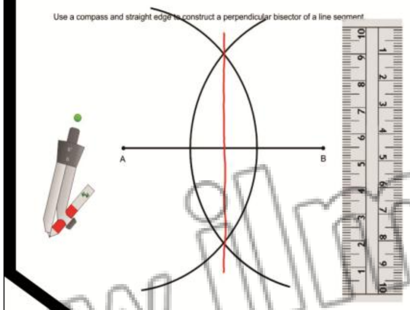


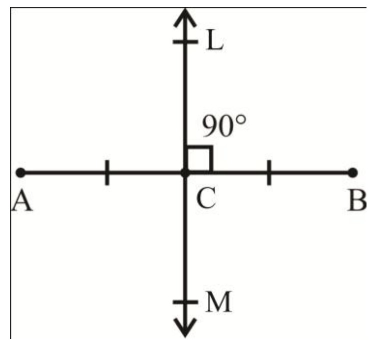
UNIT 12

LINE BISECTORS AND ANGLE BISECTORS

Right Bisector of a line segment

(K.B + A.B)

A line is called a right bisector of a line segment if it is perpendicular to the line segment and passes through its mid-point.



In the above ℓ is called right bisector of line segment AB, if $\ell \perp \overline{AB}$ and $m\overline{AC} = m\overline{CB}$.

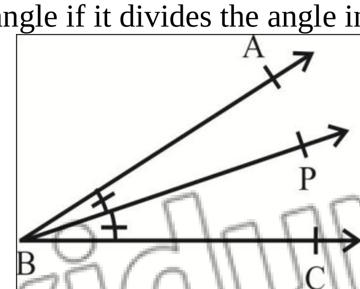
Bisector of angle

(K.B + A.B)

A ray $\overrightarrow{BP}$ is called the bisector of $m\angle ABC$ if P is a point in the interior of the angle and $m\angle ABP = m\angle PBC$

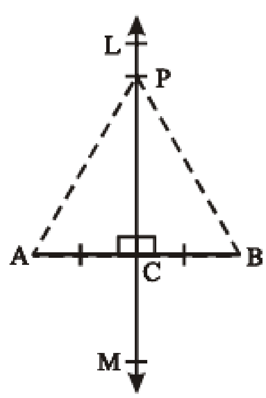
Or

A ray is called bisector of an angle if it divides the angle into two equal parts.



Theorem 12.1.1

(K.B + A.B)



Statement:

Any point on the right bisector of a line segment is equidistant from its end points.

Given

A line $\overleftrightarrow{LM}$ intersects the line segment AB at the point C Such that $\overleftrightarrow{LM} \perp \overline{AB}$ and $\overline{AC} \cong \overline{BC}$. P is a point on $\overleftrightarrow{LM}$

To prove

$\overline{PA} \cong \overline{PB}$

Construction

Join P to the points A and B

Proof

Statements	Reasons
In $\Delta ACP \leftrightarrow \Delta BCP$	
$\overline{AC} \cong \overline{BC}$	Given
$\angle ACP \cong \angle BCP$	Given $\overline{PC} \perp \overline{AB}$, so that each $\angle$ at $C = 90^o$
$\overline{PC} \cong \overline{PC}$	Common
$\therefore \Delta ACP \cong \Delta BCP$	S.A.S Postulate
Hence $\overline{PA} \cong \overline{PB}$	(Corresponding sides of congruent triangles)

Theorem 12.1.2 **(K.B + A.B)**

{Converse of Theorem 12.1.1}

Any point equidistant from the end points of a line segment is on the right bisector of it.

Given

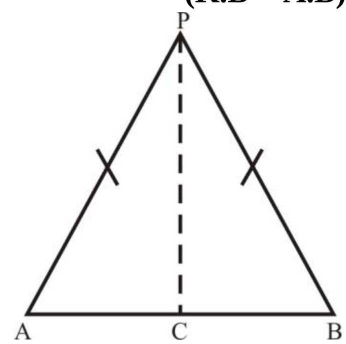
$\overline{AB}$ is a line segment. Point P is such that $\overline{PA} \cong \overline{PB}$

