24. 0/3 points LarTrig10 3.4.043. [3883300]

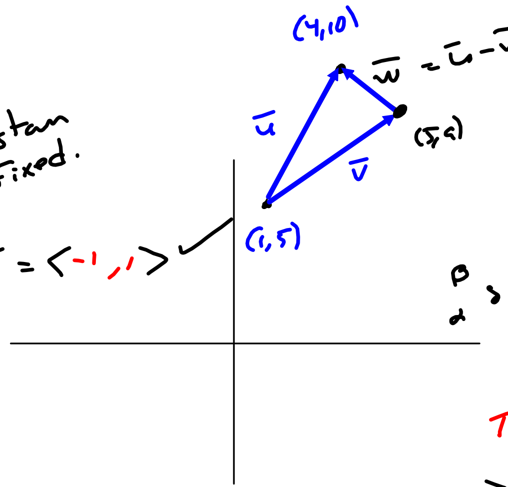
Use vectors to find the interior angles of the triangle with the given vertices. (Round your answers to two decimal places.)

(1, 5), (5, 9), (4, 10)

14.04 ° (smallest value)

75.96 °

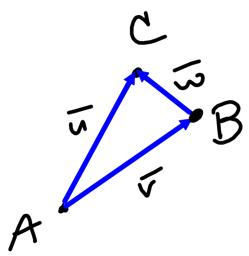
90 ° (largest value)



$\bar{u} = \langle 3, 5 \rangle$ ← Tristan Fixed.

$\bar{v} = \langle 4, 4 \rangle$

$\bar{w} = \langle -1, 1 \rangle \stackrel{?}{=} \bar{u} - \bar{v} = \langle -1, 1 \rangle$ ✓



Tristan hates my arithmetic

$$\cos A = \frac{\bar{u}\cdot\bar{v}}{\|\bar{u}\|\|\bar{v}\|} = \frac{\langle 3,5\rangle \cdot \langle 4,4\rangle}{(\sqrt{34})(4\sqrt{2})} = \frac{32}{8\sqrt{17}} \Rightarrow A \approx$$

$$\cos B = \frac{\bar{w}\cdot(-\bar{v})}{\|\bar{w}\|\|\bar{v}\|} = \frac{\langle -1,1\rangle \cdot \langle -1,-4\rangle}{\sqrt{2}\cdot 4\sqrt{2}} = \frac{4-4}{\sim} = 0 = \cos B \Rightarrow \boxed{B = 90^\circ}$$

$$\cos C = \frac{\bar{w}\cdot(-\bar{u})}{\|\bar{w}\|\|-\bar{u}\|} = \frac{\langle -1,1\rangle \cdot \langle 3,5\rangle}{\|\bar{w}\|\|\bar{u}\|} = \frac{-3+5}{(\sqrt{2})(\sqrt{34})} = \frac{+2}{\sqrt{68}} = \frac{+2}{2\sqrt{17}} = \frac{+1}{\sqrt{17}}$$

