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Question Bank

Standard :- 10th

Subject :- Mathematics Part 2

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 $\Delta ABC \sim \Delta PQR$ and $AB : PQ = 3 : 4$ then $A(\Delta ABC) : A(\Delta PQR) = ?$

(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 $\Delta XYZ \sim \Delta PQR$ and $A(\Delta XYZ) = 25\ cm^2$, $A(\Delta PQR) = 4\ cm^2$ then $XY : PQ = ?$

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

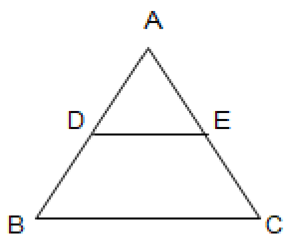
4.Ratio of areas of two similar tringles is 9:25. ______ is the ratio of their corresponding sides.

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

5. $Given$ $\Delta ABC \sim \Delta DEF$, if $\angle A = 45°$ and $\angle E = 35°$ then $\angle B = ?$

(A) 45° (B)35° (C)25° (D) 40°

6. In fig,seg DE|| 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) $\frac{AD}{DB} = \frac{AE}{EC}$

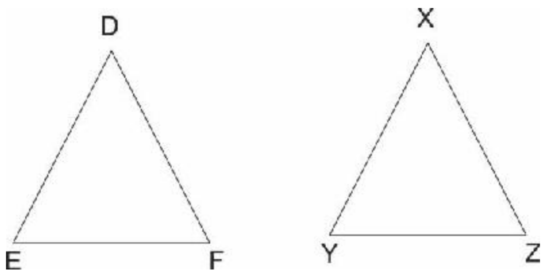
7.If $\Delta XYZ \sim \Delta PQR$ then $\frac{XY}{PQ} = \frac{YZ}{QR} = ?$

(A) $\frac{XZ}{PR}$ (B) $\frac{XZ}{PQ}$ (C) $\frac{XZ}{QR}$ (D) $\frac{YZ}{PQ}$

8. If $\Delta ABC \sim \Delta LMN$ and $\angle A = 60°$ then $\angle L = ?$

(A) 45° (B)60° (C)25° (D) 40°

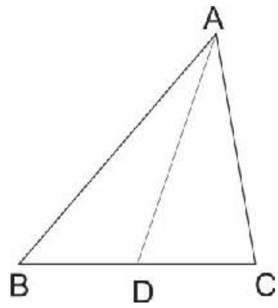
9. In ΔDEF and ΔXYZ , $\frac{DE}{XY} = \frac{FE}{YZ}$ & $\angle E \cong \angle Y$ _______ test gives similarity between ΔDEF & ΔXYZ.



(A)AAA (B)SAS

(C) SAA (D)SSS

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

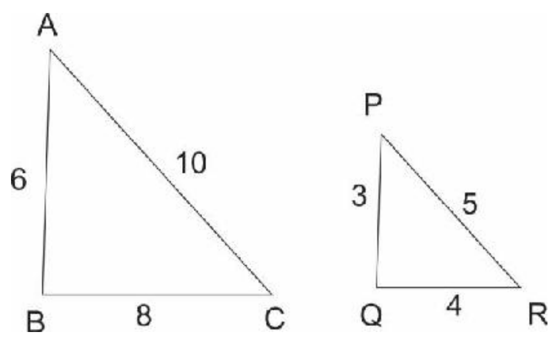


(A)2:3 (B)3:2

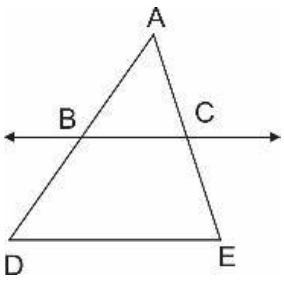
(C) 5:3 (D)3:4

Q.1 B) Solve 1 mark

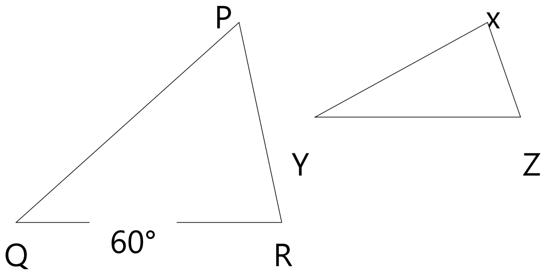
B.1 Are triangles in figure similar ? If yes then write the test of similarity.



2. In fig line BC|| 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.



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

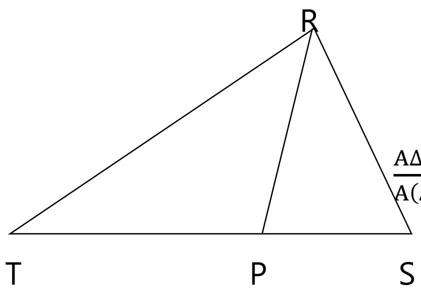
4. If $\Delta ABC \sim \Delta LMN$ & $\angle B = 40°$ then $\angle M$ =? Give reason .

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

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

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

8.

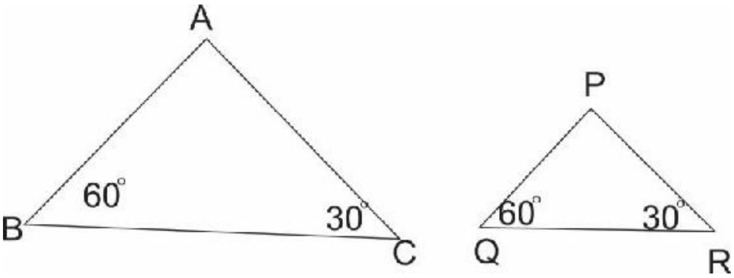


In fig. TP =10 cm PS=6 cm

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

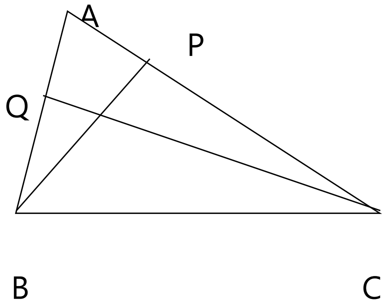
9.Ratio of corresponding sides of two similar triangles is 4:7 then find the ratio of their areas = ?

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



Q.2 A. Complete the activity 2marks

1.



in fig. BP ⊥ AC, CQ ⊥ AB A-P-C & A-Q-B then show that ΔAPB & ΔAQC are similar

In ΔAPB & ΔAQC $\angle APB = [\quad]^0 \ldots (I)$

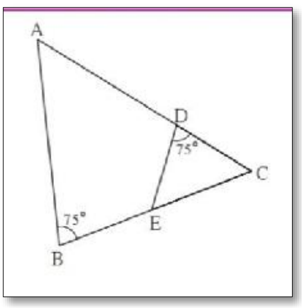
$\angle AQC = [\quad]^0 \ldots (II)$

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

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

ΔAPB~ ΔAQC [..........]

2.Observe the figure & complete following activity.



in fig $\angle B = 75^0$, $\angle D = 75^0$

$\angle B \cong [\ldots.]$ each of 75^0

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

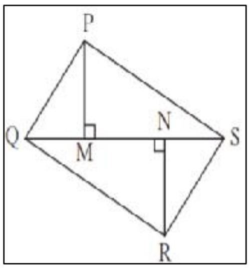
ΔABC~ Δ[........]

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

3. ΔABC~ ΔPQR , A(ΔABC)= 80sqcm A(ΔPQR) = 125 sqcm then complete

$\frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{80}{125} = \frac{[....]}{[....]}$ hence $\frac{AB}{PQ} = \frac{[.....]}{[.....]}$

4.in fig.PM=10 cm A(ΔPQS)= 100sqcm A(ΔQRS) = 110sqcm then NR?

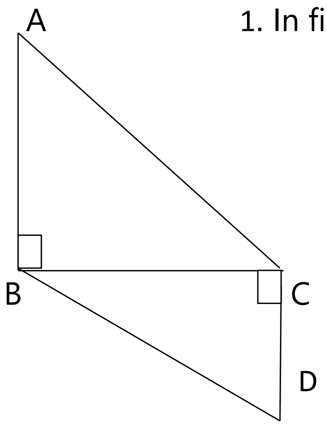


ΔPQS &ΔQRS having seg QS common base

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

$\frac{A(\Delta PQS)}{A(\Delta QRS)} = \frac{[....]}{NR}$, $\frac{100}{110} = \frac{[....]}{NR}$, NR = [.....] cm

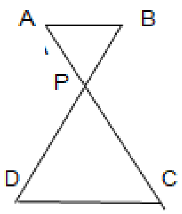
Q.2 B



1. In figAB ⊥ BC and DC ⊥ BC AB=6, DC=4

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

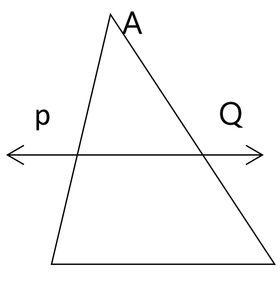
2. In fig seg AC & seg BD intersect each other at point p



$\frac{AP}{PC} = \frac{BP}{PD}$ then prove that ΔABP~ ΔDPC

3. ΔABP~ ΔDEF & A(ΔABP): A(ΔDEF) = 144: 81 then AB: DE =?

