

Evaluate:

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

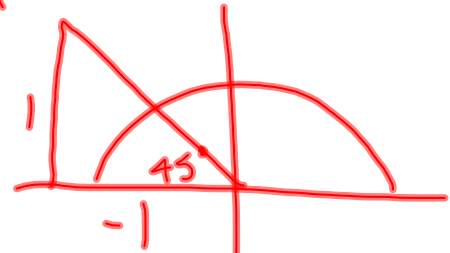
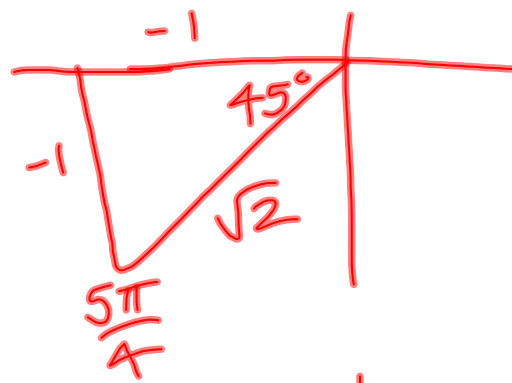
2. $\cot^{-1}(-1) = \boxed{\frac{3\pi}{4}}$

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

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

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

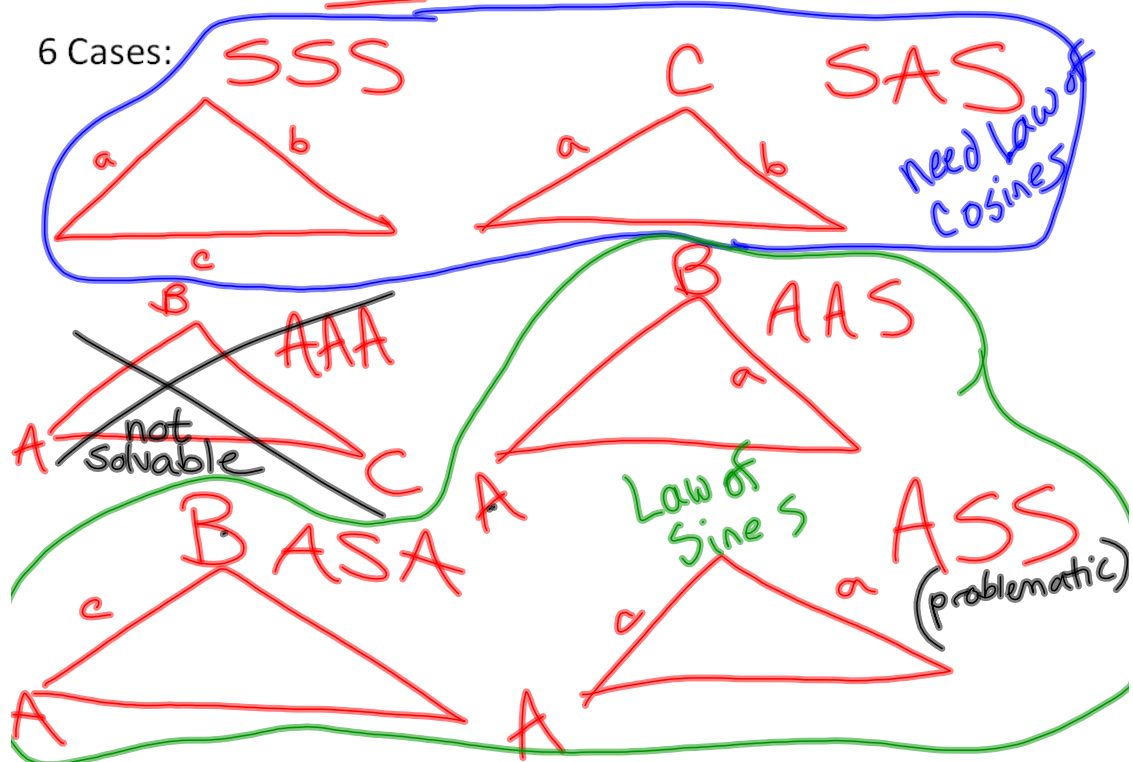
$\cos \frac{x}{2} = \pm \sqrt{\frac{1 + \cos x}{2}}$

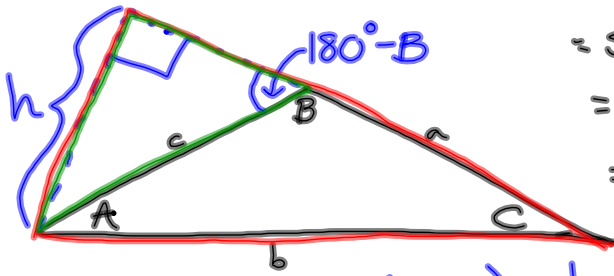


7.1 The Law of Sines

How do we solve oblique (not right) triangles?

