots (\text{Tangent Theorem})$$

If one angle of $\square$ is right angle ,then it is a square.

$\therefore$ Quadrilateral ABOC is a square.

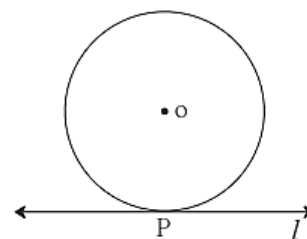
Q.6. Solve the following sub-questions. (3 marks question)

1) Prove the following theorems:

- i) Opposite angles of a cyclic quadrilateral are supplementary.
- ii) Tangent segments drawn from an external point to a circle are congruent.
- iii) Angles inscribed in the same arc are congruent.

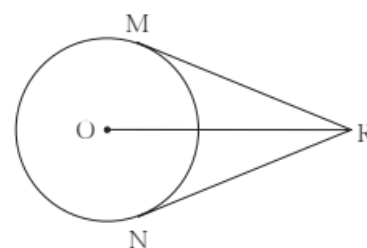
2) Line ℓ touches a circle with centre O at point P. If radius of the circle is 9 cm, answer the following.

- (i) What is $d(O, P)$ = ? Why ?
- (ii) If $d(O, Q) = 8$ cm, where does the point Q lie ?
- (iii) If $d(PQ) = 15$ cm, How many locations of point R are line on line ℓ ? At what distance will each of them be from point P ?



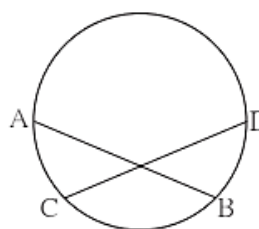
3) In the adjoining figure, O is the centre of the circle. From point R, seg RM and seg RN are tangent segments touching the circle at M and N. If $(OR) = 10$ cm and radius of the circle = 5 cm, then

- (1) What is the length of each tangent segment ?
- (2) What is the measure of $\angle MRO$?
- (3) What is the measure of $\angle MRN$?



4)

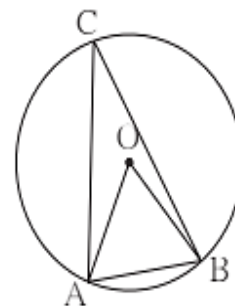
In figure ,chord $AB \cong$ chord CD ,
Prove that, arc $AC \cong$ arc BD



5)

In figure , in a circle with centre O, length of chord AB is equal to the radius of the circle. Find measure of each of the following.

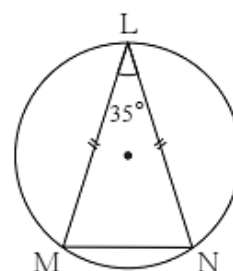
- (1) $\angle AOB$ (2) $\angle ACB$
(3) arc AB



6)

In figure , chord $LM \cong$ chord LN , $\angle L = 35^\circ$
find (i) $m(\text{arc MN})$

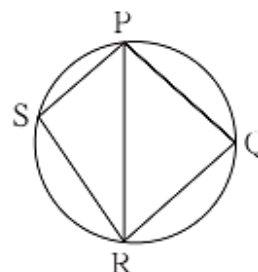
(ii) $m(\text{arc LN})$



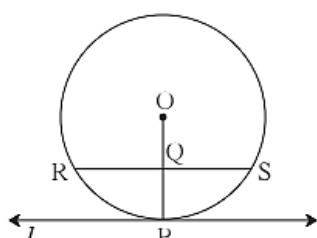
7) Prove that, any rectangle is a cyclic quadrilateral.

8)

In figure , PQRS is cyclic.
side $PQ \cong$ side RQ . $\angle PSR = 110^\circ$,
Find- (1) measure of $\angle PQR$
(2) $m(\text{arc PQR})$
(3) $m(\text{arc QR})$



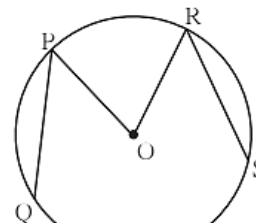
9)



In figure , line ℓ touches the circle with centre O at point P. Q is the mid point of radius OP. RS is a chord through Q such that chords $RS \parallel$ line ℓ . If $RS = 12$ find the radius of the circle

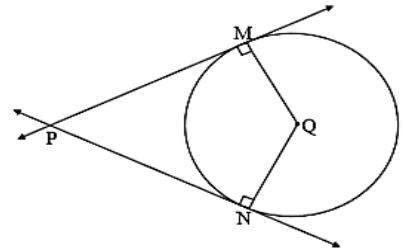
10)

In figure , O is the centre of a circle,
chord $PQ \cong$ chord RS If $\angle POR = 70^\circ$
and $(\text{arc RS}) = 80^\circ$, find (1) $m(\text{arc PR})$ (2)
 $m(\text{arc QS})$ (3) $m(\text{arc QSR})$



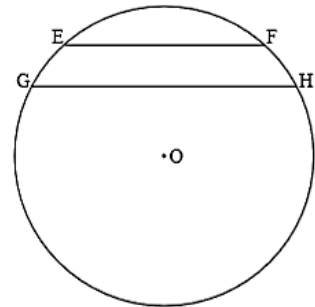
11)

In the adjoining figure circle with Centre Q touches the sides of $\angle MPN$ at M and N. If $\angle MPN = 40^\circ$, find measure of $\angle MQN$.