4. From given information is PQ|| BC ?

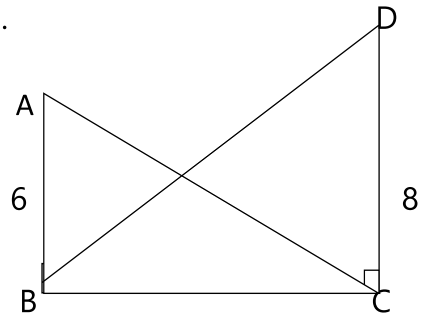


AP=2, PB=4 AQ=3,QC=6

B C

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.

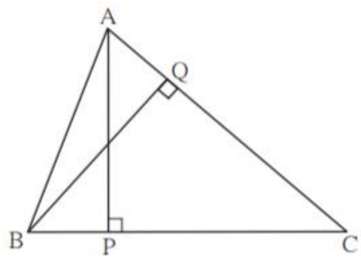


from adjoining figure

$\angle ABC = 90°$ $\angle DCB = 90°$ $AB = 6$,

DC=8 then $\frac{A(\Delta ABC)}{A(\Delta BCD)} = ?$

Q.3A) Complete the following activity 3 marks



1. ΔABC APpendicular BC & BQ perpendicular AC , B-P-C,A-Q-C then show that ΔCPA~ ΔCQB if AP=7,BQ=8 BC=12 then AC=? In ΔCPA and ΔCQB $\angle CPA \cong [\angle \ldots]$.(each 90^0)

$\angle ACP \cong [\angle \ldots]$.(common angle)

ΔCPA~ ΔCQB (..........similarity test)

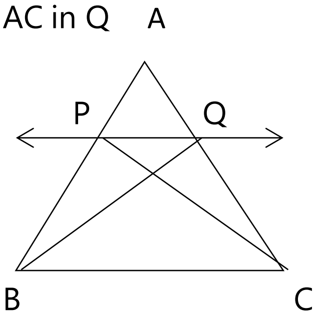
$\frac{AP}{BQ} = \frac{[....]}{BC}$ (corresponding sides of similar triangle)

$\frac{7}{8} = \frac{[....]}{12}$

ACx[.....]=7x12 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 divdes sides in same proportion.

Given :In ΔABC line l II side BC & line l intersect side AB in P & side AC in Q



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

$Proof$: ΔAPQ&ΔPQB have equal height

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

$\frac{\mathrm{A(\Delta APQ)}}{\mathrm{A(\Delta PQC)}}=\frac{[....]}{\mathrm{QC}}$ (areas in proportion of baseII

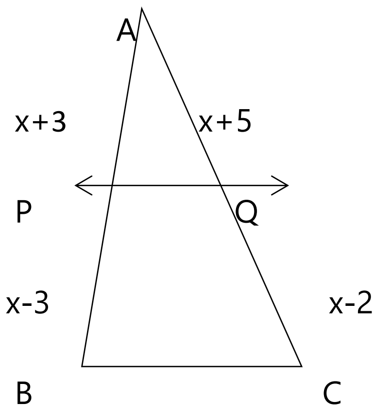
ΔPQC&ΔPQB have [.....]is common base SegPQ II Seg BC hence height of: ΔAPQ&ΔPQB

A(ΔPQC)=A(Δ......)...........(III)

$\frac{\mathrm{A(\Delta APQ)}}{\mathrm{A(\Delta PQB)}}=\frac{\mathrm{A(\Delta\ ....)}}{\mathrm{A(\Delta\ ....)}}$ ....[(I),(II)&(III)]

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

3.



From fig.seg PQ II side BC

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

then complete the activity to find the value of x

inΔPQB, PQ II side BC

$\frac{\mathrm{AP}}{\mathrm{PB}}=\frac{\mathrm{AQ}}{[...]}$ ....([...........])

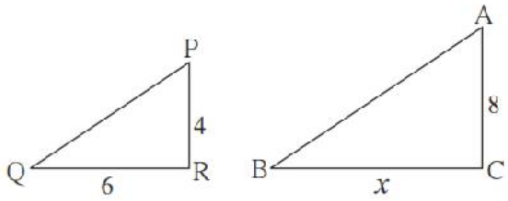
$$\frac{\mathrm{x+3}}{\mathrm{x-3}}=\frac{\mathrm{x+5}}{[...]}$$

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

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

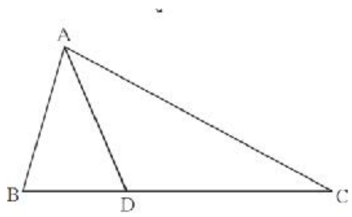
x=[....]

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.

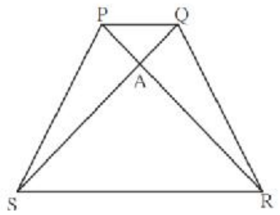
2.In ΔABC B-D-C & BD=7, BC=20 then find the following ratio



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

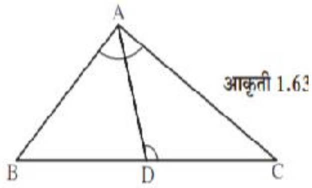
2) $\frac{A(\Delta ABD)}{A(\Delta ABC)}$

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



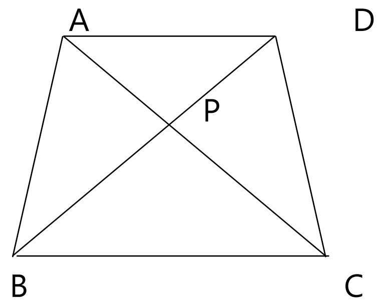
3. In given fig.quadrilateral PQRS side PQ II|side SR ,AR=5 AP, then prove that , SR=5PQ

4.



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

5.



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

Q.4 4 marks

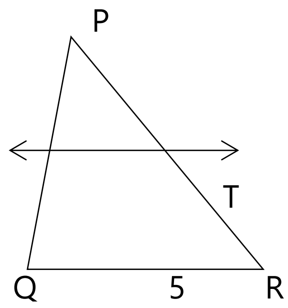
1. Side of eqilateral triangle PQR is 8 cm then find the area of triangle whose side is half of side of triangle PQR

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 perimter 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 ll 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& heght 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 ΔABC, AB = $6\sqrt{3}$ cm, AC = 12 cm, and BC = 6 cm then m∠A = ?

(A)30^0 (B) 60^0 (C) 90^0 (D) 45^0

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.

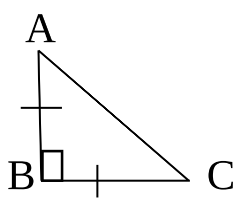
11. Out of all numbers from given dates, which is a Pythagoras triplet ?

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

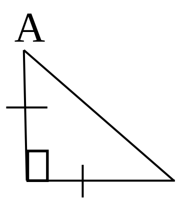
Que. 1 (B). Solve the following questions : (1 mark each)

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

2. From given figure, In Δ ABC, AB⊥ BC, AB =BC then m ∠A = ?

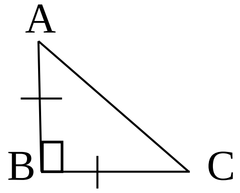


3. From given figure, In Δ ABC, AB⊥ BC, AB =BC, AC = $2\sqrt{2}$ then l (AB) = ?



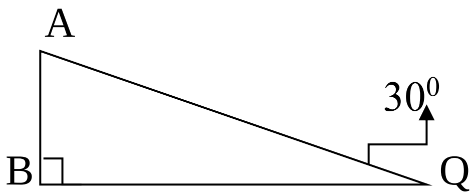
B C

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



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

6. From given figure, In Δ ABQ, 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.

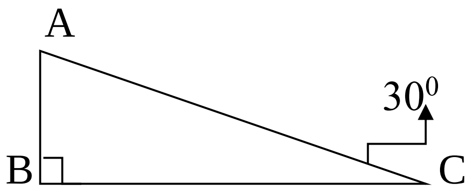
9. If a triangle having sides 8 cm., 15 cm., and 17 cm., then state wheather given triangle is right angled triangle or not.

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 Δ ABC, If AC = 12 cm. then AB = ?



Activity : From given figure, In Δ ABC, ∠ ABC = 90^0, ∠ ACB = 30^0

∴ ∠ **BAC =** [ ]

∴ ΔABC is $30^0 - 60^0 - 90^0$ Δ.

∴ In ΔABC by Property of $30^0 - 60^0 - 90^0$ Δ.

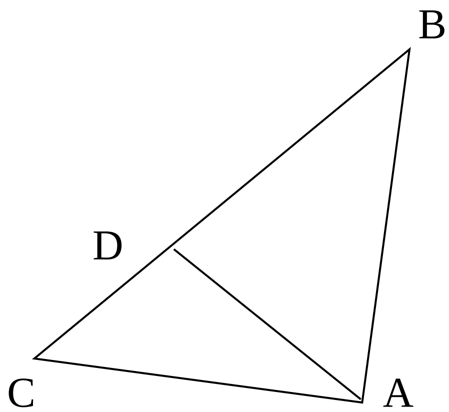
∴AB $= \frac{1}{2}$AC and [ ] $= \frac{\sqrt{3}}{2}$ AC.

