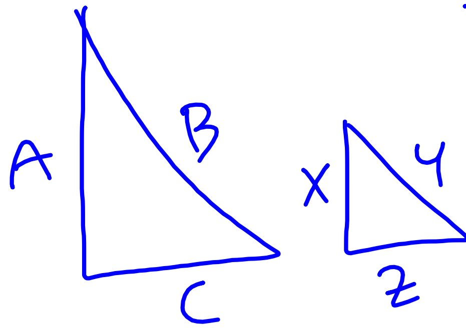
4-3 Triangle Proportionality

pages 285-302

corr. sides



$$\frac{A}{x} = \frac{B}{y} = \frac{C}{z}$$

Warm-Up

Solve the following proportions for x:

$$\frac{x}{5} = \frac{16}{20}$$

$$\frac{20x}{20} = \frac{80}{20}$$

$$\boxed{x = 4}$$

$$\frac{2x}{4} = \frac{9}{6}$$

$$12x = 36$$

$$x = 3$$

$$\frac{2x+3}{3} = \frac{5x-3}{4}$$

$$4(2x+3) = 3(5x-3)$$

$$8x + 12 = 15x - 9$$

$$-8x \qquad -8x$$

$$12 = 7x - 9$$

$$+9 \qquad +9$$

$$21 = 7x$$

$$x = 3$$

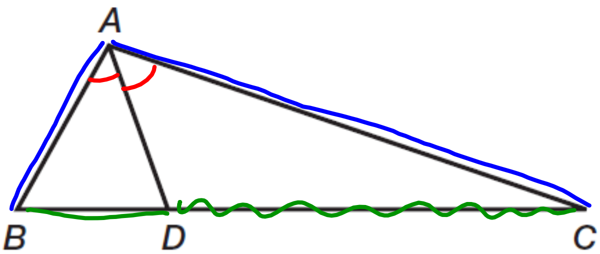
p 286

Angle Bisector/Proportional Side Theorem: "A bisector of an angle in a triangle divides the opposite side into two segments whose lengths are in the same ratio as the lengths of the sides adjacent to the angle."

~~Given~~ If $\overline{AD}$ bisects $\measuredangle BAC$

~~Prove~~ Then $\frac{AB}{AC} = \frac{BD}{CD}$

adajacent across



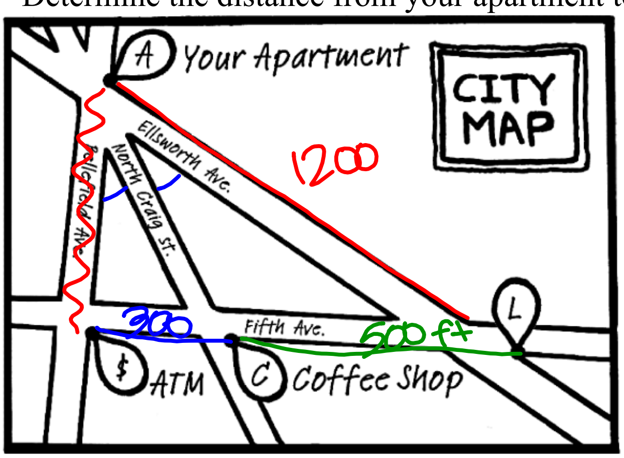
Complete the proof on the next slide.

Practice p 288

On the map, North Craig Street bisects the angle formed between Bellefield Avenue and Ellsworth Avenue.

• The distance from the ATM to the Coffee Shop is 300 feet, the Coffee Shop to the Library is 500 feet, and from your apartment to the Library is 1200 feet.

