Good afternoon; assessments are being passed back; will do an example proof as our warm up

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Triangle Congruence Proofs Made Easy

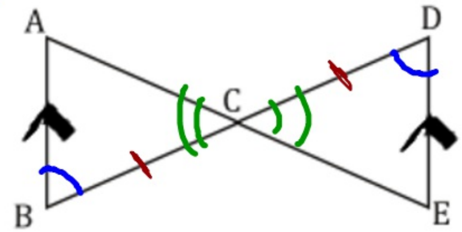
- Always begin with Given
- SSS/SAS/ASA/AAS/HL ONLY used if the statement has two △'s in it.
- Reflexive Property is only used for shared sides, and the statement always has the same segment written on both sides of the symbol
- CPCTC is never used if the statement has a △ symbol in it
- CPCTC must come after SSS/SAS/ASA/ AAS/HL and never before.
- Only use HL if it's a right triangle
- Use the "definition of bisect" as a reason to state that two segments or angles are congruent if they are not given (so long as word "bisect" is given)
- Always look for vertical angles, shared sides, and alt. interior angles (if given parallel lines)
- Vertical angles always have same middle letter
- "Prove" and "Congruent" are NEVER reasons
- The last statement is always provided to you

AAS
ASA

Model Proof

Given: $\overline{AB} \parallel \overline{DE}$ and $\overline{AE}$ *bisects* $\overline{BD}$

Prove: $\overline{AC} \cong \overline{EC}$

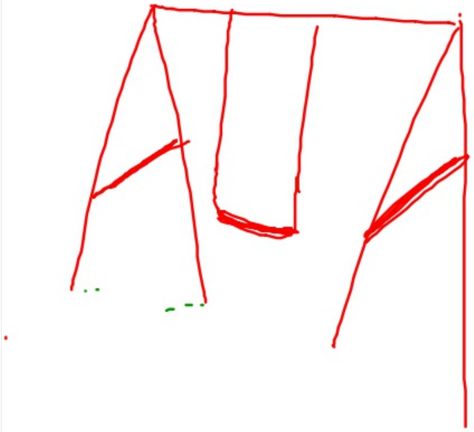


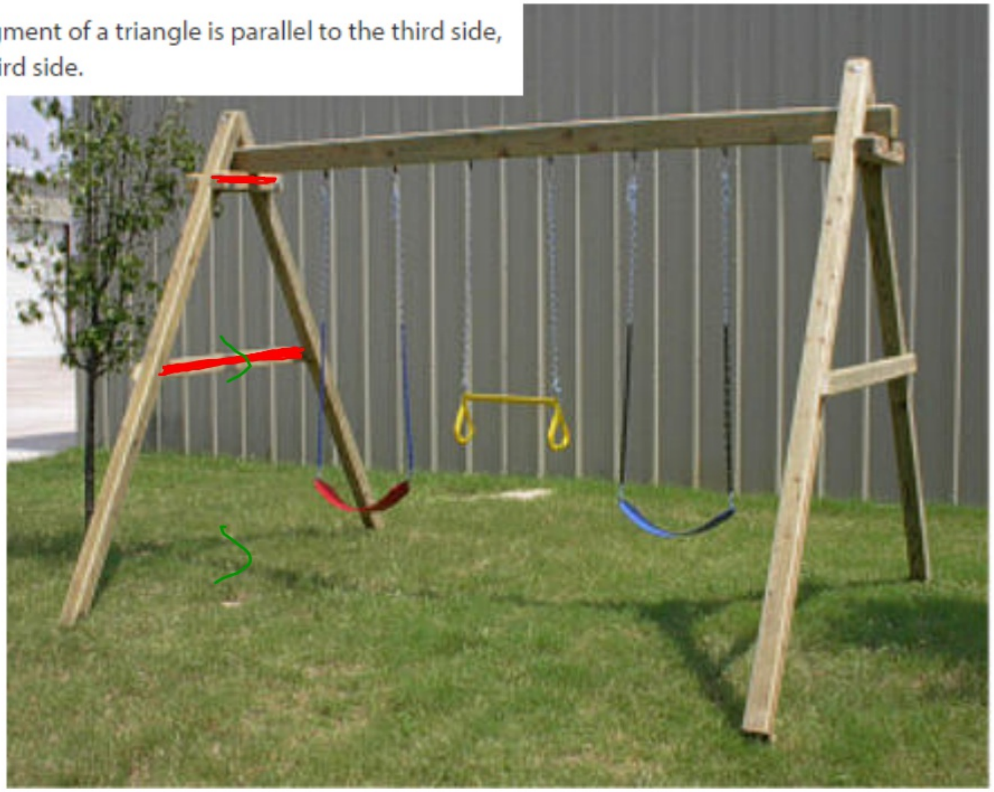
Statements	Reasons
1. $\overline{AB} \parallel \overline{DE}$ and $\overline{AE}$ *bisects* $\overline{BD}$	1. Given
2. $\angle ABC \cong \angle EDC$	2. Alt. Int. Angles
3. $\angle ACB \cong \angle ECD$	3. Vertical ∠'s
4. $\overline{BC} \cong \overline{DC}$	4. Def. of bisect
5. $\Delta ABC \cong \Delta EDC$	5. ASA
6. $\overline{AC} \cong \overline{EC}$	6. CPCTC