12)

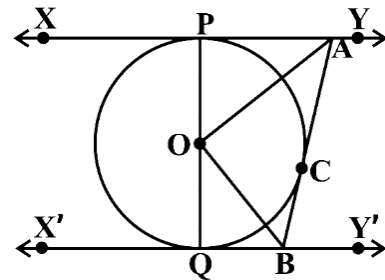
In the figure if O is the center of the circle and two chords of the circle EF and GH are parallel to each other. Show that $\angle EOG \cong \angle FOH$



Q. 7. Solve the following sub-questions. (4 marks question)

1)

In the figure segment PQ is the diameter of the circle with center O. The tangent to the circle drawn from point C on it, intersects the tangents drawn from points P and Q at points A and B respectively, prove that $\angle AOC = 90^\circ$

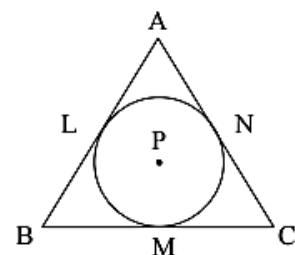


2) The chords AB and CD of the circle intersect at point M in the interior of the same circle then prove that $CM \times BD = BM \times AC$.

3)

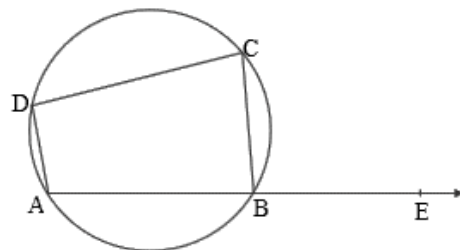
A circle with centre P is inscribed in the $\triangle ABC$. Side AB, side BC and side AC touches the circle at points L, M and N respectively. Radius of the circle is r.

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



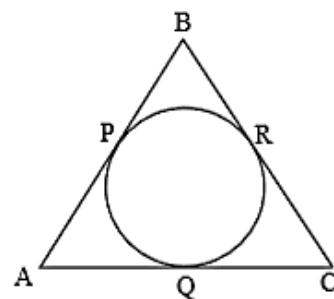
4)

In the figure $\square ABCD$ is a cyclic quadrilateral. If $m(\text{arc } ABC) = 230^\circ$. then find $\angle ABC$, $\angle CDA$, $\angle CBE$

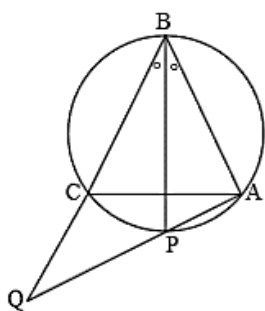


5)

The figure $\triangle ABC$ is an isosceles triangle with a perimeter of 44 cm. The sides AB and BC are congruent and the length of the base AC is 12 cm. If a circle touches all three sides as shown in the figure, then find the length of the tangent segment drawn to the circle from the point B



6)

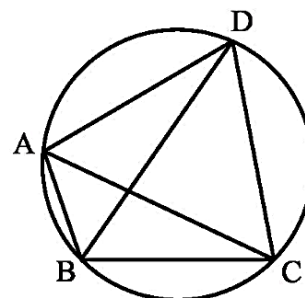


In the figure $\triangle ABC$ is an equilateral triangle. The angle bisector of $\angle B$ will intersect the circumcircle $\triangle ABC$ at point P.

Then prove that : $CQ = CA$.

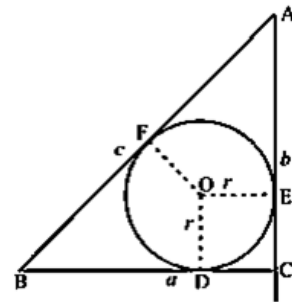
7)

In the figure quadrilateral ABCD is cyclic, If $m(\text{arc } BC) = 90^\circ$ and $\angle DBC = 55^\circ$. Then find the measure of $\angle BCD$.



- 8) Given : A circle inscribed in a right angled $\triangle ABC$. If $\angle ACB = 90^\circ$ and the radius of the circle is r .