∴ [ ] $= \frac{1}{2} \times 12$ And BC $= \frac{\sqrt{3}}{2} \times 12$

∴ [ ] = 6 व BC = $6\sqrt{3}$.

2. From given figure, In ΔABC, AD⊥BC, then prove that

$AB^2 + CD^2 = BD^2 + AC^2$ by completing activity.



Activity : From given figure, In Δ ABC, By pythagoras theorem

$AC^2 = AD^2 +$ [ ]

∴ $AD^2 = AC^2 - CD^2$….. (I)

Also, In ΔABD, by pythagoras theorem,

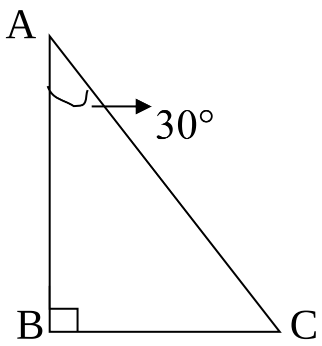
$AB^2 =$ [ ] $+ BD^2$

∴ $AD^2 = AB^2 - BD^2$……….. (II)

$\therefore$ [ ] $- BD^2 = AC^2 -$ [ ]

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

3. From given figure, In Δ ABC, If $\angle ABC = 90^0$ $\angle CAB = 30^0$, AC = 14 then for finding value of AB and BC, complete the following activity.



Activity : In Δ ABC, If $\angle ABC = 90^0$ $\angle CAB = 30^0$

$\therefore \angle BCA =$ [ ]

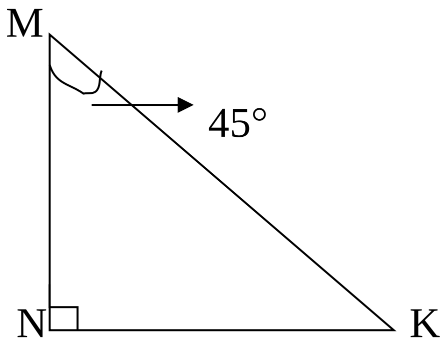
By theorem of $30^0 - 60^0 - 90^0$ Δ^{le},

$\therefore$ [ ] $= \frac{1}{2} AC$ and [ ] $= \frac{\sqrt{3}}{2} AC$

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

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

4. From given figure, In Δ MNK, If $\angle MNK = 90^0$ $\angle M = 45^0$, MK = 6 then for finding value of MK and KN, complete the following activity.



Activity : In Δ MNK, If ∠MNK = 90^0 ∠ M=45^0 ...(given)

∴ ∠ K = ☐ .... (remaining angles of Δ MNK)

By theorem of $45^0 – 45^0 – 90^0$ Δ^{le},

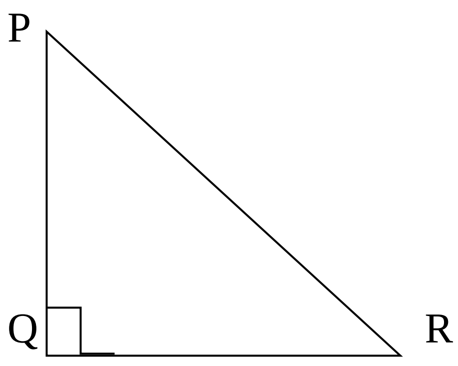
∴ ☐ = $\frac{1}{\sqrt{2}}$ MK and ☐ = $\frac{1}{\sqrt{2}}$ MK

∴ MN = $\frac{1}{\sqrt{2}} \times$ ☐ & KN = $\frac{1}{\sqrt{2}} \times 6$

∴ 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

∴ PQ = 6 m

∴ QR = ?

In ΔPQR , m ∠PQR = 90^0

By Pythagoras Theorem,

∴ PQ^2 + [ ] = PR^2…… (I)

Here, PR =10 , PQ = [ ]

From equation (I)

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

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

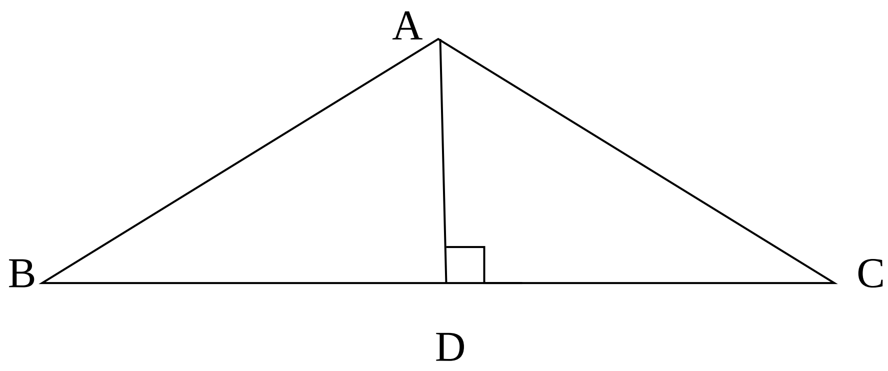
$QR^2 = 100 – 64$

QR^2 = [ ]

QR =6

∴ The distance of foot of the ladder from the base of wall is 6 m.

6. From the given figure, In Δ ABC, If AD⊥BC, ∠C = 45^0, AC = $8\sqrt{2}$, BD = 5 then for finding value of AD and BC, complete the following activity.



Activity : In Δ ADC, If $\angle ADC = 90^0$ $\angle C = 45^0$ ... (given)

$\therefore \angle DAC = \square$ .... (remaining angles of Δ ADC)

By theorem of $45^0 - 45^0 - 90^0$ Δ^{le},

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

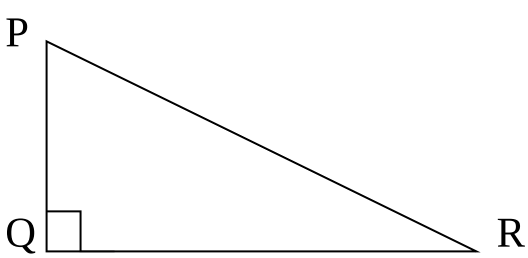
$\therefore AD = \frac{1}{\sqrt{2}} \times \square$ & $DC = \frac{1}{\sqrt{2}} \times 8\sqrt{2}$

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

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

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 $\angle PQR = 90^0$



By Pythagoras Theorem,

∴ $PQ^2 +$ ☐ $= PR^2$…… (I)

∴ $PR^2 = 9^2 + 12^2$

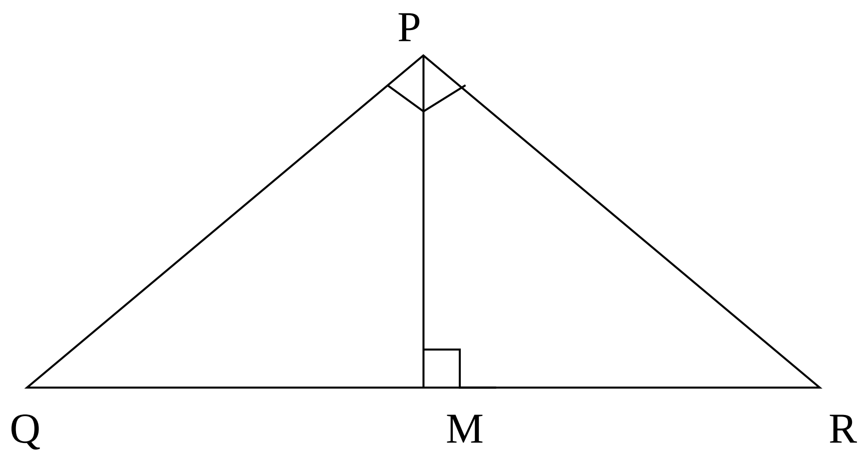
∴ $PR^2 =$ ☐ $+ 144$

∴ $PR^2 =$ ☐

∴ $PR = 15$

∴ Length hypotenuse of triangle PQR is ☐ cm.

8. From given figure, In Δ PQR, If ∠QPR = 90^0, PM ⊥QR, PM = 10, QM = 8 then for finding the value of QR, complete the following activity.



Activity : In Δ PQR, If ∠QPR = 90^0, PM ⊥QR, ...,.. (given)

In Δ PMQ, By Pythagoras Theorem,

∴ $PM^2 +$ ☐ $= PQ^2$…… (I)

∴ $PQ^2 = 10^2 + 8^2$

∴ $PQ^2 =$ ☐ $+ 64$

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

$\therefore PQ = \sqrt{164}$

Here, ΔQPR ~ΔQMP ~ΔPMR

∴ ΔQMP ~ΔPMR

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

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

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

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

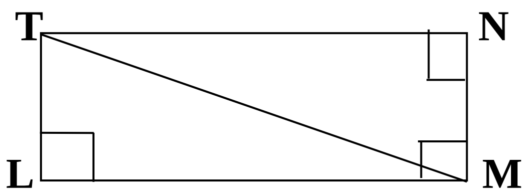
And,

QR =QM + MR

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

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

Activity :



As shown in fig. ▢ LMNT is rectangle

∴ Area of rectangle = length X breadth

∴ Area of rectangle = $\boxed{}$ X breadth

∴ 192 = $\boxed{}$ X breadth

∴ Breadth = 12 cm.

