Solving using Similar Triangles { 8.4 }

Secondary Math II Notes

OBJECTIVE: Use similar triangle theorems to solve a variety of triangle values

Review

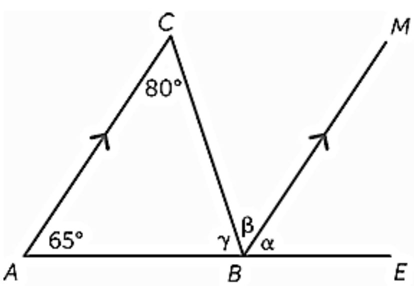
Angle Relationships: complementary & supplementary angles Vertical Angles, Corresponding Angles, Alt. Interior angles, Alt. Exterior angles

Triangle Similarity: Corresponding sides are proportional and angles are congruent

Theorem 1: A line parallel to one side of a triangle divides the other two proportionally.

Theorem 2: The altitude to the hypotenuse of a right triangle forms two triangles that are similar to each other and to the original triangle.

Find the missing angle measures

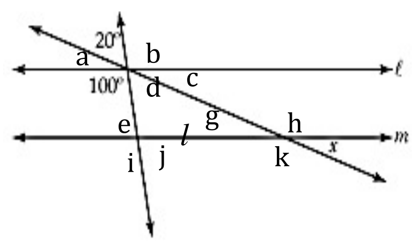


$\alpha = 65$ by corresponding angles

$\beta = 80$ by alt. interior angles

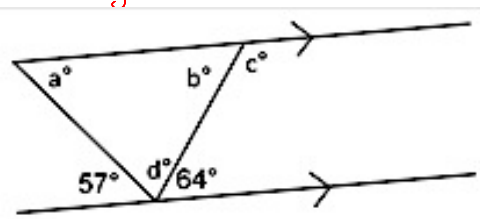
$\lambda = 35$ by supplementary angles

Assume $l \parallel m$



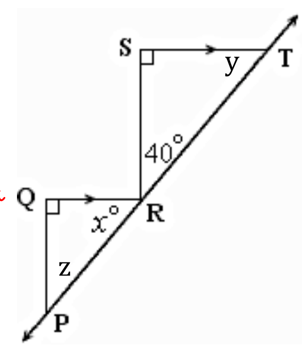
$a = 60$, $b = 100$, $c = 60$, $d = 20$, $e = 80$, $l = 100$, $j = 80$, $i = 100$, $h = 120$, $g = 60$, $k = 120$, $x = 60$

$a = 57$ by alternate interior angles, $d = 59$ by supplementary angles, $c = 116$ by alternate interior, $b = 64$ by alt. interior

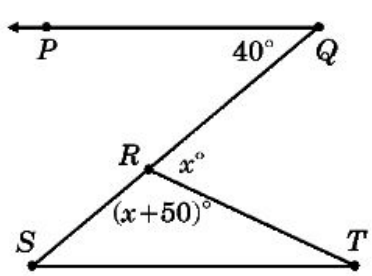


Assume $\overline{QR} \parallel \overline{ST}$

$x = 50$ from supplementary angles, $y = 50$ from corresponding angles, $z = 40$ from corresponding angles



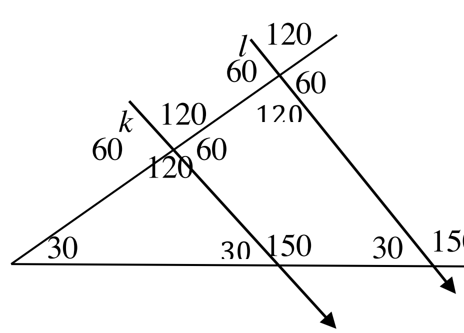
Solve for the value of x. Assume $\overline{PQ} \parallel \overline{ST}$.



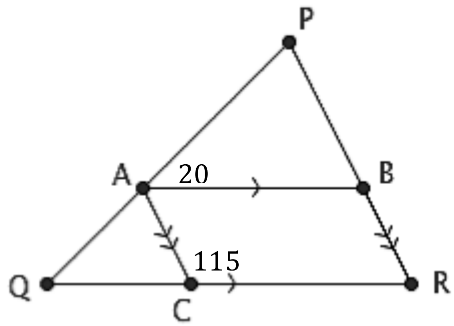
$$x + 50 + x = 180$$
$$2x + 50 = 180$$
$$2x = 130$$
$$x = 65$$

By supplement angles

Assume $k \parallel l$



Find all missing angles, then identify any similar triangles using AA similarity theorem.



