TRIGONOMETRIC RATIOS – SOLVING FOR ANGLES

Geometry

A BowerPoint Presentation

Calculator Practice

- Try these on your calculator to make sure you are getting correct answers:
  - $\sin^{-1}(0.7660444) = 50°$
  - $\cos^{-1}(0.4694716) = 62°$
  - $\tan^{-1}(3.73205081) = 75°$
- You may need to use a "2nd" function on your calculator to use $\sin^{-1} x$, $\cos^{-1} x$, $\tan^{-1} x$. Look above the buttons for $\sin x$, $\cos x$, and $\tan x$.
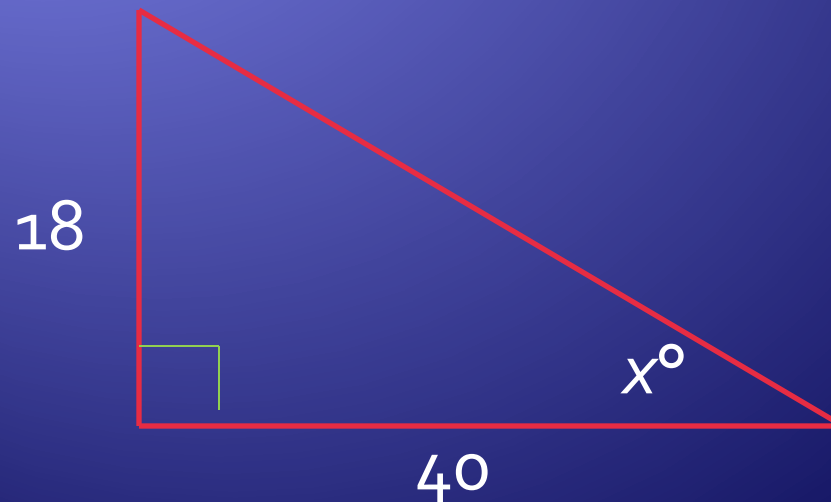
Solving for angles of right Δs

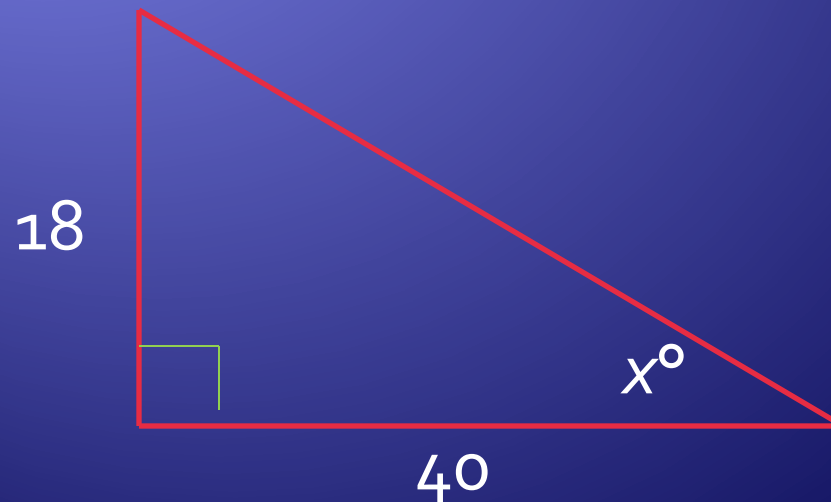- If you know the lengths of any two sides of a right triangle, that is enough information to find the acute angles.

