Trigonometric Ratios – Solving For Sides

Geometry

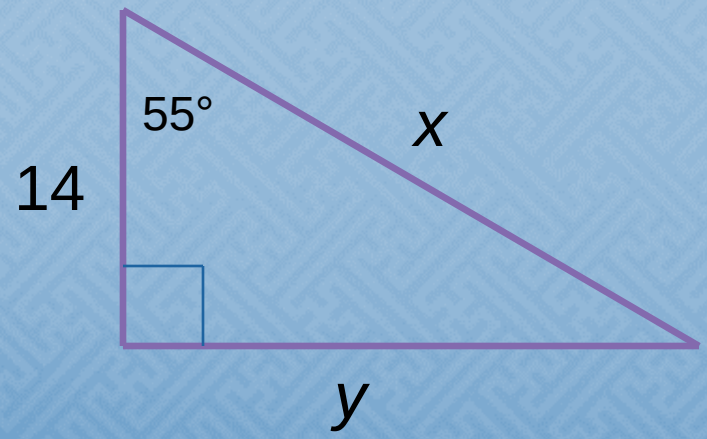
A BowerPoint Presentation

Calculator Practice

- Try these on your calculator to make sure you are obtaining the correct answers:
  - tan 60° = 1.7321
  - cos 25° = 0.9063
  - sin 20° = 0.3420
- You may have to enter 60 first and then press the tan button, or (for text-based calculators) you may have to press tan first, then 60, then ENTER

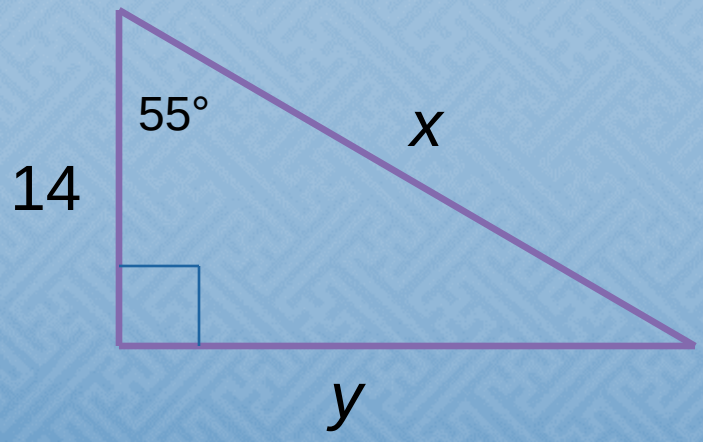
Solving for sides of right ∆s

- If you know **one acute angle** and the length of any **one side** of a right triangle, that is enough information to find the other two sides!



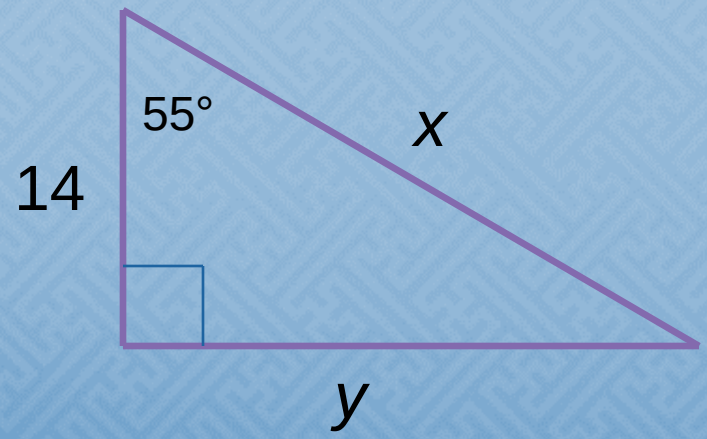
Step 1 – Choose an acute ∡

- We will use the 55° angle (we know the other acute ∡ must be 35°)



