

3.4. Honors Geometry

DATE: 11/15

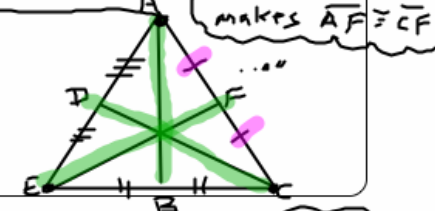
Target 3E. Understand and explain the differences between medians and altitudes

Median of a triangle

- Every Δ has 3 medians
- A **median** of a Δ is a **segment** drawn from a vertex to the midpoint of the opposite side of the Δ . (Median divides opp. seg. into 2 \cong segs.)

Vertex

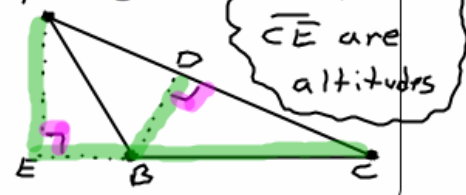
Diagram



Altitude of a triangle

- Every Δ has 3 altitudes (extended if need be)
- An **altitude** of a Δ is a **segment** drawn from a vertex to the opposite side of a Δ , making a right angle with the opposite side

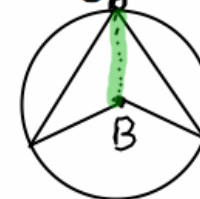
Diagram



Auxiliary line

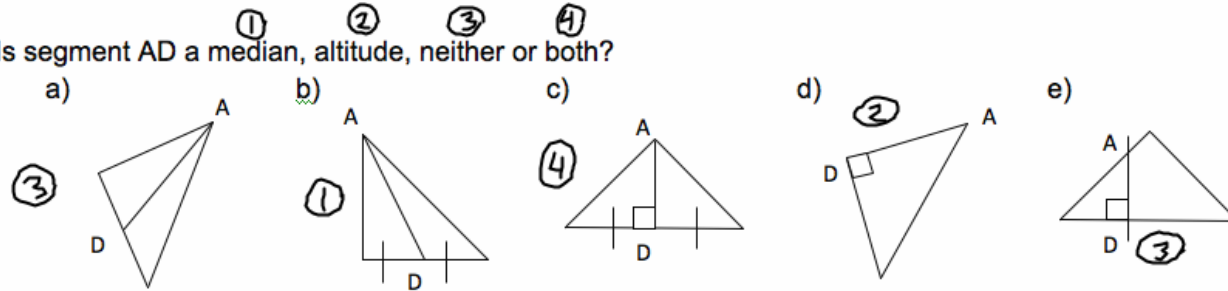
A line segment that can be drawn into the diagram, example \overline{OB} .

Diagram



Examples

1) Is segment AD a median, altitude, neither or both?



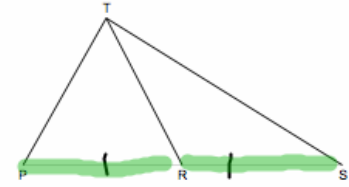
2) Given: \overline{TR} is the median to $\overline{PS} \Rightarrow \overline{PR} \cong \overline{RS}$

$PR = x + 8$
 $PT = 2x - 1$
 $RS = 2x - 6$

$x + 8 = 2x - 6$
 $14 = x$

Find PT.

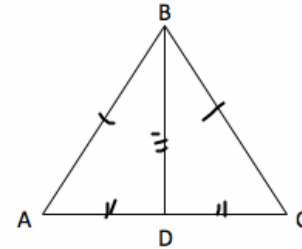
$PT = 2x - 1 = 2(14) - 1 = 27$



3) Given: $AB \cong CB$, $AD \cong CD$

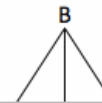
Prove: BD bisects $\angle ABC$

Statements	Reasons
① $\overline{AB} \cong \overline{CB}$	① Given
② $\overline{AD} \cong \overline{CD}$	② Given
③ $\overline{BD} \cong \overline{BD}$	③ Reflexive Property
④ $\triangle ABD \cong \triangle CBD$	④ SSS (step 1, 2, 3)
⑤ $\angle ABD \cong \angle CBD$	⑤ CPCTC
⑥ \overline{BD} bisects $\angle ABC$	⑥ If a seg. divides an \angle into 2 $\cong \angle$ s, then it bisects the \angle . (Def. of bisection)



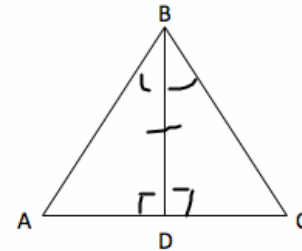
4) Given: $\angle ABD \cong \angle CBD$, BD is an altitude of $\triangle ABC$

Prove: BD is the median to AC



4) Given: $\angle ABD \cong \angle CBD$, BD is an altitude of $\triangle ABC$

Prove: BD is the median to AC



Statements	Reasons
① $\angle ABD \cong \angle CBD$	① Given
② BD alt of $\triangle ABC$	② Definition of altitude
③ $\angle BDA, \angle BDC$ r.t.	③ Rt \angle 's are \cong .
④ $\angle BDA \cong \angle BDC$	④ Reflexive property
⑤ $BD \cong BD$	⑤ ASA (step 1, 5, 4)
⑥ $\triangle ABD \cong \triangle CBD$	⑥ CPCTC
⑦ $AD \cong CD$	⑦ If a seg. drawn from a vertex to opp. side forms 2 \cong seg, then it's a median. (Def of median)
⑧ BD median to AC	