Also, ∠ TLM = 90^0 ..... (each angle of rectangle is right angle)

In ΔTLM, By Pythagoras theorem

$\therefore TM^2 = TL^2 +$ [ ]

$\therefore TM^2 = 12^2 +$ [ ]

$\therefore TM^2 = 144 +$ [ ]

$\therefore TM^2 = 400$

$\therefore TM = 20$

10. In Δ LMN, 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 = [ ]

$\therefore l^2 =$ [ ] ; $m^2 = 169$; $n^2 = 144$.

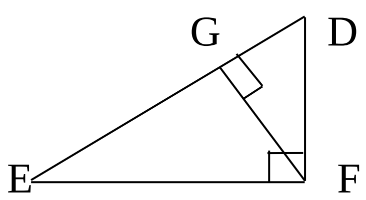
$\therefore l^2 + n^2 = 25 + 144 =$ [ ]

$\therefore$ [ ] $+ l^2 = m^2$

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

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

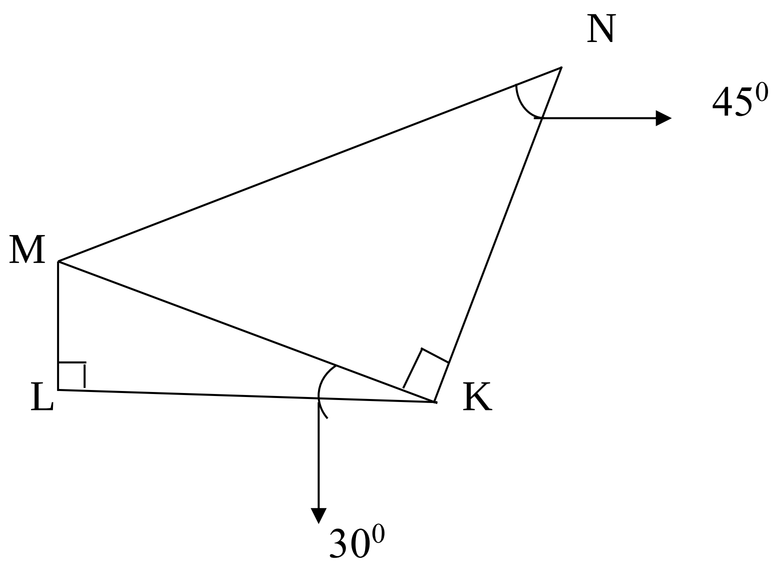
1. As shwon in figure, $\angle DFE = 90^0$, FG$\perp$ED, If GD = 8, FG = 12, then (1) EG = ? (2) FD = ? (3) EF = ?



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

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

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



3 Circle.

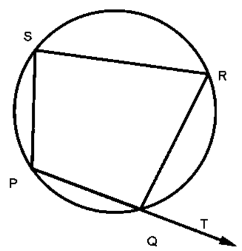
Q.1. Four alternative answers for each of the following questions are given. Choose the correct alternative.

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 $\angle ACB = 65°$, find m(arc ACB).
   (A) 65° (B) 130° (C) 295° (D) 230°
4) In a cyclic □ 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 drawn 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(arc AB) = m(arc BC) = 120°. No point, except point B, is common to the arcs. Which is the type of Δ ABC?
   (A) Equilateral triangle (B) Scalene triangle
   (C) Right angled triangle (D) Isosceles triangle

10) In □ PQRS if $\angle RSP = 80°$ then find $\angle RQT$?



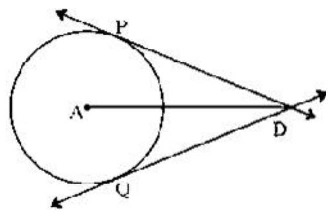
   (A) 100° (B) 80°
   (C) 70° (D) 110°

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,

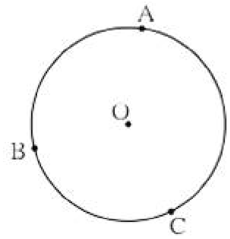
If DP = 7 cm. So find the length of the segment DQ?



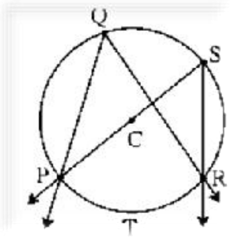
3) Two circles having radii 3.5 cm and 4.8 cm touch each other internally. Find the distance between their centres.

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

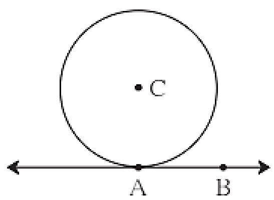
5) A, B, C are any points on the circle with centre O. If m arc (BC) = 110° and m arc (AB) = 125°, find measure arc AC



6) In the figure if ∠PQR = 50° then find ∠PSR

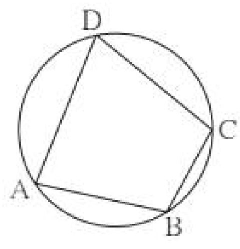


7)

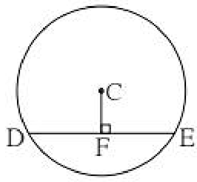


In the adjoining figure the radius of a circle with centre C is 6 cm, line AB is a tangent at A. What is the measure of ∠ CAB? Why?

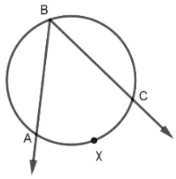
8) In the figure quadrilateral ABCD is a cyclic, if ∠DAB = 75° then find measure of ∠DCB



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

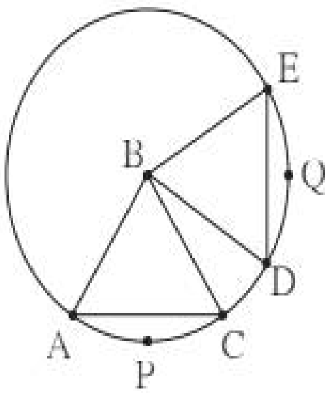


10) In the figure, if ∠ABC = 35° then find m(*arc* AXC) ?



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

arc APC ≅ arc DQE

To Prove : Chord AC ≅chord DE

Proof : In Δ ABC and Δ DBE,

side AB ≅ side DB [ ]

side BC ≅ side [ ] [ ]

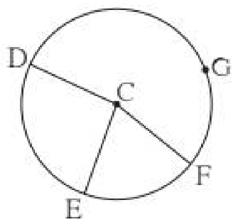
∠ ABC ≅ ∠ DBE (measure of congruent arcs)

Δ ABC ≅ Δ DBE [ ]

2) In figure , points G, D, E, F are concyclic points of a circle with centre C.

∠ ECF = 70°, m(arc DGF) = 200°

find m(arc DEF) by completing activity.



m(arc EF) = ∠ECF ..... (Definition of measure of arc)

∴ m(arc EF) = [ ]

But; m(arc DE)+ m(arc EF)+ m(arc DGF) = [ ] (measure of a complete circle)

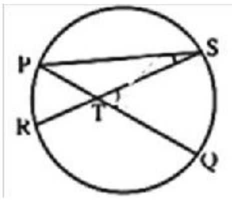
∴ m(arc DE) = [ ]

∴ m(arc DEF) = m(arc DE) + m(arc EF)

∴ m(arc DEF) = [ ]

3)

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



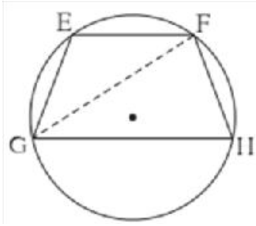
Proof: **m∠STQ** = **m∠SPQ** + [ ] .. (Theorem of the external angle of a triangle)

= $\frac{1}{2}$ m(कंस SQ) + [ ] ...... (inscibed angle theorem)

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

4) In figure, chord EF || chord GH. Prove that, chord EG≅ chord FH. Fill in the blanks and write the proof.

Proof : Draw seg GF.



$\angle$**EFG** = $\angle$**FGH** ...... ☐ (I)

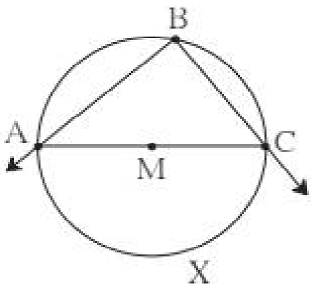
$\angle$**EFG** = ☐ .....(inscribed angle theorem) (II)

$\angle$**FGH** = ☐ .....(inscribed angle theorem) (III)

∴ m(arc EG) = ☐ .....[By (I) , (II) व (III)]

chord EG ≅ 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.

∴ m(arc AXC) = ☐

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

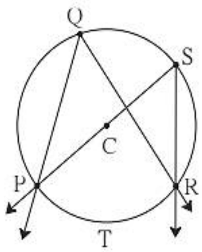
$\angle$ABC = ☐ **.....(**Inscribed angle theorem**)**

$= \frac{1}{2} \times$ ☐

∴ m $\angle$ABC = ☐

∴ $\angle$ABC is a right angle.