18

$x°$

40
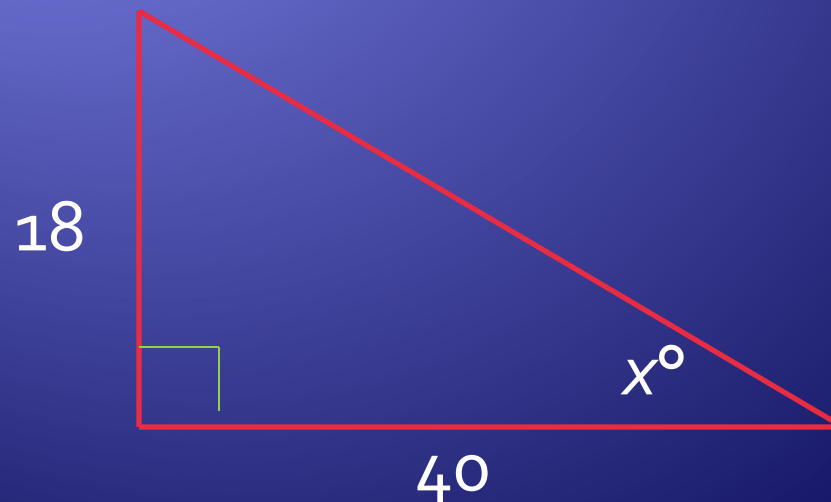
Step 1 – Choose an acute ∡
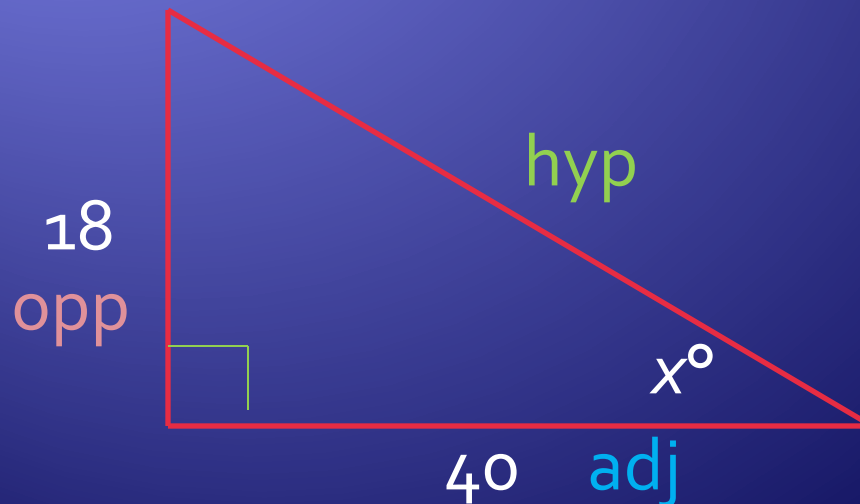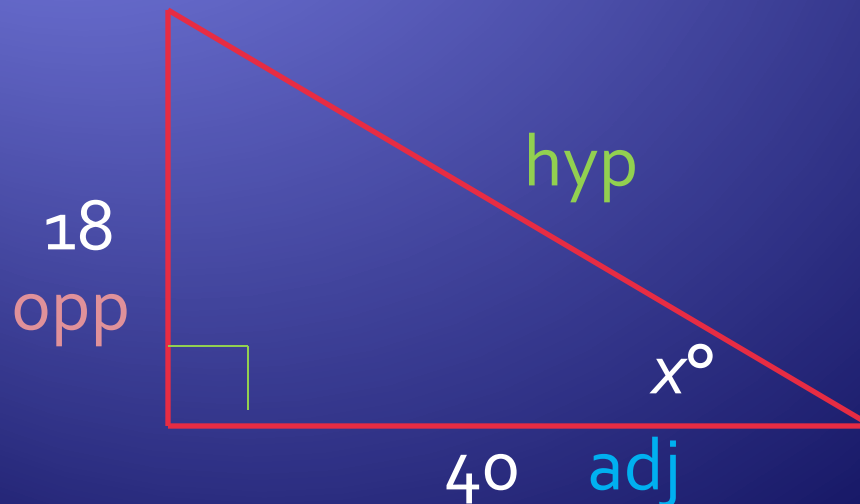
- We will solve for the angle that is $x°$

18

40

$x°$

Step 2 – Label the sides

- The hypotenuse is across from the right angle
- Label the legs as opposite and adjacent (positions relative to the angle with x°)

