Evaluate:

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

2. $\cot^{-1}(-1) =$

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

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

2) $\cot^{-1}(-1)$ $\cot\alpha = \frac{adj}{opp} = \frac{-1}{1} = -1$

$45° \; \frac{3\pi}{4}$

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

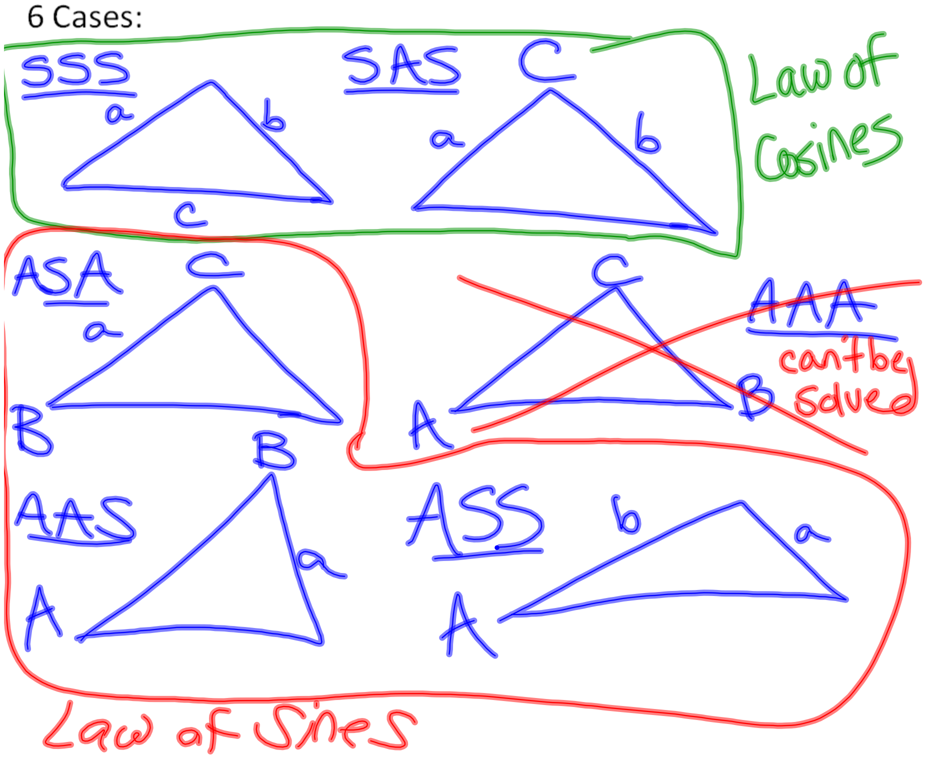
$= +\sqrt{\frac{1+\cos\frac{3\pi}{4}}{2}} = \sqrt{\frac{1+\left(-\frac{\sqrt{2}}{2}\right)}{\frac{2}{1}}} = \sqrt{\left(\frac{2}{2}-\frac{\sqrt{2}}{2}\right)\cdot\frac{1}{2}}$

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

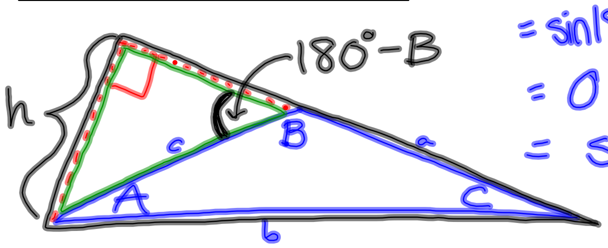
7.1 The Law of Sines

How do we solve oblique (not right) triangles?

6 Cases:



Derivaon of the Law of Sines



$$\sin(180^\circ - B) = \sin 180^\circ \cos B - \cos 180^\circ \sin B = 0 \cdot \cos B - (-1)\sin B = \sin B$$

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

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

$$h = c\sin B$$

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

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

The Law of Sines

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

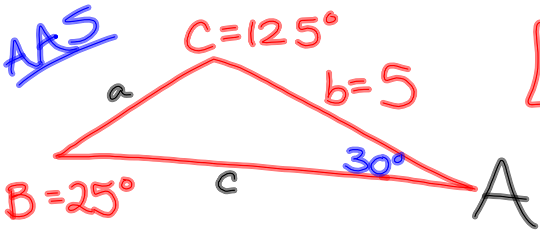
or

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

7.1 handout   Solve the Triangle.

