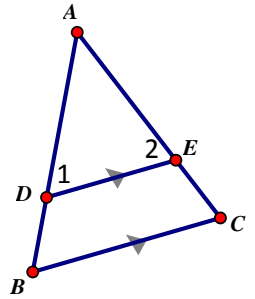


The Side Splitting Theorem: A line parallel to one side of a triangle divides the other two proportionally.

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

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



Statements	Reasons
1. $\overline{DE} \parallel \overline{BC}$	1. <b>Given</b>
2. $\angle 2 \cong \angle C$	2. $\parallel$ lines $\rightarrow$ corr $\angle$ 's $\cong$
3. $\angle A \cong \angle A$	3. <b>Reflexive</b> (could also have been $\angle 1 \cong \angle B$ )
4. $\triangle ADE \sim \triangle ABC$	4. <b>AA~</b>
5. $\frac{AD}{AB} = \frac{AE}{AC}$	5. <b>Def of ~<math>\Delta</math>'s</b>
6. $AB = \underline{AD} + \underline{DB}$ ; $AC = \underline{AE} + \underline{EC}$	6. <b>Segment addition property</b>
7. $\frac{AD}{\underline{AD + DB}} = \frac{AE}{\underline{AE + EC}}$	7. <b>Substitution</b>
8. $AD(\underline{AE + EC}) = AE(\underline{AD + DB})$	8. <b>Cross multiplication</b>
9. $AD(\underline{AE}) + AD(\underline{EC}) = AE(\underline{AD}) + AE(\underline{DB})$	9. <b>Distributive Prop</b>
10. $AD(\underline{EC}) = AE(\underline{DB})$	10. <b>Subtraction Prop</b>
11. $\frac{AD}{\underline{DB}} = \frac{AE}{\underline{EC}}$	11. <b>Division Prop</b>

**Explore:**

a)  $\frac{GA}{AB} = \frac{GD}{DE}$  **True** **False**

$$\frac{8}{4} = \frac{4}{2}$$

c)  $\frac{AB}{EF} = \frac{DE}{BC}$  **True** **False**

$$\frac{4}{1} \neq \frac{2}{2}$$

e)  $\frac{BC}{AB} = \frac{EF}{DE}$  **True** **False**

$$\frac{2}{4} = \frac{1}{2}$$

b)  $\frac{GA}{BC} = \frac{GD}{DE}$  **True** **False**

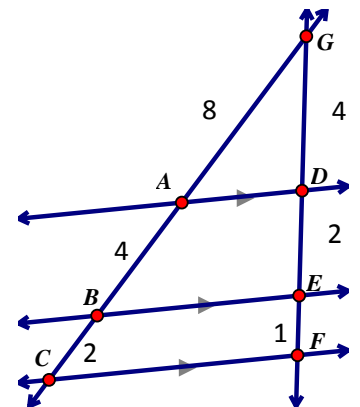
$$\frac{8}{2} \neq \frac{4}{2}$$

*DE should be EF*

d)  $\frac{AC}{DF} = \frac{GB}{GE}$  **True** **False**

$$\frac{6}{3} = \frac{12}{6} \quad \frac{3}{2} \neq \frac{4}{6}$$

f)  $\frac{FD}{ED} = \frac{BA}{CA}$  **True** **False**



**Corollary (Result) of Side Splitting Theorem:** If multiple parallel lines intersect two transversals, then the segments intercepted by the parallel lines are proportional.

Just be careful to always match up corresponding parts!

Examples:

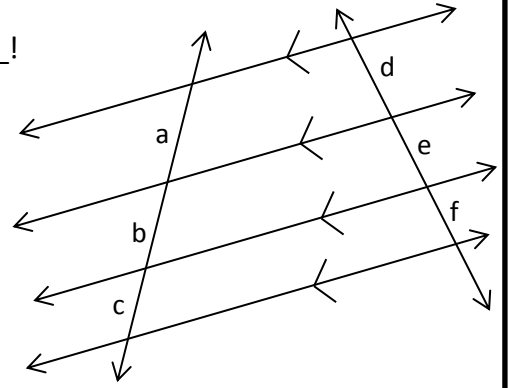
$$1. \frac{a}{b} = \frac{d}{e}$$

$$3. \frac{b}{a+b} = \frac{e}{d+e}$$

$$5. \frac{c}{b} = \frac{f}{e}$$

$$2. \frac{a}{c} = \frac{d}{f}$$

$$4. \frac{a+b}{c} = \frac{d+e}{f}$$



Complete the proportions.

$$a) \frac{AB}{BC} = \frac{DE}{\boxed{EF}}$$

$$b) \frac{AC}{DF} = \frac{AB}{\boxed{DE}}$$

$$c) \frac{GE}{DF} = \frac{\boxed{GB}}{AC}$$

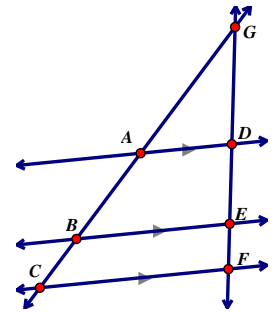
$$d) \frac{GF}{DE} = \frac{GC}{\boxed{AB}}$$

$$e) \frac{\boxed{AC}}{DF} = \frac{BC}{EF}$$

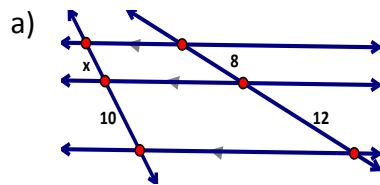
$$f) \frac{CB}{CG} = \frac{FE}{\boxed{FG}}$$

$$g) \frac{GA}{\boxed{GB}} = \frac{AD}{BE}$$

$$h) \frac{CF}{AD} = \frac{\boxed{FG}}{DG}$$



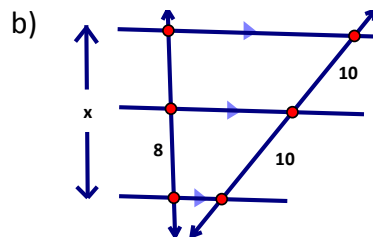
Examples: Find the values for the missing variables.



$$\frac{x}{10} = \frac{8}{12}$$

$$12x = 80$$

$$x = 20/3 = 6.6$$



$$\frac{8}{x} = \frac{10}{20}$$

$$10x = 160$$

$$x = 16$$