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



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

To prove : ∠PQR ≅ ∠PSR.

Proof : m∠PQR = $\frac{1}{2}$ × [m(arc PTR)] .... (i) ☐

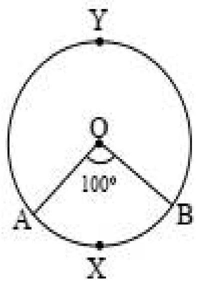
m∠ ☐ = $\frac{1}{2}$ × [m(arc PTR)] .... ☐

m∠ ☐ = m∠PSR ....By(i) &(ii)

∴ ∠PQR ≅ ∠PSR

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

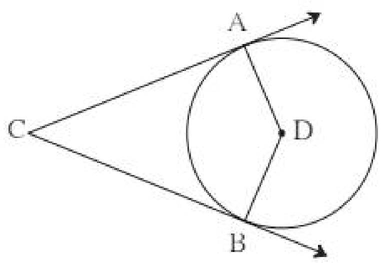
The type of arc



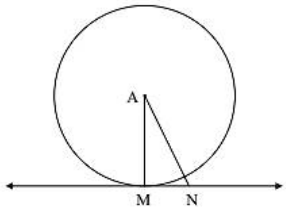
Type of circular arc	Name of circular arc	Measure of circular arc
Minor arc		
Major arc		

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

1) In the adjoining figure circle with Centre D touches the sides of ∠ACB at A and B. If ∠ ACB = 52°, find measure of ∠ ADB.

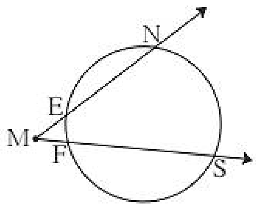


2) In the adjoining figure, the line MN touches the circle with center A at point M. If AN = 13 and MN = 5 then find the radius of the circle?



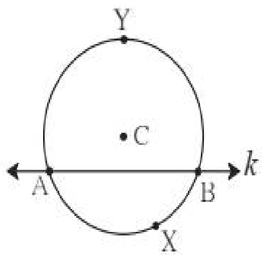
3) What is the distance between two parallel tangents of a circle having radius 4.5 cm? Justify your answer.

4) In figure, m(arc NS) = 125°, m(arc EF) = 37°, find the measure ∠NMS.

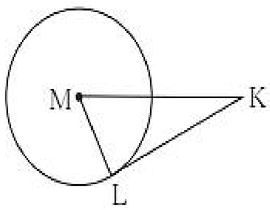


5) Length of a tangent segment drawn from a point which is at a distance 15 cm from the centre of a circle is 12 cm, find the diameter of the circle?

6) In the figure a circle with center C has m (arc AXB) = 100° then find central ∠ACB and measure m (arc AYB).



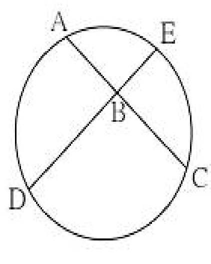
7)



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 ∠K and ∠M.

8) In figure, chords AC and DE intersect at B.
If ∠ ABE = 108°, m(arc AE) = 95°, find m(arc DC) .

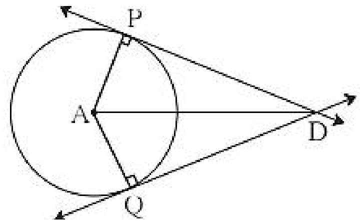


Q. **5. Complete the following activity. (3 marks each)**

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 ΔPAD and ΔQAD ,

Seg PA ≅ [ ] **.... (** radii of the same circle. **)**

Seg AD ≅ Seg AD **.... (** [ ] **)**

$\angle APD \cong \angle AQD = 90°$ **....(**tangent theorem **)**

∴ $\Delta PAD \cong \Delta QAD$ **....** ([ ] **)**

∴seg DP ≅ seg DQ **.... (** [ ] **)**

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

Solution : □ MRPN is cyclic

The opposite angles of a cyclic square are [ ]

$\angle R + \angle N =$ [ ]

$\therefore (5x-13)° + (4x+4°) =$ [ ]

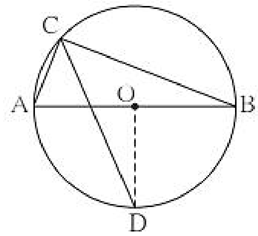
$\therefore 9x = 189$

$\therefore x =$ [ ]

$\therefore \angle R = (5x-13)° =$ [ ]

$\therefore \angle N = (4x+4)° =$ [ ]

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



Proof Draw seg OD.

∠ACB = [ ] .... angle inscribed in semicircle

∠DCB = [ ] .... CD is the bisector of ∠C

m(arc DB) = [ ] .... inscribed angle theorem

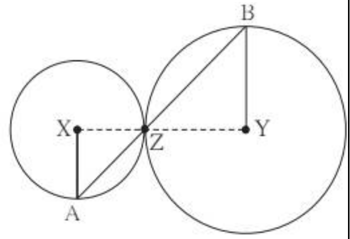
∠DOB = [ ] .... definition of measure of an arc (I)

seg OA ≅ seg OB .... [ ] (II)

∴line OD is [ ] of seg AB .... From (I) and (II)

∴seg AD ≅ 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 || 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 [ ]

∴ ∠XZA ≅ [ ] .... opposite angles

Let ∠XZA = ∠BZY = *a* ..... (I)

Now, seg XA ≅ seg XZ .... (radii of the same circle.)

∴ ∠XAZ = [ ] = *a* .... (isosceles triangle theorem) (II)

similarly, seg YB ≅ seg YZ .... (radii of the same circle.)

∴ ∠BZY = [ ] = *a* .... (isosceles triangle theorem.) (III)

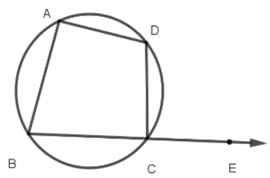
∴from (I), (II), (III),
∠XAZ = ☐

∴ radius XA || radius YB .... (☐)

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 : ☐ABCD is cyclic ,

☐ is the exterior angle of ☐ABCD



To prove : ∠DCE ≅ ∠BAD

Proof : ☐ + ∠BCD = ☐....(Angles in linear pair) (I)

☐ ABCD is a cyclic .

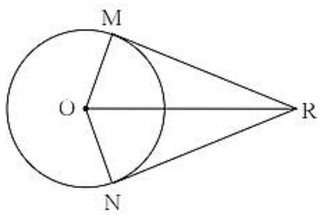
☐ + ∠BAD ☐ .....(Theorem of cyclic quadrilateral) (II)

By (I) and (II)

∠DCE + ∠BCD ☐ + ∠BAD

∠DCE ≅ ∠BAD

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



Proof : In ΔRMO and ΔRNO **,**

$\angle RMO \cong \angle RNO = 90°$ **....([ ])**

hypt OR ≅ hypt OR **.... ([ ])**

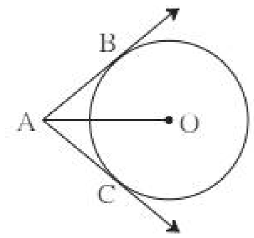
seg OM ≅ seg [ ] **.... (** radii of the same circle **)**

$\therefore \Delta RMO \cong \Delta RNO$ **.... ([ ])**

$\angle MOR \cong \angle NOR$

Similarly $\angle MRO \cong$ [ ] **.... ([ ])**

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, □ABOC is a square.



Proof : Draw segment OB and OC.

$\boldsymbol{\ell}(AB) = r$ ..... (Given) **(I)**

AB=AC .....([ ]) (II)

But OB = OC = r ..... ([ ]) (III)

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

AB= [ ] = OB = OC = r

∴ Quadrilateral ABOC is [ ] .

Similarly $\angle OBA =$ [ ] ....(Tangent Theorem)

If one angle of [ ] is right angle ,then it is a square.

∴ Quadrilateral ABOC is a suqare**.**

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

1) Prove the following theorems:

i) Opposite angles of a cyclic quadrilateral are supplementry.

ii) Tangent segments drawn from an external point to a circle are congruent.

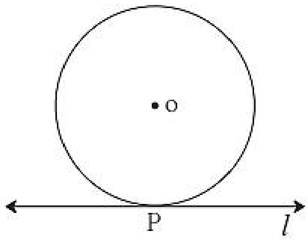
iii) Angles inscribed in the same arc are congruent**.**

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 ?

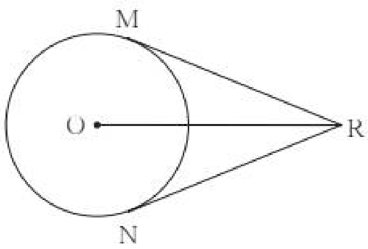


3) In the adjoining figure, O is the centre of the circle. From point R, seg RM and seg RN are tangent segments touching the circle at M and N. If (OR) = 10 cm and radius of the circle = 5 cm, then

(1) What is the length of each tangent segment ?