Determine the distance from your apartment to the ATM.



$$\frac{x}{1200} = \frac{3\cancel{00}}{5\cancel{00}}$$

$$\frac{5x}{5} = \frac{3600}{5}$$

$$\boxed{x = 720 \text{ ft}}$$

Practice

p 289 #2

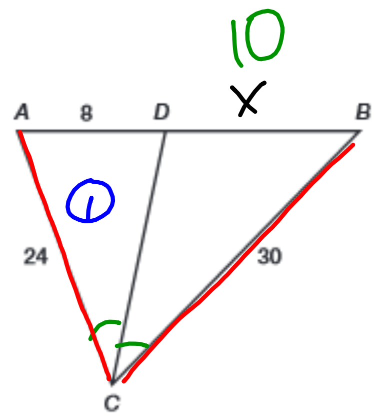
$\overline{CD}$ bisects $\measuredangle C$ What is the measure of $\overline{BD}$?

$$\frac{24}{30} = \frac{8}{x}$$

$$\frac{4}{5} \times \frac{8}{x}$$

$$\frac{4x}{4} = \frac{40}{4}$$

$$\boxed{x = 10}$$

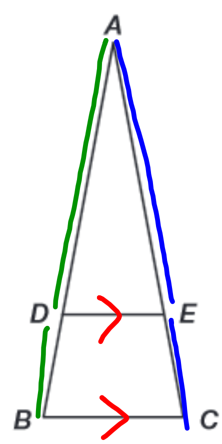


p 291

*Triangle Proportionality Theorem:** "If a line parallel to one side of a triangle intersects the other two sides, then it divides the two sides proportionally. "

If $\overline{BC} \parallel \overline{DE}$

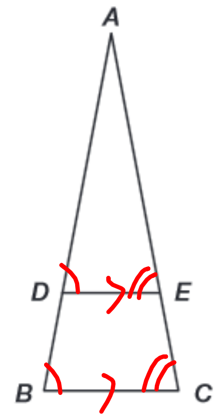
Then $\dfrac{AD}{DB} = \dfrac{AE}{EC}$



On the next slide, arrange the statements and reasons into a flow chart or 2 column proof.

p 293

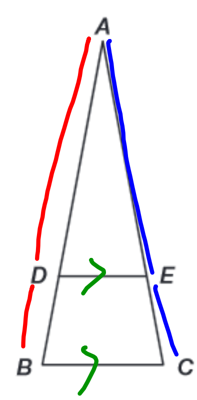
$\overline{BC} \parallel \overline{DE}$	Given
$\measuredangle AED \cong \measuredangle C$	Corresponding Angle Postulate
$\measuredangle ADE \cong \measuredangle B$	Corresponding Angle Postulate
$\Delta ADE \sim \Delta ABC$	AA Similarity
$\frac{BA}{DA} = \frac{CA}{EA}$	Corresponding sides of similar triangles are proportional
$BA = BD + DA$ $CA = CE + EA$	Segment Addition
$\frac{BD+DA}{DA} = \frac{CE+EA}{EA}$	Substitution
$\frac{BD}{DA} = \frac{CE}{EA}$	Simplify



p 296

Converse of the Triangle Proportionality Theorem: "If a line divides two sides of a triangle proportionally, then it is parallel to the third side."

If $\frac{AD}{DB} = \frac{AE}{EC}$ then $\overline{DE} \parallel \overline{BC}$

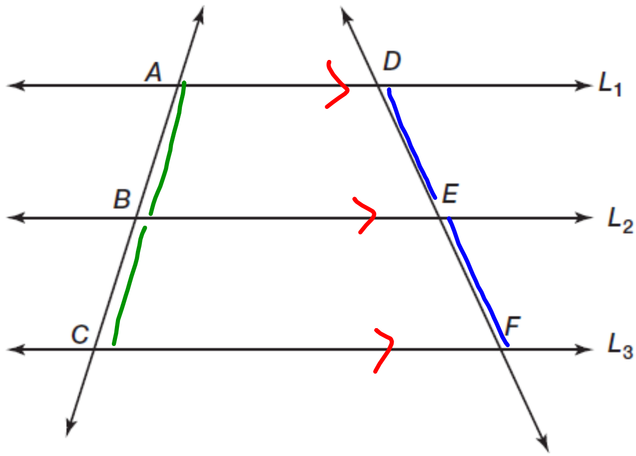


p 297

Proportional Segments Theorem: "If three parallel lines intersect two transversals, then they divide the transversals proportionally."

