

HW SOL 2.3

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Date: _____

Pre-Calculus 11: HW 2.3 Sine Law

$$\frac{s}{T} = \frac{A}{C}$$

1. Given each equation, solve for all values of θ where $0 \leq \theta \leq 180^\circ$

<p>a) $\sin \theta = 0.25$</p> <p>$\sin^{-1}(0.25) = 14.48^\circ$ $\theta_1 = 14.48^\circ$ $\theta_2 = 180 - 14.48 = 165.52^\circ$</p>	<p>b) $\sin \theta = 0.85$</p> <p>$\sin^{-1}(0.85) = 58^\circ$ $\theta_1 = 58^\circ$ $\theta_2 = 180 - 58 = 122^\circ$</p>	<p>c) $\sin \theta = \frac{\sqrt{3}}{2}$</p> <p>$\sin^{-1}\left(\frac{\sqrt{3}}{2}\right) = 60^\circ$ $\theta_1 = 60^\circ$ $\theta_2 = 180 - 60 = 120^\circ$</p>	<p>d) $\sin \theta = \frac{\sqrt{2}}{2}$</p> <p>$\sin^{-1}\left(\frac{\sqrt{2}}{2}\right) = 45^\circ$ $\theta_1 = 45^\circ$ $\theta_2 = 180 - 45 = 135^\circ$</p>
<p>e) $\sin \theta = 1.2$</p> <p>Not in $0 \leq \theta \leq 180$</p>	<p>f) $\sin \theta = -0.25$</p> <p>Not in $0 \leq \theta \leq 180$</p>	<p>g) $\sin \theta = 0$</p> <p>$\sin^{-1}(0) = 0$</p>	<p>h) $\sin \theta = 1$</p> <p>$\sin^{-1}(1) = 90^\circ$</p>

2. Given each triangle, find the value of any missing side or angle "x" and "y". Show all your work

<p>a) $x = 15.82$ $y = 27.16$</p> <p>$\frac{\sin 35}{x} = \frac{\sin 65}{25}$ $x = \frac{\sin 35 \cdot 25}{\sin 65} = 15.82$</p> <p>$\frac{\sin 80}{y} = \frac{\sin 65}{25}$ $y = \frac{\sin 80 \cdot 25}{\sin 65} = 27.16$</p>	<p>b) $x = 28.48$</p> <p>$\frac{\sin 112}{x} = \frac{\sin 23}{12}$ $x = \frac{\sin 112 \cdot 12}{\sin 23} = 28.48$</p>
<p>c) $x = 1.69$</p> <p>$\frac{\sin 19}{4} = \frac{\sin 108}{x}$ $x = \frac{\sin 19 \cdot 4}{\sin 108} = 1.69$</p>	<p>d) $x =$ $y = 24.91$</p> <p>$\frac{\sin 115}{y} = \frac{\sin 20}{12}$ $y = \frac{\sin 115 \cdot 12}{\sin 20} = 31.25$</p> <p>$\frac{\sin 45}{x} = \frac{\sin 115}{31.25}$ $x = \frac{\sin 45 \cdot 31.25}{\sin 115} = 24.91$</p>

e) $x = 97.53^\circ$ $y = \frac{\sin 97}{\sin 110} = \frac{\sin 110}{14} = 8.96$

$\frac{\sin 110}{14} = \frac{\sin \theta}{8}$
 $\sin \theta = 8 \times 0.0671$
 $\sin \theta = 0.53696$
 $\angle \theta = 32.47^\circ$
 $\angle x = 180 - 32.47 - 110 = 97.53$

f) $x = 69.81^\circ$ $y = 180 - 35 - 69.81 = 75.19^\circ$

$x: \frac{\sin 35}{22} = \frac{\sin x}{36}$
 $\sin x = 36 \times 0.026071$
 $\angle x = 69.81^\circ$