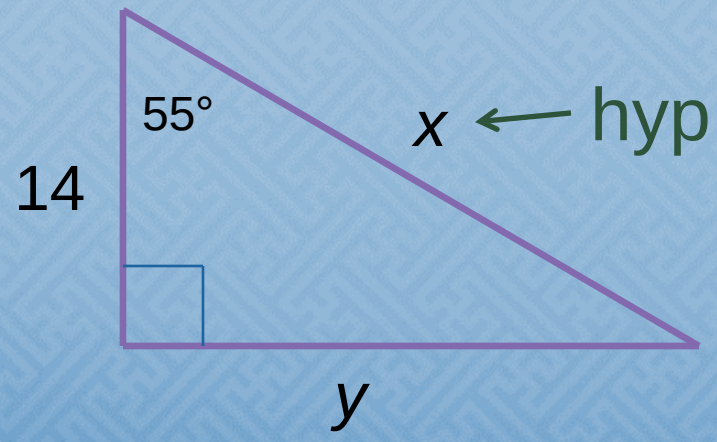
Step 2 – Label sides

- Start with the hypotensue



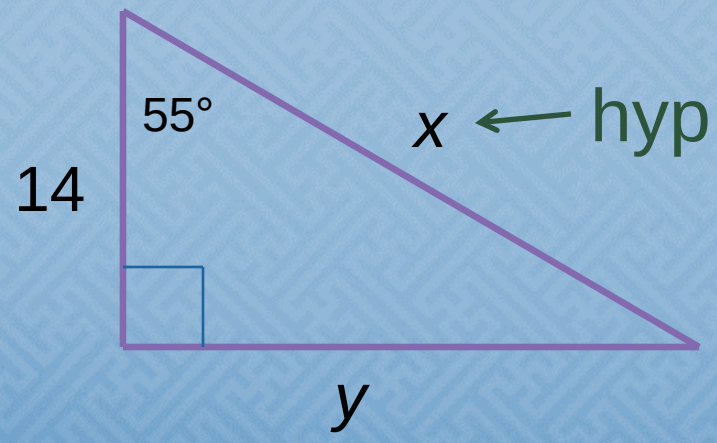
Step 2 – Label sides

- Start with the hypotensue



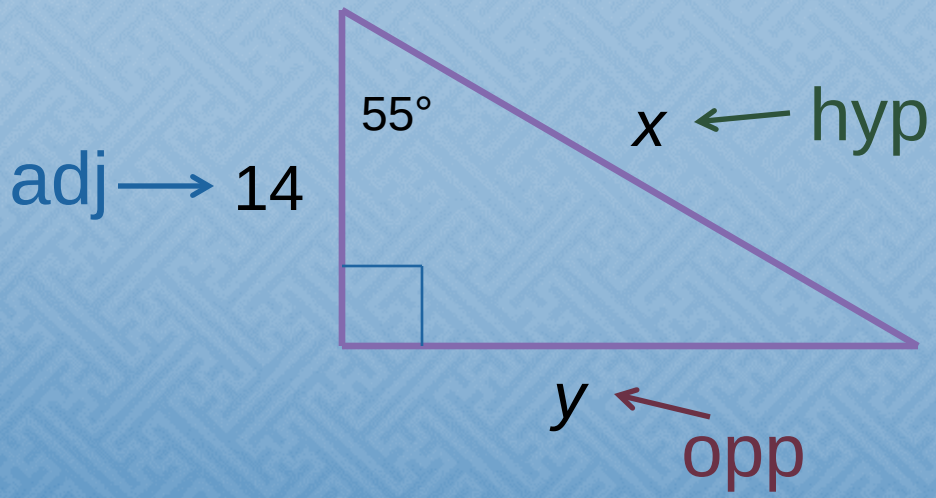
Step 2 – Label sides

- Next, label the opposite and adjacent legs



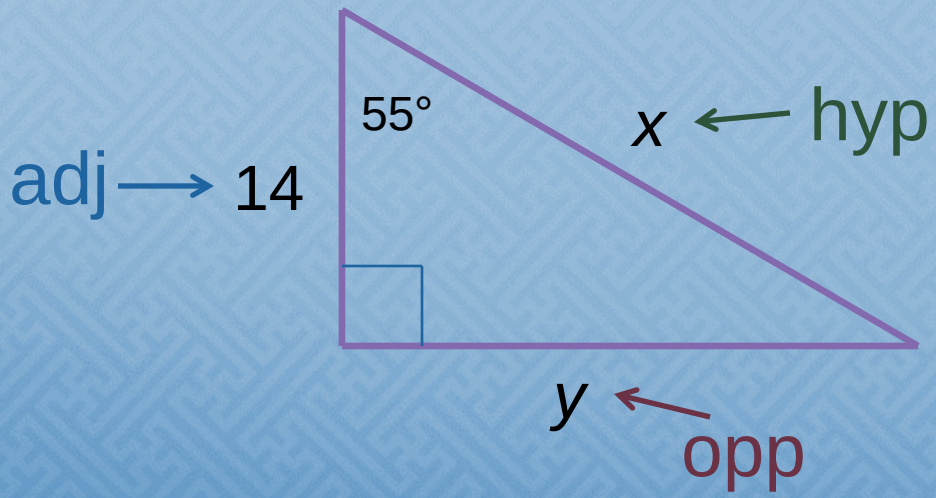
Step 2 – Label sides

- Next, label the opposite and adjacent legs



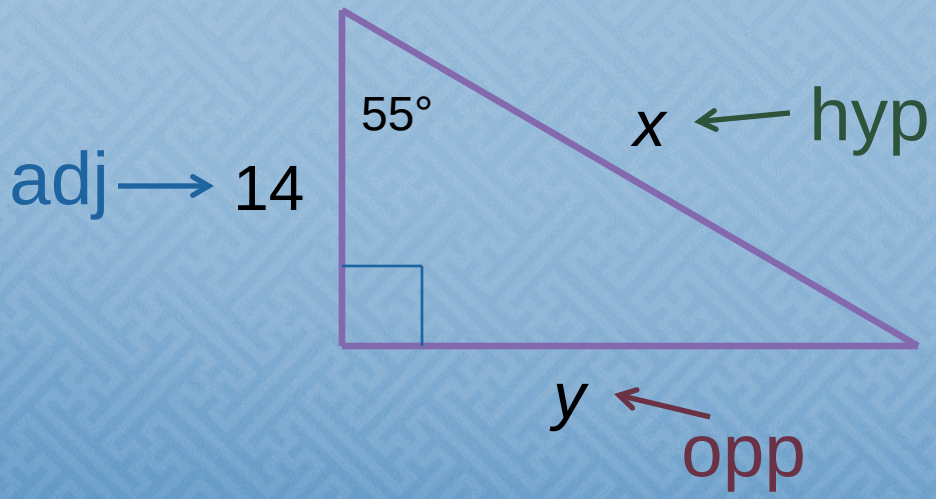
Step 3 – Select ratio

- We are going to solve for *x*. Should we use sin, cos, or tan?