6 Cases:



Derivaon of the Law of Sines

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

$$\begin{aligned}\sin C &= \frac{h}{b} & \sin(180^\circ - B) &= \frac{h}{c} \\ b \sin C &= h & \sin B &= \frac{h}{c} \\ & & c \sin B &= h\end{aligned}$$

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

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

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

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

Law of Sines

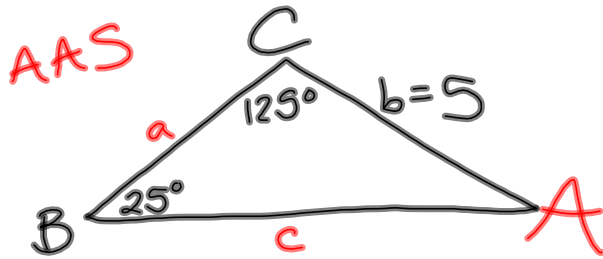
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

or

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

7.1 handout

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



$$A = 180^\circ - 125^\circ - 25^\circ$$

$$= \boxed{30^\circ}$$

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

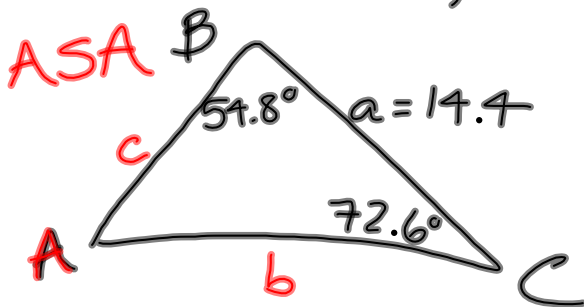
$$\frac{c}{\sin 125^\circ} = \frac{5}{\sin 25^\circ}$$

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

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

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

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



$$A = 180^\circ - 54.8^\circ - 72.6^\circ$$

$$= \boxed{52.6^\circ}$$

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

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

$$\approx \boxed{14.8}$$

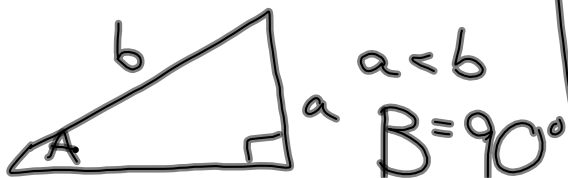
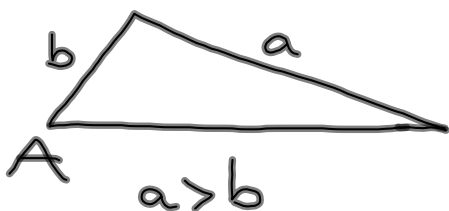
$$\frac{c}{\sin 72.6^\circ} = \frac{14.4}{\sin 52.6^\circ}$$

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

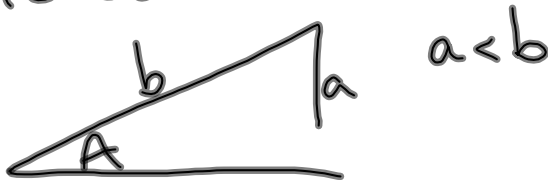
$$\approx \boxed{17.3}$$

ASS, The Problematic Triangle

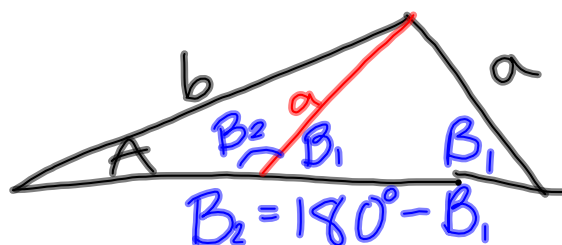
one solution:



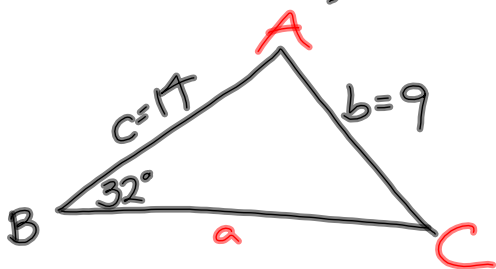
no solutions:



two solutions: $a < b$



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



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

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

$$C = \sin^{-1}\left(\frac{14 \sin 32^\circ}{9}\right) \approx \boxed{55.5^\circ}$$

$$A = 180^\circ - 32^\circ - 55.5^\circ = \boxed{92.5^\circ}$$

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

$$a = \frac{9 \sin 92.5^\circ}{\sin 32^\circ} \approx \boxed{17}$$

case 2 tomorrow

HW

7.1 (book)

1, 2, 4, 6, 7