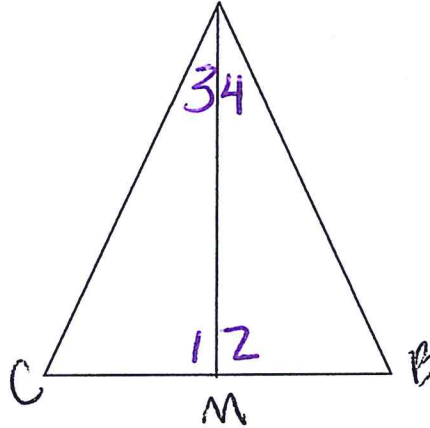Isosceles Triangle
Deductive Reasoning

Given: Isosceles triangle ABC
with median $\overline{AM}$ and $\overline{AC} \cong \overline{AB}$.

Show:
$\overline{AM}$ is an altitude,
an angle bisector, and
a perpendicular bisector.

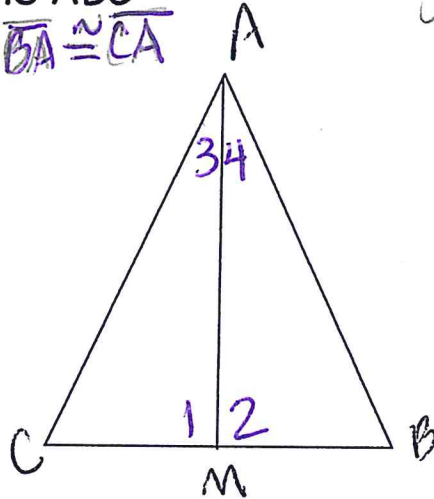| **What I know**	**Why I know it**
1) $\overline{BA} \cong \overline{CA}$	
2) $\angle B \cong \angle C$	
2.5) M is the midpoint of $\overline{CB}$	
3) $\overline{BM} \cong \overline{CM}$	
4) $\triangle BAM \cong \triangle CAM$	
5) $\angle 1 \cong \angle 2$	
6) $m\angle 1 + m\angle 2 = 180°$	
6.5) $m\angle 1 + m\angle 1 = 180°$	
7) therefore $m\angle 1 = 90°$	
8) therefore $\overline{AM}$ is also a perpendicular bisector	
9) therefore $\overline{AM}$ is also an altitude	
10) $\angle 3 \cong \angle 4$	
11) $\overline{AM}$ is an angle bisector	

$\therefore$ The angle bisector of the vertex angle of an isosceles
triangle is also a median, an altitude and a $\perp$ bisector.

Isosceles Triangle
Deductive Reasoning

Given: Isosceles triangle ABC
with median $\overline{AM}$ and $\overline{BA} \cong \overline{CA}$

try these to apply:
p243:1-3

Show: $\overline{AM}$ is a median, angle bisector, altitude, and perpendicular bisector.

What I know

1) $\overline{BA} \cong \overline{CA}$

2) $\angle B \cong \angle C$
2.5) M is the midpoint of $\overline{CB}$
3) $\overline{BM} \cong \overline{CM}$

4) $\triangle BAM \cong \triangle CAM$

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6) $m\angle 1 + m\angle 2 = 180°$
6.5) $m\angle 1 + m\angle 1 = 180°$
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8) therefore $\overline{AM}$ is also a perpendicular bisector
9) therefore $\overline{AM}$ is also an altitude

10) $\angle 3 \cong \angle 4$
11) $\overline{AM}$ is an angle bisector

Why I know it

Given
Isosceles $\triangle$ Th (or base angles are $\cong$)
def of median
def of midpoint
SAS

CPCTC

Linear Pair Post
Substitution
Division Prop

def of $\perp$ bisector
def of altitude

CPCTC
def of angle bisector

∴ The angle bisector of the vertex angle of an isosceles triangle is also a median, an altitude and a $\perp$ bisector.