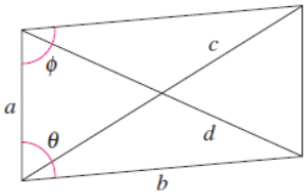
8. 0/3 points LarTrig10 3.2.029. [3882722]

Find the missing values by solving the parallelogram shown in the figure. (The lengths of the diagonals are given by c and d. Round your answers to two decimal places.)

READ!

a	b	c	d	θ	φ
20	✖ 26.69	40	25	✖ 62.83 °	✖ 117.17 °



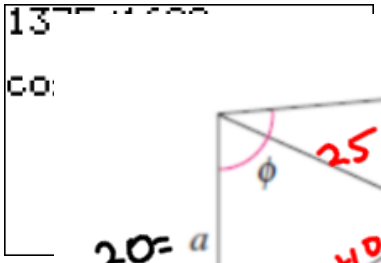
2

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

$\cos D = \frac{20^2+40^2-25^2}{2(20)(40)}$ by re-labeling

$\approx \frac{400+1600-625}{1600} = \frac{2000-625}{1600} = \frac{1375}{1600}$

$\Rightarrow D = \cos^{-1}\left(\frac{1375}{1600}\right) \approx 30.753519^\circ \approx D$

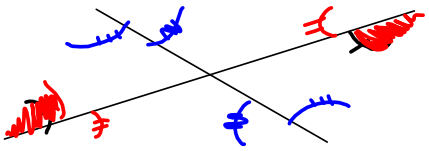


Solve for C:

$\cos C = \frac{a^2+b^2-c^2}{2ab} = \frac{25^2+20^2-40^2}{2(20)(25)}$

$= \frac{625+400-1600}{1000}$

$= \frac{1025-1600}{1000}$? NEGATIVE?



$25^2+20^2-40^2$ → -575

Ans/1000 → $-.575$

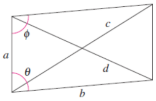
$\cos^{-1}(\text{Ans})$ → 125.0996322

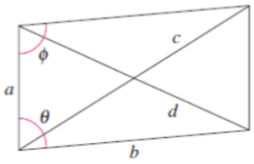
DOES NOT LOOK CORRECT

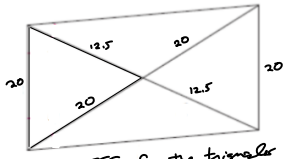
8. 0/3 points LarTrig10 3.2.029. [3882722]

Find the missing values by solving the parallelogram shown in the figure. (The lengths of the diagonals are given by c and d. Round your answers to two decimal places.)

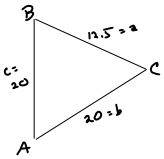
a	b	c	d	θ	φ
20	26.69	40	25	62.83°	117.17°







We have SSS for the triangles on right & left



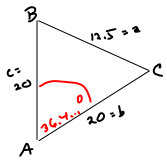
$a^2 = b^2 + c^2 - 2bc\cos A$

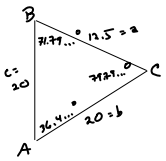
$\cos A = \frac{b^2+c^2-a^2}{2bc} = \frac{20^2+20^2-(12.5)^2}{2(20)(20)} \approx 0.8046875000$

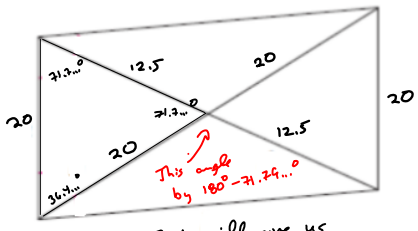
$A \approx \arccos(0.8046875000) \approx \boxed{36.41991372^\circ \approx A}$

$\cos B = \frac{a^2+c^2-b^2}{2ac} = \frac{12.5^2+20^2-20^2}{2(12.5)(20)} \approx 0.3125000000$

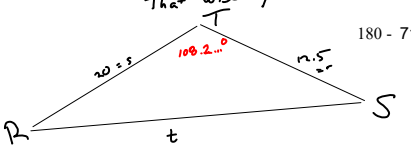
$\arccos(0.3125000000) \approx \boxed{71.79004314^\circ \approx B = C}$







That will give us

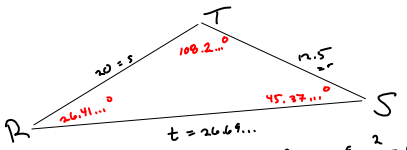


$180 - 71.79004314 = 108.2099569$

$t^2 = r^2 + s^2 - 2rs\cos T$

$= 12.5^2 + 20^2 - 2(12.5)(20)\cos(108.2...^\circ) \approx 712.5000006$

$\Rightarrow t \approx (712.5...)^{\frac{1}{2}} \approx \boxed{26.69269564 \approx t}$

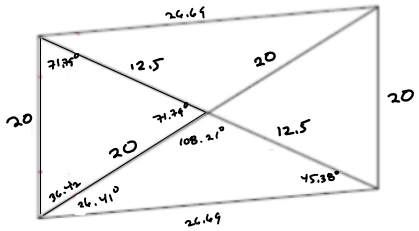


$\cos R = \frac{s^2+t^2-r^2}{2st} = \frac{20^2+26.69...^2-12.5^2}{2(20)(26.69...)} \approx 0.8956101817$

$\Rightarrow R \approx \arccos(0.8956101817) \approx \boxed{26.41308642^\circ \approx R}$

$S = 180^\circ - R - T = 180^\circ - 26.4...^\circ - 108.2...^\circ$

$\approx 45.3769567^\circ$



Next time:

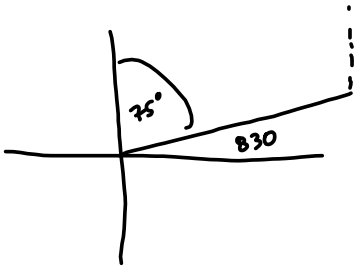
VECTORS!