18

40

x°
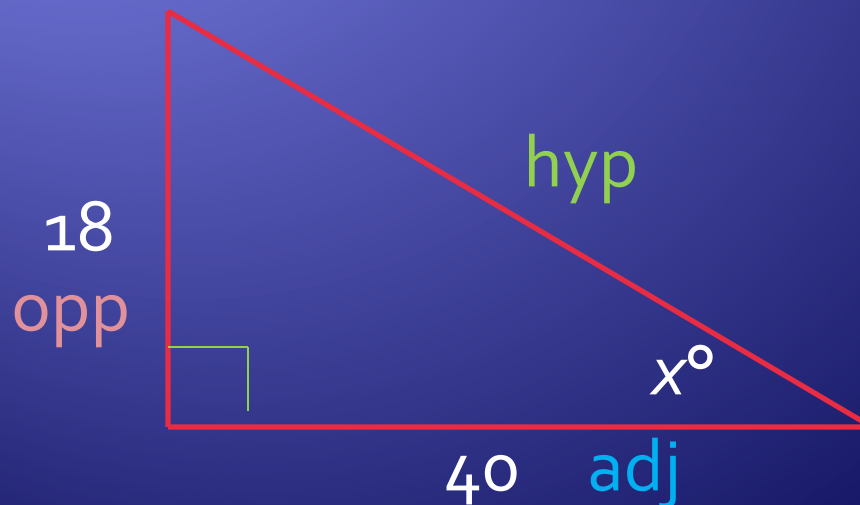
Step 2 – Label the sides

♦ The hypotenuse is across from the right angle

♦ Label the legs as opposite and adjacent (positions relative to the angle with $x°$)

hyp

18
opp

$x°$

40   adj

Step 3 – Select ratio

- Look at the two sides for which you know the lengths
- We know **o**pp = 18 and **a**dj = 40

hyp

18
opp

40 adj

$x°$

Step 3 – Select ratio

- Look at the two sides for which you know the lengths

- We know **o**pp = 18 and **a**dj = 40

- Which ratio has **o**pp and **a**dj?

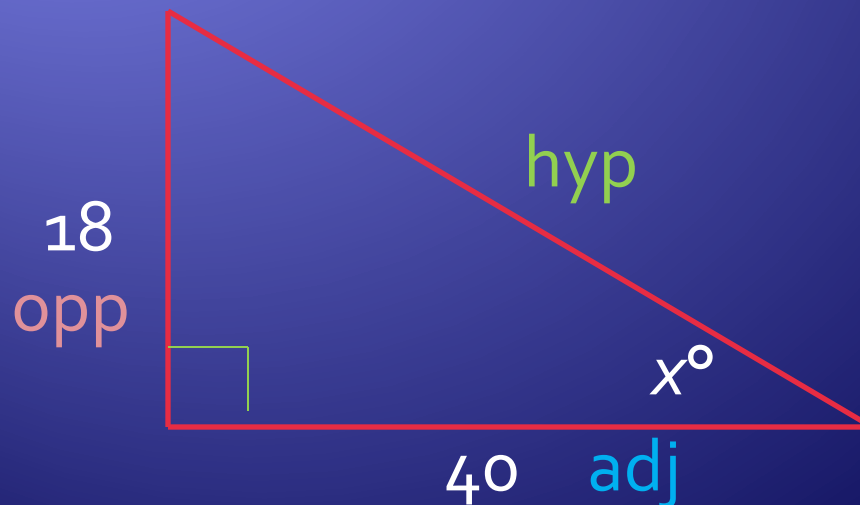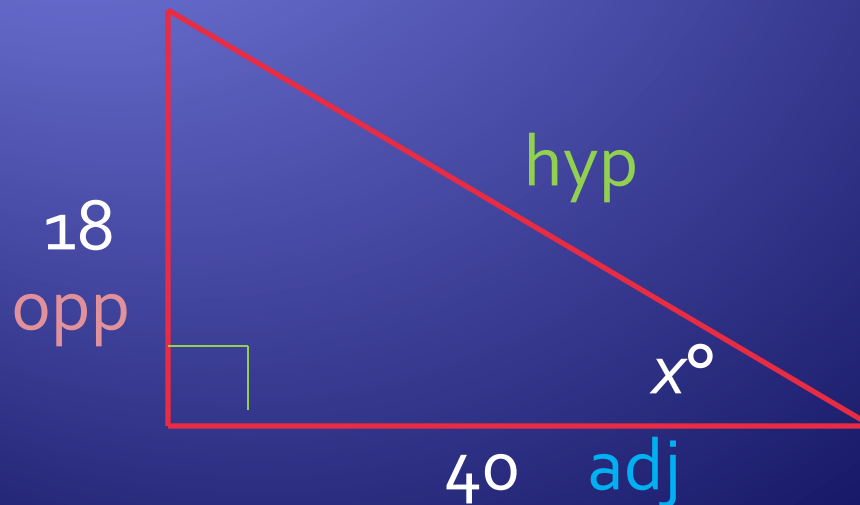# Step 3 – Select ratio