To prove : $2r = a + b - c$



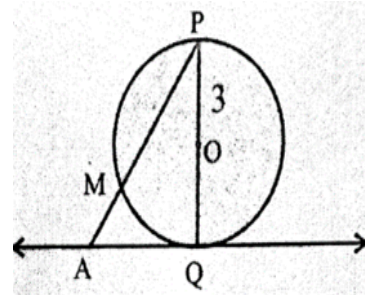
- 9) In a circle with centre P , chord AB is parallel to a tangent and intersects the radius drawn from the point of contact to its midpoint. If $AB = 16\sqrt{3}$ then find the radius of the circle.

- 10) In the figure, O is the center of the circle.

Line AQ is a tangent. If $OP = 3$

$m(\text{arc } PM) = 120^\circ$

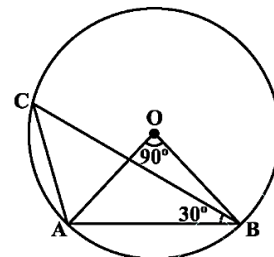
then find the length of AP ?



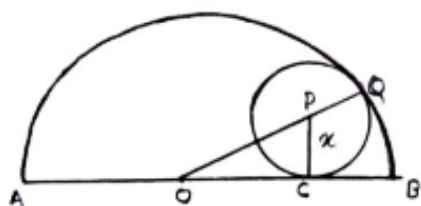
Q. 8. Solve the following sub-questions (3 marks each)

- 1) In the figure, O is the centre of the circle and $\angle AOB = 90^\circ$, $\angle ABC = 30^\circ$

Then find $\angle CAB$?



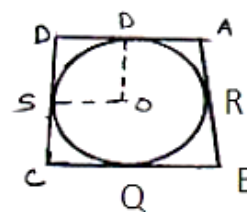
2)



In the figure a circle with center P touches the semicircle at points Q and C having center O. if diameter $AB = 10$, $AC = 6$ then find the radius x of the smaller circle?

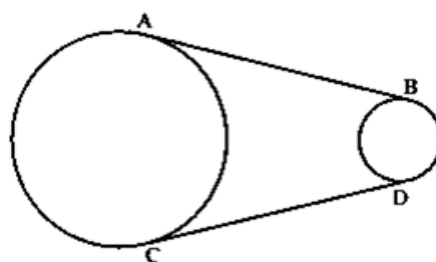
3)

In the figure a circle touches all the sides of quadrilateral ABCD from the inside. The center of the circle is O. If $AD \perp DC$ and $BC = 38$, $QB = 27$, $DC = 25$ then find the radius of the circle?



4)

If AB and CD are the common tangents in the circles of two unequal (different) radii then show that $\text{seg } AB \cong \text{seg } CD$



5) Circles with centres A, B and C touch each other externally. If $AB = 36$, $BC = 32$, $CA = 30$, then find the radii of each circle.

4. Geometric Constructions

Question 1) (A) choose the correct alternative answer for each of the following sub question. Write the correct alphabet.

1) number of tangents can be drawn to a circle from the point on the circle.

A) 3 B) 2 C) 1 D) 0

2) The tangents drawn at the end of a diameter of a circle are.....

A) Perpendicular B) parallel C) congruent D) can't say

3) $\triangle LMN \sim \triangle HIJ$ and $\frac{LM}{HI} = \frac{2}{3}$ then

A) $\triangle LMN$ is a smaller triangle.

B) $\triangle HIJ$ is a smaller triangle.

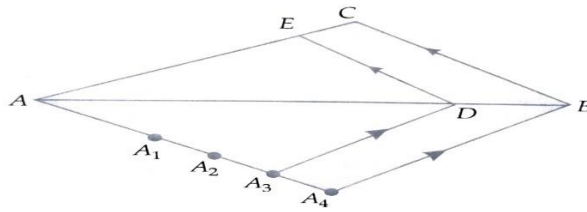
C) Both triangles are congruent.

D) Can't say.

4)number of tangents can be drawn to a circle from the point outside the circle.

A) 2 B) 1 C) one and only one D) 0

5)



In the figure $\Delta ABC \sim \Delta ADE$ then the ratio of their corresponding sides is -----.

A) $\frac{3}{1}$

B) $\frac{1}{3}$

C) $\frac{3}{4}$

D) $\frac{4}{3}$

6) Which theorem is used while constructing a tangent to the circle by using center of a circle?

A) tangent - radius theorem.

B) Converse of tangent - radius theorem.

C) Pythagoras theorem

D) Converse of Pythagoras theorem.

7) $\Delta PQR \sim \Delta ABC$, $\frac{PR}{AC} = \frac{5}{7}$ then

A) ΔABC is greater.

B) ΔPQR is greater.

C) Both triangles are congruent.

D) Can't say.

