Proportions in Triangles Name _____

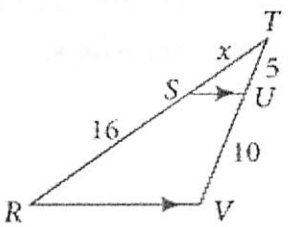
Below are three theorems that we use and that can be proven using similar triangles. Pay close attention to the picture and how it relates to each theorem.

Theorem 7-4 **Side-Splitter Theorem**

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

1 EXAMPLE Using the Side-Splitter Theorem

Gridded Response Find the value of x.



$\frac{TS}{SR} = \frac{TU}{UV}$ Side-Splitter Theorem

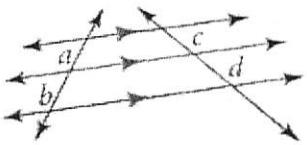
$\frac{x}{16} = \frac{5}{10}$ Substitute.

$x = \frac{5}{10} \cdot 16$ Solve for x.

$x = 8$

Corollary **Corollary to Theorem 7-4**

If three parallel lines intersect two transversals, then the segments intercepted on the transversals are proportional.

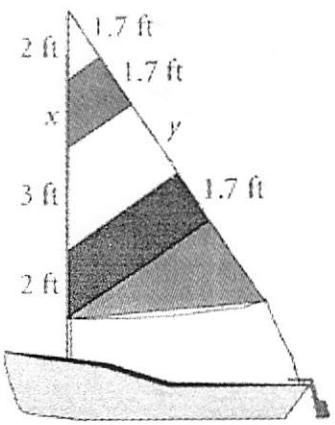


$\frac{a}{b} = \frac{c}{d}$

2 EXAMPLE Real-World Connection

Sail Making Sail makers sometimes use a computer to create a pattern for a sail. After they cut out the panels of the sail, they sew them together to form the sail.

The edges of the panels in the sail at the right are parallel. Find the lengths x and y.



$\frac{2}{x} = \frac{1.7}{1.7}$ Side-Splitter Theorem

$x = 2$

$\frac{3}{2} = \frac{y}{1.7}$ Corollary to the Side-Splitter Theorem

$\frac{3}{2}(1.7) = y$ Solve for y.

$2.55 = y$

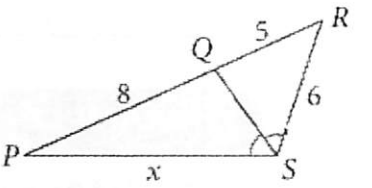
Length x is 2 ft and length y is 2.55 ft.

Theorem 7-5 **Triangle-Angle-Bisector Theorem**

If a ray bisects an angle of a triangle, then it divides the opposite side into two segments that are proportional to the other two sides of the triangle.

3 EXAMPLE Using the Triangle-Angle-Bisector Theorem

Algebra Find the value of x.



$\frac{PS}{SR} = \frac{PQ}{RQ}$ Triangle-Angle-Bisector Theorem

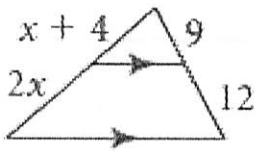
$\frac{x}{6} = \frac{8}{5}$ Substitute.

$5x = 48$ Cross-Product Property

$x = 9.6$ Solve for x.

Mixed Practice

2.



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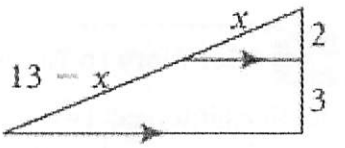

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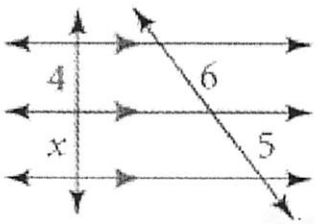

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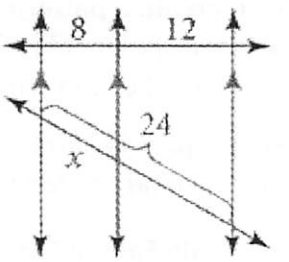

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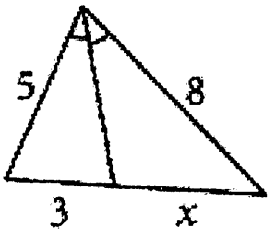

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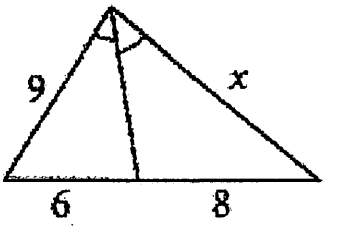
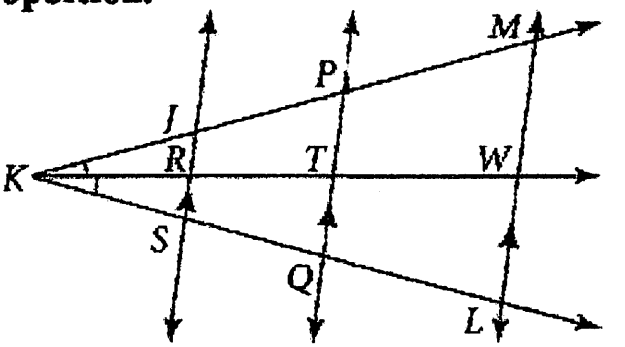


Use the figure at the right to complete each proportion.