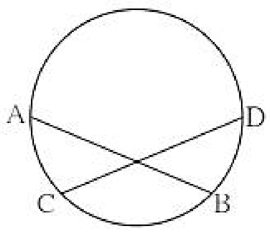
(2) What is the measure of ∠MRO ?

(3) What is the measure of ∠ MRN ?



4)

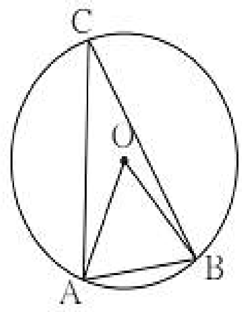
In figure ,chord AB ≅ chord CD,
Prove that, arc AC ≅ arc BD



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.

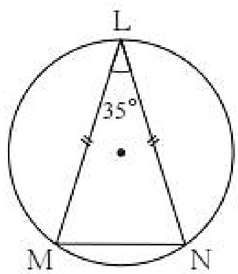
(1) ∠AOB (2) ∠ACB

(3) arc AB



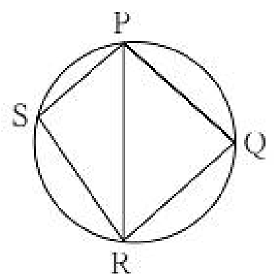
6) In figure , chord LM ≅ chord LN , ∠L = 35°
find (i) m(arc MN)

(ii) m(arc LN)

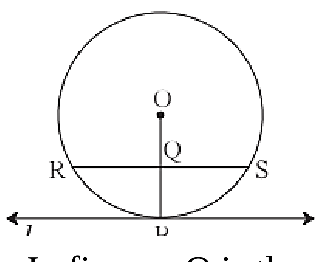


7) Prove that, any rectangle is a cyclic quadrilateral.

8) In figure , PQRS is cyclic.
side PQ ≅ side RQ. ∠ PSR = 110°,
Find- (1) measure of ∠ PQR
(2) m(arc PQR)
(3) m(arc QR)

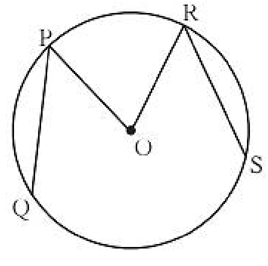


9)

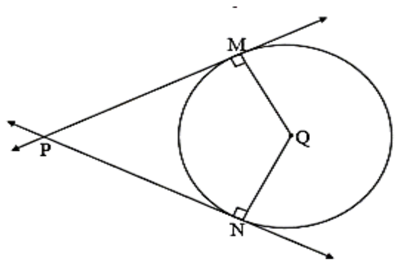


In figure , line ℓ touches the circle with centre O at point P. Q is the mid point of radius OP. RS is a chord through Q such that chords RS || line ℓ. If RS = 12 find the radius of the circle

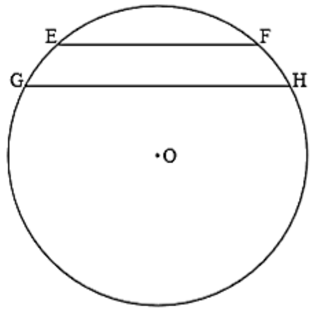
10) In figure , O is the centre of a circle, chord PQ ≅chord RS If ∠ POR = 70° and (arc RS) = 80°, find (1) m(arc PR) (2) m(arc QS) (3) m(arc QSR)



11) In the adjoining figure circle with Centre Q touches the sides of ∠MPN at M and N. If ∠ MPN = 40°, find measure of ∠ MQN.

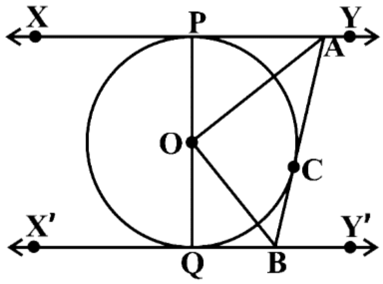


12) In the figure if O is the center of the circle and two chords of the circle EF and GH are parallel to each other. Show that **∠EOG ≅ ∠FOH**



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

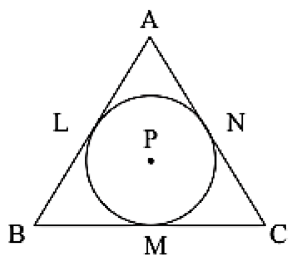
1) In the figure segment PQ is the diameter of the circle with center O. The tangent to the tangent circle drawn from point C on it , intersects the tangents drawn from points P and Q at points A and B respectively , prove that ∠AOC = 90°



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

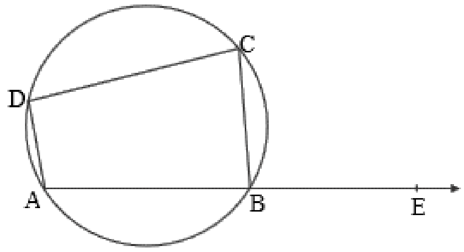
3) A circle with centre P is inscribed in the ΔABC. Side AB, side BC and side AC touches the circle at points L, M and N respectively. Radius of the circle is r.

Prove that : A(ΔABC) = $\frac{1}{2}(AB + BC + AC)$ × r



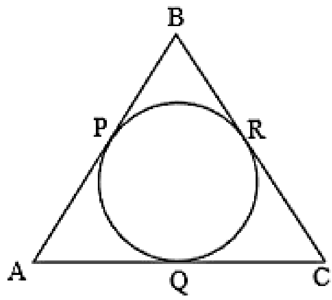
4)

In the figure □ABCD is a cyclic quadrilateral. If m(arc ABC) = 230°.then find ∠ABC ,∠CDA ,∠CBE

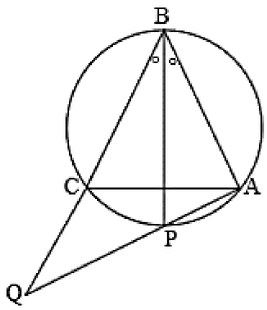


5)

The figure△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)

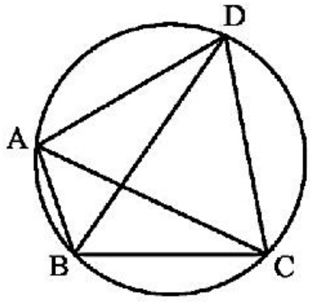


In the figure △ABC is an equilateral triangle.The angle bisector of ∠**B** will intersect the circumcircle △ABC at point P.

Then prove that : CQ = CA.

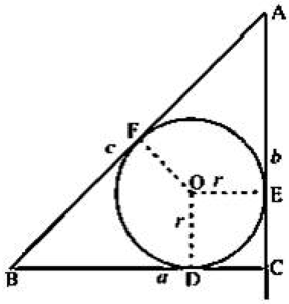
7)

In the figure quadrilateral ABCD is cyclic , If m(arc BC) = 90° and ∠DBC = 55°. Then find the measure of ∠BCD .



8) Given : A circle inscribed in a right angled ΔABC. If $\angle ACB = 90°$ and the radius of the circle is r.

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



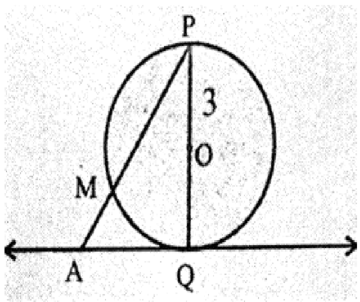
9) In a circle with centre P , chord AB is parallel to a tangent and intersects the radius drawn from the point of contact to its midpoint. If AB = $16\sqrt{3}$ then find the radius of the circle.

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

Line AQ is a tangent. If OP = 3

m(arc PM) = 120°

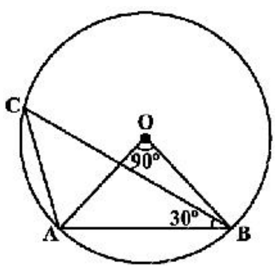
then find the length of AP?



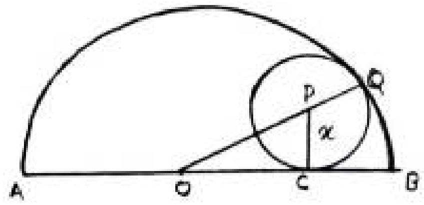
Q. 8. Solve the following sub-questions (3 marks each)

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

Then find $\angle CAB$**?**

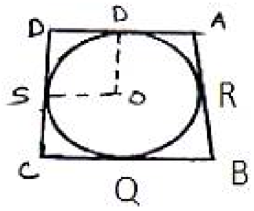


2)

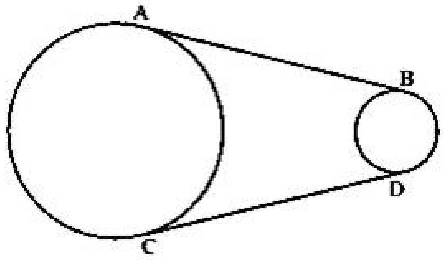


In the figure a circle with center P touches the semicircle at points Q and C having center O. if diameter AB = 10, AC = 6 then find the radius x of the smaller circle?

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⊥ 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 seg AB ≅ 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) $\Delta LMN \sim \Delta HIJ$ and $\frac{LM}{HI} = \frac{2}{3}$ then

   A) Δ LMN is a smaller triangle.

