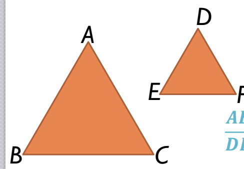
§7-5 Parts of Similar Triangles

- Proportional Perimeters Theorem
  - If two triangles are similar, then the perimeters are proportional to the measures of corresponding sides.

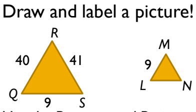


$$\frac{AB+BC+AC}{DE+EF+DF}=\frac{AC}{DF}=\frac{BC}{EF}=\frac{AB}{DE}$$

$\Delta ABC \sim \Delta DEF$

§7-5 Parts of Similar Triangles

- Example
  - If $\Delta LMN \sim \Delta QRS$, $QR = 40$, $RS = 41$, $SQ = 9$, and $LM = 9$, find the perimeter of ΔLMN.
    - Draw and label a picture!



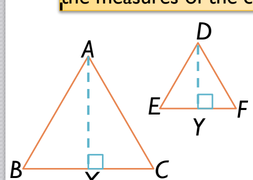
- Use the Proportional Perimeters Theorem to set up a proportion!

$$\frac{9+40+41}{LM+LN+MN}=\frac{40}{9} \qquad \frac{90}{LM+LN+MN}=\frac{40}{9}$$

$$40(P_{\Delta LMN}) = 810 \qquad P_{\Delta LMN}=\frac{810}{40} \qquad P_{\Delta LMN}=20\frac{1}{4}$$

§7-5 Parts of Similar Triangles

- Theorem
  - If two triangles are similar, then the measures of the corresponding altitudes are proportional to the measures of the corresponding sides.

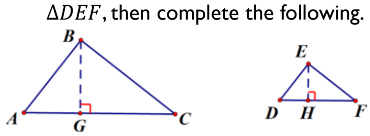


$$\frac{AX}{DY}=\frac{AC}{DF}=\frac{BC}{EF}=\frac{AB}{DE}$$

$\Delta ABC \sim \Delta DEF$

§7-5 Parts of Similar Triangles

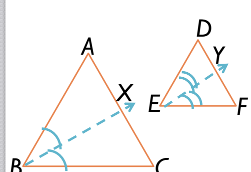
- Example
  - In the figure, $\Delta ABC \sim \Delta DEF$. If $\overline{BG}$ is an altitude of ΔABC, and $\overline{EH}$ is an altitude of ΔDEF, then complete the following.



$$\frac{BG}{EH} = \frac{AB}{DE} \qquad \frac{BG}{EH} = \frac{BC}{EF}$$

§7-5 Parts of Similar Triangles

- Theorem
  - If two triangles are similar, then the measures of the corresponding angle bisectors are proportional to the measures of the corresponding sides.

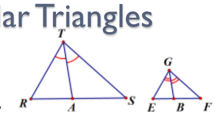


$$\frac{BX}{EY} = \frac{AC}{DF} = \frac{BC}{EF} = \frac{AB}{DE}$$

$\Delta ABC \sim \Delta DEF$

§7-5 Parts of Similar Triangles

- Proof of the theorem.
  - Given: $\Delta RTS \sim \Delta EGF$
    $\overline{TA}$ is an angle bisector of $\angle RTS$
    $\overline{GB}$ is an angle bisector of $\angle EGF$
  - Prove: $\frac{TA}{GB} = \frac{RT}{EG}$

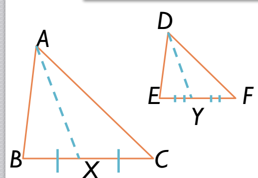


Statement	Reason
1. $\Delta RTS \sim \Delta EGF$	1. Given
2. $\angle RTS \cong \angle EGF$ $\angle R \cong \angle E$	2. 2 Δs are ~ ⇔ corr. ∠s are ≅ and corr. sides are proportional (Def. ~ Δs)
3. $\overline{TA}$ is an angle bisector of $\angle RTS$ $\overline{GB}$ is an angle bisector of $\angle EGF$	3. Given
4. $\angle RTA \cong \angle ATS; \angle EGB \cong \angle BGF$	4. Def. angle bisectors
5. $m\angle RTA = m\angle ATS; m\angle EGB = m\angle BGF$ $m\angle RTS = m\angle EGF$	5. Def. ≅ ∠s
6. $m\angle RTA + m\angle ATS = m\angle RTS;$ $m\angle EGB + m\angle BGF = m\angle EGF;$	6. ∠ Add. Post.

Continued on board

§7-5 Parts of Similar Triangles

- Theorem
  - If two triangles are similar, then the measures of the corresponding medians are proportional to the measures of the corresponding sides.

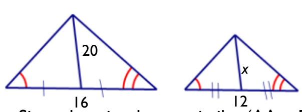


$$\frac{AX}{DY} = \frac{AC}{DF} = \frac{BC}{EF} = \frac{AB}{DE}$$

$$\Delta ABC \sim \Delta DEF$$

§7-5 Parts of Similar Triangles

- Example
  - Find the value of *x*.



- Since the triangles are similar (AA ~ Post.) we know that the medians are proportional to the sides.
- Therefore, $\frac{20}{x} = \frac{16}{12}$

$\frac{20}{x} = \frac{4}{3}$ $4x = 60$

$x = 15$