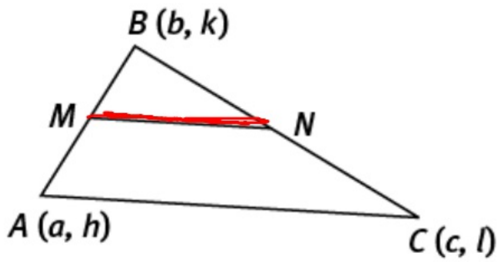
Midsegment: p. 207

The segment whose endpoints are the midpoints of two sides of a triangle is called a ***midsegment***.

Triangle Midsegment Theorem The midsegment of a triangle is parallel to the third side, and its length is one-half the length of the third side.







The segment whose endpoints are the midpoints of two sides of a triangle is called a ***midsegment***.

Triangle Midsegment Theorem The midsegment of a triangle is parallel to the third side, and its length is one-half the length of the third side.

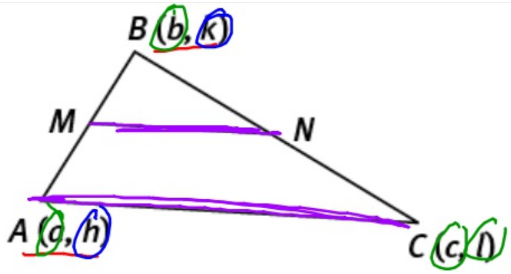
a. Complete the hypothesis and conclusion for the Triangle Midsegment Theorem.

Hypothesis: ***M* is the midpoint of** ~~B~~ BA.

N is the midpoint of BC.

Conclusion: $\overline{MN} \parallel$ AC.

$MN =$ $\frac{1}{2}$AC



b. Find the coordinates of midpoints M and N in terms of a, b, c, h, k, and l.

$M\left(\frac{a+b}{2}, \frac{h+k}{2}\right)$ $N\left(\frac{b+c}{2}, \frac{k+l}{2}\right)$

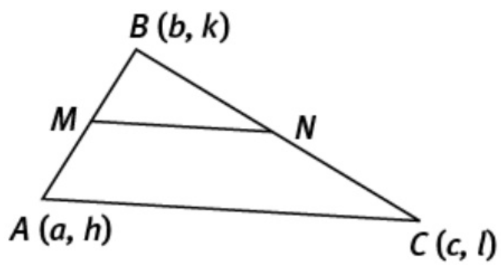
c. Find the slope of $\overline{AC}$ and $\overline{MN}$.

AC: $\frac{\Delta y}{\Delta x} = \frac{l-h}{c-a}$

MN Slope: $\dfrac{\frac{k+l}{2} - \frac{h+k}{2}}{\frac{b+c}{2} - \frac{b+a}{2}}$

d. Simplify your response to part c and explain how your answers to part c show $\overline{MN} \parallel \overline{AC}$.