No. $-\bar{w}$

$$\Rightarrow C = \cos^{-1}(1/\sqrt{17})$$

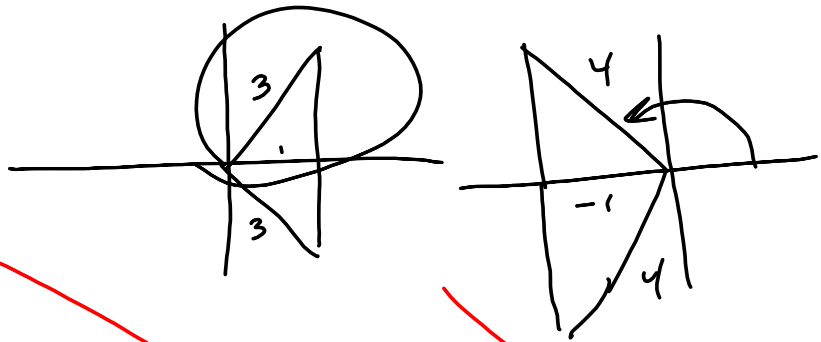
$\approx$

$\|\bar{u}\| = \sqrt{3^2+5^2} = \sqrt{34}$

$\|\bar{v}\| = \sqrt{4^2+4^2} = 4\sqrt{2}$

$\|\bar{w}\| = \sqrt{1^2+1^2} = \sqrt{2}$

$\boxed{\begin{array}{l} \cos B = Z \\ B = \arccos(Z) \end{array}} \longrightarrow$ is not generally true.
But $0^\circ \le \theta < 180^\circ$ makes it true

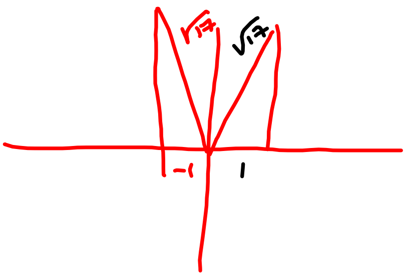



```
cos⁻¹(4/√(17))
        14.03624347
cos⁻¹(-1/√(17))
        104.0362435
```

No.

```
cos⁻¹(4/√(17))
        14.03624347
cos⁻¹(-1/√(17))
        104.0362435
Ans-90
        14.03624347
```

Yes




```
        104.0362435
Ans-90
        14.03624347
cos⁻¹(1/√(17))
        75.96375653
cos⁻¹(4/√(17))
        14.03624347
```

$75.96375653^\circ \approx C$

$14.03624347^\circ \approx A$

$B = 90^\circ$

Work

$$\|\text{proj}_{\bar{v}} \bar{F}\| \|\bar{v}\|$$

$$= \left\| \left(\frac{\bar{F} \cdot \bar{v}}{\|\bar{v}\|^2} \right) \bar{v} \right\| \|\bar{v}\|$$

$$= \frac{|\bar{F} \cdot \bar{v}|}{\|\bar{v}\|^2} \|\bar{v}\| \|\bar{v}\| = |\bar{F} \cdot \bar{v}|$$

Definition of Work

The **work** W done by a constant force $\mathbf{F}$ as its point of application moves along the vector $\overrightarrow{PQ}$ is given by either formula below.

1. $W = \|\text{proj}_{\overrightarrow{PQ}} \mathbf{F}\| \, \|\overrightarrow{PQ}\|$ Projection form
2. $W = \mathbf{F} \cdot \overrightarrow{PQ}$ Dot product form (if you assume $\bar{F} \cdot \overrightarrow{PQ} > 0$)

$$= |\bar{F} \cdot \overrightarrow{PQ}|$$

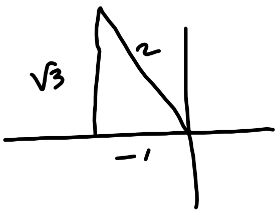
22. 0/1 points LarTrig10

Find the angle θ (in radians) between the vectors.

$$u = \cos\left(\frac{\pi}{2}\right)\mathbf{i} + \sin\left(\frac{\pi}{2}\right)\mathbf{j} = \langle 0, 1\rangle = \bar{u}$$

$$v = \cos\left(\frac{2\pi}{3}\right)\mathbf{i} + \sin\left(\frac{2\pi}{3}\right)\mathbf{j} = \langle -\tfrac{1}{2}, \tfrac{\sqrt{3}}{2}\rangle = \bar{u}$$

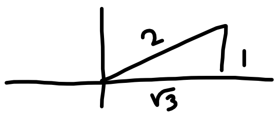
θ = $\frac{\pi}{6}$



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

$$\cos\theta = \frac{\bar{u}\cdot\bar{v}}{\|\bar{u}\|\|\bar{v}\|} = \frac{\langle 0,1\rangle \cdot \langle -\frac{1}{2}, \frac{\sqrt{3}}{2}\rangle}{1\cdot 1} = \frac{\sqrt{3}}{2}$$

$$\Rightarrow \theta = \arccos\left(\frac{\sqrt{3}}{2}\right) = \frac{\pi}{6} = 30^\circ$$



