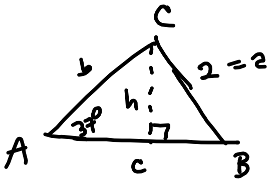
10. 0/3 points

Find values for b such that the triangle has one solution, two solutions (if possible), and no solutior

$A = 37°$, $a = 2$

(a) one solution

- ○ $b = 2,\ b > \dfrac{2}{\sin(37°)}$
- ○ $2 < b < \dfrac{2}{\sin(37°)}$
- ○ $b \le 2,\ b = \dfrac{2}{\sin(37°)}$
- ○ $b < \dfrac{2}{\sin(37°)}$
- ○ $b > \dfrac{2}{\sin(37°)}$



Need $a \ge b$
$b \le 2$

$\dfrac{h}{b} = \sin 37°$

$h = b \sin 37°$

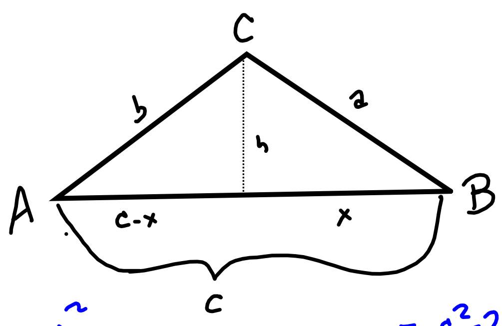
$b = \dfrac{h}{\sin 37°} = \dfrac{2}{\sin(37°)}$

If $h = 2$, then a is just big enough to reach c.

(b) 2 sol'ns:
Need $a > h$ & $a < b$

(c) 0 solutions:
$a < h$

I'm not sure what their answers (2nd part) are about.



LAW OF COSINES §3.2

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

$a^2 = x^2 + h^2$ $\qquad \frac{h}{a} = \sin B$

$= (c - b\cos A)^2 + (b\sin A)^2$ $\qquad \frac{h}{b} = \sin A$

$(x-y)^2 = x^2 - 2xy + y^2$

$= c^2 - 2cb\cos A + (b\cos A)^2 + b^2\sin^2 A$ $\qquad h = b\sin A$

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

Need it all in terms of A.

$= c^2 - 2bc\cos A + b^2\left[\underbrace{\cos^2 A + \sin^2 A}_{1}\right]$

$\frac{c-x}{b} = \cos A$

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

$c - x = b\cos A$

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

$-x = -c + b\cos A$

$x = c - b\cos A$

Other version: solve for $\cos A$:

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

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

7. 0/3 points

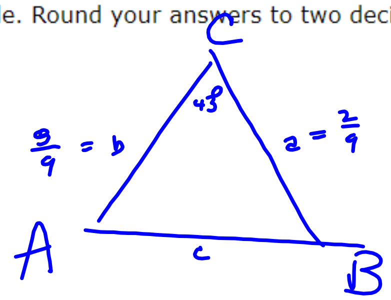
Use the Law of Cosines to solve the triangle. Round your answers to two decimal places.

$C = 43°$, $a = \frac{2}{9}$, $b = \frac{8}{9}$

$A =$ ✗ 11.79 °

$B =$ ✗ 125.21 °

$c =$ ✗ 0.74




```
68/81-32/81*cos(
43
          .5505763154
cos⁻¹(Ans
          56.5934404
```

??

```
cos⁻¹(Ans
          56.5934404
68/81-32/81*cos(
43
          .5505763154
Ans^.5
          .7420082987
```

$c^2 = a^2 + b^2 - 2ab\cos C$

$= \left(\frac{2}{9}\right)^2 + \left(\frac{8}{9}\right)^2 - 2\left(\frac{2}{9}\right)\left(\frac{8}{9}\right)\cos 43°$

$= \frac{4+64}{81} - \frac{32}{81}\cos 43°$

$= \frac{68}{81} - \frac{32}{81}\cos 43° = c^2$

$\rightarrow \approx .7420082987 \approx c$

$\boxed{\approx .74 \approx c \text{ to 2 places.}}$

Need A & B.
Law of sines will handle it.