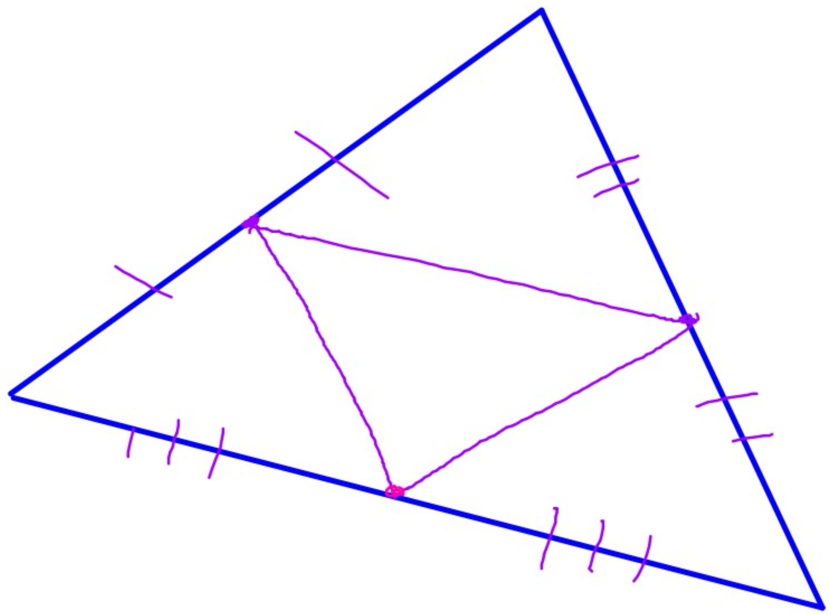
e. Find AC and MN.

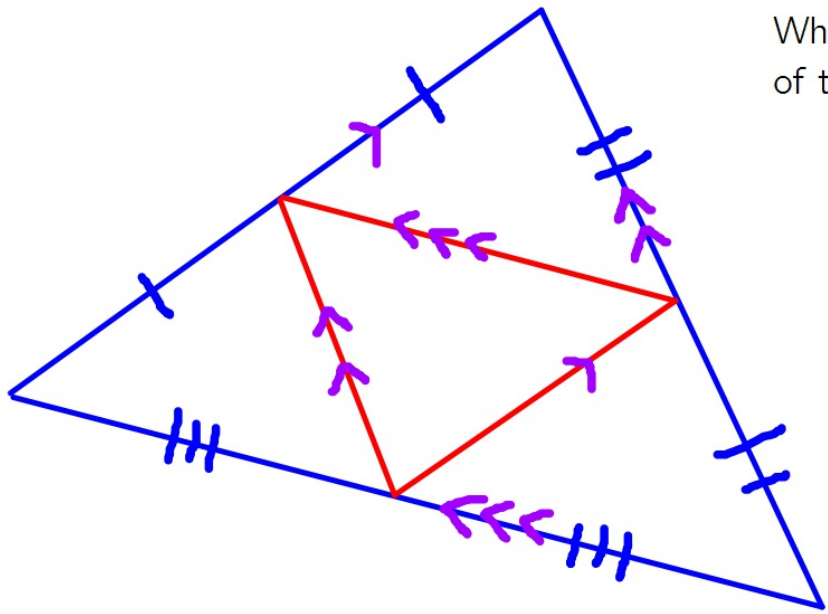


f. Simplify your response to part e and explain how your answers to part e show that $MN = \frac{1}{2}AC$.

How many midsegments does a given triangle have?

3

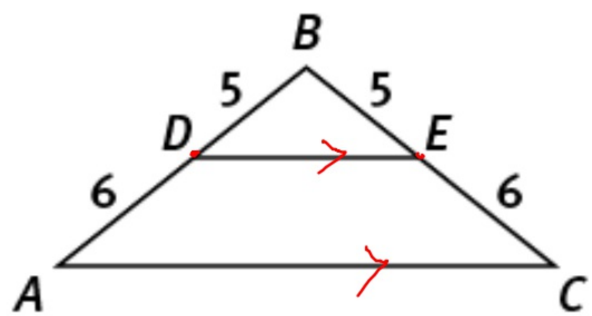




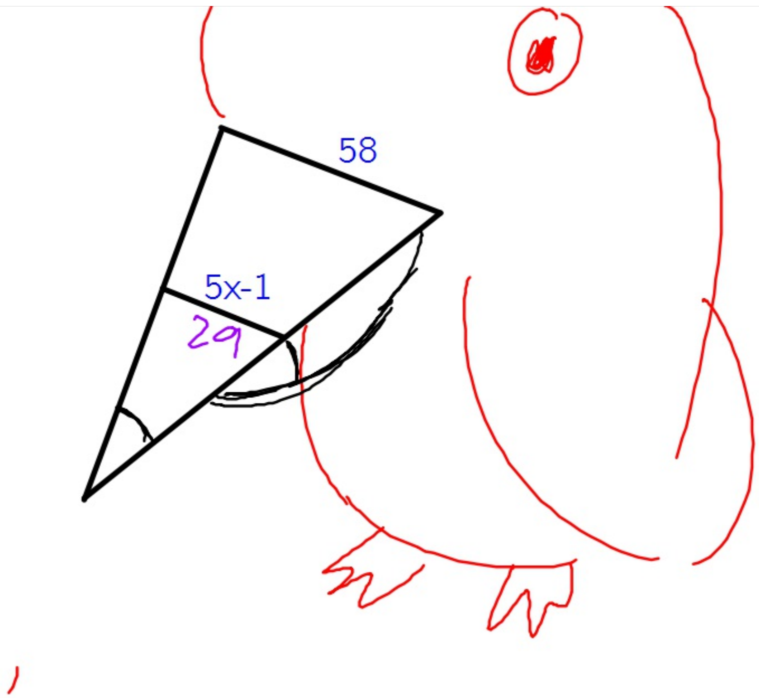
What is the ratio of the perimeter
of the blue triangle to the red triangle?

