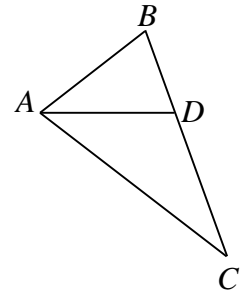


Geometry Notes S - 10: Angle Bisector Theorem

Given: $\triangle ABC$; point D is on \overline{BC} such that \overline{AD} is an angle bisector of $\triangle ABC$.

Prove: $\frac{BD}{CD} = \frac{BA}{CA}$

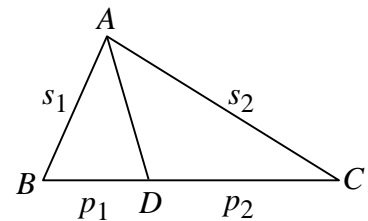


Plan: Draw line ℓ through point C parallel to \overline{AD} .

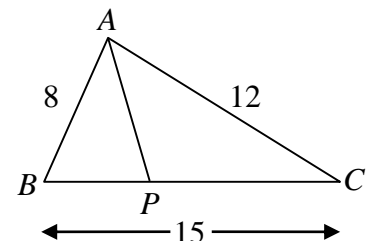
Extend \overline{BA} past A to intersect line ℓ at P .

<u>Statement</u>	<u>Reason</u>
1. $\triangle ABC$; point D is on \overline{BC} such that \overline{AD} is an angle bisector of $\triangle ABC$.	1. Given
2. Draw line ℓ through $C \parallel$ to \overline{AD} .	2.
3. Extend \overline{BA} to intersect line ℓ at P .	3.
4. $\frac{BD}{CD} = \frac{BA}{PA}$	4.
5. $\angle CPA \cong \angle DAB$	5.
6. $\angle DAB \cong \angle DAC$	6.
7. $\angle DAC \cong \angle PCA$	7.
8. $\angle CPA \cong \angle PCA$	8.
9. $\overline{PA} \cong \overline{CA}$	9.
10. $\frac{BD}{CD} = \frac{BA}{CA}$	10.

If \overline{AD} is an angle bisector of $\triangle ABC$, then



Ex: Triangle ABC has sides of 8, 12 and 15. Point P is on \overline{BC} so that \overline{AP} is an angle bisector of the triangle. Find the length of \overline{BP} .



Geometry HW: Similarity - 10

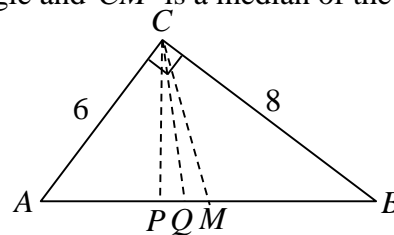
1. In $\triangle ABC$, D is on \overline{BC} so that \overline{AD} is an angle bisector. If $AB = 10$, $BD = 6$ and $DC = 8$, find the length of side \overline{AC} .

2. In $\triangle ABC$, D is on \overline{BC} so that \overline{AD} is an angle bisector. If $AB = 12$, $BC = 18$ and $AC = 15$, find the lengths of \overline{BD} and \overline{DC} .

3. Triangle OPQ has vertices $O(0, 0)$, $P(5, 12)$ and $Q(14, 0)$.
 - a. find the lengths of all three sides of $\triangle OPQ$.
 - b. If R has coordinates $R(x, 0)$, find the value of x so that \overline{PR} bisects $\angle OPQ$.

4. In right $\triangle ABC$, C is the right angle, $AC = 6$ and $BC = 8$. Points P and Q and M are on hypotenuse \overline{AB} such that \overline{CP} is an altitude of the triangle, \overline{CQ} is an angle bisector of the triangle and \overline{CM} is a median of the triangle.

<ol style="list-style-type: none"> a. Find the length of \overline{AB}. c. Find the length of \overline{CP}. e. Find the length of \overline{CM}.* g. Find the measure of $\angle AQC$. 	<ol style="list-style-type: none"> b. Find the length of \overline{AP}. d. Find the length of \overline{AQ}. f. Find the measure of $\angle A$. h. Find the measure of $\angle AMC$.
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*On a homework assignment a long time ago, you learned that the median to the hypotenuse of a right triangle is half the length of the hypotenuse.

5. A right triangle has legs of length 30 and 40.
- Find the lengths of the two parts of the hypotenuse created by the altitude.
 - Find the length of the altitude to the hypotenuse.

6. Find the value of x in the diagram algebraically.

