

LESSON 165

- B, C
- D; The included angles must be congruent.
- $m\angle E = 180 - 120 = 60^\circ$
 $m\angle D = 180 - 44 - m\angle E = 76^\circ$
 $\angle DHE \cong \angle FHG$ because vertical angles are congruent.
 $\angle D \cong \angle F$ because their measures are equal.
 So, $\triangle DHE \sim \triangle FHG$ by AA.
- $\angle B \cong \angle B$ by the Reflexive Property.
 $BC/BD = 18/(18 + 12) = 3/5$
 $BF/BE = 21/(21 + 14) = 3/5$
 So, $\triangle BCF \sim \triangle BDE$ by SAS.
- $AB/DE = 12/15 = 4/5$
 $BC/EF = 15/20 = 3/4$
 $AC/DF = 20/25 = 4/5$
 So, the triangles are not similar.
- Corresponding angles must be congruent, so both triangles have angles 90° , 33° , and a° .
 A triangle has 180° , so $a = 180 - 90 - 33 = 57$.
- Corresponding sides must be proportional.

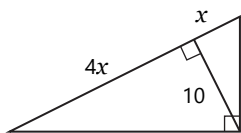
$$\frac{15}{10} = \frac{18}{a} \quad \rightarrow \quad 15a = 10(18) \quad \rightarrow \quad a = 12$$

$$\frac{15}{10} = \frac{12}{b} \quad \rightarrow \quad 15b = 10(12) \quad \rightarrow \quad b = 8$$
- Corresponding sides must be proportional.

$$\frac{16}{16 + 8} = \frac{a}{a + 7} \quad \rightarrow \quad 16(a + 7) = 24a \quad \rightarrow \quad a = 14$$

$$\frac{16}{16 + 8} = \frac{10}{b} \quad \rightarrow \quad 16b = 24(10) \quad \rightarrow \quad b = 15$$
- ... rotation of 90° ... a scale factor of 2 ...
- $\triangle ABC \sim \triangle ACD \sim \triangle CBD$
- Use the Leg Rule [68.2]. Use the Altitude Rule [68.1].
 $x^2 = 5(5 + 10)$ $y^2 = 5(10)$
 $x = 5\sqrt{3}$ $y = 5\sqrt{2}$
- Use the Altitude Rule [68.1].
 $10^2 = x(4x)$
 $x^2 = 25$
 $x = 5$
 The shorter segment is 5 cm.
- Use the Triangle Side Splitter Theorem [69.1].

$$\frac{24}{8} = \frac{x}{7} \quad \rightarrow \quad 8x = 24(7) \quad \rightarrow \quad x = 21$$



- Use the Three Parallel Lines Theorem [69.2].

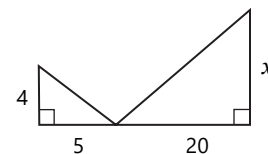
$$\frac{5}{x} = \frac{6}{4} \quad \rightarrow \quad 6x = 5(4) \quad \rightarrow \quad x = 10/3$$
- Use the Triangle Angle Bisector Theorem [70.1].

$$\frac{x}{20 - x} = \frac{18}{12} \quad \rightarrow \quad 12x = 18(20 - x) \quad \rightarrow \quad x = 12$$
2. Vertical angles are congruent.
 3. AA
 4. Corresponding sides of similar triangles are proportional (CSSTP).
- $$\frac{20}{135} = \frac{24}{x} \quad \rightarrow \quad 20x = 135(24) \quad \rightarrow \quad x = 162$$

 The shadow is 162 m long.

- $$\frac{4}{x} = \frac{5}{20}$$

 $5x = 4(20)$
 $x = 16$



The tree is 16 feet tall.

- There are two pairs of similar triangles, so set up two proportions. Let $EF = x$ and $BF = y$. Then $DF = 48 - y$.
 $\triangle BEF \sim \triangle BCD$ $\triangle DEF \sim \triangle DAB$

$$\frac{EF}{CD} = \frac{BF}{BD} \quad \quad \quad \frac{EF}{AB} = \frac{DF}{DB}$$

$$\frac{x}{24} = \frac{y}{48} \quad \quad \quad \frac{x}{12} = \frac{48 - y}{48}$$

$$48x = 24y$$

$$y = 2x$$

$$48x = 12(48 - y)$$

$$4x = 48 - y$$

$$4x = 48 - 2x$$

$$x = 8$$

So, the intersection is 8 m above the ground.