To prove

The point P is the on the right bisector of $\overline{AB}$

Construction

Join P to C, the midpoint of $\overline{AB}$



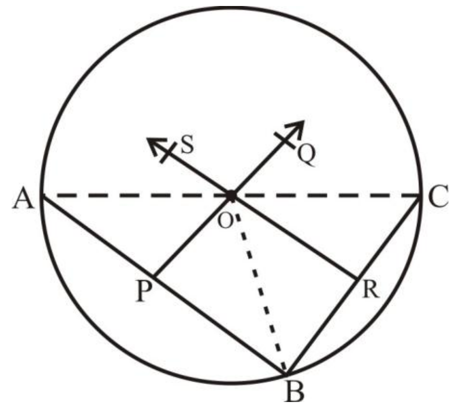
Proof

Statements	Reasons
In $\Delta ACP \leftrightarrow \Delta BCP$	
$\overline{PA} \cong \overline{PB}$	Given
$\overline{PC} \cong \overline{PC}$	Common
$\overline{AC} \cong \overline{BC}$	Construction
$\therefore \Delta ACP \cong \Delta BCP$	$S.S.S \cong S.S.S$
$\angle ACP \cong \angle BCP$ ________ (i)	Corresponding angles of congruent triangles
But $m\angle ACP + m\angle BCP = 180^o$ ___ (ii)	Supplementary angles
$\therefore m\angle ACP = m\angle BCP = 90^o$	From (i) and (ii)
i.e $\overline{PC} \perp \overline{AB}$ ________ (iii)	$m\angle ACP = 90^o$ (Proved)
Also $\overline{CA} \cong \overline{CB}$ ________ (iv)	Construction
$\therefore$ $\overline{PC}$ is a right bisector of $\overline{AB}$	from (iii) and (iv)

i.e. the point P is on the right bisector of $\overline{AB}$	

Exercise 12.1

Q.1 Prove that the centre of a circle is on the right bisectors of each of its chords. (K.B + U.B)



Given

A, B, C are the three non-collinear points.

To Prove:

The centre of the circle is on the right bisector of each of its chord.

Construction

Join B to C, A take $\overleftrightarrow{PQ}$ is right bisector of $\overline{AB}$ and $\overleftrightarrow{RS}$ right bisector of BC, they intersect at O.

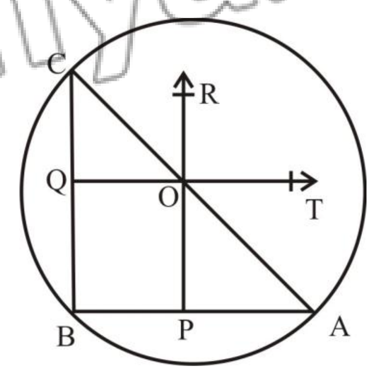
Join O to A, B and C.

$\therefore$ O is the centre of circle.

Proof

Statements	Reasons
$\overline{OB} \cong \overline{OC}$ ________ (i)	O lies on the right bisector of $\overline{BC}$
$\overline{OA} \cong \overline{OB}$ ________ (ii)	O lies on the right bisector of $\overline{AB}$
$\overline{OA} = \overline{OB} = \overline{OC}$	From (i) and (ii)
Hence, O is the only point equidistant from the points A, B, C. $\therefore O$ is center of circle which lies on the right bisector of each of its chord.	

Q.2 Where will the center of a circle passing through three non-collinear points? And Why? (K.B + U.B)



Given

A.B.C are three non collinear points and circle passing through these points.

To prove

Center of the circle passing through vertices A, B and C.

Construction

(i) Join B to A and C.

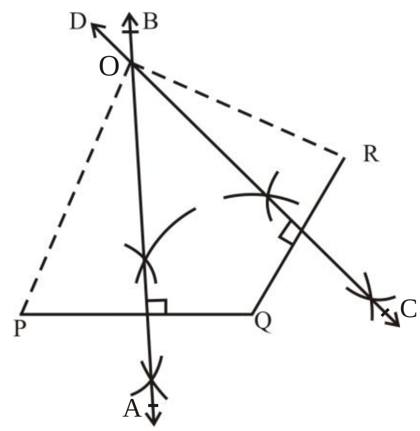
(ii) Take $\overleftrightarrow{QT}$ right bisector of $\overline{BC}$ and take also $\overleftrightarrow{PR}$ right bisector of $\overline{AB}$.

$\overrightarrow{PR}$ and $\overrightarrow{QT}$ intersect at point O. joint O to A,B and C. O is the center of the circle.

Proof

Statements	Reasons
$\overline{OB} \cong \overline{OC}$ …(i) $\overline{OA} \cong \overline{OB}$ …(ii) So $\overline{OA} \cong \overline{OC} \cong \overline{OB}$ $\therefore$ O is the center of the circle.	$\overline{QO}$ is right bisector $\overline{BC}$ $\overline{PO}$ is right bisector of $\overline{AB}$ From (i) and (ii)

Q.3 Three villages P,Q and R are not on the same line. The people of these villages want to make a children park at such a place which is equidistant from these three villages. After fixing the place of Children Park prove that the park is equidistant from the three villages. (K.B + U.B)



Given

P,Q,R are three villages not on the same straight line.

To Find

The point equidistant from P,R,Q.

Construction

(i) Joint Q to P and R.

