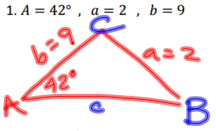
Part I. Solve the given triangle. Circle your final answers, with side or angle the measurement corresponds to clearly indicated. If there is no solution, state this. If there is more than one solution, make sure to clearly indicate which answers go together.

1. $A = 42°$, $a = 2$, $b = 9$

$a<b \Rightarrow$ ASS 0,1,or 2 solutions

Quiz#9 Solutions
$b=28.2$
$B=133°$
$C=20.5°$

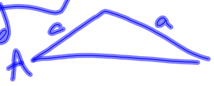


$$\frac{\sin B}{9} = \frac{\sin 42°}{2}$$

$$B = \sin^{-1}\left(\underbrace{\frac{9\sin 42°}{2}}_{>1}\right)$$

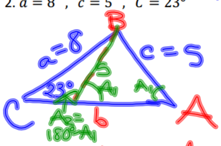
undefined

no triangle



2. $a = 8$, $c = 5$, $C = 23°$

$c<a$ ASS $\Rightarrow$ 0,1,or 2 solutions



$$\frac{\sin 23°}{5} = \frac{\sin A}{8}$$

$$\frac{8\sin 23°}{5} = \sin A$$

$$\sin^{-1}\left(\frac{8\sin 23°}{5}\right) = \boxed{A \approx 38.7°}$$

$$\boxed{B} = 180° - 23° - 38.7° = \boxed{118.3°}$$

$$\frac{b}{\sin 118.3°} = \frac{5}{\sin 23°}$$

$$\boxed{b} = \frac{5\sin 118.3°}{\sin 23°} = \boxed{11.3}$$

Case 2

$$\boxed{A_2} = 180° - 38.7° = \boxed{141.3°}$$

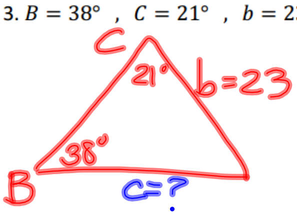
$$\boxed{B_2} = 180° - 23° - 141.3° = \boxed{15.7°}$$

$$\frac{b_2}{\sin 15.7°} = \frac{5}{\sin 23°}$$

$$\boxed{b_2} = \frac{5\sin 15.7°}{\sin 23°} = \boxed{3.5}$$

Part II. Find only the requested side or angle. Circle your final answer, with side or angle the measurement corresponds to clearly indicated. If there is no solution, state this. If there is more than one solution, circle both.

3. $B = 38°$, $C = 21°$, $b = 23$; Find side c.

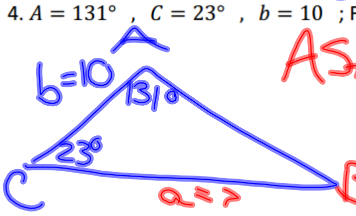


AAS $\Rightarrow$ Law of Sines

$$\frac{c}{\sin 21°} = \frac{23}{\sin 38°}$$

$$\boxed{c} = \frac{23\sin 21°}{\sin 38°} = \boxed{13.4}$$

4. $A = 131°$, $C = 23°$, $b = 10$; Find side a.



ASA $\Rightarrow$ Law of Sines

$$B = 180° - 131° - 23° = 26°$$

$$\frac{a}{\sin 131°} = \frac{10}{\sin 26°}$$

$$\boxed{a} = \frac{10\sin 131°}{\sin 26°} = \boxed{17.2}$$

5. $a = 12$, $b = 14$, $c = 20$; Find angle B.