8) $\triangle ABC \sim \triangle AQR$. $\frac{AB}{AQ} = \frac{7}{5}$ then which of the following option is true.

A) A-Q-B B) A-B-Q C) A-C-B D) A-R-B

Question 1 (B) solve the following examples (1 mark each)

- 1) Construct $\angle ABC = 60^\circ$ and bisect it.
- 2) Construct $\angle PQR = 115^\circ$ and divide it into two equal parts.
- 3) Draw Seg AB of length 9.7cm. Take point P on it such that AP = 3.5 cm and A-P-B. Construct perpendicular to seg AB from point P.
- 4) Draw seg AB of length 4.5 cm and draw its perpendicular bisector.
- 5) Draw seg AB of length 9 cm and divide it in the ratio 3:2.
- 6) Draw a circle of radius 3 cm and draw a tangent to the circle from point P on the circle.

Question 2) (A) Solve the following examples as per the instructions given in the activity. (2 marks each)

- 1) Draw a circle and take any point P on the circle. Draw ray OP



Draw perpendicular to ray OP from point P.

2) Draw a circle with center O and radius 3cm



Take any point P on the circle.



Draw ray OP.



Draw perpendicular to ray OP from point P

1) To draw tangents to the circle from the end points of the diameter of the circle.

Construct a circle with center O. Draw any diameter AB of it.



Draw ray OA and OB



Construct perpendicular to ray OA from point A



Construct perpendicular to Ray OB from point B

Question 2) (B) Solve the following examples (2 marks each)

- 1) Draw a circle of radius 3.4 cm take any point P on it. Draw tangent to the circle from point P.
- 2) Draw a circle of radius 4.2 cm take any point M on it. Draw tangent to the circle from point M.
- 3) Draw a circle of radius 3 cm. Take any point K on it. Draw a tangent to the circle from point K without using center of the circle.
- 4) Draw a circle of radius 3.4 cm. Draw a chord MN 5.7 cm long in a circle. Draw a tangent to the circle from point M and point N.
- 5) Draw a circle of 4.2 cm. Draw a tangent to the point P on the circle without using the center of the circle.
- 6) Draw a circle with a diameter AB of length 6 cm. Draw a tangent to the circle from the endpoints of the diameter.
- 7) Draw seg AB = 6.8 cm. Draw a circle with diameter AB. Draw points C on the circle apart from A and B. Draw line AC and line CB Write the measure of angle ACB .

Question 3) (A) Do the activity as per the given instructions. (3 marks each)

1) Complete the following activity to draw tangents to the circle.

- a) Draw a circle with radius 3.3 cm and center O. Draw chord PQ of length 6.6cm.. Draw ray OP and ray OQ.
- b) Draw a line perpendicular to the ray OP from P.

c) Draw a line perpendicular to the ray OQ from Q.

2) Draw a circle with center O. Draw an arc AB of 100° measure.

Perform the following steps to draw tangents to the circle from point A and B.

a) Draw a circle with any radius and center P.

b) Take any point A on the circle.

c) Draw ray PB such $\angle APB = 100^\circ$.

d) Draw perpendicular to ray PA from point A.

e) Draw perpendicular to ray PB from point B.

3) Do the following activity to draw tangents to the circle without using center of the circle.

a) Draw a circle with radius 3.5 cm and take any point C on it.

b) Draw chord CB and an inscribed angle CAB

c) With the center A and any convenient radius draw an arc intersecting the sides of angle BAC in points M and N.

d) Using the same radius draw and center C, draw an arc intersecting the chord CB at point R.

e) Taking the radius equal to $d(MN)$ and center R, draw an arc intersecting the arc drawn in the previous step. Let D be the point of intersection of these arcs. Draw line CD. Line CD is the required tangent to the circle.

Question 3 B) Solve the following examples (3 marks each):

1) $\triangle ABC \sim \triangle PBQ$, In $\triangle ABC$, $AB = 3$ cm, $\angle B = 90^\circ$, $BC = 4$ cm.

Ratio of the corresponding sides of two triangles is 7:4. Then construct

$\triangle ABC$ and $\triangle PBQ$

2) $\triangle RHP \sim \triangle NED$, In $\triangle NED$, $NE = 7$ cm, $\angle D = 30^\circ$, $\angle N = 20^\circ$ and $\frac{HP}{ED} = \frac{4}{5}$. Then construct $\triangle RHP$ and $\triangle NED$.

3) $\triangle PQR \sim \triangle ABC$, In $\triangle PQR$ $PQ = 3.6$ cm, $QR = 4$ cm, $PR = 4.2$ cm ratio of the corresponding sides of triangle is 3:4 then construct $\triangle PQR$ and $\triangle ABC$.