11. 0/2 points LarTrig10 3.1.047. [3882867]

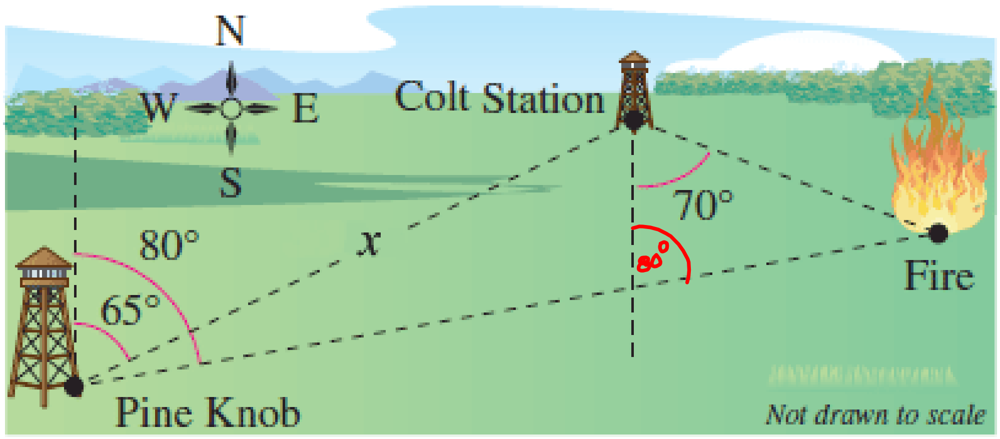
The bearing from the Pine Knob fire tower to the Colt Station fire tower is N 65° E, and the two towers are 24 kilometers apart. A fire spotted by rangers in each tower has a bearing of N 80° E from the Pine Knob and S 70° E from Colt Station (see figure). Find the distance of the fire from each tower. (Round your answers to two decimal places.)

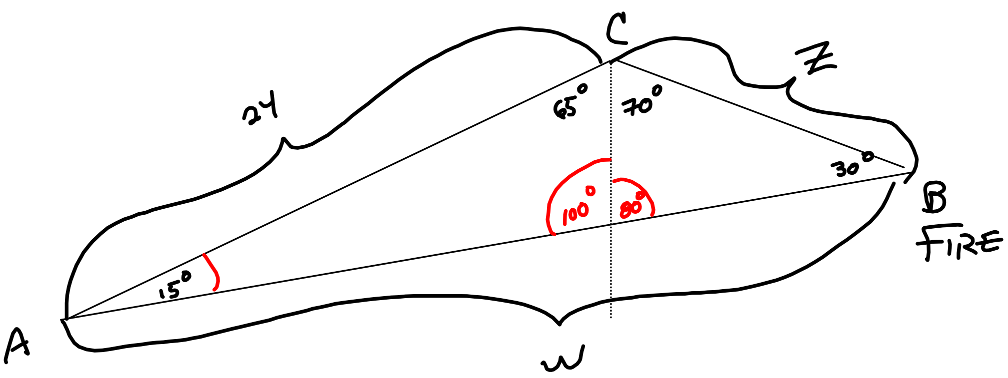
From Pine Knob:

33.94 km

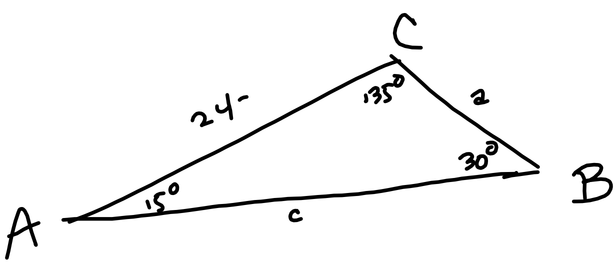
From Colt Station:

12.42 km





Want w & z



Law of Sines!