Midsegment Examples: p. 208 #8

Given $\overline{DE} \parallel \overline{AC}$. Is $\overline{DE}$ a midsegment of triangle *ABC*? Explain.



No, D is not midpoint of $\overline{AB}$ b/c $\overline{AD} \neq \overline{DB}$.



Midsegment Examples:

(not in the book; please draw this in margin)

$5x-1 = \cancel{58}\ 29$

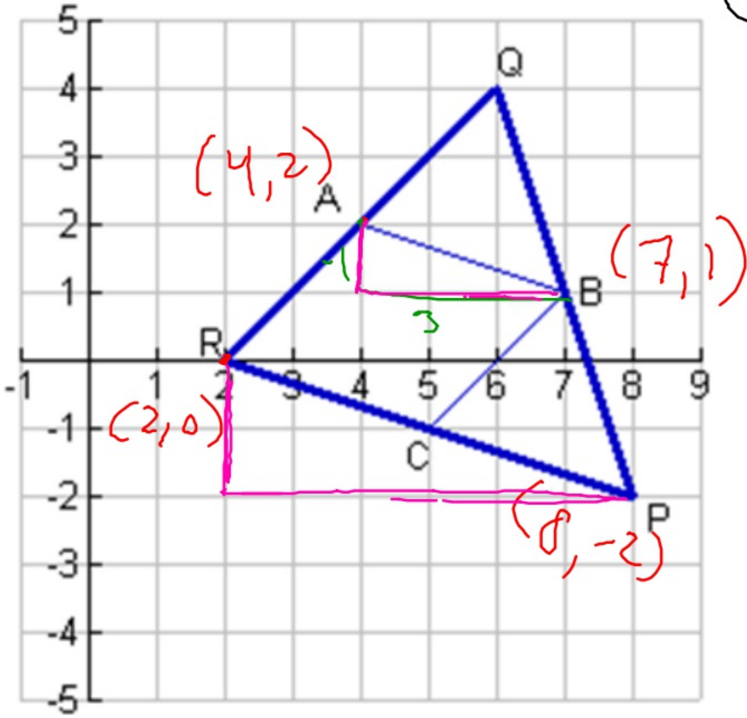
$5x - \cancel{1} = 29$

$\underline{+\cancel{1}} \quad \underline{+1}$

$5x = 30$

$\underline{x = 6}$

9a



Show that AB is a midsegment of the triangle.