4) Construct an equilateral $\triangle ABC$ with side 5 cm. $\triangle ABC \sim \triangle LMN$, ratio of the corresponding sides of triangle is 6:7 then construct $\triangle LMN$ and $\triangle ABC$

5) Draw a circle with center O and radius 3.4. Draw a chord MN of length 5.7 cm in a circle. Draw a tangent to the circle from point M and N.

6) Draw a circle with center O and radius 3.6 cm. draw a tangent to the circle from point B at a distance of 7.2 cm from the center of the circle.

7) Draw a circle with center C and radius 3.2 cm. Draw a tangent to the circle from point P at a distance of 7.5 cm from the center of the circle.

8) Draw a circle with a radius of 3.5 cm. Take the point K anywhere on the circle. Draw a tangent to the circle from K (without using the center of the circle).

9) Draw a circle of radius 4.2 cm. Draw arc PQ measuring 120°
Draw a tangent to the circle from point P and point Q.

10) Draw a circle of radius 4.2 cm. Draw a tangent to the circle from a point 7 cm away from the center of the circle.

11) Draw a circle of radius 3 cm and draw chord XY 5 cm long. Draw the tangent of the circle passing through point X and point Y (without using the center of the circle).

Question 4) solve the following examples. (4 marks each)

1) $\triangle AMT \sim \triangle AHE$, In $\triangle AMT$, $AM = 6.3$ cm

$\angle MAT = 120^\circ$, $AT = 4.9$ cm, $\frac{AM}{HA} = \frac{7}{5}$ then construct $\triangle AMT$ and $\triangle AHE$.

2) $\triangle RHP \sim \triangle NED$, In $\triangle NED$, $NE = 7$ cm. $\angle D = 30^\circ$, $\angle N = 20^\circ$, $\frac{HP}{ED} = \frac{4}{5}$ then construct $\triangle RHP$ and $\triangle NED$.

3) $\triangle ABC \sim \triangle PBR$, $BC = 8$ cm, $AC = 10$ cm, $\angle B = 90^\circ$,

$\frac{BC}{BR} = \frac{5}{4}$ then construct $\triangle ABC$ and $\triangle PBR$

4) $\triangle AMT \sim \triangle AHE$, In $\triangle AMT$ $AM=6.3$ cm, $\angle TAM=50^\circ$, $AT=5.6$ cm, $\frac{AM}{AH}=\frac{7}{5}$, then construct $\triangle AMT$ and $\triangle AHE$.

5) Draw a circle with radius 3.3cm. Draw a chord PQ of length 6.6cm .

Draw tangents to the circle at points P and Q. Write your observation about the tangents.

6) Draw a circle with center O and radius 3 cm. Take the point P and the point Q at a distance of 7 cm from the center of the circle on the opposite side of the circle at the intersection passing through the center of the circle Draw a tangent to the circle from the point P and the point Q.

Question 5) Solve the following examples (3 marks each)

1) Draw a circle with radius 4cm and construct two tangents to a circle such that when those two tangents intersect each other outside the circle they make an angle of 60° with each other.

2) $AB = 6$ cm, $\angle BAQ = 50^\circ$. Draw a circle passing through A and B so that AQ is the tangent to the circle.

3) Draw a circle with radius 3 cm. Construct a square such that each of its side will touch the circle from outside.

4) Take points P and Q on the same side of line AB Draw a circle passing through point P and point Q so that it touches line AB.

5) Draw any circle with radius greater than 1.8 cm and less than 3 cm.

Draw a chord AB 3.6 cm long in this circle. Tangent to the circle passing through A and B without using the center of the circle

6) Draw a circle with center O and radius 3 cm. Take point P outside the circle such that $d(O, P) = 4.5$ cm. Draw tangents to the circle from point P.

7) Draw a circle with center O and radius 2.8 cm. Take point P in the exterior of a circle such that tangents PA and PB drawn from point P make an angle $\angle APB$ of measure 70° .

8) Point P is at a distance of 6 cm from line AB. Draw a circle of radius 4cm passing through point P so that line AB is the tangent to the circle.

.....

...

Trigonometry

Que.) 1 A) .Choose the correct alternative from those given below each question : (1 mark for each MCQ)

1. $\cos \theta \cdot \sec \theta = ?$

- A) 1 B) 0 C) $\frac{1}{2}$ D) $\sqrt{2}$

2. $\sec 60^\circ = ?$

- A) $\frac{1}{2}$ B) 2 C) $\frac{2}{\sqrt{3}}$ D) $\sqrt{2}$

3. $1 + \cot^2 \theta = ?$

- A) $\frac{\tan^2 \theta}{\cos^2 \theta}$ B) $\sec^2 \theta$ C) $\operatorname{cosec}^2 \theta$ D)