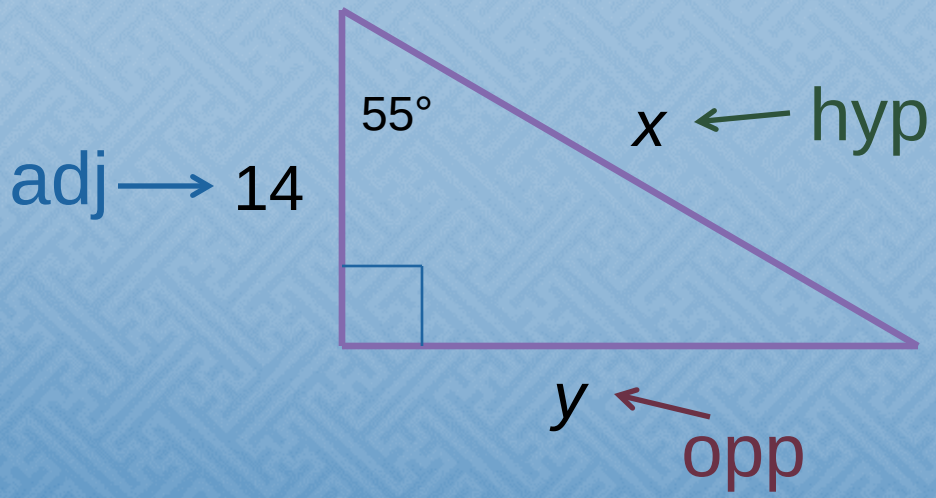
Step 3 – Select ratio

- We are going to solve for *x*. Should we use sin, cos, or tan?
  - Since *x* is a hyp, we will need a ratio with a **h**yp



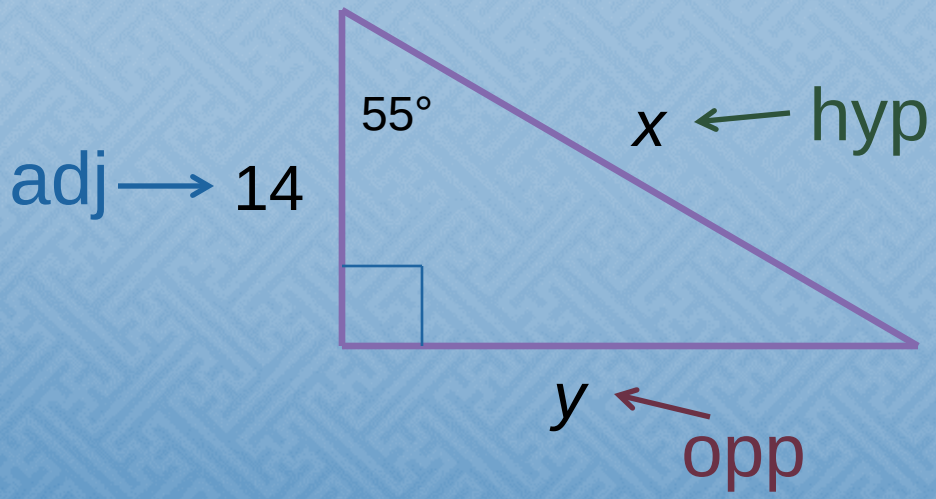
Step 3 – Select ratio

- We are going to solve for *x*. Should we use sin, cos, or tan?
  - Since x is a hyp, we will need a ratio with a **h**yp
  - We have a number for the length of adj, so we need a ratio with **a**dj.



Step 3 – Select ratio

- We are going to solve for *x*. Should we use sin, cos, or tan?
  - Since *x* is a hyp, we will need a ratio with a **h**yp
  - We have a number for the length of adj, so we need a ratio with **a**dj.
  - Which ratio has **a**dj and **h**yp?

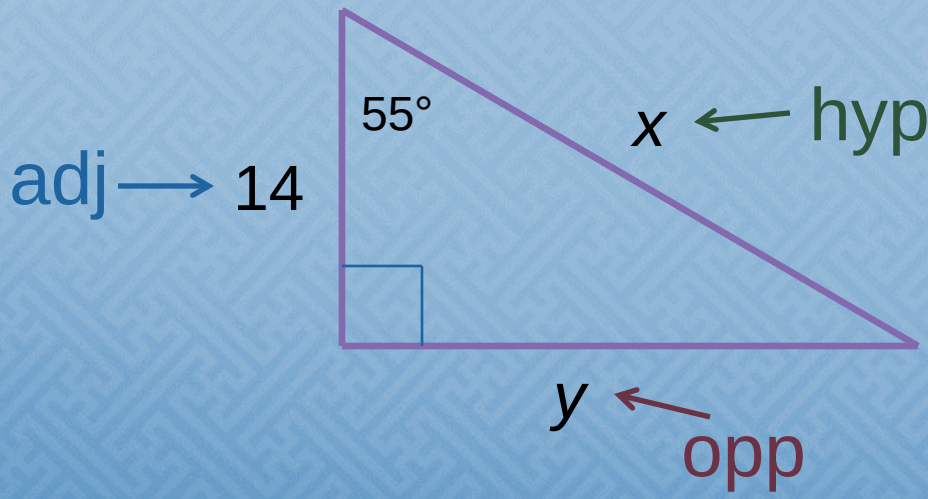


Step 3 – Select ratio

- We are going to solve for *x*. Should we use sin, cos, or tan?
  - Since *x* is a hyp, we will need a ratio with a **h**yp
  - We have a number for the length of adj, so we need a ratio with **a**dj.
  - Which ratio has **a**dj and **h**yp?

