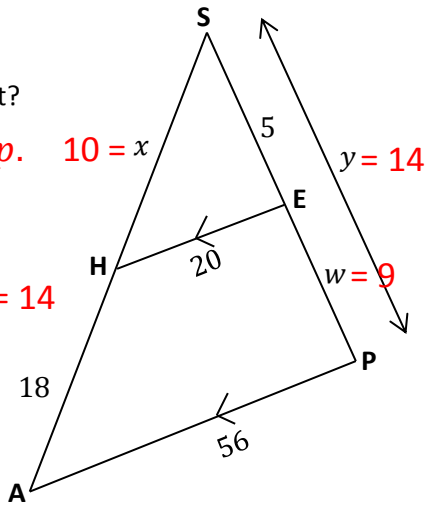
Geometry (G-SRT.4)
Unit 2: Side-Splitting Theorem – Day 1 (IC9)

Name: _____
Date: _____ Period: _____

Review and Explore: Using what you know about similarity, answer the following.



1. Are there similar polygons shown in the diagram to the right? Why or why not?

   Yes → the || sides cause ≅ *corr ∠'s and/or reflexive prop.*

2. Solve for the missing measurements (variables in the diagram).

$\frac{small\ side}{large\ side} = \frac{20}{56}$ $\quad \frac{x}{x+18} = \frac{20}{56}$ $\quad \frac{5}{y} = \frac{20}{56}$

5 + w = 14
w = 9

56x = 20x + 360
36x = 360
x = 10

20y = 280
y = 14

3. Using your answers from #2, test each of the following proportions to identify whether they are true or false.

a) $\frac{SH}{SA} = \frac{SE}{SP}$ **True** **False**
$\frac{10}{28} = \frac{5}{14}$

b) $\frac{SH}{HA} = \frac{HE}{AP}$ **True** **False**
$\frac{10}{18} \neq \frac{20}{56}$

c) $\frac{AS}{HS} = \frac{HE}{AP}$ **True** **False**
$\frac{28}{10} \neq \frac{20}{56}$

d) $\frac{SP}{SE} = \frac{HE}{AP}$ **True** **False**
$\frac{14}{5} \neq \frac{20}{56}$

e) $\frac{EP}{SE} = \frac{HA}{SH}$ **True** **False** $\frac{9}{5} = \frac{18}{10}$

4. Using one of the descriptions below, fill in the proportions used in each part of #3 with their corresponding labels. The first one has been done as an example.

Description Choices: **1.** Small Δ side **2.** Large Δ side **3.** Neither

a) $\frac{SH}{SA} = \frac{SE}{SP} \rightarrow \frac{Small\ \Delta\ side}{Large\ \Delta\ side} = \frac{Small\ \Delta\ side}{Large\ \Delta\ side}$

b) $\frac{SH}{HA} = \frac{HE}{AP} \rightarrow \frac{Small\ \Delta\ side}{Neither} \neq \frac{Small\ \Delta\ side}{Large\ \Delta\ side}$

c) $\frac{AS}{HS} = \frac{HE}{AP} \rightarrow \frac{Large\ \Delta\ side}{Small\ \Delta\ side} \neq \frac{Small\ \Delta\ side}{Large\ \Delta\ side}$

d) $\frac{SP}{SE} = \frac{HE}{AP} \rightarrow \frac{Large\ \Delta\ side}{Small\ \Delta\ side} \neq \frac{Small\ \Delta\ side}{Large\ \Delta\ side}$

e) $\frac{EP}{SE} = \frac{HA}{SH} \rightarrow \frac{Neither}{Small\ \Delta\ side} = \frac{Neither}{Small\ \Delta\ side}$

5. What occurred that caused the false proportion(s)?

   Mismatched corresponding parts

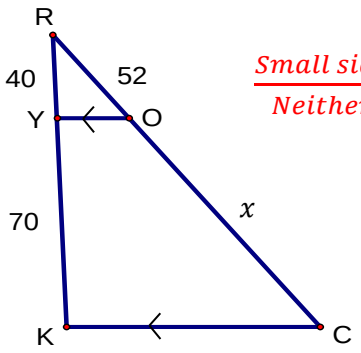
6. Did any true statements surprise you? Why?

   (e) → what's going on with the "neither" pieces?

The Side Splitting Theorem states: If a line is parallel to one side of a triangle, then it divides the other 2 sides of the triangle proportionally

Examples:

1.



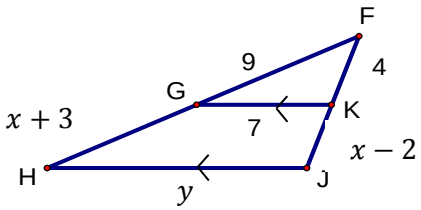
$\frac{Small\ side}{Neither} = \frac{40}{70} = \frac{4}{7}$

$\frac{4}{7} = \frac{52}{x}$

4x = 364

x = 91

2.



$\frac{Small\ side}{Neither} = \frac{9}{x+3} = \frac{4}{x-2}$

9x – 18 = 4x + 12

5x = 30

x = 6

- Can't use side-splitter theorem to solve for y because there is no "neither" piece.

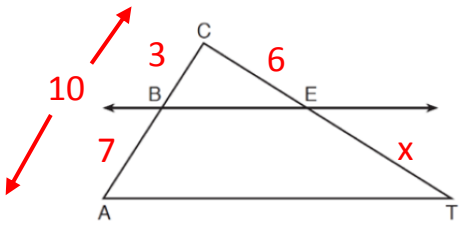
$\frac{Small\ side}{Large\ side} = \frac{7}{y} = \frac{9}{18}$

9y = 126

y = 14

3. If $\overleftrightarrow{BE} \parallel \overline{AT}$, CB = 3, CA = 10, and CE = 6, what is ET?

a) 5
b) 14
c) 20
d) 26



$\frac{3}{7} = \frac{6}{x}$

3x = 42

x = 14

or

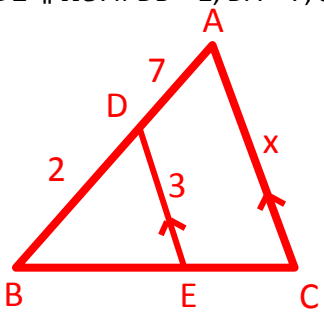
$\frac{3}{10} = \frac{6}{6+x}$

18 + 3x = 60

3x = 42

x = 14

4. In ΔABC, D is on $\overline{AB}$, and E is on $\overline{BC}$ such that $\overline{DE} \parallel \overline{AC}$. If DB = 2, DA = 7, and DE = 3, what is AC?



$\frac{Small}{Large} = \frac{3}{x} = \frac{2}{9}$

27 = 2x

x = 13.5

Not a side-splitter theorem problem!