4. $\cot \theta \cdot \tan \theta = ?$

- A) 1 B) 0 C) 2 D) $\sqrt{2}$

5. $\sec^2 \theta - \tan^2 \theta = ?$

- A) 0 B) 1 C) 2 D) $\sqrt{2}$

6. $\sin^2 \theta + \sin^2(90^\circ - \theta) = ?$

- A) 0 B) 1 C) 2 D) $\sqrt{2}$

7. $\frac{1 + \cot^2 A}{1 + \tan^2 A} = ?$

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

8. $\sin \theta = \frac{1}{2}$ then $\theta = ?$

- A) 30° B) 45° C) 60° D) 90°

9. $\tan (90-\theta) = ?$

- A) $\sin \theta$ B) $\cos \theta$ C) $\cot \theta$ D) $\tan \theta$

10. $\cos 45^0 = ?$

- A) $\sin 45^0$ B) $\sec 45^0$ C) $\cot 45^0$ D) $\tan 45^0$

11. If $\sin \theta = \frac{3}{5}$ then $\cos \theta = ?$

- A) $\frac{5}{3}$ B) $\frac{3}{5}$ C) $\frac{4}{5}$ D) $\frac{5}{4}$

12. Which is not correct formula ?

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

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

C) $\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$

D) $\sin^2 \theta + \cos^2 \theta = 1$

13. If $\angle A = 30^0$ then $\tan 2A = ?$

- A) 1 B) 0 C) $\frac{1}{\sqrt{3}}$ D) $\sqrt{3}$

Que.) 1 B). Solve the following questions : (1 mark each)

1. $\frac{1 - \tan^2 45^0}{1 + \tan^2 45^0} = ?$

2. If $\tan \theta = \frac{13}{12}$ then $\cot \theta = ?$

3. Prove that $\operatorname{cosec} \theta \times \sqrt{1 - \cos^2 \theta} = 1$.

4. If $\tan \theta = 1$ then $\sin \theta \cdot \cos \theta = ?$

5. If $2 \sin \theta = 3 \cos \theta$ then $\tan \theta = ?$

6. If $\cot (90 - A) = 1$ then $\angle A = ?$

7. If $1 - \cos^2 \theta = \frac{1}{4}$ then $\theta = ?$

8. Prove that $\frac{\cos (90 - A)}{\sin A} = \frac{\sin (90 - A)}{\cos A}$.

9. If $\tan \theta \times \boxed{} = \sin \theta$ then $\boxed{} = ?$

10. $(\sec \theta + \tan \theta) \cdot (\sec \theta - \tan \theta) = ?$

11. $\frac{\sin 75^\circ}{\cos 15^\circ} = ?$

Que.) 2 A). Complete the following activities (2 marks each)

*** (Write complete answers, don't just fill the boxes)**

1. Prove that $\cos^2 \theta \cdot (1 + \tan^2 \theta) = 1$. Complete the activity given below.

Activity $\Rightarrow$ L . H . S. = $\boxed{}$

= $\cos^2 \theta \times \boxed{} \dots (1 + \tan^2 \theta = \boxed{})$

= $(\cos \theta \times \boxed{})^2$

= 1^2

= 1

= R . H . S.

2. $\frac{5}{\sin^2 \theta} - 5 \cot^2 \theta$, Complete the activity given below.

$$\begin{aligned}
 \text{Activity} \Rightarrow \frac{5}{\sin^2 \theta} - 5 \cot^2 \theta \\
 &= \boxed{} \left(\frac{1}{\sin^2 \theta} - \cot^2 \theta \right) \\
 &= 5 \left(\boxed{} - \cot^2 \theta \right) \dots\dots\dots \left(\frac{1}{\sin^2 \theta} = \boxed{} \right) \\
 &= 5 (1) \\
 &= \boxed{}
 \end{aligned}$$

3. If $\sec \theta + \tan \theta = \sqrt{3}$. Complete the activity to find the value of $\sec \theta - \tan \theta$

Activity $\Rightarrow \boxed{} = 1 + \tan^2 \theta \dots\dots\dots$ (Fundamental trigonometric identity)

$$\boxed{} - \tan^2 \theta = 1$$

$$(\sec \theta + \tan \theta) \cdot (\sec \theta - \tan \theta) = \boxed{}$$

$$\sqrt{3} \cdot (\sec \theta - \tan \theta) = 1$$

$$(\sec \theta - \tan \theta) = \boxed{}$$

4. If $\tan \theta = \frac{9}{40}$. Complete the activity to find the value of $\sec \theta$.

Activity $\Rightarrow \sec^2 \theta = 1 + \boxed{} \dots\dots\dots$ (Fundamental trigonometric identity)

$$\sec^2 \theta = 1 + \boxed{}^2$$

$$\sec^2 \theta = 1 + \boxed{}$$

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

Que.) 2 B). Solve the following questions : (2 marks each)