SOH – **CAH** – TOA

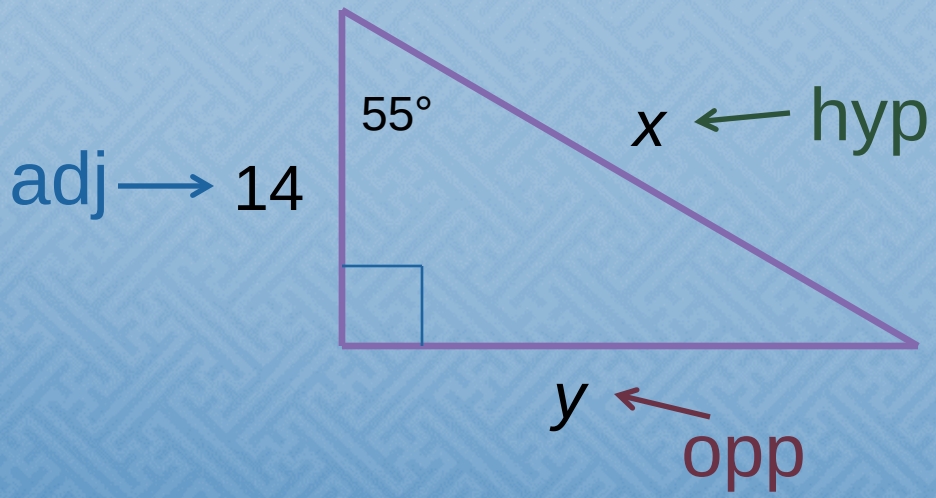
COSINE



Step 4 – Fill in and solve

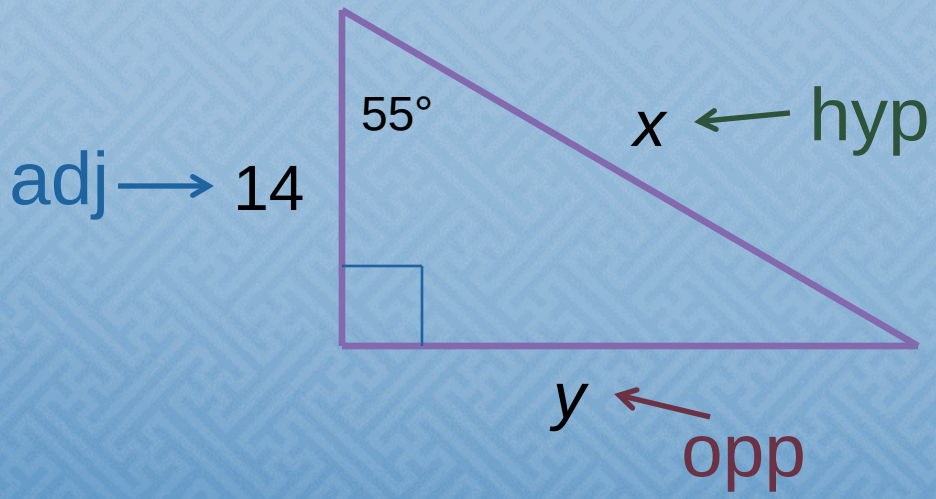
$$\cos\theta = \frac{\text{adj}}{\text{hyp}}$$