$Q = 20$

$C = 65$

$A = 65$

$A = 95$

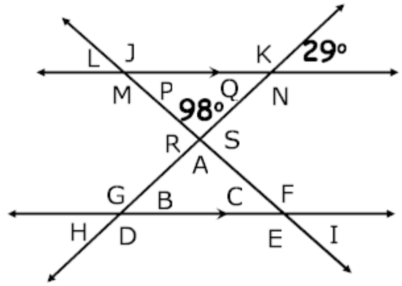
$B = 65$

$B = 115$

$R = 65$

$P = 96$

$\Delta AQC \sim \Delta PAB$



$Q = B = H = 29$

$A = 98$

$S = R = 82$

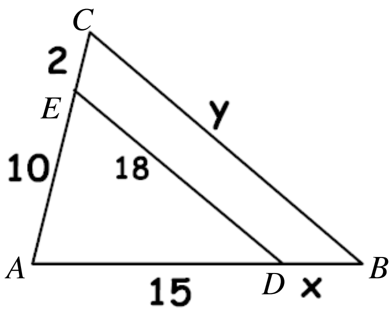
$K = N = G = D = 151$

$P = L = C = I = 53$

$M = J = F = E = 127$

$\Delta PQ(98) \sim \Delta CBA$

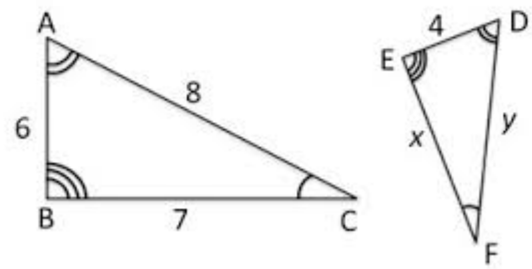
Identify similar triangles. Find any missing side lengths using proportional sides, Theorem 1, or Theorem 2.



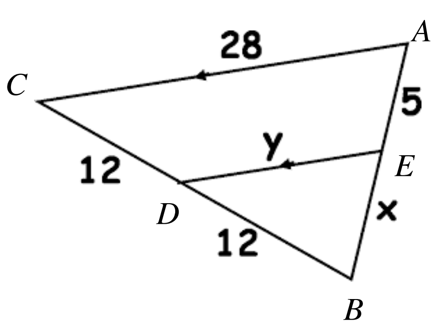
$\frac{2}{10} = \frac{x}{15}$, x=3

$\frac{10}{12} = \frac{18}{y}$, y=21.6

$\Delta ABC \sim \Delta ADE$



$\Delta ABC \sim \Delta DEF$, $\frac{4}{6} = \frac{y}{8}$ y=5.3, $\frac{4}{6} = \frac{x}{7}$ x=4.67



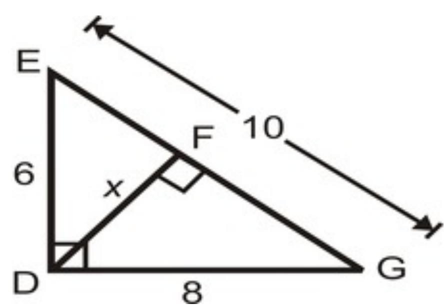
$\frac{12}{12} = \frac{5}{x}$, x=5

$\frac{12}{24} = \frac{y}{28}$, y=14

$\Delta ABC \sim \Delta EBD$

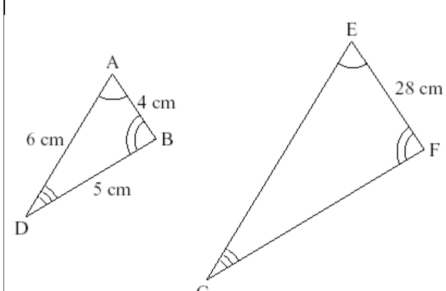
$\Delta DEF \sim \Delta GED \sim \Delta GDF$

$\frac{8}{10} = \frac{x}{6}$, x=4.8



$\frac{4.8}{8} = \frac{EF}{6}$, EF=3.6

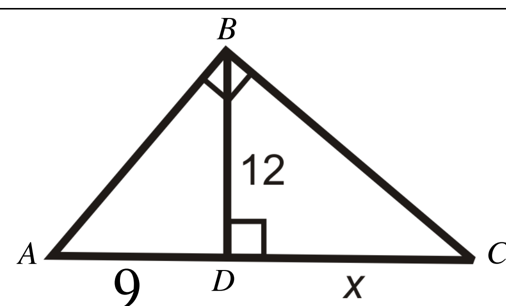
$FG = 10 - 3.6 = 6.4$



$\Delta ABC \sim \Delta EFG$

$\frac{4}{28} = \frac{5}{GF}$, GF=35

$\frac{4}{28} = \frac{6}{GE}$, GE=42



$\frac{9}{12} = \frac{12}{x}$ x=15 $\Delta ABC \sim \Delta BDA \sim \Delta BDC$