–/2 points LarTrig10 3.1.047. My Notes Ask Your Teacher

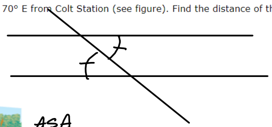
The bearing from the Pine Knob fire tower to the Colt Station fire tower is N 65° E, and the two towers are 28 kilometers apart. A fire spotted by rangers in each tower has a bearing of N 80° E from the Pine Knob and S 70° E from Colt Station (see figure). Find the distance of the fire from each tower. (Round your answers to two decimal places.)

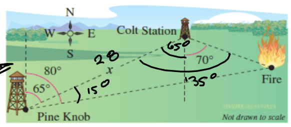
From Pine Knob:

_____ km

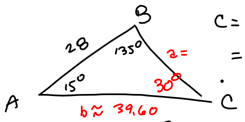
From Colt Station:

_____ km





ASA

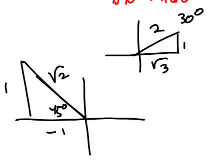


$C = 180° - (135° + 15°)$

$= 180° - 150° = 30°$

$\dfrac{c}{\sin C} = \dfrac{b}{\sin B}$

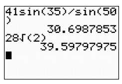
$b = \dfrac{c \sin B}{\sin C} = \dfrac{28 \sin 135°}{\sin 30°}$



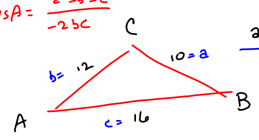
$= 2(28 \sin 135°)$

$= 56\left(\frac{1}{\sqrt{2}}\right) = \frac{56}{\sqrt{2}} = \frac{56\sqrt{2}}{2} = 28\sqrt{2}$

$= b \approx 39.60$



$\cos A = \dfrac{a^2 - b^2 - c^2}{-2bc}$



$\underline{a^2 = b^2 + c^2 - 2bc\cos A}$

$10^2 = 12^2 + 16^2 - 2(12)(16)\cos A$

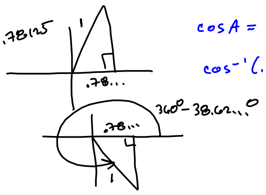
$100 - 144 - 256 = -384\cos A$

$\cos A = \dfrac{-300}{-384} = .78125$

$\cos^{-1}(.78125) \approx 38.62483287^\circ$

$\begin{array}{r} {}^{2}24 \\ 16 \\ \hline 144 \\ 240 \\ \hline 384 \end{array}$

$\cos A = .78125$

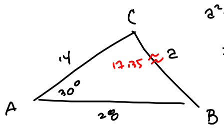



```
      39.59797975
100-144-256
             -300
300/384
           .78125
cos⁻¹(Ans)
      38.62483287
```

$A \approx 38.62^\circ$
Law of sines/cosines for next angle. Then subtract from 180° to get 3^{rd} angle.*

* Don't use rounded figures in your calculations!

#12 Test 3



$$\overset{2}{196}$$
$$\times\ 4$$
$$\overline{784}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$= 14^2 + 28^2 - \overbrace{2(14)(28)}\cos 30^\circ$$
$$= 196 + 784 - 784 \cdot \frac{\sqrt{3}}{2}$$
$$\approx 301.0760834 \approx a^2$$
$$a \approx 17.35039145$$
$$\approx 17.35$$

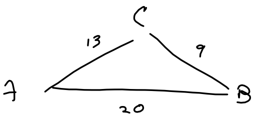
```
28²
                784
196+784-784/2*√(
3)
        301.0360834
Ans^.5
        17.35039145
```

#13 Heron's

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

$$s = \frac{a+b+c}{2}$$

$$s = \frac{13+9+20}{2} = \frac{42}{2} = 21$$

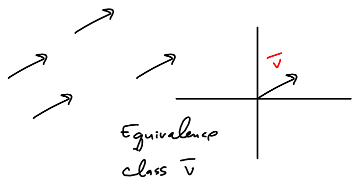


$$A = \sqrt{21(21-9)(21-13)(21-20)}$$

$$= \sqrt{21(12)(8)(1)} \approx 44.89988864$$

$$\approx 44.90$$

```
21*12*8
                2016
Ans^.5
         44.89988864
```



Equivalence class $\bar{v}$

Vector Ops $\quad a, b \in \mathbb{R}$, $\bar{u}, \bar{v}$ vectors.