Let's fill in our values…



Step 4 – Fill in and solve

$$\cos 55° = \frac{14}{x}$$

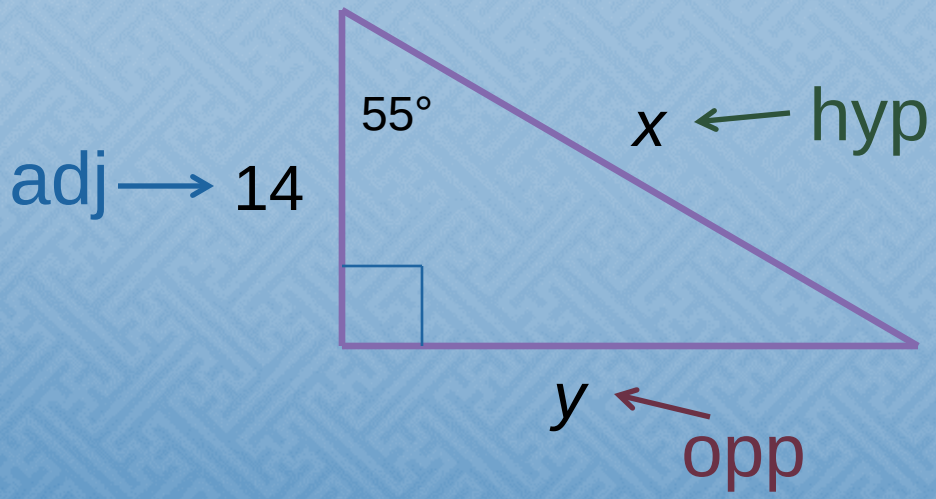


Step 4 – Fill in and solve

$$\cos 55° = \frac{14}{x}$$

Multiply both sides by x

$$x(\cos 55°) = 14$$

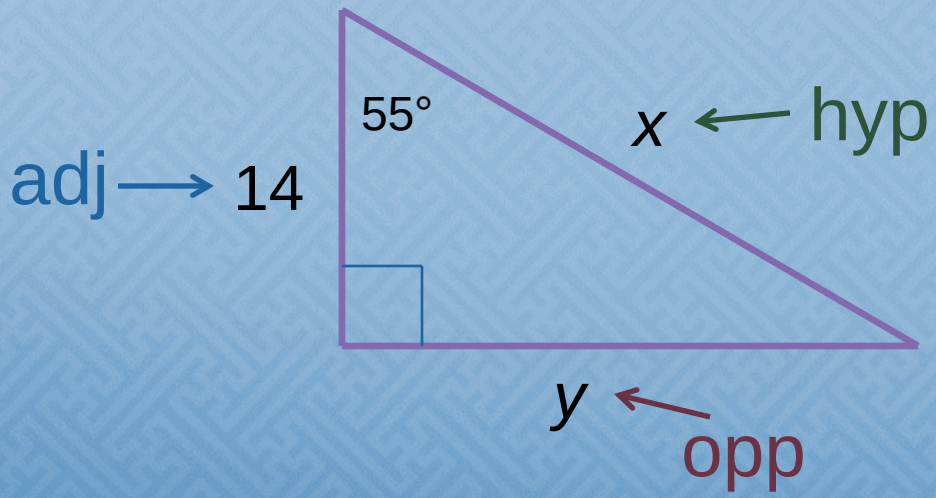


Step 4 – Fill in and solve

$$\cos 55° = \frac{14}{x}$$

Divide by cos 55°

$$x(\cos 55°) = 14 \longrightarrow x = \frac{14}{\cos 55°}$$

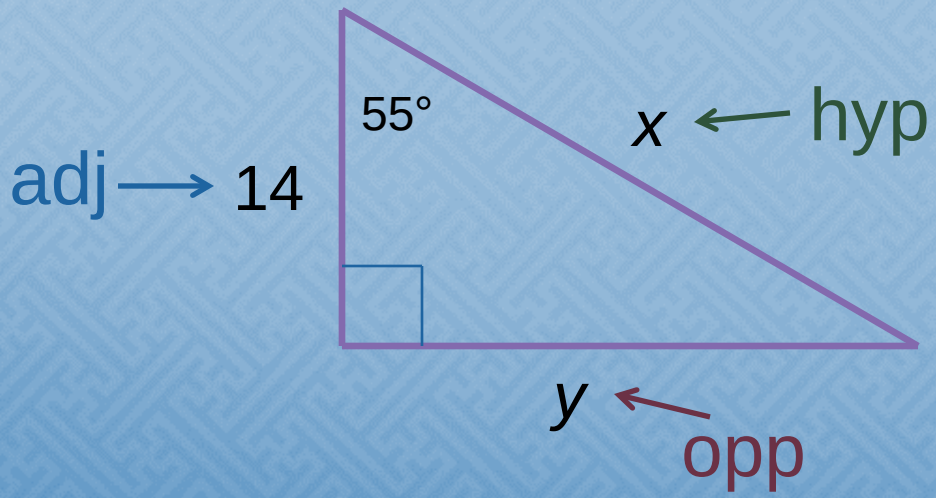


Step 4 – Fill in and solve

$$\cos 55° = \frac{14}{x}$$

Fill in for cos 55°

$$x\,(\cos 55°) = 14 \longrightarrow x = \frac{14}{0.573576}$$



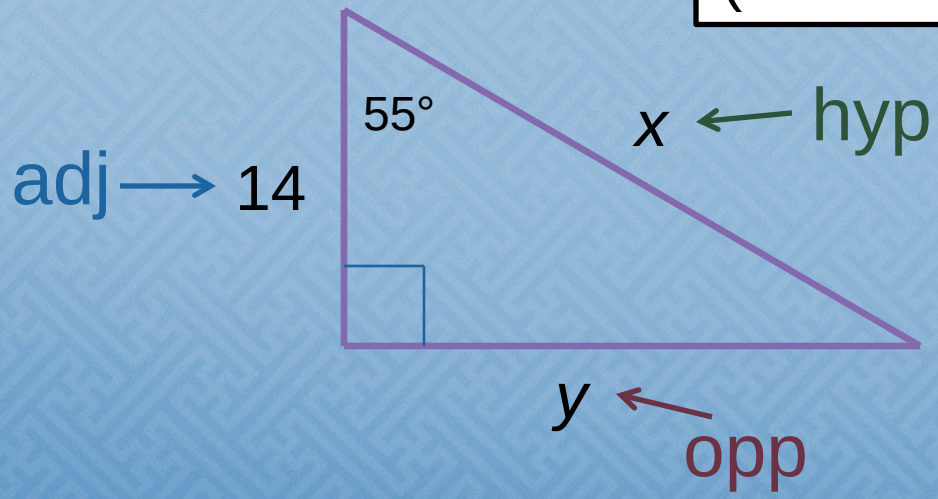