If $L_1 \parallel L_2 \parallel L_3$

Then $\frac{AB}{BC} = \frac{DE}{EF}$

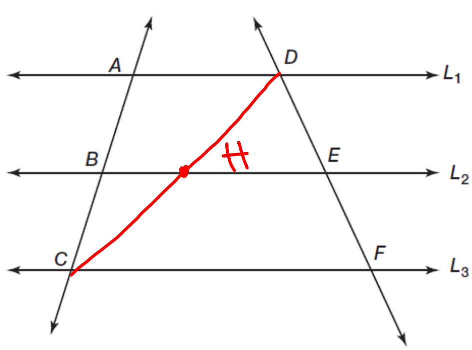


Complete the proof on the following slide.

p 297

Through any 2 pts there is exactly 1 line. Draw $\overline{CD}$ to form ΔACD & ΔFDC

Label the point where $\overline{CD}$ intersects L_2, H.



Using the Triangle Proportionality Theorem and triangle ACD, what can you conclude?

$* \frac{AB}{BC} = \frac{DH}{HC}$

Using the Triangle Proportionality Theorem and triangle FDC, what can you conclude?

$\frac{DH}{HC} = \frac{DE}{EF} *$

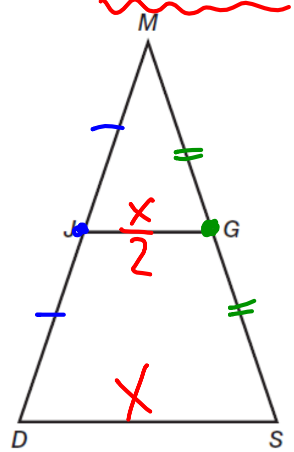
What property of equality will justify the prove statement?

Substitution $\frac{AB}{BC} = \frac{DH}{HC}$ ✓

p 298

Triangle Midsegment Theorem: "The midsegment of a triangle is parallel to the third side of the triangle and is half the measure of the third side of the triangle."

midsegment
① parallel
② $\frac{1}{2}$ measure

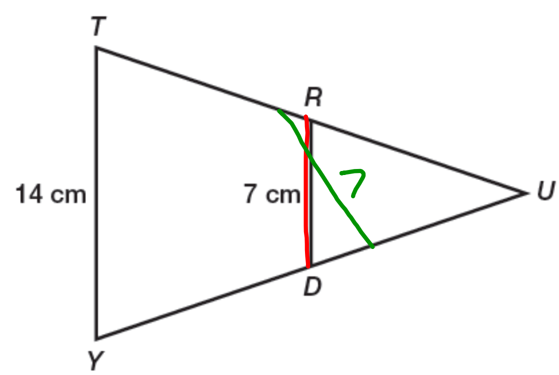


p 299 #3

Ms. Zoid asked her students to determine whether $\overline{RD}$ is the midsegment of ΔTUY, given TY = 14cm and RD = 7cm.

① parallel X
② $\frac{1}{2}$ measure ✓

~~not~~



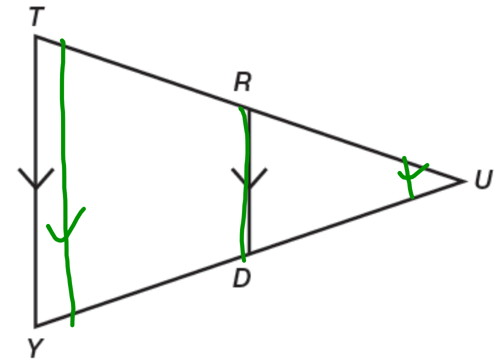
Carson told Alicia that using the Triangle Midsegment Theorem, he could conclude that $\overline{RD}$ is a midsegment. Is Carson correct? How should Alicia respond if Carson is incorrect?