SSS ⇒ Law of Cosines

$b^2 = a^2 + c^2 - 2ac \cdot \cos B$

$2ac \cdot \cos B = a^2 + c^2 - b^2$

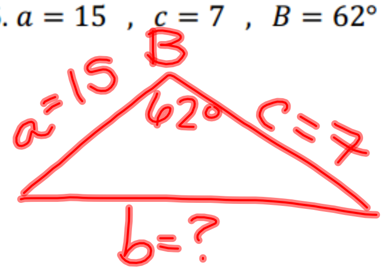
$\cos B = \dfrac{a^2 + c^2 - b^2}{2ac}$

$B = \cos^{-1}\left(\dfrac{a^2+c^2-b^2}{2ac}\right)$

$= \cos^{-1}\left(\dfrac{12^2+20^2-14^2}{2(12)(20)}\right)$

$= \boxed{43.5°}$

6. $a = 15$, $c = 7$, $B = 62°$; Find side b.



$b^2 = a^2 + c^2 - 2ac \cdot \cos B$

$b = \sqrt{a^2 + c^2 - 2ac \cdot \cos B}$

$= \sqrt{15^2 + 7^2 - 2(15)(7)\cos 62°} = \boxed{13.2}$

Part III. Find the area of the given triangle. Your answer must include appropriate units.

7. $B = 42°$, $a = 7.2\ ft$, $c = 3.4\ ft$

$K = \frac{1}{2} ac \sin B$

$= \frac{1}{2}(7.2)(3.4)\sin 42°$

$= \boxed{8.2\ ft^2}$

area:

$K = \frac{1}{2} ab \sin C$

$= \frac{1}{2} ac \sin B$

$= \frac{1}{2} bc \sin A$

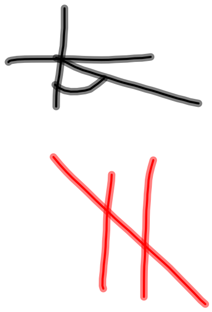
8. $A = 135.2°$, $b = 46.12\ ft$, $c = 36.74\ ft$

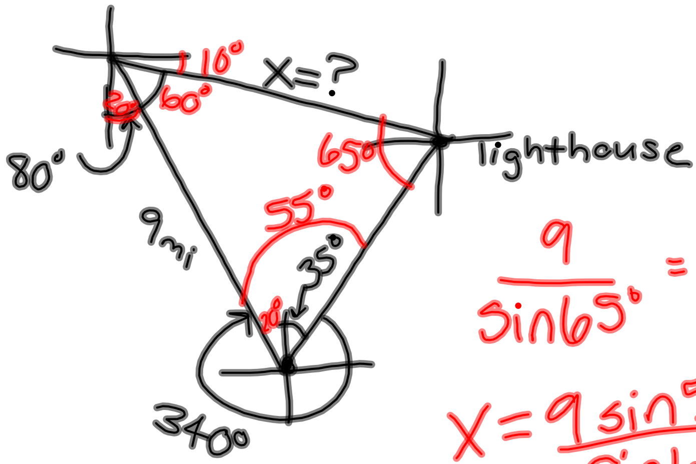
$\frac{1}{2} bc \sin A = \frac{1}{2}(46.12)(36.74)\sin 135.2°$

$= \boxed{597\ ft^2}$

Part IV. Find the distance or angle requested in the word problem by using the law of sines or cosines. Your answer must include appropriate units.

9. A navigator on a ship sights a lighthouse at a bearing of $N35°E$. After traveling 9 miles at a heading of 340°, the ship sights the lighthouse at a bearing of $S80°E$. How far is the ship from the lighthouse at the second sighting? *Hint: recall that heading is measured clockwise from north, and that $N35°E$ is read as "35 degrees east of north."*