Step 4 – Fill in and solve

$$\cos 55° = \frac{14}{x}$$

Fill in for cos 55°

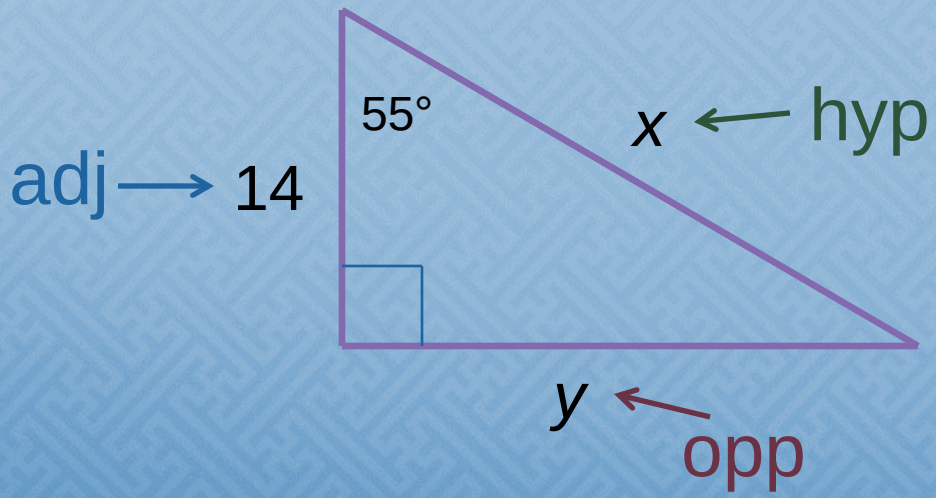
$$x\,(\cos 55°) = 14 \longrightarrow x = \frac{14}{0.573576}$$

x = 24.4
(Rounded to nearest tenth)



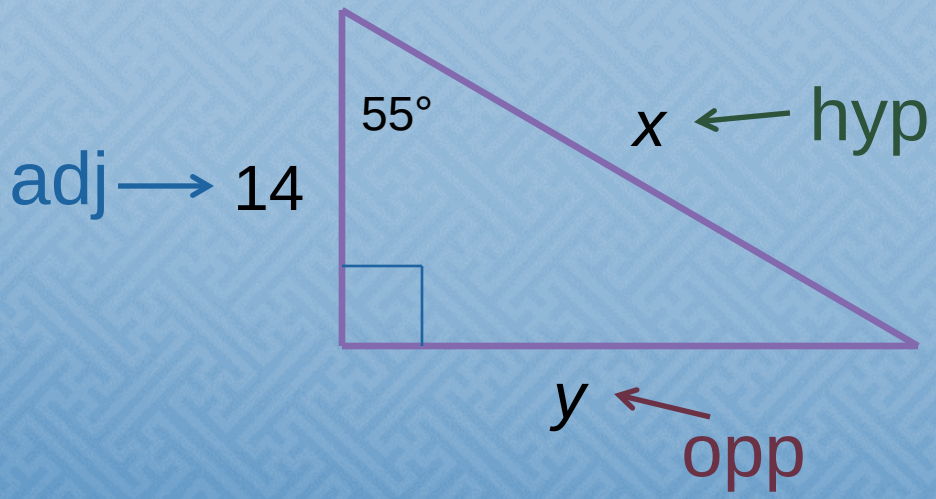
Back to Step 3 – Select ratio

- We are going to solve for *y*. Should we use sin, cos, or tan?



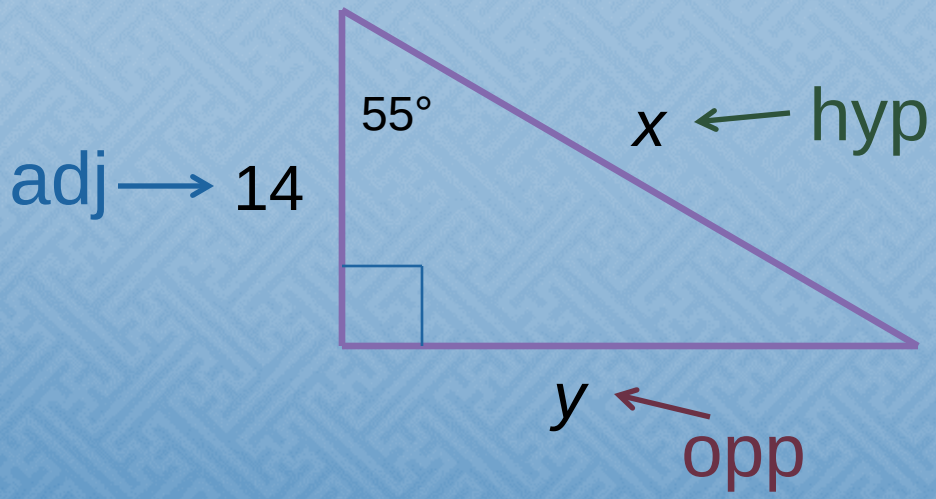
Back to Step 3 – Select ratio

- We are going to solve for y. Should we use sin, cos, or tan?
  - Since *y* is a opp, we will need a ratio with a **o**pp
  - We have a number for the length of adj, so we need a ratio with **a**dj.