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Challenge!!

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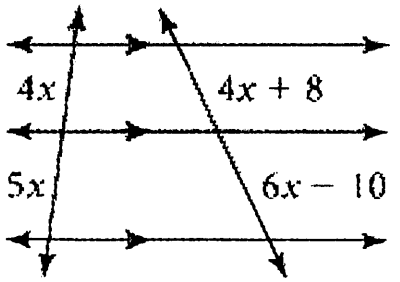

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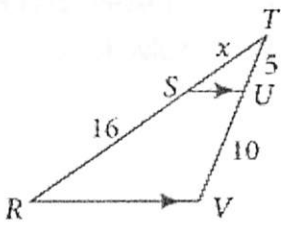

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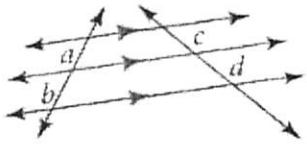

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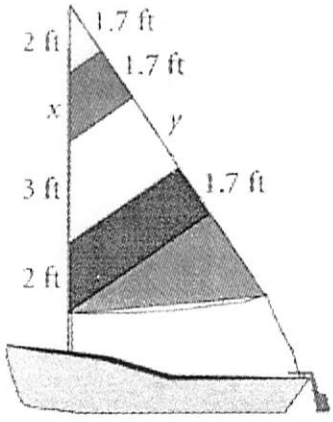

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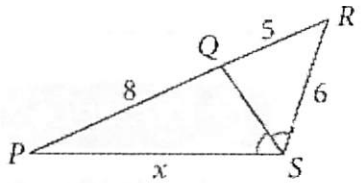

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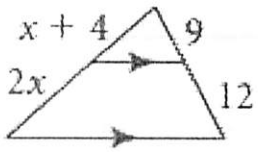


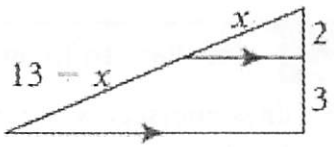
$\frac{x+4}{2x} = \frac{9}{12}$

$12x + 48 = 18x$

$48 = 6x$

$8 = x$

3.



$\frac{x}{13-x} = \frac{2}{3}$

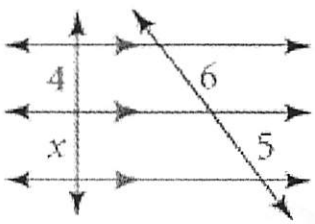
$26 - 2x = 3x$

$+2x \quad +2x$

$26 = 5x$

$5.2 = x$

9.



$\frac{4}{x} = \frac{6}{5}$

$6x = 20$

$x = 3.\overline{3}$

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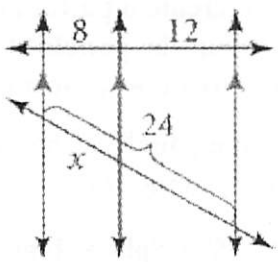

$\frac{8}{12} = \frac{x}{24-x}$

$12x = 192 - 8x$

$20x = 192$

$x = 9.6$

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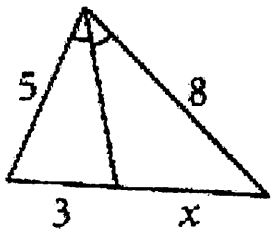
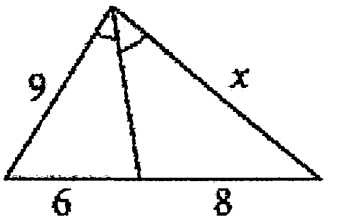


$\frac{5}{3} = \frac{8}{x}$

$5x = 24$

$x = 4.8$

16.

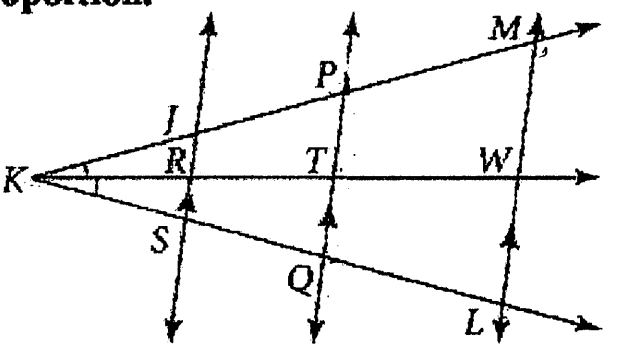


$\frac{9}{6} = \frac{x}{8}$

$6x = 72$

$x = 12$

Use the figure at the right to complete each proportion.



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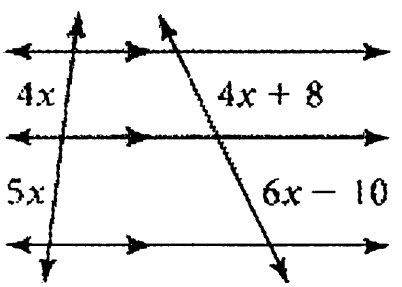

$\frac{4x}{5x} = \frac{4x+8}{6x-10}$

$24x^2 - 40x = 20x^2 + 40x$

$4x^2 - 80x = 0$

$4x(x - 20) = 0$

$4x = 0$

$x = 0$

$x = 20$