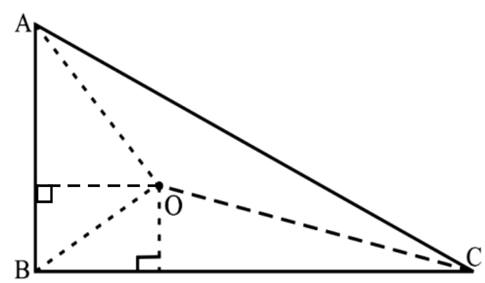
(ii) Take $\overleftrightarrow{AB}$ right bisector of $\overline{PQ}$ and $\overleftrightarrow{CD}$ right bisector of $\overline{QR}$. $\overline{AB}$ and $\overleftrightarrow{CD}$ intersect at O.

(iii) Join 0 to P, Q, R
The place of children part at point O.

Proof

Statements	Reasons
$\overline{OQ} \cong \overline{OR}$ __________ (i)	O is on the right bisector of $\overline{QR}$
$\overline{OP} \cong \overline{OQ}$ __________ (ii)	O is on the right bisector of $\overline{PQ}$
$\overline{OP} \cong \overline{OQ} \cong \overline{OR}$__________ (iii)	From (i) and (ii)
$\therefore O$ is equidistant from P,Q and R	From (iii)
Hence, point O is equidistant from three villages.	

Theorem 12.1.3 **(K.B + A.B)**



The right bisectors of the sides of a triangle are concurrent.

Given

ΔABC

To prove

The right bisectors of $\overline{AB}$, $\overline{BC}$ and $\overline{CA}$ are concurrent.

Construction

Draw the right bisectors of $\overline{AB}$ and $\overline{BC}$ which meet each other at the point O. Join O to A, B and C.

Proof

Statements	Reasons
$\overline{OA} \cong \overline{OB} \longrightarrow$ (i)	(Each point on right bisector of a segment is equidistant from its end points)
$\overline{OB} \cong \overline{OC} \longrightarrow$ (ii)	As in (i)
$\overline{OA} \cong \overline{OC}$	from (i) and (ii)
$\therefore$ Point O is on the right bisector of $\overline{CA} \rightarrow$ (iv)	(O is equidistant from A and C)
But point O is on the right bisector of $\overline{AB}$ and of $\overline{BC} \longrightarrow$ (v)	Construction
Hence the right bisectors of the three sides of triangle are concurrent at O	{from (iv) and (v)}

Note **(K.B)**

(a) The right bisectors of the sides of an acute triangle intersect each other inside the triangle.

(b) The right bisectors of the sides of a right triangle intersect each other on the hypotenuse.

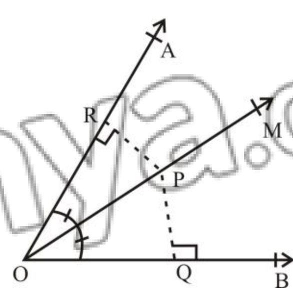
(c) The right bisectors of the sides of an obtuse triangle intersect each other outside the triangle.

Theorem 12.1.4 **(A.B)**

Any point on the bisector of an angle is equidistant from its arms.

Given

A point P is on $\overrightarrow{OM}$, the bisector of $\angle AOB$



To Prove

$\overline{PQ} \cong \overline{PR}$ i.e P is equidistant from $\overrightarrow{OA}$ and $\overrightarrow{OB}$

Construction

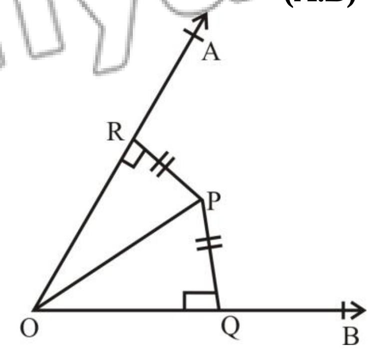
Draw $\overline{PR} \perp \overrightarrow{OA}$ and $\overline{PQ} \perp \overrightarrow{OB}$

Proof

Statements	Reasons
In $\Delta POQ \leftrightarrow \Delta POR$	
$\overline{OP} \cong \overline{OP}$	Common
$\angle PQO \cong \angle PRO$	Construction
$\angle POQ \cong \angle POR$	Given
$\therefore \Delta POQ \cong \Delta POR$	$S.A.A \cong S.A.A$
Hence $\overline{PQ} \cong \overline{PR}$	(Corresponding sides of congruent triangles)

Theorem 12.1.5 (Converse of Theorem 12.1.4) **(A.B)**

Any point inside an angle, equidistant from its arms, is on the bisector of it.