1. If $\cos \theta = \frac{24}{25}$ then $\sin \theta = ?$
2. Prove that $\frac{\sin^2 \theta}{\cos \theta} + \cos \theta = \sec \theta$.
3. Prove that $\frac{1}{\operatorname{cosec} \theta - \cot \theta} = \operatorname{cosec} \theta + \cot \theta$.
4. If $\cos (45^\circ + x) = \sin 30^\circ$ then $x = ?$
5. If $\tan \theta + \cot \theta = 2$ then $\tan^2 \theta + \cot^2 \theta = ?$
6. Prove that $\sec^2 \theta + \operatorname{cosec}^2 \theta = \sec^2 \theta \times \operatorname{cosec}^2 \theta$.
7. Prove that $\cot^2 \theta \times \sec^2 \theta = \cot^2 \theta + 1$.
8. If $3 \sin \theta = 4 \cos \theta$ then $\sec \theta = ?$
9. If $\sin 3A = \cos 6A$ then $\angle A = ?$
10. Prove that $\sec^2 \theta - \cos^2 \theta = \tan^2 \theta + \sin^2 \theta$.
11. Prove that $\frac{\tan A}{\cot A} = \frac{\sec^2 A}{\operatorname{cosec}^2 A}$.
12. Prove that $\frac{\sin \theta + \tan \theta}{\cos \theta} = \tan \theta (1 + \sec \theta)$.
13. Prove that $\frac{\cos^2 \theta}{\sin \theta} + \sin \theta = \operatorname{cosec} \theta$.
14. Prove that $\frac{\cos \theta}{1 + \sin \theta} = \frac{1 - \sin \theta}{\cos \theta}$.

Que.) 3 A). Complete the following activities (3 marks each)

*** (Write complete answers, don't just fill the boxes)**

1. $\sin^4 A - \cos^4 A = 1 - 2\cos^2 A$, For proof of this complete the activity given below.

Activity $\Rightarrow$ L . H . S. =

$$\begin{aligned}
&= (\sin^2 A + \cos^2 A) \quad (\quad) \\
&= 1 \quad (\quad) \quad \dots\dots\dots (\sin^2 A + \quad = 1) \\
&= \quad - \cos^2 A \quad \dots\dots\dots (\sin^2 A = 1 - \cos^2 A) \\
&= \quad \\
&= \text{R. H. S.}
\end{aligned}$$

2. $\tan^2 \theta - \sin^2 \theta = \tan^2 \theta \times \sin^2 \theta$.For proof of this complete the activity given below.

$$\begin{aligned}
\text{Activity} \Rightarrow \text{L. H. S.} &= \quad \\
&= \quad \left(1 - \frac{\sin^2 \theta}{\tan^2 \theta} \right) \\
&= \tan^2 \theta \left(1 - \frac{\quad}{\frac{\sin^2 \theta}{\cos^2 \theta}} \right) \\
&= \tan^2 \theta \left(1 - \frac{\sin^2 \theta}{1} \times \frac{\cos^2 \theta}{\quad} \right) \\
&= \tan^2 \theta \left(1 - \quad \right) \\
&= \tan^2 \theta \times \quad \dots\dots\dots (1 - \cos^2 \theta = \sin^2 \theta) \\
&= \text{R. H. S.}
\end{aligned}$$

3. If $\tan \theta = \frac{7}{24}$ then To find value of $\cos \theta$ complete the activity given below.

Activity $\Rightarrow \sec^2 \theta = 1 + \quad \dots\dots\dots$ (Fundamental tri. identity)

$$\begin{aligned}
\sec^2 \theta &= 1 + \quad^2 \\
\sec^2 \theta &= 1 + \frac{\quad}{576} \\
\sec^2 \theta &= \frac{\quad}{576}
\end{aligned}$$

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

$$\cos \theta = \boxed{} \dots\dots\dots (\cos \theta = \frac{1}{\sec \theta})$$

4. To prove $\cot \theta + \tan \theta = \operatorname{cosec} \theta \times \sec \theta$. Complete the activity given below.

$$\text{Activity} \Rightarrow \text{L. H. S.} = \boxed{}$$

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

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

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

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

$$= \boxed{}$$

$$= \text{R. H. S.}$$

Que.) 3 B). Solve the following questions : (3 marks each)

1. If $\sec \theta = \frac{41}{40}$ then find values of $\sin \theta$, $\cot \theta$, $\operatorname{cosec} \theta$.
2. If $5 \sec \theta - 12 \operatorname{cosec} \theta = 0$ then find values of $\sin \theta$, $\sec \theta$.
3. Prove that $\frac{\tan(90^\circ - \theta) + \cot(90^\circ - \theta)}{\operatorname{cosec} \theta} = \sec A$.
4. Prove that $\cot^2 \theta - \tan^2 \theta = \operatorname{cosec}^2 \theta - \sec^2 \theta$.
5. Prove that $\frac{1 + \sin \theta}{1 - \sin \theta} = (\sec \theta + \tan \theta)^2$.
6. Prove that $\frac{\sin \theta}{\sec \theta + 1} + \frac{\sin \theta}{\sec \theta - 1} = 2 \cot \theta$.
7. Prove that $\frac{\sec A}{\tan A + \cot A} = \sin A$.