Then $\bar{u} = \langle u_1, u_2 \rangle$

$\bar{v} = \langle v_1, v_2 \rangle$

$$a\bar{u} + b\bar{v} = a\langle u_1, u_2 \rangle + b\langle v_1, v_2 \rangle$$

$$= \langle au_1, eu_2 \rangle + \langle bv_1, bv_2 \rangle$$

$$= \langle au_1 + bv_1, au_2 + bv_2 \rangle$$

$a = 3$, $b = -2$

$\bar{u} = \langle 3, 7 \rangle$, $\bar{v} = \langle -1, 5 \rangle$

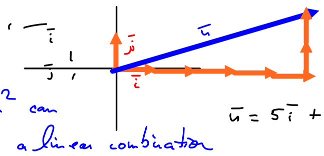
$a\bar{u} = 3\langle 3, 7 \rangle = \underline{\langle 9, 21 \rangle = a\bar{u}}$

$b\bar{v} = -2\langle -1, 5 \rangle = \underline{\langle 2, -10 \rangle = b\bar{v}}$

$a\bar{u} + b\bar{v} = \langle 9+2, 5-10 \rangle = \boxed{\langle 11, -5 \rangle} = a\bar{u} + b\bar{v}$

$\bar{i} = \langle 1, 0 \rangle$

$\bar{j} = \langle 0, 1 \rangle$



$\bar{u} = 5\bar{i} + 2\bar{j} = \langle 5, 2 \rangle$

Any vector in $\mathbb{R}^2$ can be expressed as a linear combination of $\bar{i}$ & $\bar{j}$. Standard (Canonical) Basis for $\mathbb{R}^2$.

$$\bar{u} = \langle 5, -11 \rangle = \langle 5, 0 \rangle + \langle 0, -11 \rangle$$
$$= 5\langle 1, 0 \rangle - 11 \langle 0, 1 \rangle$$
$$= 5\bar{i} - 11\bar{j}$$

23 $\langle 5,-12\rangle = \bar{u}$

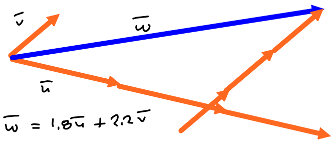
$\Rightarrow$ unit vector in direction of $\bar{u}$ is

$\frac{1}{\|\bar{u}\|}\bar{u}$

$\|\bar{u}\| = \sqrt{5^2+12^2}$

$= \sqrt{25+144} = \sqrt{169} = 13$

$\frac{1}{\|\bar{u}\|}\bar{u} = \frac{1}{13}\langle 5,-12\rangle$



$\bar{w} = 1.8\bar{u} + 2.2\bar{v}$

#24

$\bar{u} = \langle -8, 15 \rangle$ want $a \ni \| a\bar{u} \| = 34$

$\| \bar{u} \| = \sqrt{8^2 + 15^2} = \sqrt{64 + 225} = \sqrt{289} = 17$

Want $17a = 34$

$a = \frac{34}{17} = 2$

#25 $P(-5,2)$, $Q(7,-3)$

Want $\overrightarrow{PQ} = \bar{u}$

$\bar{u} = \overrightarrow{PQ} = \langle 7-(-5), -3-2 \rangle = \boxed{\langle 12, -5 \rangle = \bar{u}}$

$= 12\langle 1, 0 \rangle - 5\langle 0, 1 \rangle$

$= 12\bar{i} - 5\bar{j}$