Given

Any point P lies inside $\angle AOB$, such that $\overline{PQ} \cong \overline{PR}$, where $\overline{PQ} \perp \overrightarrow{OB}$ and $\overline{PR} \perp \overrightarrow{OA}$

To prove

Point P is on the bisector of $\angle AOB$

Construction

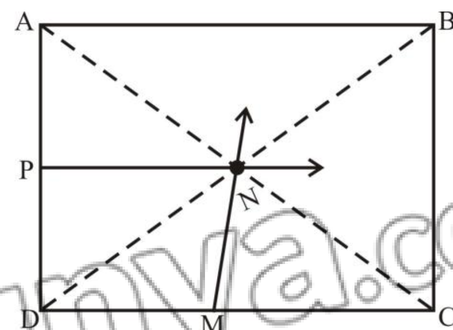
Join P to O

Proof

Statements	Reasons
In $\Delta POQ \leftrightarrow \Delta POR$	
$\angle PQO \cong \angle PRO$	Given (Right angles)
$\overline{PO} \cong \overline{PO}$	Common
$\overline{PQ} \cong \overline{PR}$	Given
$\therefore$ ΔPOQ ≅ ΔPOR	H.S ≅ H.S
Hence ∠POQ≅∠POR	(Corresponding angles of congruent triangles)
i.e, P is on the bisector of ∠AOB	

Exercise 12.2

Q.1 In a quadrilateral ABCD $\overline{AB} \cong \overline{BC}$ and the right bisectors of $\overline{AD}, \overline{CD}$ meet each other at point N. Prove that $\overline{BN}$ is a bisector of $\angle ABC$ **(K.B + A.B)**



Given

In the quadrilateral ABCD

$\overline{AB} \cong \overline{BC}$

$\overline{NM}$ is right bisector of $\overline{CD}$

$\overline{PN}$ is right bisector of $\overline{AD}$

They meet at N

To prove

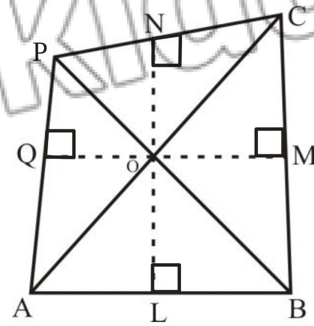
$\overline{BN}$ is the bisector of angle ABC

Construction join N to A,B,C,D

Proof

Statements	Reasons
$\overline{ND} \cong \overline{NA}$ ________ (i)	N is an right bisector of $\overline{AD}$
$\overline{ND} \cong \overline{NC}$ ________ (ii)	N is on right bisector of $\overline{DC}$
$\overline{NA} = \overline{NC}$ ________ (iii)	from (i) and (ii)
$\Delta BNC \leftrightarrow \Delta ANB$	
$\overline{NC} = \overline{NA}$	Already proved (from iii)
$\overline{AB} \cong \overline{CB}$	Given
$\overline{BN} \cong \overline{BN}$	Common
$\therefore \Delta BNA \cong \Delta BNC$	$S.S.S \cong S.S.S$
Hence $\angle ABN \cong \angle NBC$	Corresponding angles of congruent triangles
Hence $\overline{BN}$ is the bisector of $\angle ABC$	

Q.2 The bisectors of $\angle A, \angle B$ and $\angle C$ of a quadrilateral ABCP meet each other at point O. Prove that the bisector of $\angle P$ will also pass through the point O. (K.B + A.B)



Given

ABCP is quadrilateral. $\overline{AO}, \overline{BO}, \overline{CO}$ are bisectors of $\angle A, \angle B$ and $\angle C$ meet at point O.

To prove

$\overline{PO}$ is bisector of $\angle P$

Construction:

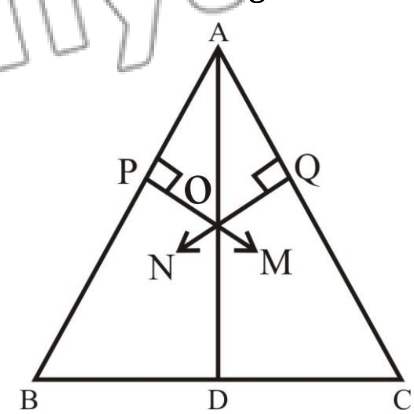
Join P to O.

