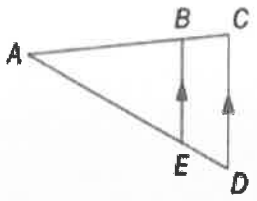
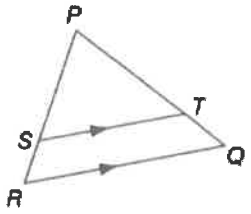
Theorem 7.5 **Triangle Proportionality Theorem** For Your FOLDABLE

If a line is parallel to one side of a triangle and intersects the other two sides, then it divides the sides into segments of proportional lengths.



Example If $\overline{BE} \parallel \overline{CD}$, then $\frac{AB}{BC} = \frac{AE}{ED}$.

1. In $\triangle PQR$, $\overline{ST} \parallel \overline{RQ}$. If $PT = 7.5$, $TQ = 3$, and $SR = 2.5$, find PS.

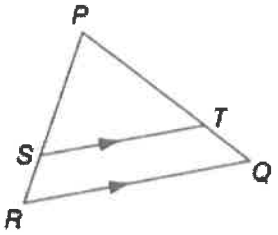


$\frac{PT}{TQ} = \frac{PS}{SR}$

$\frac{7.5}{3} = \frac{PS}{2.5}$

$6.25 = PS$

2. If $PS = 12.5$, $SR = 5$, and $PT = 15$, find TQ



$\frac{PT}{TQ} = \frac{PS}{SR}$

$\frac{15}{TQ} = \frac{12.5}{5}$

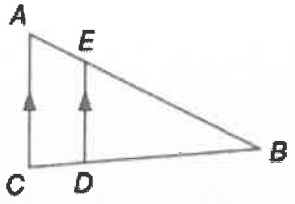
$12.5\,TQ = 75$

$TQ = 6$

Theorem 7.6 For Your FOLDABLE

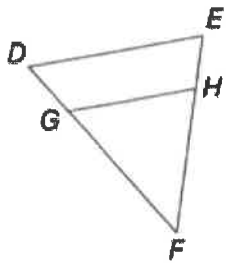
Converse of Triangle Proportionality Theorem

If a line intersects two sides of a triangle and separates the sides into proportional corresponding segments, then the line is parallel to the third side of the triangle.



Example If $\frac{AE}{EB} = \frac{CD}{DB}$, then $\overline{AC} \parallel \overline{ED}$.

3. In $\triangle DEF$, $EH = 3$, $HF = 9$, and DG is one-third the length of $\overline{GF}$. Is $\overline{DE} \| \overline{GH}$?



$\frac{HF}{EH} \stackrel{?}{=} \frac{GF}{GD}$

$\frac{9}{3} \stackrel{?}{=} 3$

$3 \stackrel{?}{=} 3$

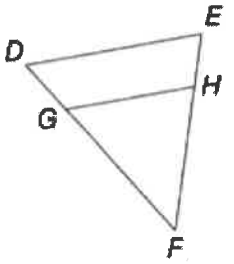
$DG = \frac{1}{3} GF$

$1 = \frac{1}{3} \frac{GF}{DG}$

$3 = \frac{GF}{DG}$

$\overline{DE} \| \overline{GH}$

4. DG is half the length of $\overline{GF}$, $EH = 6$, and $HF = 10$. Is $\overline{DE} \| \overline{GH}$?



$DG = \frac{1}{2} GF$

$2 = \frac{GF}{DG}$

$\frac{GF}{DG} \stackrel{?}{=} \frac{FH}{HE}$

$2 \stackrel{?}{=} \frac{10}{6}$

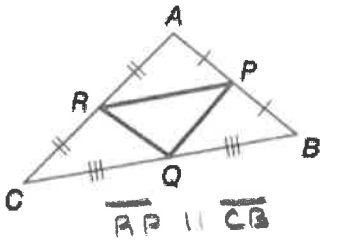
$2 \stackrel{?}{=} 5/3$

$\overline{DE} \not\| \overline{GH}$

Midsegment of a Triangle:

