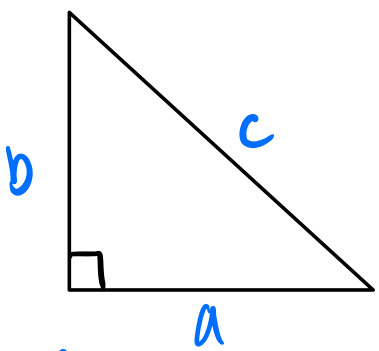
Sarah Firestone

Right Triangles, Trigonometric Ratios, Unit Circle.

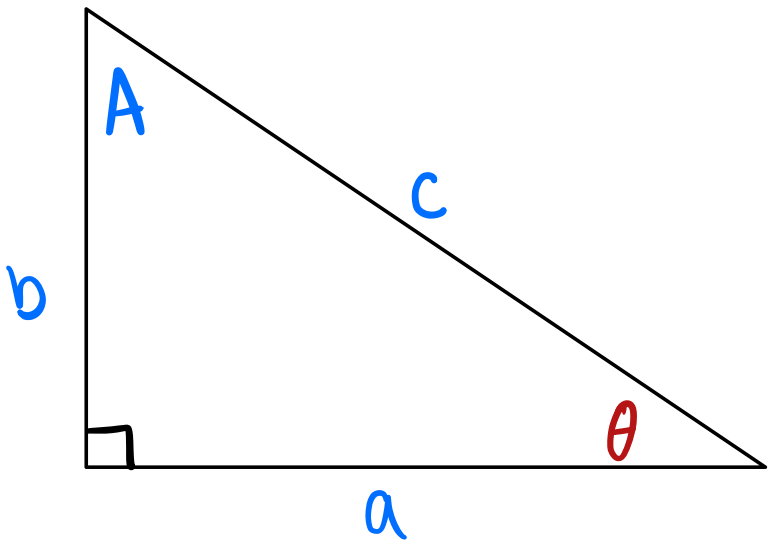
Warm Up

Write down everything you know about right triangles



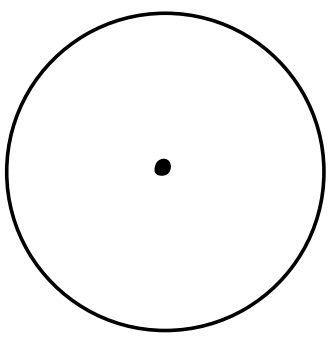
$a^2+b^2=c^2$

- Scalene triangle
- cannot be equilateral
- no obtuse angles
- longest side = hypotenuse
  - ↳ opposite of the 90° angle
- isocoles triangle
- $\frac{a \cdot b}{2}$
- trig ratios w/ sides and angles
- $\angle A+\angle B+\angle C=180°$
- $\angle A+\angle B=90°$
- circumcenter is on the hypotenuse
- a and b are called legs

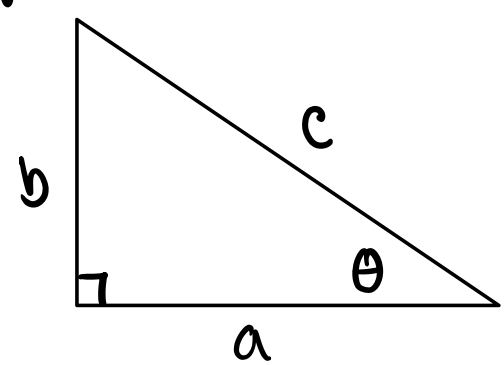


$$a^2 + b^2 = c^2$$

Def Trigonometry is the study of triangles



Trigonometric Ratios



Sine

$\sin(\theta) = \frac{b}{c}$

SOH

Cosine

$\cos(\theta) = \frac{a}{c}$

CAH

Tangent

$\tan(\theta) = \frac{b}{a}$

TOA

Cosecant

$\csc(\theta) = \frac{1}{\sin(\theta)}$

$\csc(\theta) = \frac{c}{b}$

secant

$\sec(\theta) = \frac{1}{\cos(\theta)}$

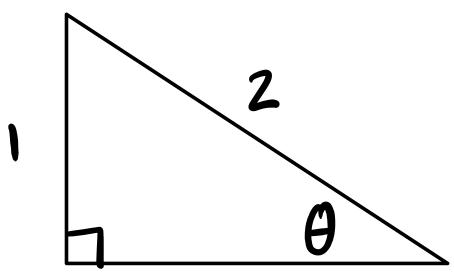
$\sec(\theta) = \frac{c}{a}$

Cotangent

$\cot(\theta) = \frac{1}{\tan(\theta)}$

$\cot(\theta) = \frac{a}{b}$

ex 1



Find all 6 trig ratios using the information given. Using geometry, find the value of θ.