Draw $\overline{OQ} \perp \overline{AP}$, $\overline{ON} \perp \overline{PC}$ and $\overline{OL} \perp \overline{AB}$, $\overline{OM} \perp \overline{BC}$

Proof:

Statements	Reasons
$\overline{OM} \cong \overline{ON}$ ________ (i)	O is on the bisector of $\angle C$
$\overline{OL} \cong \overline{OM}$ ________ (ii)	O is on the bisector of $\angle B$
$\overline{OL} \cong \overline{OQ}$ ________ (iii)	O is on the bisector of $\angle A$
$\overline{OQ} \cong \overline{ON}$ ________ (iv)	From (i), (ii), (iii)
Point O lines on the bisector of $\angle P$	From (iv)
$\therefore \overline{OP}$ is the bisector of angle P	

Q.3 Prove that the right bisector of congruent sides of an isosceles triangle and its altitude are concurrent. (K.B + A.B)



Given

ΔABC

$\overline{AB} \cong \overline{AC}$ due to isosceles triangle $\overline{PM}$ is right bisector of $\overline{AB}$

$\overline{QN}$ is right bisector of $\overline{AC}$

$\overrightarrow{PM}$ and $\overrightarrow{QN}$ intersect each other at point O

To Prove

The altitude of ΔABC lies at point O

Join A to O and extend it to cut $\overline{BC}$ at D.

Proof

Statements	Reasons
In $\triangle ABC$,	
$m\overline{AB} \cong m\overline{AC}$	Given
$\frac{1}{2}m\overline{AB} = \frac{1}{2}m\overline{AC}$	Dividing both side by 2
$\overline{AQ} \cong \overline{AP}$	$\overline{PM} \perp \overline{AB}, \overline{QN} \perp \overline{AC}$
In $\Delta AQO \leftrightarrow \Delta APO$	
$\angle APO \cong \angle AQO$	Each 90^o (Given)
$\overline{AQ} \cong \overline{AP}$	Already Proved
$\overline{AO} \cong \overline{AO}$	Common
$\Delta APO \cong \Delta AQO$	$H.S \cong H.S$
$\angle PAO \cong \angle QAO$ (i)	Corresponding angles of congruent triangles
$\Delta BAD \leftrightarrow \Delta CAD$	
$\overline{AB} \cong \overline{AC}$	Given
$\overline{AD} \cong \overline{AD}$	Common
$\angle BAD \cong \angle CAD$	Proved from (i)
$\Delta BAD \cong \Delta CAD$	$S.A.S \cong S.A.S$
$\angle ODB \cong \angle ODC \rightarrow (i)$	Each angle is 90^o (Given)
$m\angle ODM + m\angle ODC = 180^o \rightarrow (ii)$	Supplementary angle
$m\angle ODM \cong m\angle ODC = 90^o \rightarrow (iii)$	From (*i*) and (*ii*)
$\therefore \overline{AD} \perp \overline{BC}$	From (*iii*)
Point 0 lies on altitude $\overline{AD}$	

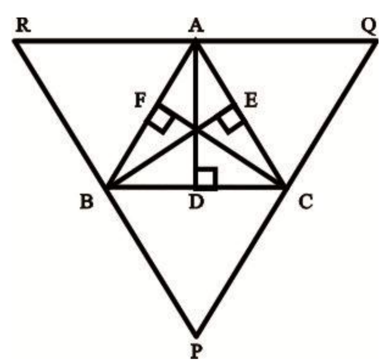
Q.4 Prove that the altitudes of a triangle are concurrent. **(K.B + A.B)**

Given

In ΔABC

$\overline{AD}, \overline{BE}, \overline{CF}$ are its altitiudes

i.e $\overline{AD} \perp \overline{BC}, \overline{BE} \perp \overline{AC}, \overline{CF} \perp \overline{AB}$



To Prove

$\overline{AD}, \overline{BE}$ and $\overline{CF}$ are concurrent

Construction:

Passing through A, B, C take

$\overline{RQ} \parallel \overline{BC}, \overline{RP} \parallel \overline{AC}$ and $\overline{QP} \parallel \overline{AB}$ respectively forming a ΔPQR

Proof

Statements	Reasons
$\overline{BC} \parallel \overline{AQ}$	Construction
$\overline{AB} \parallel \overline{QC}$	Construction
$\therefore$ ABCQ is a P^{gm}	
Hence $\overline{AQ} \cong \overline{BC}$	
Similarly $\overline{AB} \cong \overline{QC}$	
Hence point A is midpoint RQ	
And $\overline{AD} \perp \overline{BC}$	Given
$\overline{BC} \parallel \overline{RQ}$	Opposite sides of parallelogram ABCQ
$\overline{AD} \parallel \overline{RQ}$	
Thus $\overline{AD} \perp$ is right bisector of $\overline{RQ}$	
similarly $\overline{BE}$ is a right bisector of $\overline{RP}$ and	
$\overline{CF}$ is right bisector of PQ	
$\therefore \perp^{s}$ $\overline{AD}, \overline{BE}, \overline{CF}$ are right bisector of sides of ΔPQR	
$\therefore \overline{AD}, \overline{BE}$ and $\overline{CF}$ are	
Concurrent	

