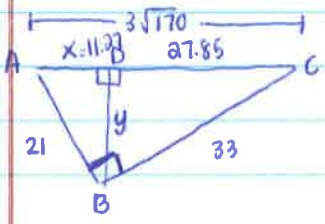
Geometry Honors Section 7.3 HW #9-13 Solutions

(9) To find if it is a right △: $c^2 = a^2 + b^2$

$(3\sqrt{170})^2 = 21^2 + 33^2$

$9(170) = 441 + 1089$

$1530 = 1530$ **Right △**



① Label $\overline{AD}$ or $\overline{DC}$ as a variable & use pinball setup to solve

$\frac{x}{21} = \frac{21}{3\sqrt{170}}$

$\frac{441}{3\sqrt{170}} = \frac{3\sqrt{170}x}{3\sqrt{170}} \Rightarrow x \approx 11.27$

AD = 11.27

② Find side DC: $AD + DC = 3\sqrt{170}$

$11.27 + DC = 39.12$

DC = 27.85

③ Label altitude $\overline{DB}$ as a variable & use upside down T to solve

$\frac{11.27}{y} = \frac{y}{27.85} \Rightarrow y^2 = 313.8695$

$y = 17.7 \Rightarrow$ **DB = 17.7**

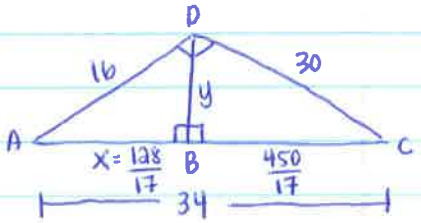
(11) To find $\overline{AC}$, use Pythag Thm:

$AD^2 + CD^2 = AC^2$

$16^2 + 30^2 = AC^2$

$1156 = AC^2$

$AC = 34$



① mark either side $\overline{AB}$ or $\overline{BC}$ with a variable & use pinball setup to solve

$\frac{x}{16} = \frac{16}{34} \Rightarrow 34x = 256$

$x = 128/17 \Rightarrow$ **AB = 128/17**

② Find side BC: $AB + BC = AC$

$\frac{128}{17} + BC = 34$

$BC = 34 - 128/17$

BC = 450/17

#11 continued

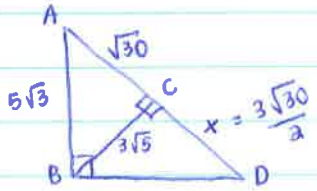
③ Label altitude $\overline{DB}$ as a variable; use upside down T to solve

$$\frac{\frac{128}{17}}{y} = \frac{y}{\frac{450}{17}} \Rightarrow y^2 = \left(\frac{128}{17}\right)\left(\frac{450}{17}\right)$$

$$y^2 = \frac{57600}{289}$$

$$y = \frac{\sqrt{57600}}{\sqrt{289}} = \frac{240}{17} \Rightarrow \boxed{DB = \frac{240}{17}}$$

(12) ① To find $\overline{AC}$, use Pythag Thm on $\triangle ABC$



$AC^2 + BC^2 = AB^2$

$AC^2 + (3\sqrt{5})^2 = (5\sqrt{3})^2$

$AC^2 + (9(5)) = 25(3)$

$AC^2 + 45 = 75$

$AC^2 = 30$

$\boxed{AC = \sqrt{30}}$

② Label side $\overline{CD}$ as a variable; use upside down T to solve

$$\frac{\sqrt{30}}{3\sqrt{5}} = \frac{3\sqrt{5}}{x} \Rightarrow \sqrt{30}\,x = (3\sqrt{5})(3\sqrt{5})$$

$$\sqrt{30}\,x = 9(5)$$

$$\sqrt{30}\,x = 45$$

$$x = \frac{45 \cdot \sqrt{30}}{\sqrt{30} \cdot \sqrt{30}} = \frac{45\sqrt{30}}{30} = \frac{3\sqrt{30}}{2} \Rightarrow \boxed{CD = \frac{3\sqrt{30}}{2}}$$

③ Find entire length of AD:

$AC + CD = AD$

$$\frac{\sqrt{30}}{1} + \frac{3\sqrt{30}}{2} = AD$$

$$\frac{2\sqrt{30}}{2} + \frac{3\sqrt{30}}{2} = AD$$

$$\boxed{\frac{5\sqrt{30}}{2} = AD}$$

#12 Continued

④ Either use Pythag Thm on $\triangle ABD$ or use pinball to solve for BD

$$AB^2 + BD^2 = AD^2$$

$$(5\sqrt{3})^2 + BD^2 = \left(\frac{5\sqrt{30}}{2}\right)^2$$

$$25(3) + BD^2 = \frac{25(30)}{4}$$

$$75 + BD^2 = \frac{750}{4}$$

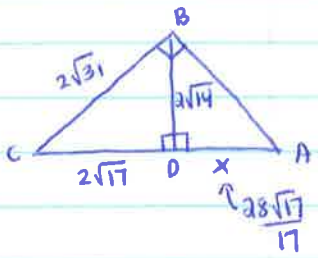
$$BD^2 = \frac{750}{4} - \frac{75}{1}$$

$$BD^2 = \frac{750}{4} - \frac{300}{4}$$

$$BD^2 = \frac{450}{4}$$

$$BD = \frac{\sqrt{450}}{\sqrt{4}} = \boxed{\frac{15\sqrt{2}}{2} = BD}$$

(13) ① To find altitude $\overline{BD}$, use Pythag Thm on $\triangle BDC$



$$BD^2 + DC^2 = BC^2$$

$$BD^2 + (2\sqrt{17})^2 = (2\sqrt{31})^2$$

$$BD^2 + 4(17) = 4(31)$$

$$BD^2 + 68 = 124$$

$$BD^2 = 56$$

$$\boxed{BD = 2\sqrt{14}}$$

② To find $\overline{AD}$, label as variable & use upside down T to solve

$$\frac{2\sqrt{17}}{2\sqrt{14}} = \frac{2\sqrt{14}}{x} \Rightarrow 2\sqrt{17}\,x = 4(14)$$

$$2\sqrt{17}\,x = 56$$

$$x = \frac{56}{2\sqrt{17}} = \frac{28}{\sqrt{17}} \cdot \frac{\sqrt{17}}{\sqrt{17}} = \frac{28\sqrt{17}}{17} \Rightarrow \boxed{AD = \frac{28\sqrt{17}}{17}}$$

#13 continued

③ To find $\overline{AC}$, add both bottom pieces together

$CD + AD = AC$

$\frac{2\sqrt{17}}{1} + \frac{28\sqrt{17}}{17} = AC$

$\frac{34\sqrt{17}}{17} + \frac{28\sqrt{17}}{17} = AC$

$$\boxed{\frac{62\sqrt{17}}{17} = AC}$$