8. Prove that $\frac{\sin \theta + \operatorname{cosec} \theta}{\sin \theta} = 2 + \cot^2 \theta$.

9. Prove that $\frac{\cot A}{1 - \cot A} + \frac{\tan A}{1 - \tan A} = -1$.

10. Prove that $\sqrt{\frac{1 + \cos A}{1 - \cos A}} = \operatorname{cosec} A + \cot A$.

11. Prove that $\sin^4 A - \cos^4 A = 1 - 2\cos^2 A$.

12. Prove that $\sec^2 \theta - \cos^2 \theta = \tan^2 \theta + \sin^2 \theta$.

13. Prove that $\operatorname{cosec} \theta - \cot \theta = \frac{\sin \theta}{1 + \cos \theta}$.

14. In ΔABC , $\cos C = \frac{12}{13}$ and $BC = 24$ then $AC = ?$

15. Prove that $\frac{1 + \sec A}{\sec A} = \frac{\sin^2 A}{1 - \cos A}$.

16. If $\sin A = \frac{3}{5}$ then show that $4 \tan A + 3 \cot A = 6 \cos A$

17. Prove that $\frac{1 + \sin B}{\cos B} + \frac{\cos B}{1 + \sin B} = 2 \sec B$.

Que. 4 Solve the following questions : (Challenging questions, 4 marks each)

1. Prove that

$$\sin^2 A \cdot \tan A + \cos^2 A \cdot \cot A + 2 \sin A \cdot \cos A = \tan A + \cot A$$

2. Prove that $\sec^2 A - \operatorname{cosec}^2 A = \frac{2\sin^2 A - 1}{\sin^2 A \cdot \cos^2 A}$.

3. Prove that $\frac{\cot A + \operatorname{cosec} A - 1}{\cot A - \operatorname{cosec} A + 1} = \frac{1 + \cos A}{\sin A}$.

4. Prove that $\sin \theta (1 - \tan \theta) - \cos \theta (1 - \cot \theta) = \operatorname{cosec} \theta - \sec \theta$

5. If $\cos A = \frac{2\sqrt{m}}{m+1}$ then Prove that $\operatorname{cosec} A = \frac{m+1}{m-1}$.

6. If $\sec A = x + \frac{1}{4x}$ then show that $\sec A + \tan A = 2x$ or $\frac{1}{2x}$.

7. In ΔABC , $\sqrt{2} AC = BC$, $\sin A = 1$, $\sin^2 A + \sin^2 B + \sin^2 C = 2$ then $\angle A = ?$ $\angle B = ?$ $\angle C = ?$

8. Prove that $\sin^6 A + \cos^6 A = 1 - 3 \sin^2 A \cdot \cos^2 A$.

9. Prove that $2(\sin^6 A + \cos^6 A) - 3(\sin^4 A + \cos^4 A) + 1 = 0$.

10. Prove that $\frac{\cot A}{1 - \tan A} + \frac{\tan A}{1 - \cot A} = 1 + \tan A + \cot A = \sec A \cdot \operatorname{cosec} A + 1$

Que. 5 Solve the following questions : (Creative questions, 3 marks each)

1. If $3 \sin A + 5 \cos A = 5$ then show that $5 \sin A - 3 \cos A = \pm 3$.

2. If $\cos A + \cos^2 A = 1$ then $\sin^2 A + \sin^4 A = ?$

3. If $\operatorname{cosec} A - \sin A = p$ आणि $\sec A - \cos A = q$ then prove that

$$(p^2 q)^{\frac{2}{3}} + (pq^2)^{\frac{2}{3}} = 1$$

4. Show that $\tan 7^\circ \times \tan 23^\circ \times \tan 60^\circ \times \tan 67^\circ \times \tan 83^\circ = \sqrt{3}$.

5. If $\sin \theta + \cos \theta = \sqrt{3}$ then show that $\tan \theta + \cot \theta = 1$.

6. If $\tan \theta - \sin^2 \theta = \cos^2 \theta$ then show that $\sin^2 \theta = \frac{1}{2}$.

7. Prove that

$$(1 - \cos^2 A) \cdot \sec^2 B + \tan^2 B (1 - \sin^2 A) = \sin^2 A + \tan^2 B$$