Theorem12.1.6 **(K.B + A.B)**

The bisectors of the angles of a triangle are concurrent

Given

ΔABC

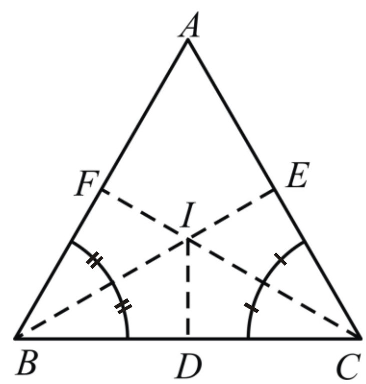
To Prove

The bisector of $\angle$A, $\angle$B, and $\angle$C are concurrent

Construction:

Draw the bisectors of $\angle$B and $\angle$C which intersect at point I. From I, draw

$\overline{IF} \perp \overline{AB}, \overline{ID} \perp \overline{BC}$ and $\overline{IE} \perp \overline{CA}$



Proof

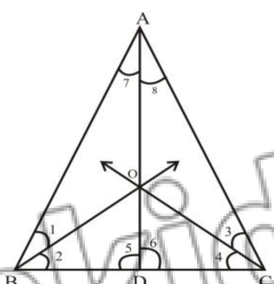
Statements	Reasons
$\overline{ID} \cong \overline{IF}$	(Any point on bisector of an angle is equidistance from its arms.
Similarly $\overline{ID} \cong \overline{IE}$	
$\therefore\ \overline{IE} \cong \overline{IF}$	Each $\cong \overline{ID}$
So the point I is on the bisector of $\angle A$ … (i)	
Also the point I is on the bisectors of $\angle ABC$ and $\angle BCA$ … (ii)	Construction
Thus the bisector of $\angle A$, $\angle B$ and $\angle C$ are concurrent at I	{From (i) and (ii)}

Note **(K.B + A.B)**

In practical geometry also, by constructing angle bisectors of a triangles, we shall verify that they are concurrent.

Exercise 12.3

Q.1 Prove that the bisectors of the angles of base of an isosceles triangle intersect each other on its altitude. **(K.B + A.B)**



Given

An isosceles triangle ABC.

To Prove

Angle bisector of $\angle B$ and $\angle C$ intersect each other at altitude.

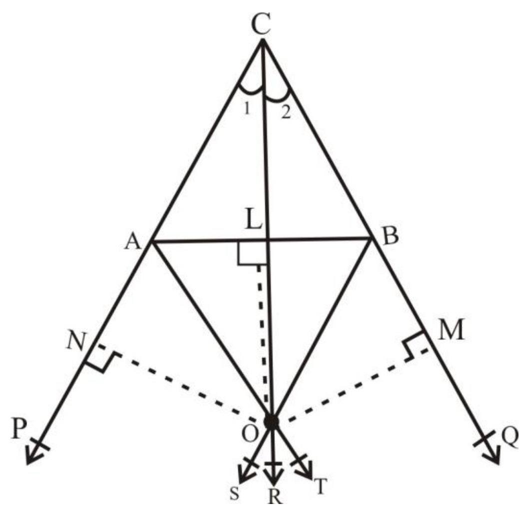
Construction

Draw $\overline{AD} \perp \overline{BC}$, also draw angle bisectors of $\angle B$ and $\angle C$ which meet each other at point O. Label the angles $\angle 1, \angle 2, \angle 3, \angle 4, \angle 5, \angle 6, \angle 7, \angle 8$ as shown in the figure.

Proof

Statements	Reasons
In $\angle rt\ \Delta BDO \leftrightarrow \Delta CDO$	
$\overline{BD} \cong \overline{CD}$	Construction
$\angle 7 \cong \angle 8$	Right Angle
$\overline{OD} \cong \overline{OD}$	Common
$\Delta BDO \cong \Delta CDO$	$H.S \cong H-S$
$\overline{OB} \cong \overline{OC} \quad \rightarrow$ (i)	Corresponding sides of congruent triangles
Point O is on altitude	From (i)

Prove that the bisectors of two exterior and third interior angle of a triangle are concurrent (K.B + A.B)



Given

In ΔABC, $\overrightarrow{CL}$ is bisector of interior angle $\angle C$, $\overrightarrow{AT}$ and $\overrightarrow{BS}$ are bisectors of exterior angles $\angle ABQ$ and $\angle BAP$ respectively.

To Prove

Bisectors of interior angle $\angle C$, $\angle ABQ$ and $\angle BAP$ are concurrent.

