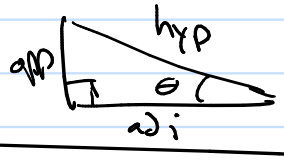
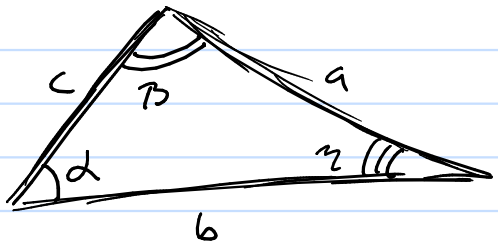
Math 112 Right triangle Trig



Law of Sines



$$\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$$

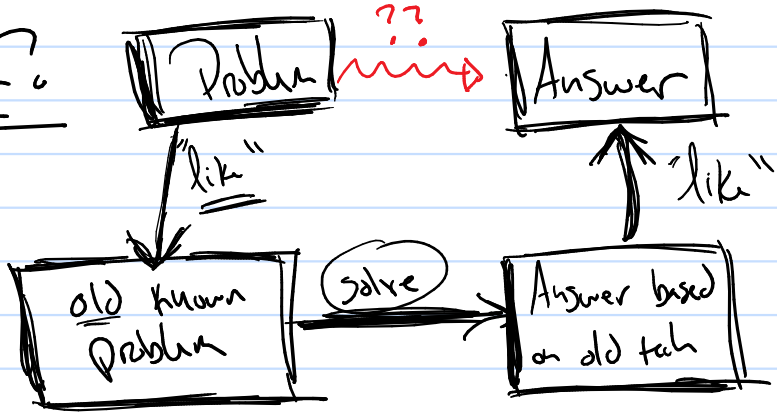
or

$$\frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma}$$

$\alpha+\beta+\gamma = 180^\circ$
or
$\alpha+\beta+\gamma = \pi$

Problem Solving

New Problem?



know

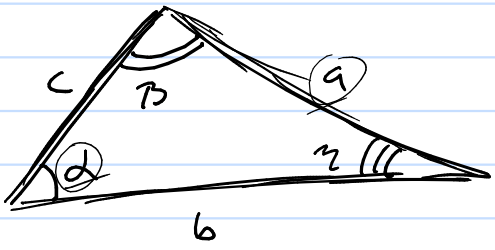
ex ① $\sin(-x) = -\sin x$ (sine is an odd function)

② $\cos(-x) = \cos x$ (cosine is an even function)

New Problem $\tan(-x)$ $\rightsquigarrow$ $\frac{-\sin x}{\cos x} = -\tan(x)$

$\tan(-x) = \frac{\sin(-x)}{\cos(-x)} \Rightarrow \frac{\sin(-x)}{\cos(-x)} = \frac{-\sin(x)}{\cos(x)}$

ok $\tan(-x) = -\tan x$ means tangent is an odd function

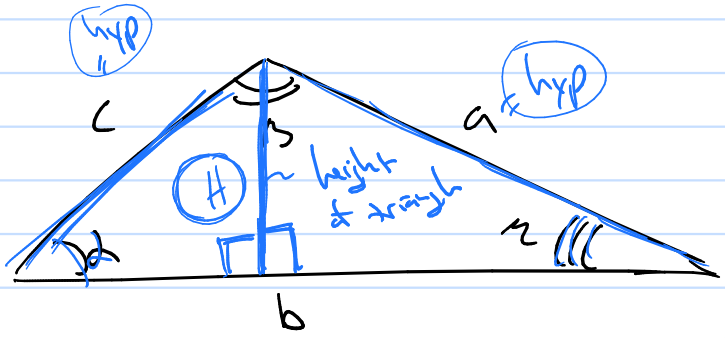


$$\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$$

or

$$\frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma}$$

How ?!