   B) Δ HIJ is a smaller triangle.

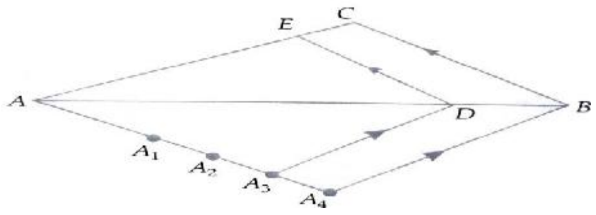
   C) Both triangles are congruent.

   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 Δ ABC ~Δ 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) ΔPQR ~ ΔABC, $\frac{PR}{AC} = \frac{5}{7}$ then

A) ΔABC is greater.

B) Δ PQR is greater.

C) Both triangles are congruent.

D) Can't say.

8) $\Delta ABC \sim \Delta AQR$. $\frac{AB}{AQ} = \frac{7}{5}$ 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 $\angle ABC = 60^0$ and bisect it.
2) Construct $\angle PQR = 115^0$ and divide it into two equal parts.
3) Draw Seg AB of lenght 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 100^0 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 $\angle APB = 100^0$.

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 ~ $\triangle$ PBQ, In $\triangle$ ABC, AB = 3 cm, $\angle$ B = 90^{0}, BC = 4 cm. Ratio of the corresponding sides of two triangles is 7:4. Then construct $\triangle$ ABC and $\triangle$ PBQ

2) ΔRHP ~ΔNED, In ΔNED,NE=7 cm ,$\angle D=30^{0}$, $\angle N=20^{0}$ and $\frac{HP}{ED}=\frac{4}{5}$. Then construct ΔRHP and ΔNED.

3) ΔPQR~ΔABC, In ΔPQR PQ=3.6cm, QR=4 cm, PR=4.2 cm ratio of the corresponding sides of triangle is 3:4 then construct ΔPQR and ΔABC.

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

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 120^0 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) $\Delta AMT \sim \Delta AHE$, In ΔAMT, AM =6.3 cm

$\angle MAT = 120^0$, AT = 4.9 cm, $\frac{AM}{HA}=\frac{7}{5}$ then construct ΔAMT and ΔAHE .

2) $\Delta RHP \sim \Delta NED$, In ΔNED, NE=7 cm. $\angle D=30^0$, $\angle N=20^0$, $\frac{HP}{ED}=\frac{4}{5}$ then construct ΔRHP and $\triangle NED$.

3) $\Delta ABC. \sim \Delta PBR$, BC=8 cm, AC=10 cm , $\angle B=90^0$,

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

4) ΔAMT. ~ΔAHE, In ΔAMT AM=6.3 cm, ∠TAM=50^0 ,AT=5.6cm, $\frac{AM}{AH}=\frac{7}{5}$, then construct △AMT and ΔAHE.

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 60^0 with each other.
2) AB = 6 cm, ∠BAQ = 50^0. 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 ∠APB of measure 70^{0}.

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.
....
...

Coordinate Geometry

Q. 1 A) MCQ

1) Point P is midpoint of segment AB where A(- 4,2) and B(6,2) then the coordinates of P are ---------

A) (-1, 2) B) (1, 2) C) (1, - 2) D) (-1, - 2)

2) The distance between Point P (2 , 2) and Q (5, x) is 5 cm then the value of x = ----------

A) 2 B) 6 C) 3 D) 1

3) The distance between points P (-1 , 1) and Q(5, -7) is ------------..

A) 11 cm B) 10 cm C) 5 cm D) 7 cm

4) If the length of the segment joining point L (x , 7) and point

M(1, 15) is 10 cm then the value of x is ---------

A) 7 B) 7 or -5 C) - 1 D) 1

5) Find distance between point A (-3 , 4) and origin O.

A) 7 cm B) 10 cm C) 5 cm D) -5 cm

6) If point P (1 , 1) divide segment joining point A and point B (-1 , -1) in the ratio 5 : 2 then the coordinates of A are ---------

A)(3 ,3) B)(6, 6) C)(2, 2) D)(1, 1)

7) If segment AB is parallel Y-axis and coordinates of A are (1, 3) then the coordinates of B are -------------

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

8) If point P is midpoint of segment joining point A (-4, 2) and point B(6, 2) then the coordinates of P are ------------

A)(-1, 2) B)(1 , 2) C)(1 , -2) D) (-1, - 2)

9) If point P divides segment AB in the ratio 1:3 where A(-5 , 3) and B(3 , -5) then the coordinates of P are -----------------

A)(-2, -2) B)(-1 , -1) C) (-3 , 1) D) (1, - 3)

10) If the sum of x-coordinates of the vertices of a triangle is 12 and the sum of Y-coordinates is 9 then the coordinates of centroid are ----------

A)(12 , 9) B)(9 , 12) C)(4, 3) D)(3 ,4)

Q. 1 B. Solve the following (1 mark each)

1) Find the coordinates of the point of intersection of the graph of the equation X = 2 and y = -3.
2) Find distance between point A (7, 5) and B (2, 5).
3) The coordinates of diameter AB of a circle are A (2, 7) and B (4 , 5) then find the coordinates of the centre.
4) Write the X-coordinate and Y-coordinate of point P(- 5 , 4).
5) What are the coordinates of origin?
6) Find distance of point A(6, 8) from origin:
7) Find coordinates of midpoint joining (-2 ,6) and (8 ,2)
8) Find the coordinates of centroid of a triangle whose vertices are (4, 7) , (8, 4) and (7 ,11).
9) Find distance between point O(0, 0) and B (-5 , 12).
10) Find coordinates of midpoint of point (0, 2) and (12, 14).

Q. 2 A) Complete the activity (each of 2 mark)

1) Find distance between point Q (3 , - 7) and point R (3, 3)

Solution: Suppose Q (x_1 , y_1) and point R (x_2 , y_2)

$X_1 = 3$, $y_1 = -7$ and $x_2 = 3$, $y_2 = 3$

Using distance formula,

d (Q, R) = $\sqrt{\square}$

$\therefore$ d (Q , R) $= \sqrt{\square + 100}$

$\therefore$ d (Q , R) $= \sqrt{\square}$

$\therefore$ d (Q , R) = $\square$

2) Find distance between point A(-1 , 1) and point B (5, -7) :

Solution : - Suppose A(x_1 , y_1) and B(x_2, y_2)

X_1 = -1, y_1 = 1 and x_2 = 5 , y_2 = -7

Using distance formula,

$$d(A, B) = \sqrt{(x2 - x1)^2 + (y2 - y1)^2}$$

$$\therefore d(A, B) = \sqrt{\square + ((-7) - \square)^2}$$

$$\therefore d(A, B) = \sqrt{\square}$$

$\therefore$ d (A , B) = $\square$

3) Find coordinates of the midpoint of a segment joining point A(-1 , 1) and point B(5 , -7).

Solution: - Suppose A(x_1 , y_1) and B(x_2, y_2)

X_1 = -1, y_1 = 1 and x_2 = 5 , y_2 = -7

Using midpoint formula,

$\therefore$ *Coordinates of midpoint of segment* AB =

$$\left(\frac{x1+x2}{2}, \frac{y1+y2}{2}\right) = \left(\frac{\square}{2}, \frac{\square}{2}\right)$$

$\therefore$ Coordinates of the midpoint $= \left(\frac{4}{2}, \frac{\square}{2}\right)$

$\therefore$ Coordinates of the midpoint = (2, $\square$)

4) The coordinates of the vertices of a triangle ABC are A (-7, 6) ,B(2 , -2) and C(8 , 5) find coordinates of its centroid.

Solution : - Suppose A(x_1 , y_1) and B(x_2,y_2) and C (x3, y3)

X_1 = -7, y_1 = 6 and x_2 = 2 , y_2 = -2 and x_3 = 8 , y_3 = 5

Using Centroid formula

∴ *Coordinates of the centroid of a triangle*

ABC= $\left(\frac{x1+x2+x3}{3} , \frac{y1+y2+y3}{3} \right) = \left(\frac{\square}{3} , \frac{\square}{3} \right)$

∴ *Coordinates of the centroid of a triangle* ABC = ($\frac{3}{3}$, $\square$)

∴ *Coordinates of the centroid of a triangle* ABC= (1, $\square$)

Q. 2 Solve (Each of 2 marks)

1) The point Q divides segment joining A (3, 5) and B (7, 9) in the ratio 2 : 3. Find the X-coordinate of Q.
2) If the distance between point L (x , 7) and point M (1, 15) is 10 then find the value of X.
3) Find the coordinates of midpoint of segment joining (22, 20) and (0 ,16)
4) Find distance CD where C(-3a , a), D(a, -2a).
5) Show that the point(11, -2) is equidistant from (4, -3) and (6, 3).

Q. 3 A) Complete the activity (Each of 3 marks)

1) If the point P (6,7) divides the segment joining A (8, 9) and B(1, 2) in some ratio. Find that ratio.

Solution : Point P divides segment AB in the ratio m : n.