Construction

Draw $\overline{OM} \perp \overrightarrow{CQ}$, $\overline{OL} \perp \overline{AB}$, $\overline{ON} \perp \overrightarrow{CP}$

Proof

Statements	Reasons
$\overline{ON} \cong \overline{OM}$...........(i)	Theorem 12.1.4
$\overline{OL} \cong \overline{OM}$...........(ii)	Theorem 12.1.4
$\overline{ON} \cong \overline{OL}$ …….. (iii)	From (*i*) and (*ii*)
Hence point O lies on the bisector of $\angle$ C	From (iii)

Review Exercise 12

Q.1 Which of the following are true and which are false? (K.B + U.B)

(i) Bisection means to divide into two equal parts **(True)**

(ii) Right bisection of line segment means to draw perpendicular which passes through the midpoint of line segment **(True)**

(iii) Any point on the right bisector of a line segment is not equidistant from its end points **(False)**

(iv) Any point equidistant from the end points of a line segment is on the right bisector of it **(True)**

(v) The right bisectors of the sides of a triangle are not concurrent **(False)**

(vi) The bisectors of the angles of a triangle are concurrent **(True)**

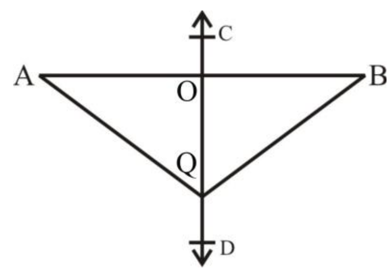
(vii) Any point on the bisector of an angle is not equidistant from its arms **(False)**

(viii) Any point inside an angle equidistant from its arms, is on the bisector of it **(True)**

Q.2 If $\overleftrightarrow{CD}$ is right bisector of line segment $\overline{AB}$, then

(i) $m\overline{OA} =$ _______ (ii) $m\overline{AQ} =$ _______

(K.B + U.B)



Solution:

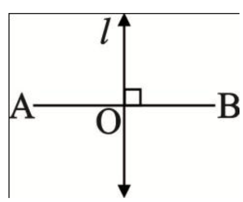
(i) $m\overline{OA} = m\overline{OB}$

(ii) $m\overline{AQ} = m\overline{BQ}$

Q.3 Define the following (K.B + U.B)

(i) Right Bisector of a Line Segment

(LHR 2017, GRW 2016, SWL 2014, 16, 17, BWP 2015, 16, SGD 2013, 15, 16, 17, RWP 2013, FSD 2013, D.G.K 2015)

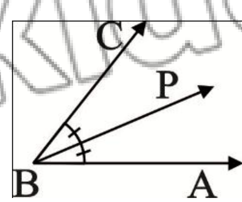


A line l is called a right bisector of a line segment AB if l is perpendicular to the line segment and passes through its midpoint.

(ii) Bisector of an Angle

(GRW 2014, 16, 17, FSD 2013, 16, MTN 2013, 14, 15, SGD 2013, 15)

A ray BP is called the bisector of $m\angle ABC$, if P is a point in the interior of the angle and $m\angle ABP = m\angle PBC$.



Q.4 The given triangle ABC is equilateral triangle and $\overline{AD}$ is bisector of angle A, then find, the values of unknown x^o, y^o and z^o. **(MTN 2013)** **(K.B + U.B)**

Solution

In equilateral triangle all side are equal to each and each angle of the triangle equal to 60^o. i.e. $m\angle A = m\angle B = m\angle C = 60^o$

So

$m\angle B = z^o = 60^o$

$m\angle A = 60^o$

$x° = y°$ ($\overline{AD}$ is the bisector of $\angle A$)

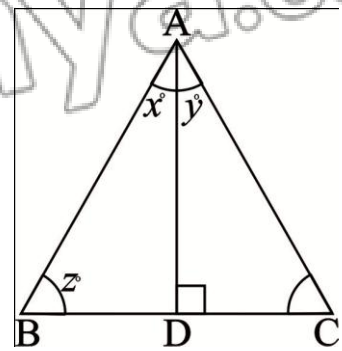
$x° = \frac{1}{2} m\angle A$

$= \frac{1}{2} \times 60°$

$x° = 30°$

$y° = 30°$ $(\because x° = y°)$

So $x^o = y^o = 30°$



Q.5 In the given congruent triangle LMO and LNO find the unknowns *x* and m given **(A.B + U.B)**

$\Delta LMO \cong \Delta LNO$

$m\overline{LM} = m\overline{LN}$ (Corresponding sides of $\cong \Delta$)