g) $x = 75^\circ$ $y = 91.51$

$\angle x = 180 - 35 - 70 = 75^\circ$

$y: \frac{\sin 35}{53} = \frac{\sin 75}{y}$
 $y = \frac{\sin 75}{0.0612}$
 $y = 91.51$

h) $x =$ $y =$

MATH ERRORS. Undefined

Area = $\frac{bh}{2}$
 $A = \frac{21.68 \times 11.80}{2}$
 $\text{Area} = 124.99 \text{ cm}^2$

h: $\sin = \frac{\text{opp}}{\text{hyp}}$
 $\sin 41 = \frac{h}{18}$
 $h = 11.80 \text{ cm}$

tan $41 = \frac{\text{opp}}{\text{adj}}$
 $\tan 41 = \frac{11.80}{\text{adj}}$
 $\text{adj} = 19.52$

$\frac{\sin 41}{14} = \frac{\sin C}{18}$
 $\angle C = 57.51^\circ$
 $\tan 57.51 = \frac{11.80}{\text{adj}}$
 $\text{adj} = 7.51 \text{ cm}$

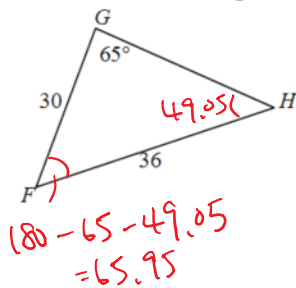
Base = $19.52 + 7.51 = 27.03 \text{ cm}$

4. Given that $a = 14 \text{ cm}$, $\angle B = 70^\circ$, and $\angle A = 35^\circ$, find the area of $\triangle ABC$.

$\frac{\sin 35}{14} = \frac{\sin 70}{b}$
 $b = \frac{\sin 70}{0.0409}$
 $b = 21.97 \text{ cm}$

$\sin C = \frac{\text{opp}}{\text{hyp}}$
 $\sin 70 = \frac{h}{14}$
 $h = \sin 70 \times 14$
 $h = 13.52 \text{ cm}$
 $A = \frac{b \times h}{2} = \frac{21.97 \times 13.52}{2}$
 $A = 155.91 \text{ cm}^2$

5. Find the value of angle "F"



$$\frac{\sin 65}{36} = \frac{\sin H}{30}$$

$$\sin H = \frac{\sin 65 \times 30}{36}$$

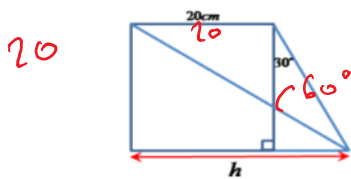
$$= 0.7552564892$$

$$\sin^{-1}(0.7552564892) = 49.04778628$$

$$\approx 49.05$$

Ans = 65.95°

6. Calculate the length of "x" to 1 decimal place



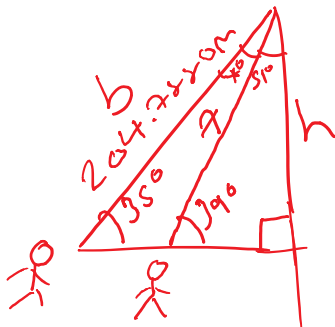
$$\tan 60 = \frac{20}{x}$$

$$x = \frac{20}{\tan 60} \quad x = 11.547 \text{ cm}$$

$$h = 11.547 + 20$$

$h = 31.547 \text{ cm}$

7. An observer is looking at a mountain peak at an angle of elevation of 35 degrees. He walks 250 meters towards the mountain and the angle of elevation to the peak is 39 degrees. What is the height of the mountain?



$$\cos 35 = \frac{b}{250}$$

$$b = 204.2880 \text{ m}$$

$$180 - 39 - 90 - 51 = 4$$

$$\sin 39 = \frac{\text{opp}}{\text{hyp}} = \frac{h}{2055.63823}$$

$h = 1293.65 \text{ m}$

$$\frac{\sin 4}{250} = \frac{\sin 35}{x}$$

$$x = \frac{\sin 35}{0.006790}$$

$= 2055.63823 \text{ m}$