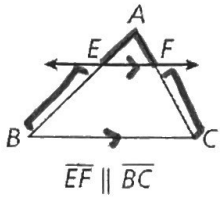
4.5 Three Theorems Involving Proportions

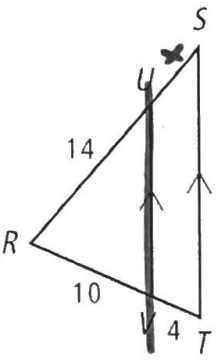
Name: _____

Theorem 7-4-1 Triangle Proportionality Theorem

THEOREM	HYPOTHESIS	CONCLUSION
If a line parallel to a side of a triangle intersects the other two sides, then it divides those sides proportionally.	 $\overline{EF} \parallel \overline{BC}$	$\frac{AE}{EB} = \frac{AF}{FC}$

Think of the **parallel line as a **fraction bar** that helps you set up the proportions!

Find US.



$\frac{14}{x} \times \frac{10}{4}$

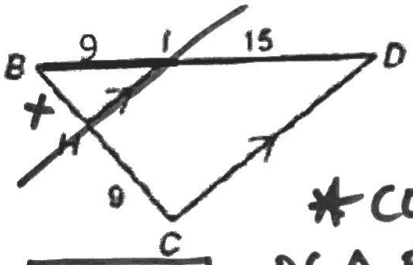
$10(x) = 14(4)$

$\frac{10x}{10} = \frac{56}{10}$

$x = 5.6$

$US = 5.6$

Find BH



$\frac{9}{x} \times \frac{15}{9}$

$15(x) = 81$

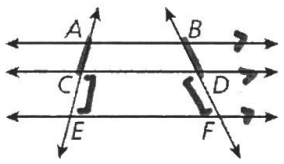
$\frac{15x}{15} = \frac{81}{15}$

$x = 5.4$

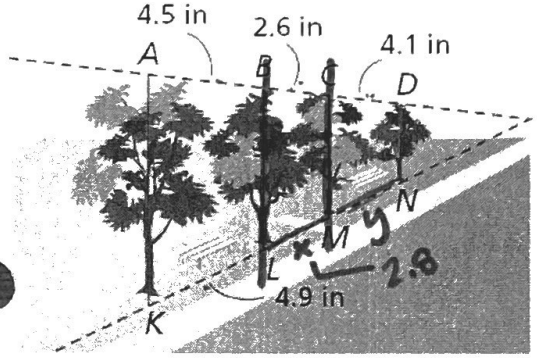
$BH = 5.4$

*CONVERSE of Δ proportionality Theorem:
If sides are prop., then lines are ||.

Corollary 7-4-3 Two-Transversal Proportionality

THEOREM	HYPOTHESIS	CONCLUSION
If three or more parallel lines intersect two transversals, then they divide the transversals proportionally.		$\frac{AC}{CE} = \frac{BD}{DF}$

Given the figure, find *LM* and *MN* to the nearest tenth of an inch.



$\frac{x}{4.9} \times \frac{2.6}{4.5}$

$4.5(x) = 4.9(2.6)$

$\frac{4.5x}{4.5} = \frac{12.74}{4.5}$

$x = 2.8$

$LM = 2.8$ in

$\frac{y}{2.8} \times \frac{4.1}{2.6}$

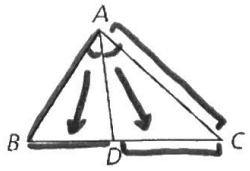
$2.6(y) = 2.8(4.1)$

$\frac{2.6y}{2.6} = \frac{11.48}{2.6}$

$y = 4.4$

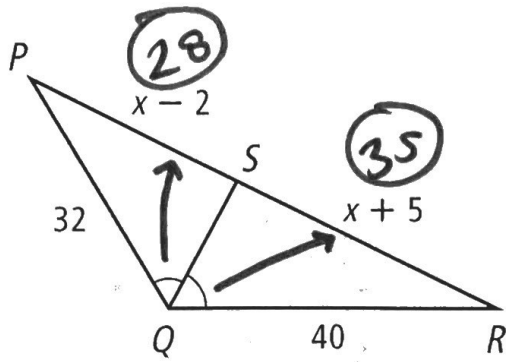
$MN = 4.4$ in

Theorem 7-4-4 Triangle Angle Bisector Theorem

THEOREM	HYPOTHESIS	CONCLUSION
An angle bisector of a triangle divides the opposite side into two segments whose lengths are proportional to the lengths of the other two sides. (△ ∠ Bisector Thm.)		$\frac{BD}{DC} = \frac{AB}{AC}$

bottom : side
bottom side

Find PS and SR.



$\frac{x+5}{x-2} \times \frac{40}{32}$

$40(x-2) = 32(x+5)$

$40x - 80 = 32x + 160$

$+80 \quad +80$

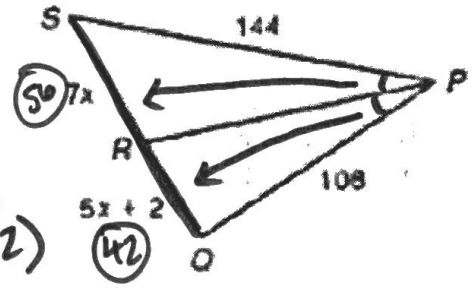
$40x = 32x + 240$

$-32x \quad -32x$

$\frac{8x}{8} = \frac{240}{8}$

$x = 30$

What is SQ?



$\frac{7x}{5x+2} \times \frac{144}{108}$

$108(7x) = 144(5x+2)$

$756x = 720x + 288$

$-720x \quad -720x$

$\frac{36x}{36} = \frac{288}{36}$

$x = 8$

$56 + 42 = 98$