$2x + 6 = 18$

$2x = 18 - 6$

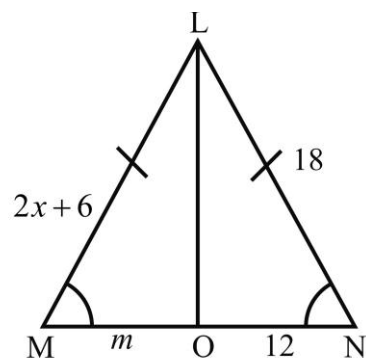
$2x = 12$

$x = \frac{12^{6}}{2}$

$x = 6$ unit

$m\overline{MO} = m\overline{ON}$ (Corresponding sides of $\cong \Delta$)

$\therefore m = 12$ unit



Q.6 CD is right bisector of the line segment AB **(GRW 2015, D.G.K 2014)** **(K.B + U.B)**

(i) If $m\overline{AB} = 6cm$ **then find the** $m\overline{AL}$ and $m\overline{LB}$

Solution

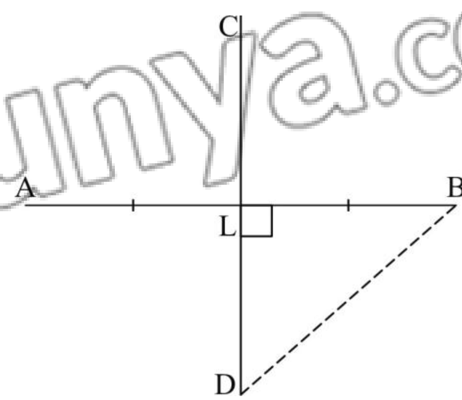
L is the midpoint of $\overline{AB}$

$\therefore m\overline{AL} = m\overline{LB}$

$m\overline{AL} = \frac{1}{2} m\overline{AB} = \frac{1}{2} \times 6$

So $m\overline{AL} = 3cm$

$m\overline{LB} = 3cm$ $(\therefore m\overline{AL} = m\overline{LB})$



(ii) If $m\overline{BD} = 4cm$ **then find m** $\overline{AD}$

$m\overline{AD} = m\overline{BD}$ (Point D lies on the right bisector AB)

$m\overline{AD} = 4$

$m\overline{AD} = 4cm$

SELF TEST

Time: 40 min **Marks: 25**

Q.1 Mark the Correct multiple choice question. **(7×1=7)**

1. Each angle in an equilateral triangle is -------in measure

(A) 30° **(B)** 45°

(C) 60° **(D)** 50°

2. If two adjacent angles are supplementary then their uncommon arms are-------

(A) Collinear **(B)** Concurrent

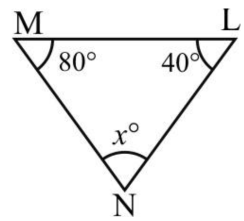
(C) Congruent **(D)** None of these

3. A Ray has --------- end point

(A) One **(B)** Two

(C) Three **(D)** None of these

4. Find unknown angle in triangle LMN.



(A) 30° **(B)** 60°

(C) 80° **(D)** 90°

5. Each diagonal of a parallelogram bisects it into __________ congruent triangles.

(A) Four **(B)** Six

(C) Two **(D)** One

6. The line segment, joining the mid-points of two sides of a triangle is parallel to the third side and is equal to __________ of its length

(A) Half **(B)** Double

(C) $\frac{1}{4}$ th **(D)** $\frac{1}{3}$

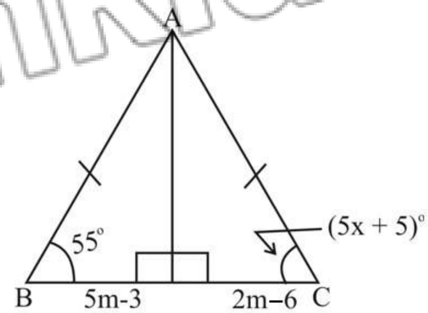
7. Any point on the bisector of an angle is equidistant from its __________

(A) Arms **(B)** Vertex

(C) Medians **(D)** Any point

Q.2 Give Short Answers to following Questions. **(5×2=10)**

(i) Find the value of unknown for the given congruent triangles.

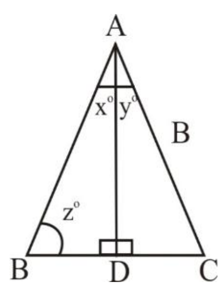


(ii) Define congruent triangles.

(iii) State S.A.S postulate.

(iv) One angle of a parallelogram is 130. Find the measure of its remaining angles.

(v) The given triangle ABC is equilateral triangle and $\overline{AD}$ is bisector of angle A, then find the values of unknowns, x^{o}, y^{o}, y^{o} .



The right bisectors if the sides of a triangle are concurrent.

Q.3 Answer the following Questions in detail. **(8)**

Any point equidistant from the end points of a line segment is on the right bisector of it.

NOTE: Parents or guardians can conduct this test in their supervision in order to check the skill of students.