New Problem: no right triangles!

old Problem: we actually have Two right triangles!

b/c $\sin\theta = \frac{opp}{hyp}$

From last class

$$\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$$

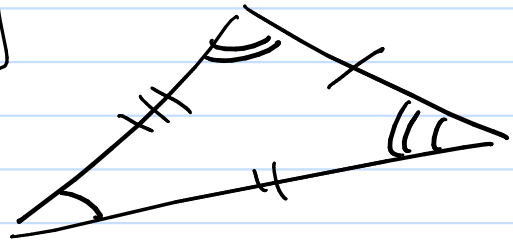
or

$$\frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma}$$

Uses?

1st

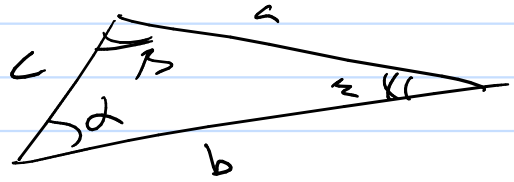
① Fixed angles
② length changes
→ shape of the triangle



→ ③ fix lengths as well
→ size of the Triangle

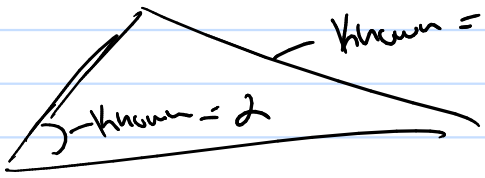
Can we find size / shape of triangles using law of sines?

1st

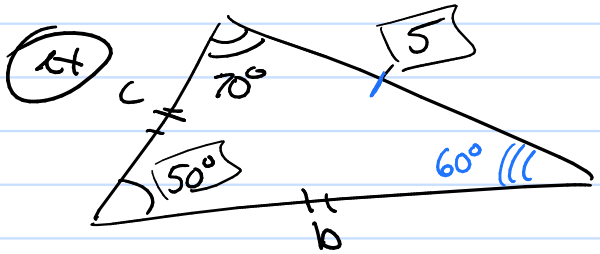


$$\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$$

need a angle and its opp side



unknown? β, b, γ, c



Size / shape?

$$\frac{\sin(50^\circ)}{5} = \frac{\sin(70^\circ)}{b} = \frac{\sin(60^\circ)}{c}$$

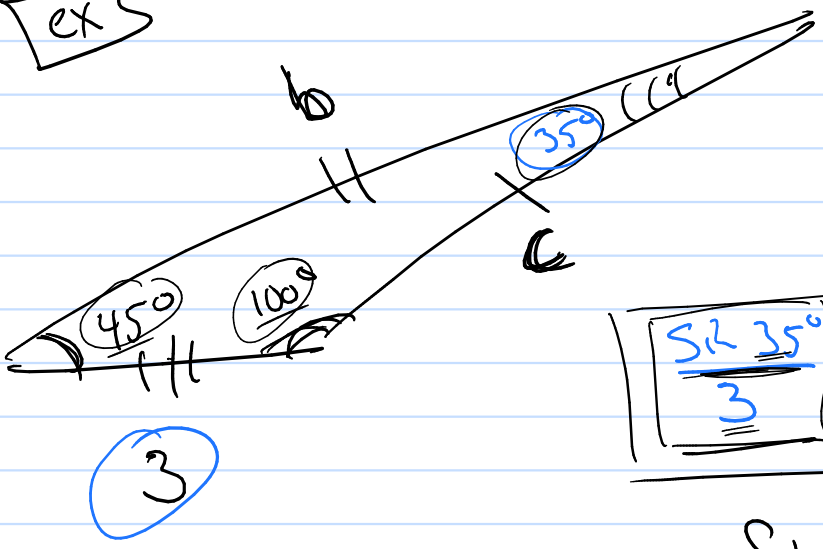
$$b = 5\,\frac{\sin(70^\circ)}{\sin(50^\circ)}$$

$$c = 5\,\frac{\sin(60^\circ)}{\sin(50^\circ)}$$

W/ $\alpha+\beta+\gamma = 180^\circ$

So $180 - 70 - 50 = 60^\circ$

ex



$180° - 100° - 45° = \boxed{35°}$

$$\boxed{\frac{\sin 35°}{3} = \frac{\sin(100°)}{b} = \frac{\sin(45°)}{c}}$$

we can find b, c