

Evaluate:

1. $\csc \frac{5\pi}{4} = -\sqrt{2}$

2. $\cot^{-1}(-1) = \frac{3\pi}{4}$

3. $\cos \frac{3\pi}{8} =$

$\cos \frac{3\pi}{8} = + \sqrt{\frac{1 + \cos \frac{3\pi}{4}}{2}}$

$= \sqrt{\frac{1 + (-\frac{1}{\sqrt{2}})}{2}} = \sqrt{\frac{2 - \sqrt{2}}{2}}$

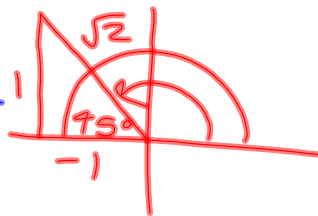
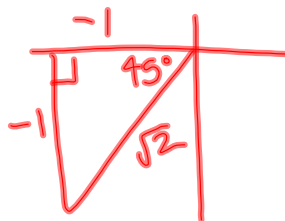
$= \sqrt{\frac{2 - \sqrt{2}}{2}} \cdot \frac{1}{2} = \frac{\sqrt{2 - \sqrt{2}}}{\sqrt{2}}$

$= \frac{\sqrt{2 - \sqrt{2}}}{2}$

$\cos \frac{x}{2} = \pm \sqrt{\frac{1 + \cos x}{2}}$

$\frac{3\pi}{8} = \frac{x}{2}$

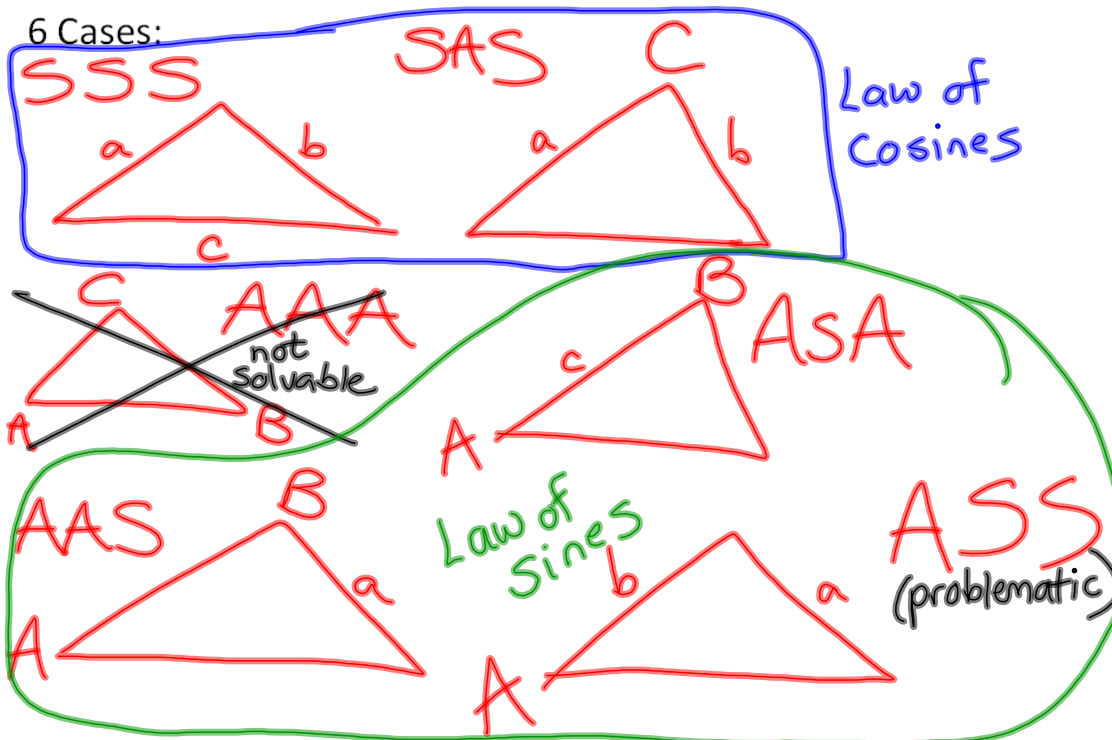
$\frac{3\pi}{4} = x$

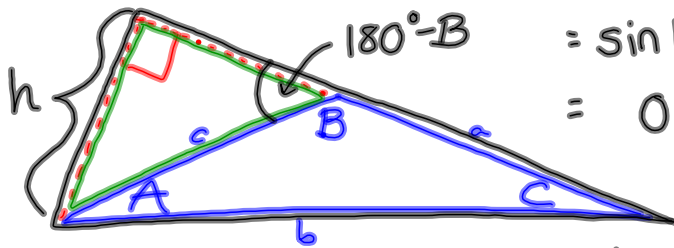


7.1 The Law of Sines

How do we solve oblique (not right) triangles?