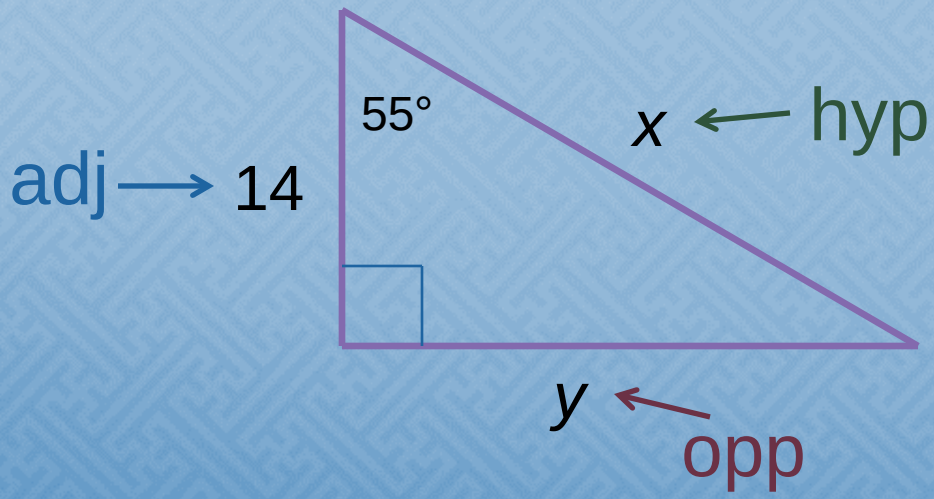
Back to Step 3 – Select ratio

- We are going to solve for y. Should we use sin, cos, or tan?
  - Since *y* is a opp, we will need a ratio with a **o**pp
  - We have a number for the length of adj, so we need a ratio with **a**dj.
  - Which ratio has **o**pp and **a**dj?



Back to Step 3 – Select ratio

- We are going to solve for y. Should we use sin, cos, or tan?
  - Since *y* is a opp, we will need a ratio with a **o**pp
  - We have a number for the length of adj, so we need a ratio with **a**dj.
  - Which ratio has **o**pp and **a**dj? SOH – CAH – **TOA**

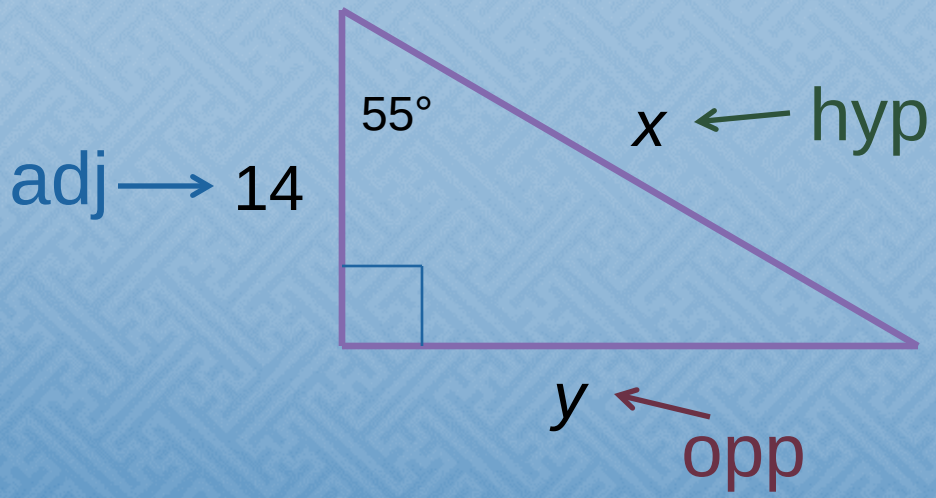


TANGENT

Step 4 – Fill in and solve

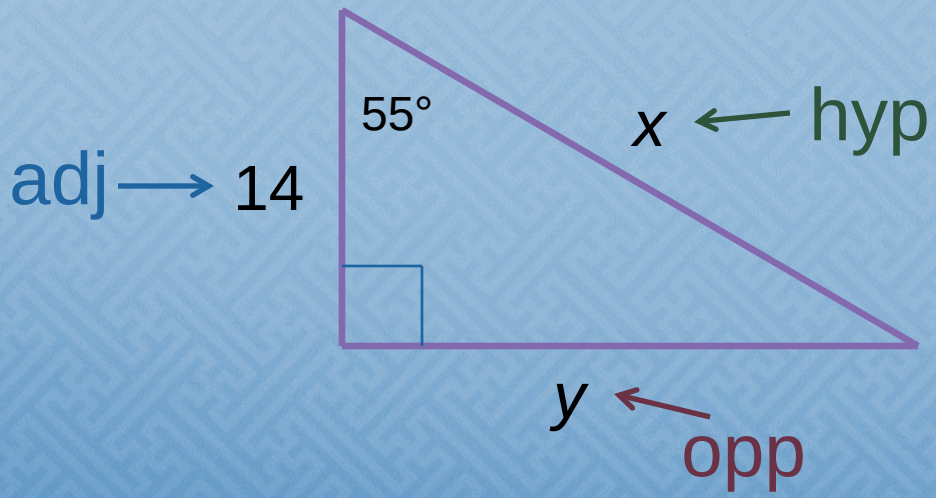
$$\tan\theta = \frac{\text{opp}}{\text{adj}}$$

