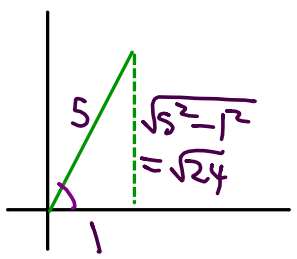
19, 22a, 16

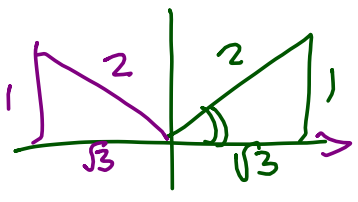
16. $\cos\theta = \frac{1}{5} = \frac{x}{r}$ $\tan\theta = 2\sqrt{6}$



$\sin\theta = \frac{\sqrt{24}}{5} = \frac{2\sqrt{6}}{5}$

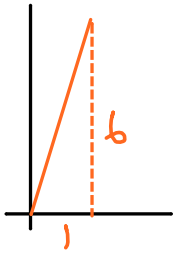
$= \frac{\sqrt{4\cdot 6}}{5} = \frac{\sqrt{4}\cdot\sqrt{6}}{5}$

19.



	sin	cos	tan
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
150°	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{\sqrt{3}}$

22a)



$y = 6x \Rightarrow r = \sqrt{6^2+1^2}$

$= \sqrt{37}$

The Sine Law

page 108 #1-4, 10, 11, 24

SOHCAHTOA can only be used with a right Δ (this is also true for pythagoras)

But some triangles do not have a 90° angle, and so two other trigonometric rules were created. (They actually sub-divided the triangle into right-angled triangles to prove them!)

Today we look at the SINE LAW, which can be used for solving for sides or angles of non-right triangles. The only requirement for using this law is we need to have

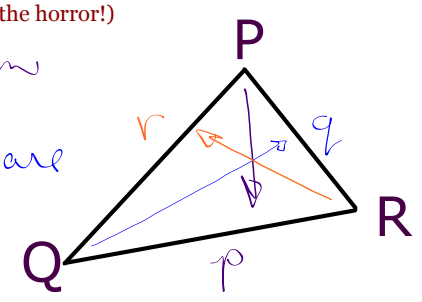
- known side + opposite angle
- one other piece of info

TIME OUT!

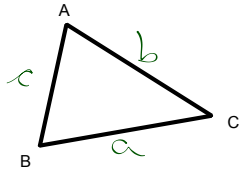
We have to talk about naming a non-right triangle's sides because now we DO NOT HAVE A HYPOTENUSE!! (oh the horror!)

→ angles are in capitals

→ opposite sides are lower case (of same letter)



Now, the SINE LAW!!!



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

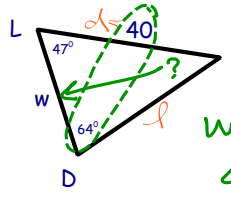
best when solving an angle

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

best when solving for a side.

Example 1:

Determine the value of w



side

we need ∠W

∠W = 180° − 64° − 47°

∠W = 69°

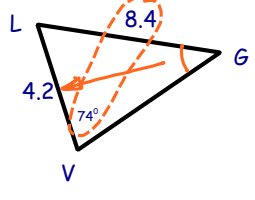
$$\frac{w}{\sin\angle W} = \frac{d}{\sin\angle D}$$

$$w = \frac{40\sin 69°}{\sin 64°}$$

w ≈ 41.5

Example 2:

Determine the value of angle G



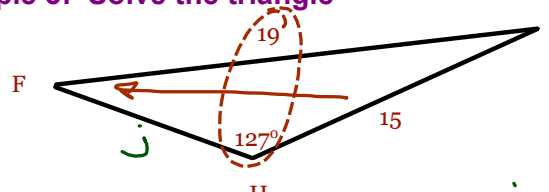
$$\frac{\sin\angle G}{4.2} = \frac{\sin 74°}{8.4}$$

$$\sin\angle G = \frac{4.2\sin 74°}{8.4}$$

$$\sin^{-1}(\sin\angle G \doteq 0.48)$$

$$\angle G \doteq 28.7°$$

Example 3: Solve the triangle



$\frac{\sin F}{15} = \frac{\sin 127^\circ}{19}$

$\sin F = \frac{15 \sin 127^\circ}{19}$

$\sin F \doteq 0.63$

$\angle F \doteq 39.1^\circ$

$\angle J = 180^\circ - 127^\circ - 39.1^\circ$

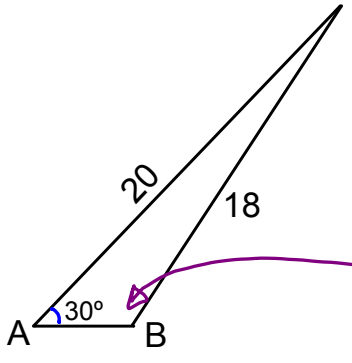
$\angle J = 13.9^\circ$

$\frac{j}{\sin \angle J} = \frac{19}{\sin 127^\circ}$ ← given ratio

$j = \frac{19 \sin 13.9^\circ}{\sin 127^\circ}$

$j \doteq 5.7$

Example 4: Calculate angle B



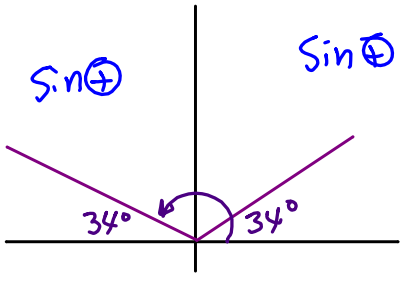
$\frac{\sin \angle B}{20} = \frac{\sin 30^\circ}{18}$

$\sin \angle B = \frac{20 \sin 30^\circ}{18}$

$\sin^{-1}(\sin \angle B = 0.\overline{5})$

$\angle B = 33.75^\circ$ wait a minute...

$\angle B$ is clearly obtuse!!



My calculator is programmed to yield acute answers... but in this case I want the answer in QII.

$\therefore \angle B = 180^\circ - 34^\circ$

$\angle B = 146.25^\circ$