2. $B=25°,\ C=125°,\ b=5$

AAS



$\boxed{A} = 180° - 125° - 25°$

$= \boxed{30°}$

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

$\dfrac{a}{\sin 30°} = \dfrac{5}{\sin 25°}$

$\boxed{a} = \dfrac{5\sin 30°}{\sin 25°}$

$\approx \boxed{5.9}$

(5sin(30))/(sin(25))

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

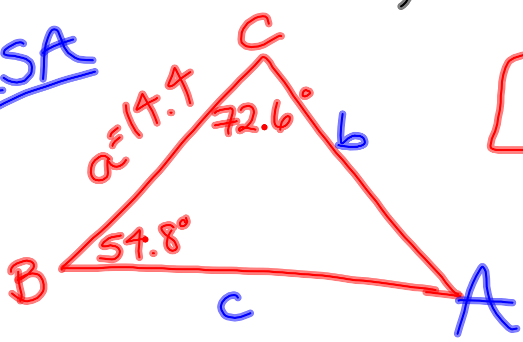
$\boxed{c} = \dfrac{b\sin C}{\sin B}$

$= \dfrac{5\sin 125°}{\sin 25°}$

$\approx \boxed{9.7}$

8. $B=54.8°,\ C=72.6°,\ a=14.4$

ASA



$\boxed{A} = 180° - 54.8° - 72.6°$

$= \boxed{52.6°}$

$\dfrac{b}{\sin 54.8°} = \dfrac{14.4}{\sin 52.6°}$

$\boxed{b} = \dfrac{14.4\sin 54.8°}{\sin 52.6°}$

$\approx \boxed{14.8}$

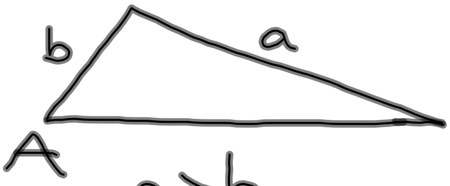
$\dfrac{c}{\sin 72.6°} = \dfrac{14.4}{\sin 52.6°}$

$\boxed{c} = \dfrac{14.4\sin 72.6°}{\sin 52.6°}$

$\approx \boxed{17.3}$

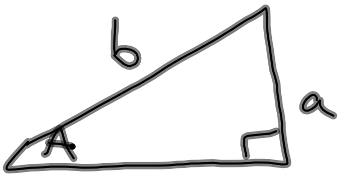
ASS, The Problematic Triangle

one solution:



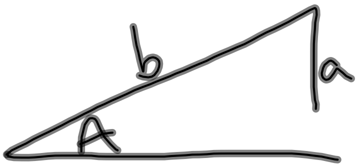
$a > b$

$a < b$



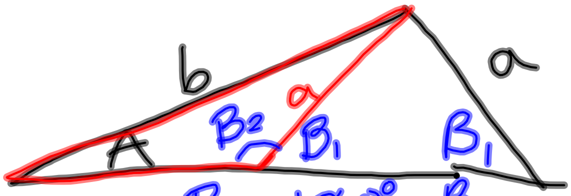
$B = 90°$

no solutions:



$a < b$

two solutions: $a < b$

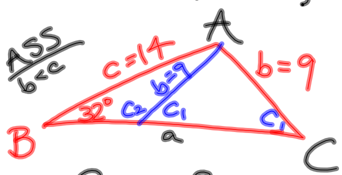


$B_2 = 180° - B_1$

14. $B = 32°,\ c = 14,\ b = 9$

ASS ⇒ 0, 1, or 2 solutions

$\frac{ASS}{b<c}$



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

$\frac{\sin C}{14} = \frac{\sin 32°}{9}$

$\sin C = \frac{14 \sin 32°}{9}$

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

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

$\approx \boxed{55.5°}$

$\boxed{A} = 180° - 55.5° - 32°$

$\approx \boxed{92.5°}$

$\frac{a}{\sin 92.5°} = \frac{9}{\sin 32°}$

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

Case 2

$\boxed{C} = 180° - 55.5°$

$= \boxed{124.5°}$

$\boxed{A} = 180° - C - B$

$= 180 - 124.5° - 32$

$= \boxed{23.5°}$

$\frac{a}{\sin 23.5°} = \frac{9}{\sin 32°}$

$\boxed{a} = \frac{9 \sin 23.5°}{\sin 32°} \approx \boxed{6.8}$

HW

7.1 (book)

#1, 2, 4, 6, 7