① Show $\overline{AB} \parallel \overline{RP}$ ✓

$-\frac{1}{3}$ $\quad$ $-\frac{2}{6} = -\frac{1}{3}$

② Show $AB = \frac{1}{2} RP$ ✓

$a^2 + b^2 = c^2$

$1^2 + 3^2 = c^2$

$1 + 9 = c^2$

$\sqrt{10} = \sqrt{c^2}$

$3.\cancel{1}5 = c$

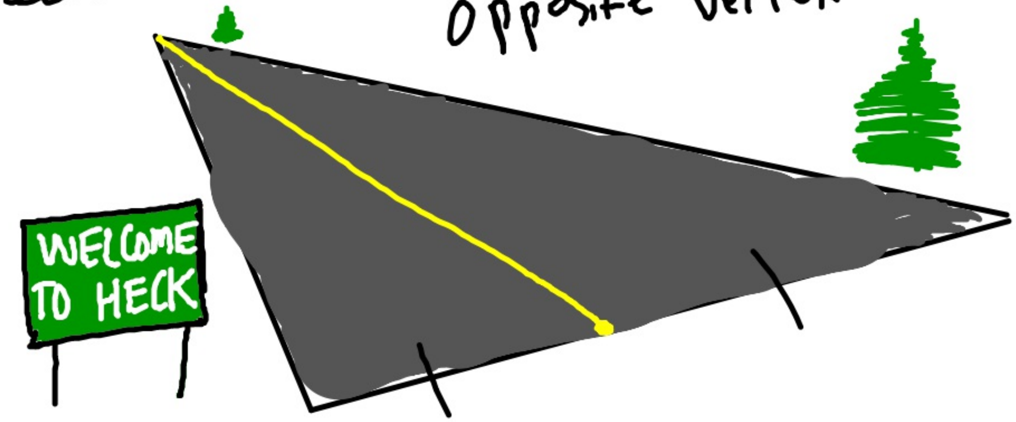
$\sqrt{40} = \sqrt{c^2}$

$6.3 = c^2$

Medians: p. 195

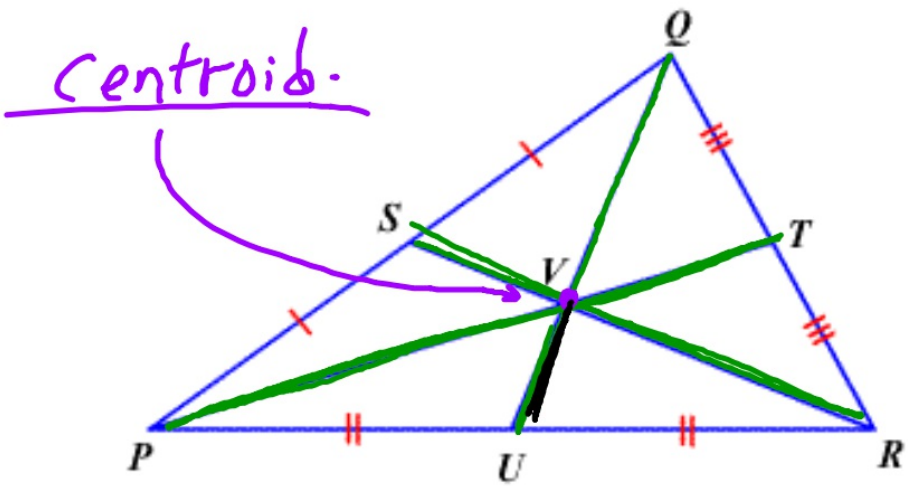
*connects a midpoint to the opposite vertex.

Definition:



Centroid: where all three medians cross: p. 196

(draw this in notes please)



2 special facts about centroids:

- Centroid is center of gravity. (balancing point)

* It splits each median into 2:1 ratio. *

p. 197: #14 (star it) twice

$3 \cdot VU = UQ$

Centroid Examples   p. 197: 20, 21, 22*

20. If $EU = 8$ cm, then

$UY =$ 16 and $YE =$ 24.

21. If $BS = 12$ cm, then

$BU =$ 8 and $US =$ 4.

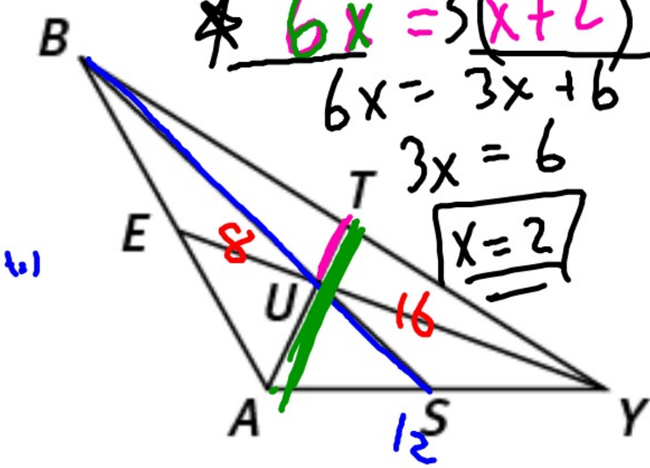
2:1 ratio

$\underbrace{\qquad\qquad}_{\text{3 parts in total}}$

$\frac{12}{3} = 4$

22: Suppose AT= 6x and UT = x+2.
Find x and then find AT, AU, and UT.

12   8   4



$6x = 3(x+2)$

$6x = 3x + 6$

$3x = 6$

$\boxed{x = 2}$

hw: p. 208: #9-11
p. 201: #8-11