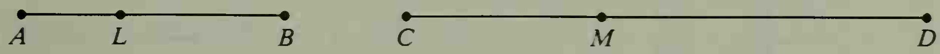
7-6 Proportional Lengths

Points L and M lie on $\overline{AB}$ and $\overline{CD}$, respectively. If $\frac{AL}{LB} = \frac{CM}{MD}$, we say that $\overline{AB}$ and $\overline{CD}$ are **divided proportionally.**

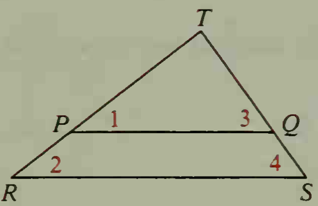


Theorem 7-3 *Triangle Proportionality Theorem*

If a line parallel to one side of a triangle intersects the other two sides, then it divides those sides proportionally.

Given: $\triangle RST$; $\overleftrightarrow{PQ} \parallel \overline{RS}$

Prove: $\frac{RP}{PT} = \frac{SQ}{QT}$



Proof:

Statements	Reasons
1. $\overleftrightarrow{PQ} \parallel \overline{RS}$	1. ?
2. $\angle 1 \cong \angle 2$; $\angle 3 \cong \angle 4$	2. ?
3. $\triangle RST \sim \triangle PQT$	3. ?
4. $\frac{RT}{PT} = \frac{ST}{QT}$	4. Corr. sides of $\sim$ $\triangle$ are in proportion.
5. $RT = RP + PT$; $ST = SQ + QT$	5. ?
6. $\frac{RP + PT}{PT} = \frac{SQ + QT}{QT}$	6. ?
7. $\frac{RP}{PT} = \frac{SQ}{QT}$	7. A property of proportions (Property 1(d), page 245.)

We will use the Triangle Proportionality Theorem to justify any proportion equivalent to $\frac{RP}{PT} = \frac{SQ}{QT}$. For the diagram at the right, some of the proportions that may be justified by the Triangle Proportionality Theorem include:

$$\frac{a}{j} = \frac{c}{k} \qquad \frac{a}{c} = \frac{j}{k} \qquad \frac{b}{j} = \frac{d}{k}$$

$$\frac{a}{b} = \frac{c}{d} \qquad \frac{a}{c} = \frac{b}{d} \qquad \frac{b}{d} = \frac{j}{k}$$