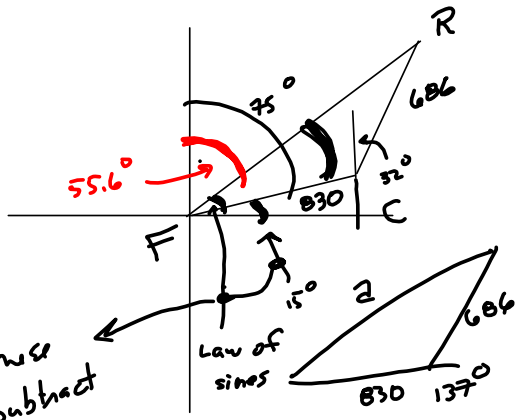
11. 0/2 points LarTrig10 3.2.052. [3882788]

A plane flies 830 miles from Franklin to Centerville with a bearing of 75°. Then it flies 686 miles from Centerville to Rosemount with a bearing of 32°. Draw a diagram that gives a visual representation of the problem. Then find the straight-line distance and bearing from Franklin to Rosemount. (Round your answers to one decimal place.)

[ ] ✖ 1411.5 mi

N [ ] ✖ 55.6 ° E

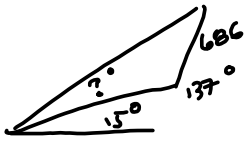


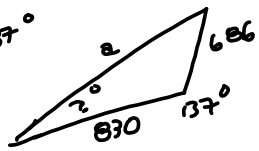


$180° - 75° = 105°$ so the angle in bottom right is $137°$!

Add these two. Subtract from $90°$ to obtain the bearing

$a^2 = 830^2 + 686^2 - 2(686)(830)\cos 137°$

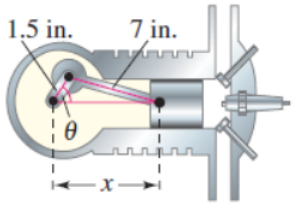




? via Law of Sines

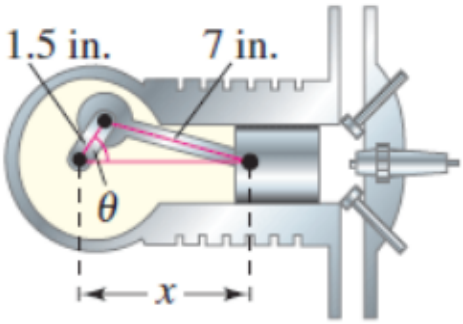
12. 0/4 points LarTrig10 3.2.056. [3882859]

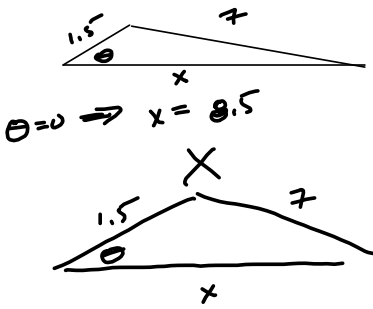
An engine has a seven-inch connecting rod fastened to a crank (see figure).



(a) Use the Law of Cosines to write an equation giving the relationship between x and θ.

$x^2 - 3x\cos(\theta) - 46.75 = 0$





$\theta = 0 \Rightarrow x = 8.5$

$7^2 = x^2 + 1.5^2 - (2x)(1.5)\cos\theta$

$x^2 + 2.25 - 49 - 3x\cos\theta = 0$

$x^2 - (3\cos\theta)x - 46.75 \overset{\text{SET}}{=} 0$

$x^2 + (3\cos\theta)x - 46.75 = 0$

$a = 1,\ b = 3\cos\theta,\ c = -46.75$

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ iff $ax^2 + bx + c = 0$

$x^2 = 1.5^2 + 7^2 - 2(1.5)(7)\cos\theta$

$x = 2.25 + 49 - 21\cos\theta$

$x = 51.25 - 21\cos\theta$

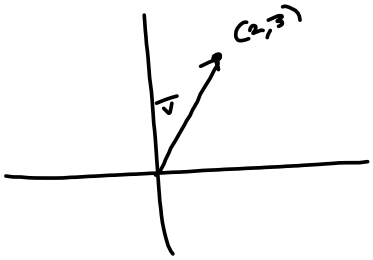
$x + 21\cos\theta = 51.25$

Nope!

unit vector in direction of $\bar{v}$ is

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

$\bar{v} = \langle 2,3 \rangle$



$\bar{v}$'s length:

$$\sqrt{2^2+3^2} = \sqrt{13}$$

$$\frac{1}{\|\bar{v}\|}\bar{v} = \frac{1}{\sqrt{13}}\langle 2,3 \rangle = \left\langle \frac{2}{\sqrt{13}}, \frac{3}{\sqrt{13}} \right\rangle = \left\langle \frac{2\sqrt{13}}{13}, \frac{3\sqrt{13}}{13} \right\rangle$$