$\frac{\sin A}{a} = \frac{\sin C}{c}$

$\sin A = \frac{a \sin C}{c} = \frac{\frac{2}{9}\sin 43°}{.74\ldots} \approx .2042499948 \rightarrow$

$A \approx 11.78559799° \approx \arcsin(.204\ldots)$

$\approx \boxed{11.79° \approx A}$

```
          .5505763154
Ans^.5
          .7420082987
2/9*sin(43)/Ans
          .2042499948
sin⁻¹(Ans
          11.78559799
```

NOTE I didn't do any rounding until I was all done with calculations. IMPORTANT.

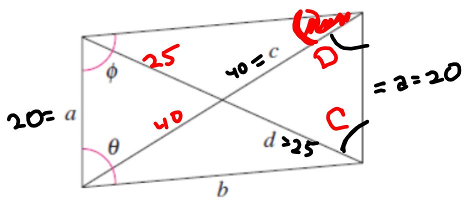
8. 0/3 points LarTrig10 3.2.029. [3882722]

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

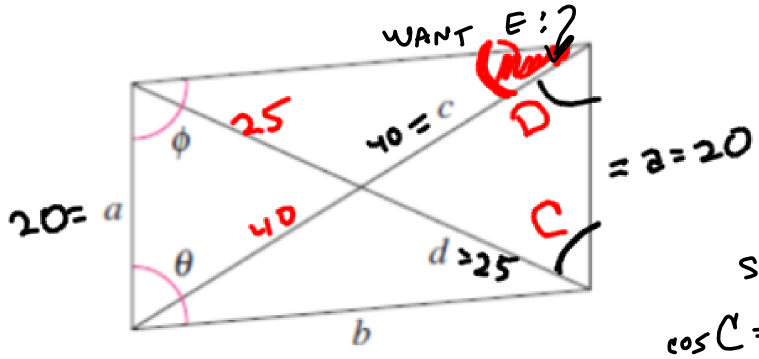
$$\approx \frac{400 + 1600 - 625}{1600} = \frac{2000 - 625}{1600} = \frac{1375}{1600}$$

$$\Rightarrow D = \cos^{-1}\left(\frac{1375}{1600}\right) \approx \boxed{30.75351981^\circ \approx D}$$

13

co:

WANT E: ?

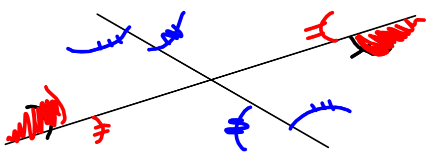


SOLVE for C:

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

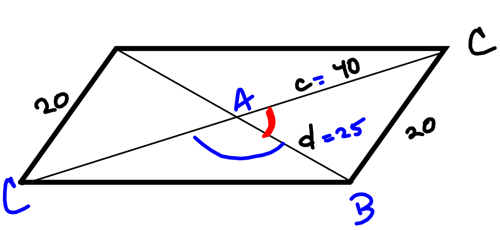
$$= \frac{625 + 400 - 1600}{1000}$$

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

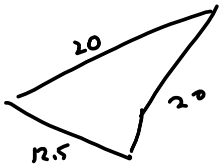


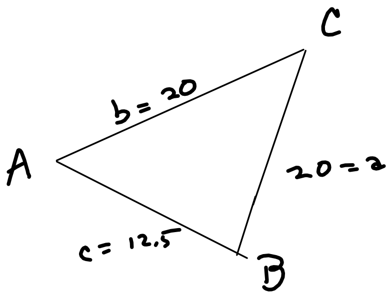
```
25²+20²-40²
             -575
Ans/1000
            -.575
cos⁻¹(Ans
      125.0996322
```

DOES NOT LOOK CORRECT



c = 20
d = 25 THIS MEANS
10 & 12.5 in calculations, Idiot.





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

$$= \frac{12.5^2}{500} = \frac{156.25}{500}$$

```
cos⁻¹(Ans
        125.0996322
12.5²
             156.25
cos⁻¹(156.25/500)

        71.79004314
```

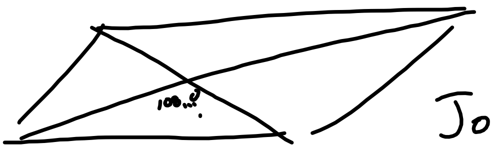
$A = \cos^{-1}(\text{previous}) \approx 71.79004314$

$180° - A$ gives the obtuse angle

≈ 108.2099569

```
12.5²
             156.25
cos⁻¹(156.25/500)

        71.79004314
Ans-180
       -108.2099569
█
```



Joshua Band
nailed it.