A (8, 9) = (x_1 , y_1) , B (1, 2) = (x_2 , y_2) and P (6, 7) = (x, y)

Using Section formula of internal division,

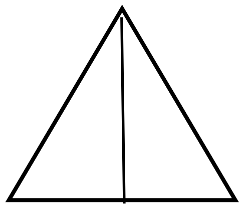
$\therefore\ 7 = \frac{m(\square) + n(9)}{m+n}$

$\therefore 7m + 7n = \square + 9n$

$\therefore 7m - \square = 9n - \square$

$\therefore \square = 2n$

$\therefore \frac{m}{n} = \square$



1) From the figure given alongside find the length of the median AD of triangle ABC .

Complete the activity.

Solution :- Here A (-1 , 1),B(5, -3), C (3, 5) and suppose D (x,y) are coordinates of point D.

Using midpoint formula,

$X = \frac{5+3}{2}$ $\qquad\qquad y = \frac{-3+5}{2}$

$\therefore\ x = \square$ $\qquad\qquad \therefore\ y = \square$

Using distance formula,

$$\therefore AD = \sqrt{(4 - \square)^2 + (1-1)^2}$$

$$\therefore AD = \sqrt{(\square)^2 + (0)^2}$$

$$\therefore AD = \sqrt{\square}$$

$$\therefore \textit{ The length of median AD } = \square$$

Q. 3 B) Solve the following (Each of 3 marks)

1) Show that P(-2 , 2), Q (2, 2) and R (2, 7) are vertices of a right angled triangle.
2) Show that the point (0 , 9) is equidistant from the points (-4,1) and (4 , 1).

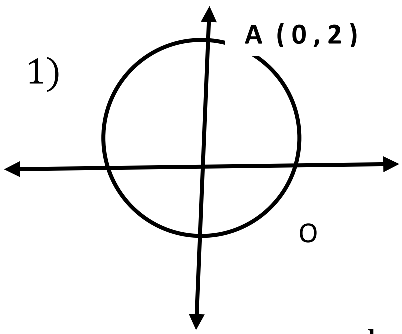
3) Point P(-4 , 6) divides point A (-6 , 10) and B (m , n) in the ratio 2:1 then find the coordinates of point B.

Q. 4 Solve (Each of 4 marks)

1) Show that points A(-4 , -7), B(-1,2), C (8, 5) and D (5 , -4) are the vertices of a parallelogram ABCD.
2) Show that the points (0 , -1), (8, 3) , (6 , 7) and (-2 , 3) are vertices of a rectangle.
3) Show that the points (2, 0), (-2 , 0) and (0, 2) are vertices of a triangle. State the type of triangle with reason.
4) If A(5,4) , B (-3 , -2) and C (1 -8) are the vertices of a $\Delta\ ABC$. Segment AD is median. Find the length of seg AD:
5) Show that A (1, 2) , (1, 6) , C $(1 + 2\sqrt{3}$, 4) are vertices of an equilateral triangle.

Q.5) Solve (Each of 3 marks)

1)



Seg OA is the radius of a circle with centre O. The coordinates of point A is (0 , 2) then decide whether the point B(1, 2) is on the circle?

2) Find the ratio in which Y-axis divides the point A(3, 5) and point B(-6 , 7). Find the coordinates of that point.
3) The points (7, -6) , (2, K) and (h,18) are the vertices of triangle. If (1,5) are the coordinates of centroid. Find the value of h and k..
4) Using distance formula decide whether the points (4, 3), (5, 1) and (1, 9) are collinear or not ?

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. $\sec 60^0 = ?$

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

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

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

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

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) $\text{cosec}^2\theta$ D) $\cot^2\theta$

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

A) 30^0 B) 45^0 C) 60^0 D) 90^0

9. tan (90-θ) = ?

A) sin θ B) cos θ C) cot θ D) tan θ

10. cos 45^0 = ?

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

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

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

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

13. If ∠ 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 θ = $\frac{13}{12}$ then cot θ = ?

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

4. If tan θ = 1 then sin θ . cos θ = ?

5. If 2 sin θ = 3 cos θ then tan θ = ?

6. If cot (90 – A) = 1 then ∠ A = ?

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

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

9. If tan θ X [ ] = sin θ then [ ] = ?

10. (sec θ + tan θ) . (sec θ - tan θ) = ?

11. $\frac{\sin 75^0}{\cos 15^0}$ = ?

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

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

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

Activity ⇨ L . H . S. = [ ]

= $\cos^2\theta$ X [ ] ...($1 + \tan^2\theta =$ [ ])

= (cos θ X [ ] $)^2$

= 1^2

= 1

= R .H .S.

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

Activity ⇨ $\frac{5}{\sin^2\theta} - 5\cot^2\theta$

$= \square \left(\frac{1}{\sin^2\theta} - \cot^2\theta\right)$

$= 5\,(\square - \cot^2\theta\,)$ .... $\left(\frac{1}{\sin^2\theta} = \square\right)$

$= 5\,(\,1\,)$

$= \square$

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

Activity ⇨ $\square = 1 + \tan^2\theta$ ......(Fundamental trigonometric identity)

$\square - \tan^2\theta = 1$

$(\sec\theta + \tan\theta)\,.\,(\sec\theta - \tan\theta) = \square$

$\sqrt{3}\;.\,(\sec\theta - \tan\theta) = 1$

$(\sec\theta - \tan\theta) = \square$

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

Activity ⇨ $\sec^2\theta = 1 + \square$ .... (Fundamental trigonometric identity)

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

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

$\sec\theta = \square$

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 $\cos(45^0 + x) = \sin 30^0$ 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 6 A then ∠ 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 ⇨ L . H . S. = $\boxed{\quad}$

= $(\sin^2 A + \cos^2 A)$ ($\boxed{\quad}$)

= 1 ($\boxed{\quad}$) .... ($\sin^2 A + \boxed{\quad} = 1$)

$= \boxed{} - \cos^2 A$ .... ($\sin^2 A = 1 - \cos^2 A$)

$= \boxed{}$

= R. H. S.

2. $\tan^2\theta - \sin^2\theta = \tan^2\theta \text{ X } \sin^2\theta$ .For proof of this complete the activity given below.

Activity ⇨ L . H . S. = $\boxed{}$

$= \boxed{} \left(1 - \frac{\sin^2\theta}{\tan^2\theta}\right)$

$= \tan^2\theta \left(1 - \frac{\boxed{}}{\frac{\sin^2\theta}{\cos^2\theta}}\right)$

$= \tan^2\theta \left(1 - \frac{\sin^2\theta}{1} \text{ X } \frac{\cos^2\theta}{\boxed{}}\right)$

$= \tan^2\theta \left(1 - \boxed{}\right)$

$= \tan^2\theta \text{ X } \boxed{}$ .... ($1 - \cos^2\theta = \sin^2\theta$)

= R. H. S.

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

Activity ⇨ $\sec^2\theta = 1 + \boxed{}$ ....(Fundamental tri. identity)

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

$\sec^2\theta = 1 + \frac{\boxed{}}{576}$

$\sec^2\theta = \frac{\boxed{}}{576}$

$\sec\theta = \boxed{}$

$\cos\theta =$ ☐ ....($\cos\theta = \frac{1}{\sec\theta}$)

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

Activity ⇨ L . H . S. = ☐

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

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

$= \frac{1}{\sin\theta\,.\,\cos\theta}$ ....($\cos^2\theta + \sin^2\theta =$ ☐)

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

= ☐

= R. H. S.

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

1. If $\sec\theta = \frac{41}{40}$ then find values of $\sin\theta$, $\cot\theta$, $\text{cosec}\,\theta$.

2. If $5\sec\theta - 12\,\text{cosec}\,\theta = 0$ then find values of $\sin\theta$, $\sec\theta$.

3. Prove that $\frac{\tan(90-\theta) + \cot(90-\theta)}{\text{cosec}\,\theta} = \sec A$.

4. Prove that $\cot^2\theta - \tan^2\theta = \text{cosec}^2\theta - \sec^2\theta$.

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 $\frac{\sin\theta + \text{cosec}\,\theta}{\sin\theta} = 2 + \cot^2\theta$.

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

10. Prove that $\sqrt{\frac{1+\cos A}{1-\cos A}}$ = 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 cosec θ – cot θ = $\frac{\sin\ \theta}{1+\cos\ \theta}$.

14. In Δ ABC, 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 tan 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
   $\sin^2 A$. tan A + $\cos^2 A$. cot A + 2 sin A . cos A = tan A + cot A
   .

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

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

4. Prove that sin θ (1 – tan θ) − cos θ (1 − cot θ) = cosec θ − sec θ
.

5. If cos A = $\frac{2\sqrt{m}}{m+1}$ then Prove that 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 Δ ABC , $\sqrt{2}$ AC = BC, sin A = 1, $\sin^2 A + \sin^2 B + \sin^2 C = 2$ then ∠A = ? ∠B = ? ∠C= ?

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

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+ tanA + cotA = secA . cosecA + 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 = ±3.

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

3. If 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 $\tan 7^0 \times \tan 23^0 \times \tan 60^0 \times \tan 67^0 \times \tan 83^0 = \sqrt{3}$.

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

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

7. Prove that

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