SOH CAH TOA

$\sin(\theta) = \frac{1}{2}$

$\cos(\theta) = \frac{\sqrt{3}}{2}$

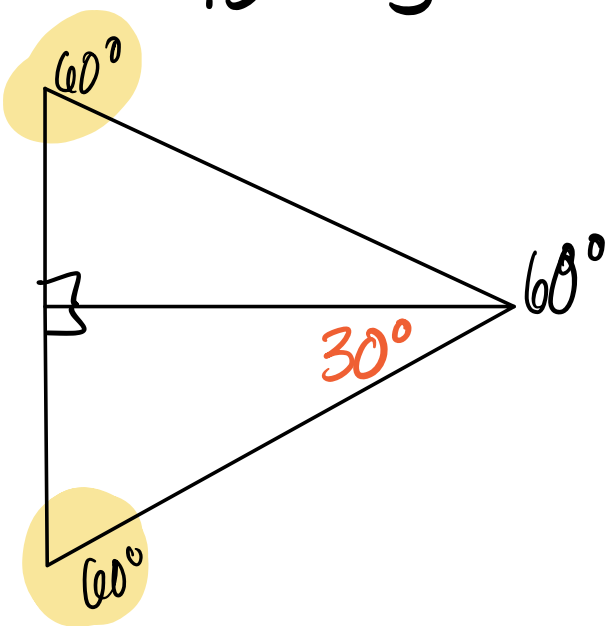
$\tan\theta = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

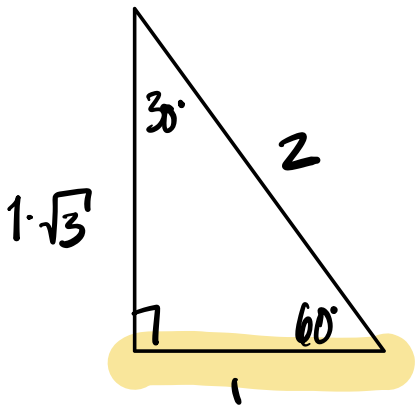
$\csc(\theta) = \frac{2}{1}$

$\sec(\theta) = \frac{2}{} = \frac{2\sqrt{3}}{}$

$\cot(\theta) = \sqrt{3}$

$\sqrt{3}$ 3 1

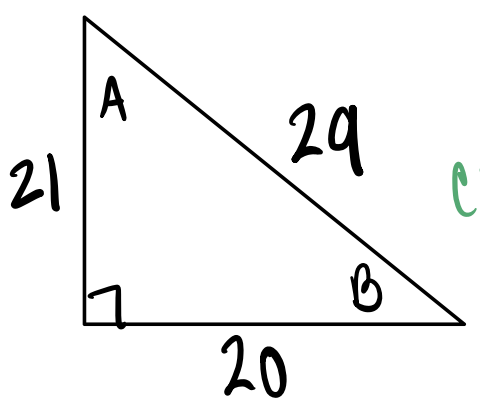




[problems #1, 2, 3]

for #2, 3: c = b C = B

①



$\cos^{-1}(\cos(B)) = \left(\frac{20}{29}\right)\cos^{-1}$

$B = \cos^{-1}\left(\frac{20}{29}\right)$

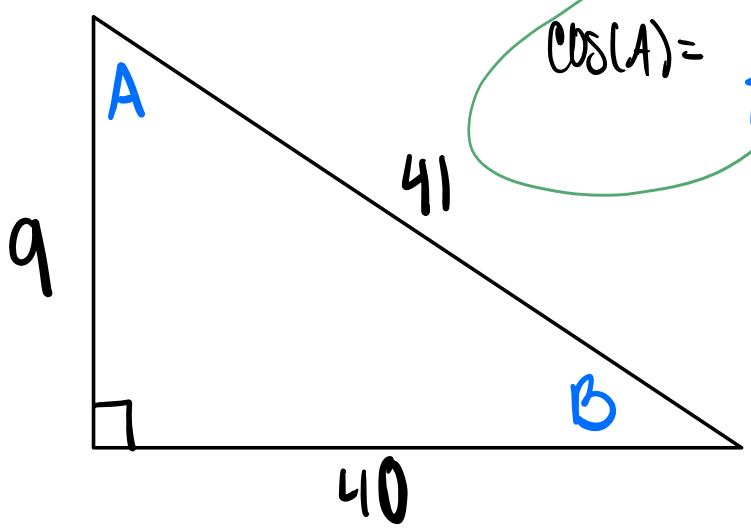
$\angle B = 46.4°$

[problems #1, 2, 3, 4, 5]

③ a=40 b=9 c=41

$\sin(A) = \frac{40}{41}$ $\sin(B) = \frac{9}{41}$

$\cos(A) = \frac{9}{41}$ $\cos(B) = \frac{40}{41}$

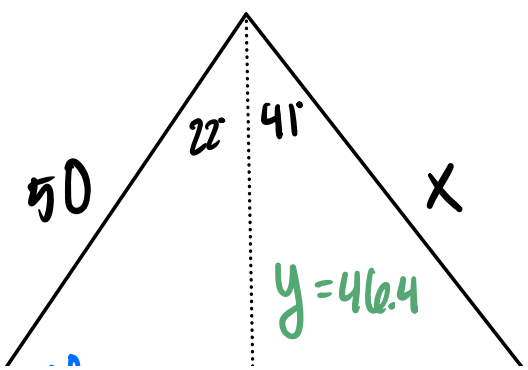


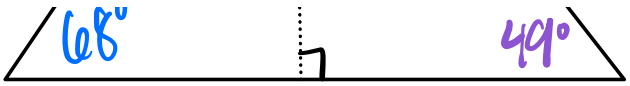
$40^2 + 9^2 = c^2$

$1681 = c^2$

$c = 41$

⑤a)