So SAS
to solve the bottom triangles
using Law of Cosines

etc.

Next time!

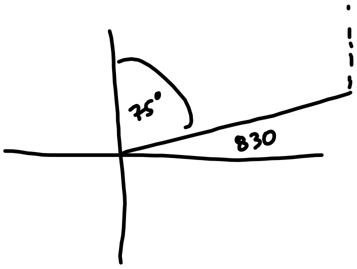
VECTORS!

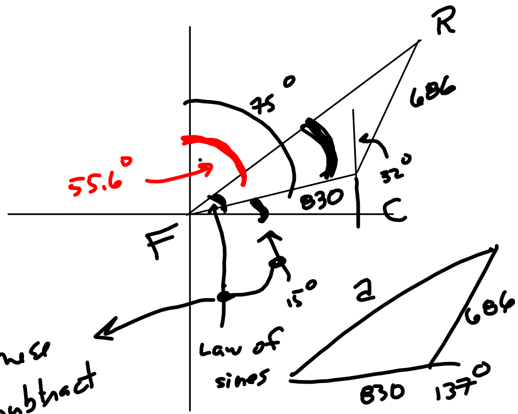
11. 0/2 points LarTrig10 3.2.052. [3882788]

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

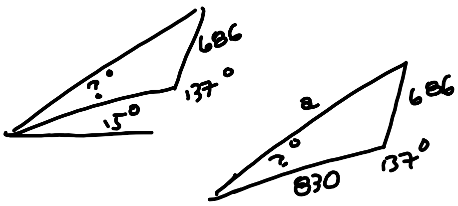




$180° - 75° = 105°$ so the angle in bottom right is $137°$!

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

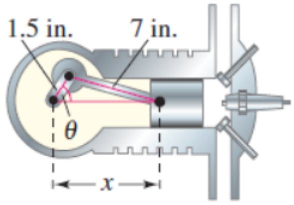
$a^2 = 830^2 + 686^2 - 2(686)(830)\cos 137°$



? via Law of Sines

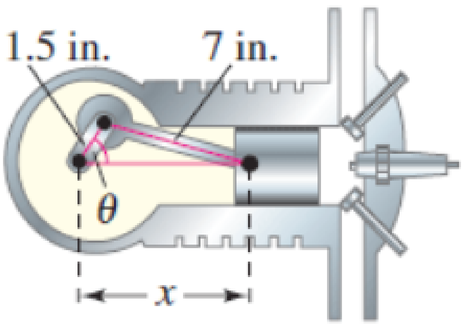
12. 0/4 points LarTrig10 3.2.056. [3882859]

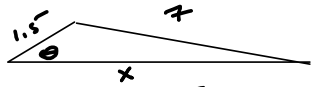
An engine has a seven-inch connecting rod fastened to a crank (see figure).



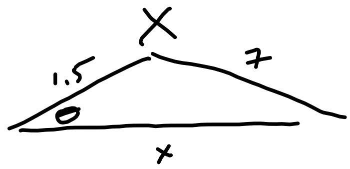
(a) Use the Law of Cosines to write an equation giving the relationship between x and θ.

✗ $x^2 - 3x\cos(\theta) - 46.75 = 0$





$\theta = 0 \Rightarrow x = 8.5$



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

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

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

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

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

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

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

$\cancel{x = 2.25 + 49 - 21\cos\theta}$

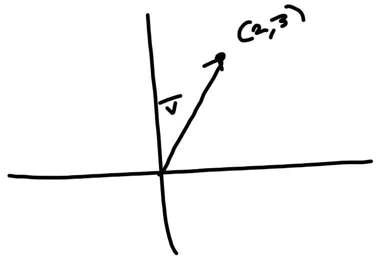
$\cancel{x = 51.25 - 21\cos\theta}$

$\cancel{x + 21\cos\theta = 51.25}$

Nope!

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

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



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

$\bar v$'s length:

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

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