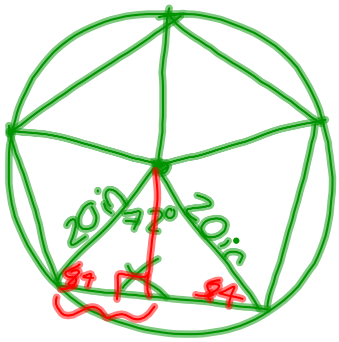


$$\frac{9}{\sin 65°} = \frac{x}{\sin 55°}$$

$$x = \frac{9\sin 55°}{\sin 65°}$$

$$= \boxed{8.1\text{ mi}}$$

10. A regular pentagon is inscribed in a circle with a radius of 20 inches. Find the length of one side of the pentagon.



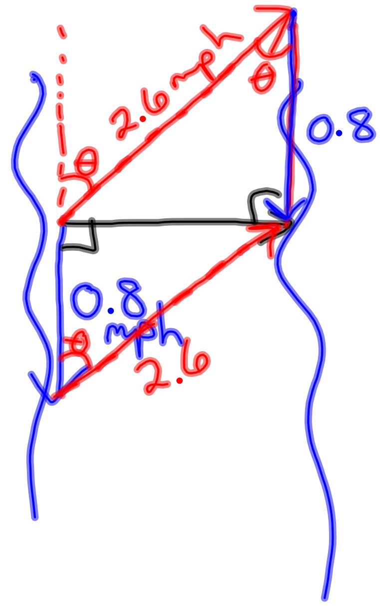
$$\frac{x}{\sin 72°} = \frac{20}{\sin 54°}$$

SAS ⇒ Law of Cosines

$$x = \sqrt{20^2 + 20^2 - 2(20)(20)\cos 72°} = \boxed{23.5\text{in}}$$

7.3 handout

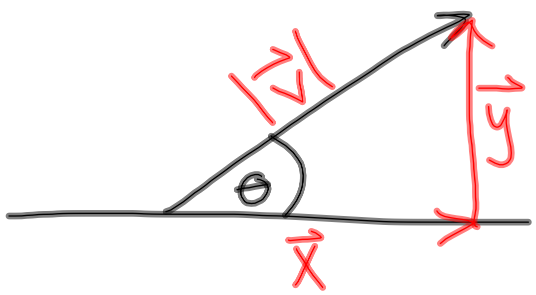
38.



$$\cos\theta = \frac{0.8}{2.6}$$

$$\theta = \cos^{-1}\left(\frac{0.8}{2.6}\right)$$

$$= 72.1°$$



horizontal component:

$$\cos\theta = \frac{|\vec{x}|}{|\vec{v}|}$$

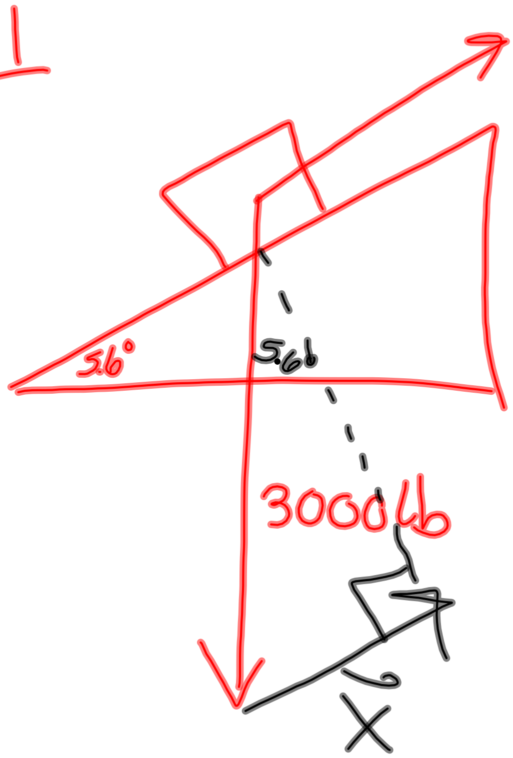
$$|\vec{x}| = |\vec{v}|\cos\theta$$

Vertical component:

$$\sin\theta = \frac{|\vec{y}|}{|\vec{v}|}$$

$$|\vec{y}| = |\vec{v}|\sin\theta$$

4.1



$$\sin 5.6° = \frac{|\vec{x}|}{3000}$$

$$|\vec{x}| = 3000 \sin 5.6°$$

$|\vec{x}|$ = Magnitude/ "Length" of $\vec{x}$

HW
test 4 practice problems