- $\sin(68°) = \frac{y}{50} \Rightarrow y = 50 \cdot (0.9)$

$y = 46.4$

- $\sin(49°) = \frac{46.4}{x}$

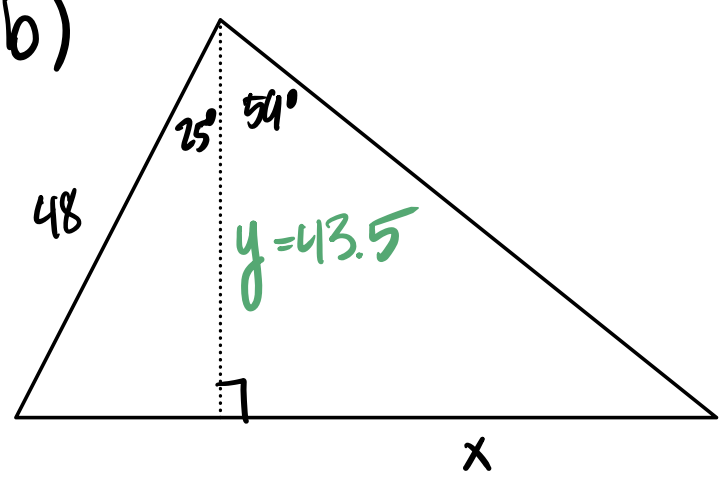
$0.6 = \frac{46.4}{x}$

$x \cdot (0.6) = 46.4$

$x = \frac{46.4}{0.6}$

$\boxed{x = 61.5}$

(5b)



$\cos(25°) = \frac{y}{48} \Rightarrow y = 48 \cdot \cos(25°)$

48

$y = 43.5$

$\tan(59°) = \frac{x}{43.5}$

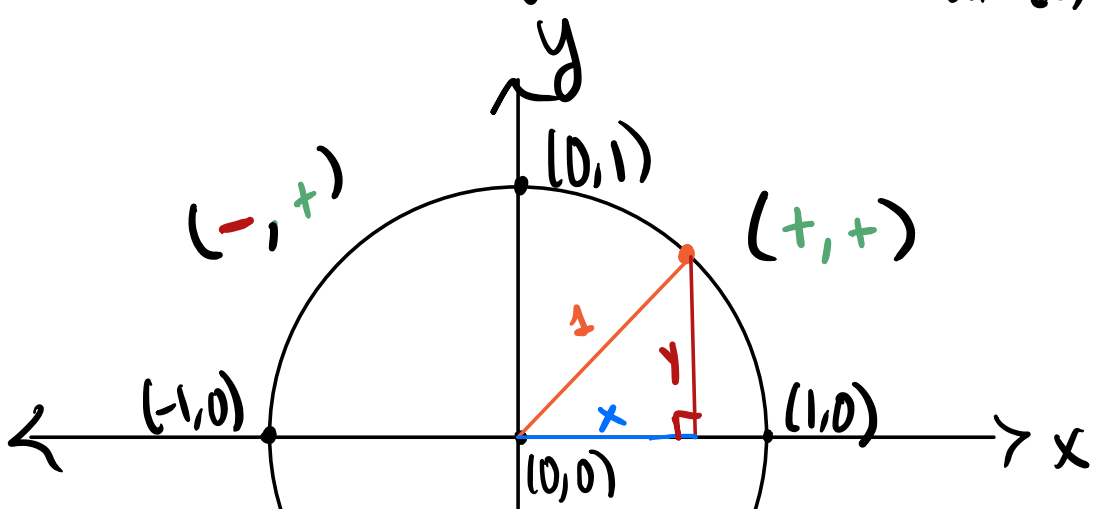
$x = 43.5(\tan(59°))$

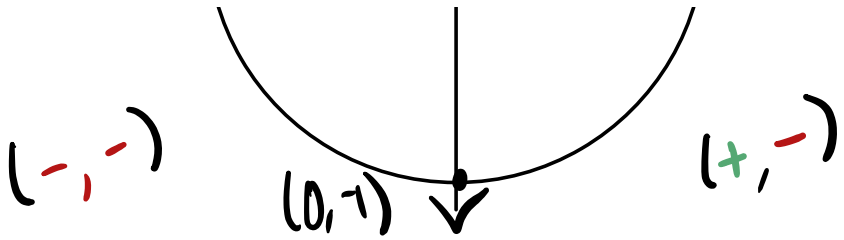
$x = 72.4$

The Unit Circle

Def The unit circle is a circle with a radius of 1. Using the pythagorean theorem, it follows the equation

$x^2 + y^2 = 1$ center is at (0,0)





360° in a circle