p 299 #4

Ms. Zoid asked her students to determine whether $\overline{RD}$ is the midsegment of ΔTUY, given $\overline{RD} \parallel \overline{TY}$

① parallel ✓
② $\frac{1}{2}$ measure X

~~not~~

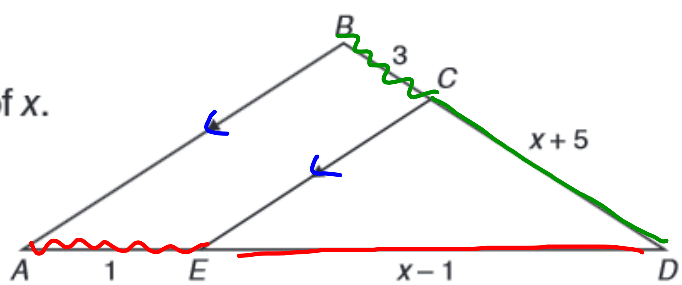


Alicia told Carson that using the Triangle Midsegment Theorem, she could conclude that $\overline{RD}$ is a midsegment. Is Alicia correct? How should Carson respond if Alicia is incorrect?

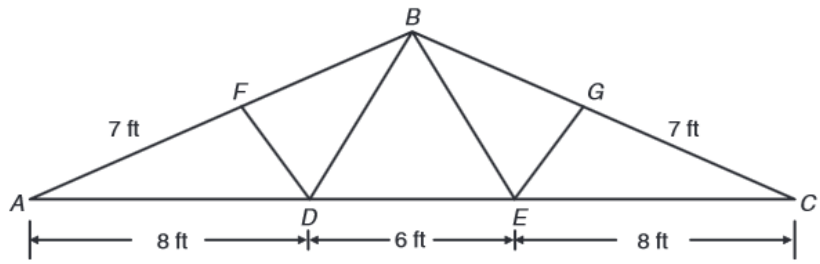
Given: $\overline{AB} \parallel \overline{CE}$

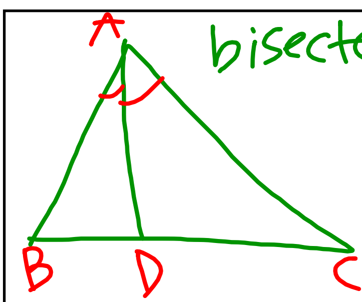
Calculate the value of x.

$$\frac{x-1}{1} = \frac{x+5}{3}$$



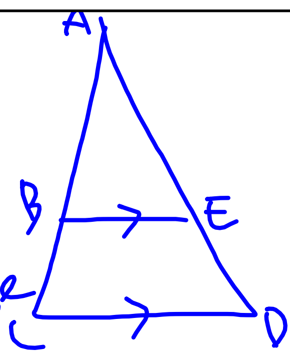
The truss for a barn roof is shown below. $\overline{DF}$ bisects $\measuredangle ADB$ and $\overline{EG}$ bisects $\measuredangle CEB$. ΔDEB is an equilateral triangle. Calculate the perimeter of the truss.





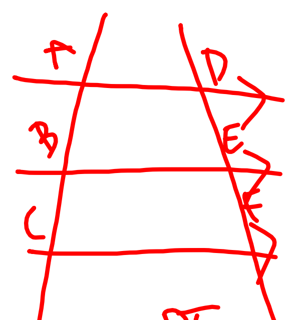
bisected

$$\frac{AB}{AC} = \frac{BD}{DC}$$

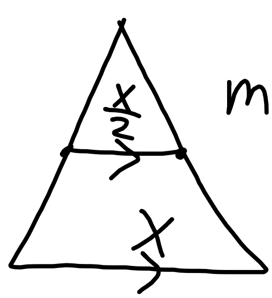


converse

$$\frac{AB}{BC} = \frac{AE}{ED}$$



$$\frac{AB}{BC} = \frac{DE}{EF}$$



midsegment