Day 4 – Side Splitter Theorem (Triangle Proportionality Theorem) - Notes

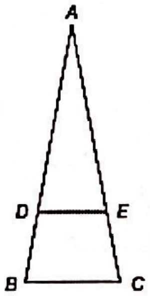
From the past few days, you learned how to determine if two triangles or figures are similar in an informal way. Now we will learn about some Similarity Theorems that apply specifically to triangles.

The **Side Splitter Theorem**, which states "If a line parallel to one side of a triangle intersects the other two sides, then it divides the two sides proportionally."

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

Then:

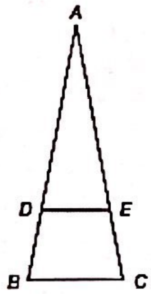
$$\frac{AD}{DB} = \frac{AE}{EC}$$



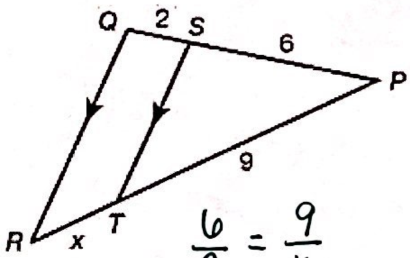
The **Converse of the Side Splitter Theorem,** states "If a lines divides two sides of a triangle proportionally, then it is parallel to the third side."

If: $\frac{AD}{DB} = \frac{AE}{EC}$

Then: $\overline{DE} \parallel \overline{BC}$



Example 1: Find the value of x if ST ∥ QR.

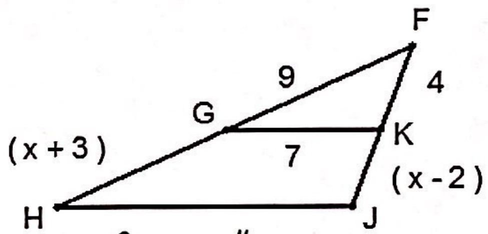


$$\frac{6}{2} = \frac{9}{x}$$

$6x = 18$

$x = 3$

Example 2: Find the value of x if GK ∥ HJ.



$$\frac{9}{x+3} = \frac{4}{x-2}$$

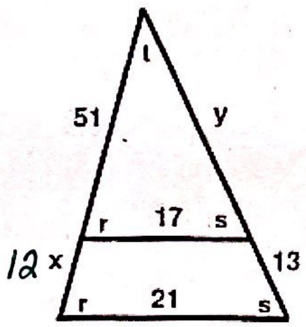
$9(x-2) = 4(x+3)$

$9x - 18 = 4x + 12$

$5x = 30$

$\boxed{x = 6}$

Example 3: Find x and y:



$$\frac{51}{17} = \frac{51+x}{21}$$

$1071 = 17(51 + x)$

$1071 = 867 + 17x$

$204 = 17x$

$\boxed{12 = x}$

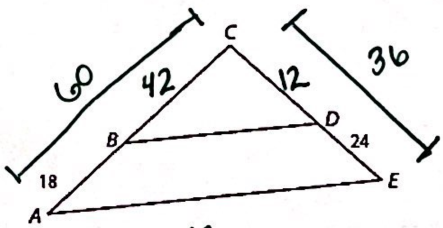
$$\frac{51}{12} = \frac{y}{13}$$

$12y = 663$

$\boxed{y = 55.25}$

Example 4: If AC = 60 units and EC = 36 units, is $\overline{AE} \parallel \overline{BD}$?

"Converse of Side Splitter Thm"



$$\frac{42}{18} = \frac{12}{24}$$

$2.\overline{3} \neq 0.5$

$\overline{BD}$ is not parallel to $\overline{AE}$, since the sides are not proportional.