Let's fill in our values…



Step 4 – Fill in and solve

$$\tan 55° = \frac{y}{14}$$

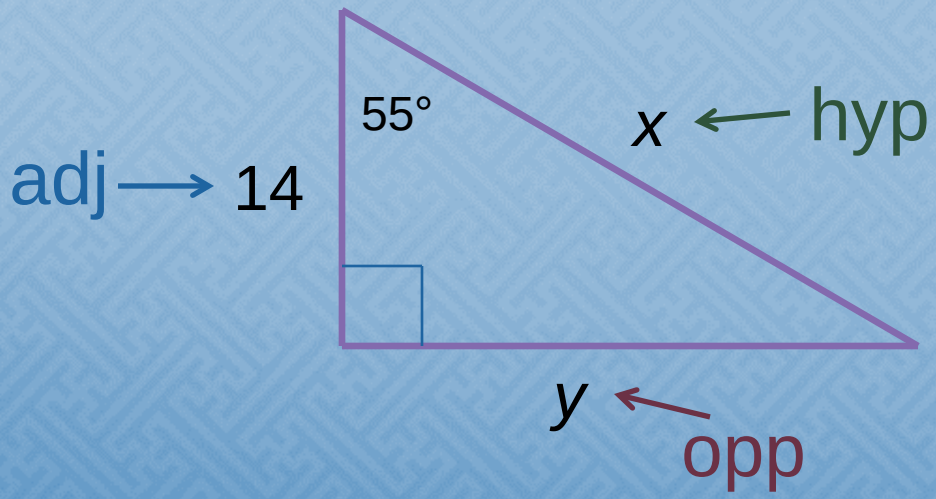


Step 4 – Fill in and solve

$\tan 55° = \frac{y}{14}$

Multiply by 14

$14 (\tan 55°) = y$



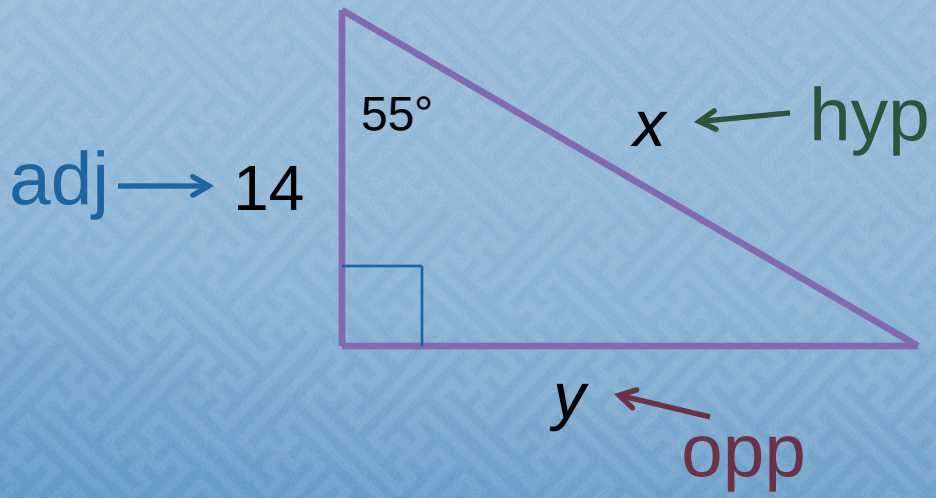
Step 4 – Fill in and solve

$\tan 55° = \frac{y}{14}$

Fill in for tan 55°

$14 (\tan 55°) = y$

$14 (1.428148) = y$



Step 4 – Fill in and solve

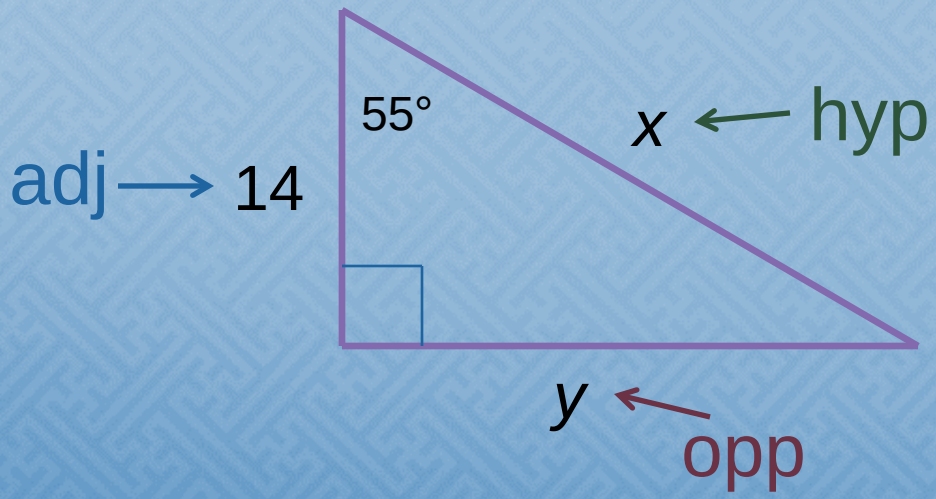
$\tan 55° = \frac{y}{14}$

Fill in for tan 55°

$14 (\tan 55°) = y$

$14 (1.428148) = y$

y = 20.0
(Rounded to nearest tenth)



Solving for sides of right Δ

- Step 1
  - Choose an acute angle
- Step 2
  - Label sides (hyp, opp, adj)
- Step 3
  - Select ratio (sin, cos, tan)
- Step 4
  - Fill in and solve

BowerPower.net