6 Cases:



Derivaon of the Law of Sines

$$\begin{aligned}\sin(180^\circ - B) &= \\ &= \sin 180^\circ \cos B - \cos 180^\circ \sin B \\ &= 0 \cdot \cos B - (-1) \sin B \\ &= \sin B\end{aligned}$$

$$\sin C = \frac{h}{b} \quad \sin(180^\circ - B) = \frac{h}{c}$$

$$b \sin C = h \quad \sin B = \frac{h}{c}$$

$$c \sin B = h$$

$$\frac{b \sin C}{b} = \frac{c \sin B}{b}$$

$$\frac{b \sin C}{\sin B} = \frac{c \sin B}{\sin B \sin C}$$

$$\frac{\sin C}{c} = \frac{\sin B}{b}$$

$$\frac{b}{\sin B} = \frac{c}{\sin C}$$

Law of Sines

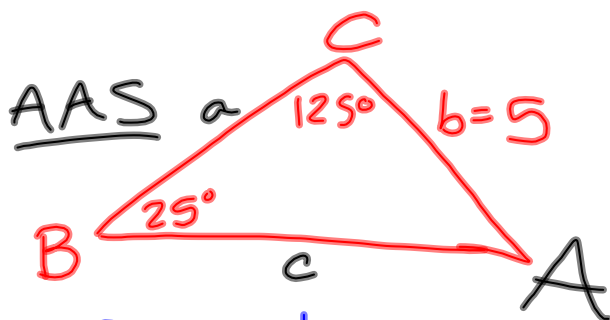
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

or

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

7.1 handout

2. $B=25^\circ$, $C=125^\circ$, $b=5$



$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{a}{\sin 30^\circ} = \frac{5}{\sin 25^\circ}$$

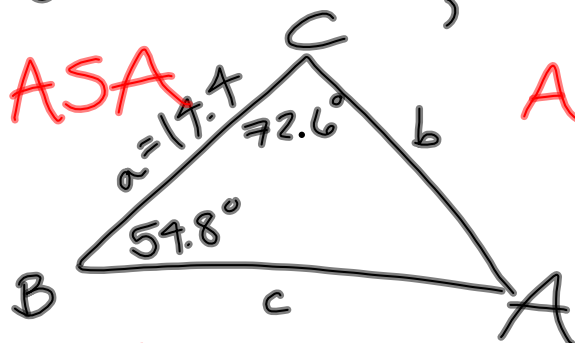
$$a = \frac{5 \sin 30^\circ}{\sin 25^\circ} \approx \boxed{5.9}$$

$$A = 180^\circ - 125^\circ - 25^\circ = \boxed{30^\circ}$$

$$\frac{c}{\sin 125^\circ} = \frac{5}{\sin 25^\circ}$$

$$c = \frac{5 \sin 125^\circ}{\sin 25^\circ} \approx \boxed{9.7}$$

8. $B=54.8^\circ$, $C=72.6^\circ$, $a=14.4$



$A=180^\circ-54.8^\circ-72.6^\circ$
 $= \boxed{52.6^\circ}$

$\frac{b}{\sin 54.8^\circ} = \frac{14.4}{\sin 52.6^\circ}$

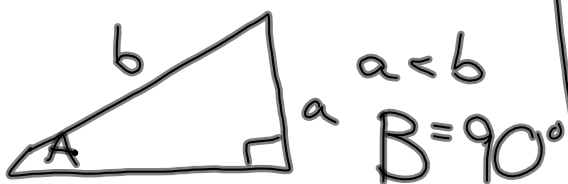
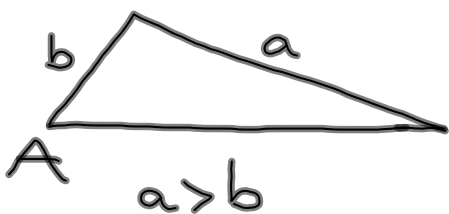
$b = \frac{14.4 \sin 54.8^\circ}{\sin 52.6^\circ}$
 $\approx \boxed{14.8}$

$\frac{c}{\sin 72.6^\circ} = \frac{14.4}{\sin 52.6^\circ}$

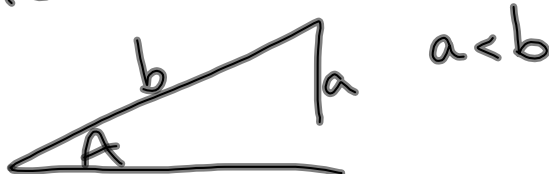
$c = \frac{14.4 \sin 72.6^\circ}{\sin 52.6^\circ}$
 $\approx \boxed{17.3}$

ASS, The Problematic Triangle

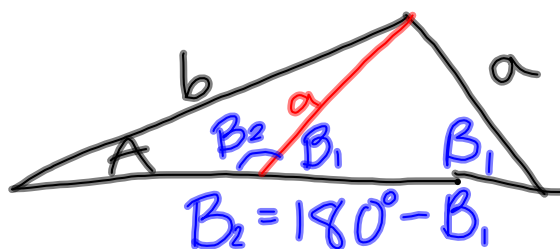
one solution:



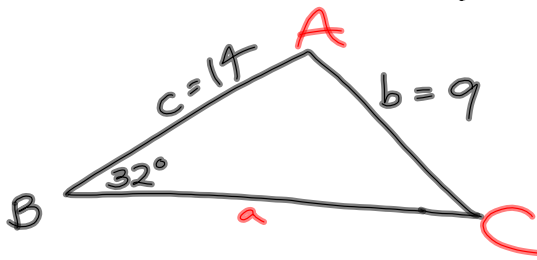
no solutions:



two solutions: $a < b$



$$14. B=32^\circ, c=14, b=9$$



$$\frac{\sin C}{14} = \frac{\sin 32^\circ}{9}$$

$$\sin C = \frac{14 \sin 32^\circ}{9}$$

$$C = \sin^{-1}\left(\frac{14 \sin 32^\circ}{9}\right)$$

$$\approx 55.5^\circ$$

$$A = 180^\circ - 32^\circ - 55.5^\circ$$

$$\approx 92.5^\circ$$

$$\frac{a}{\sin 92.5^\circ} = \frac{9}{\sin 32^\circ}$$

$$a = \frac{9 \sin 92.5^\circ}{\sin 32^\circ}$$

$$\approx 17$$

case 2
tomorrow!

HW

7.1 (book)

1, 2, 4, 6, 7