a segment w/ endpoints that are the midpoints of 2 sides of the triangle

* midsegments are $\|$ and $\frac{1}{2}$ the length of opposite side

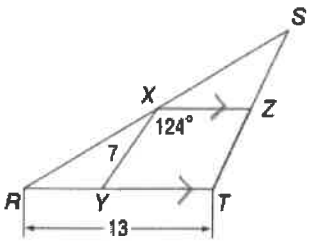


$\overline{RP} \| \overline{CB}$

$RP = \frac{1}{2} CB$

5. In the figure, $\overline{XY}$ and $\overline{XZ}$ are midsegments of $\triangle RST$. Find each measure.

a. $XZ = 6.5$



b. $ST = 14$

c. $m\angle RYX = 124^\circ$

alt int $\angle$s are $\cong$

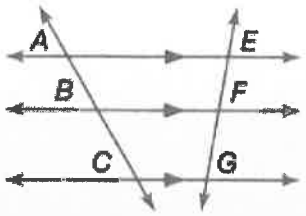
Corollary 7.1

For Your FOLDABLE

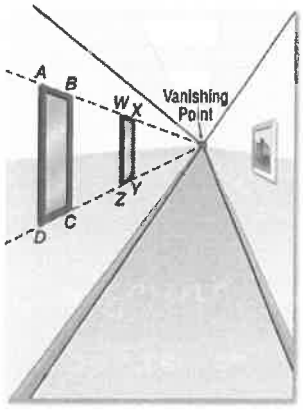
Proportional Parts of Parallel Lines

If three or more parallel lines intersect two transversals, then they cut off the transversals proportionally.

Example If $\overline{AE} \parallel \overline{BF} \parallel \overline{CG}$, then $\frac{AB}{BC} = \frac{EF}{FG}$.



6. Megan is drawing a hallway in one=point perspective. She uses the guidelines shown to draw two windows on the left wall. If segments $\overline{AD}$, $\overline{BC}$, $\overline{WZ}$, and $\overline{XY}$ are all parallel, $AB = 8\ cm$, $DC = 9\ cm$, and $ZY = 5\ cm$, find WX.



$\frac{AB}{WX} = \frac{DC}{ZY}$

$\frac{8}{WX} = \frac{9}{5}$

$9\,WX = 40$

$WX = 40/9$

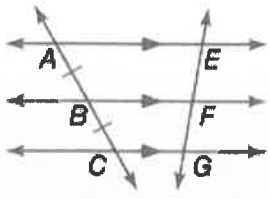
Corollary 7.2

For Your FOLDABLE

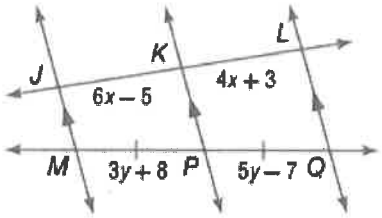
Congruent Parts of Parallel Lines

If three or more parallel lines cut off congruent segments on one transversal, then they cut off congruent segments on every transversal.

Example If $\overline{AE} \parallel \overline{BF} \parallel \overline{CG}$, and $\overline{AB} \cong \overline{BC}$, then $\overline{EF} \cong \overline{FG}$.



7. Find x and y



$3y + 8 = 5y - 7$

$15 = 2y$

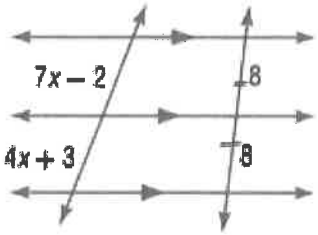
$15/2 = y$

$6x - 5 = 4x + 3$

$2x = 8$

$x = 4$

8. Find x

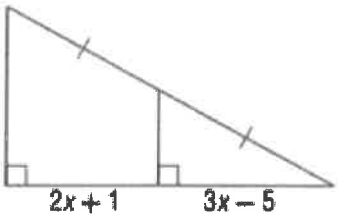


$7x - 2 = 4x + 3$

$3x = 5$

$x = 5/3$

9. Find x



$2x + 1 = 3x - 5$

$6 = x$