- Look at the two sides for which you know the lengths

- We know **opp** = 18 and **adj** = 40

- Which ratio has **opp** and **adj**?   SOH – CAH – **TOA**

TANGENT

hyp

18
opp

$x°$

40 adj

Step 4 – Fill in and solve

$$\tan x° = \frac{\text{opp}}{\text{adj}} = \frac{18}{40} = 0.4500$$

hyp

18
opp

40   adj

$x°$

Step 4 – Fill in and solve

$$\tan\ x° \ = \ \frac{\text{opp}}{\text{adj}} \ = \ \frac{18}{40} \ = \ 0.4500$$
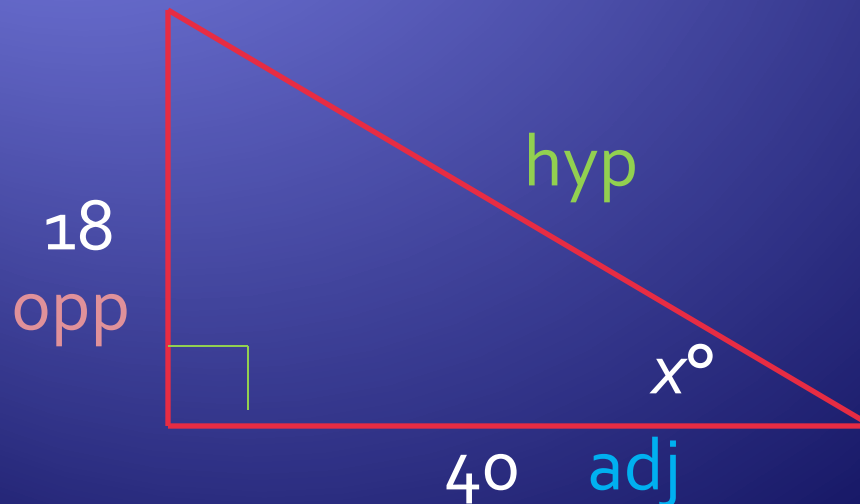
$\tan\ x° = 0.4500$ We will use the $\tan^{-1} x$ button on a calculator to answer the question "What angle has a tangent of 0.4500?"
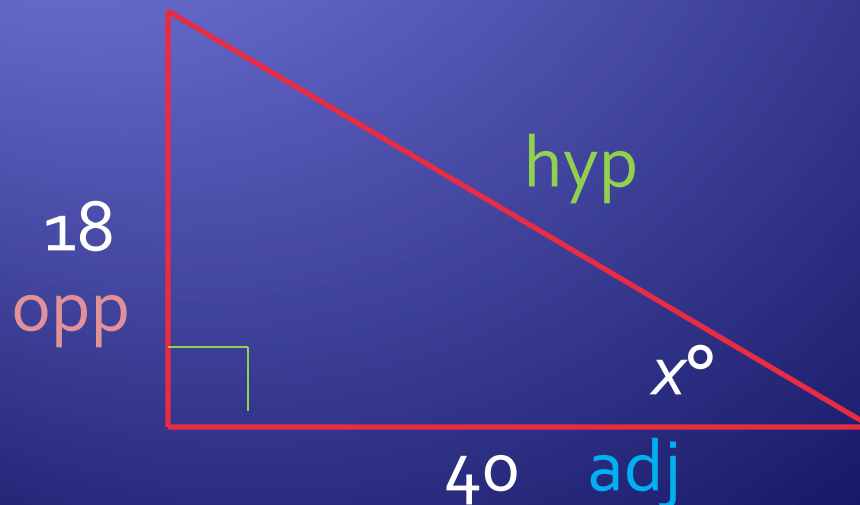
Step 4 – Fill in and solve

tan $x°$ = 0.4500 can be rewritten as

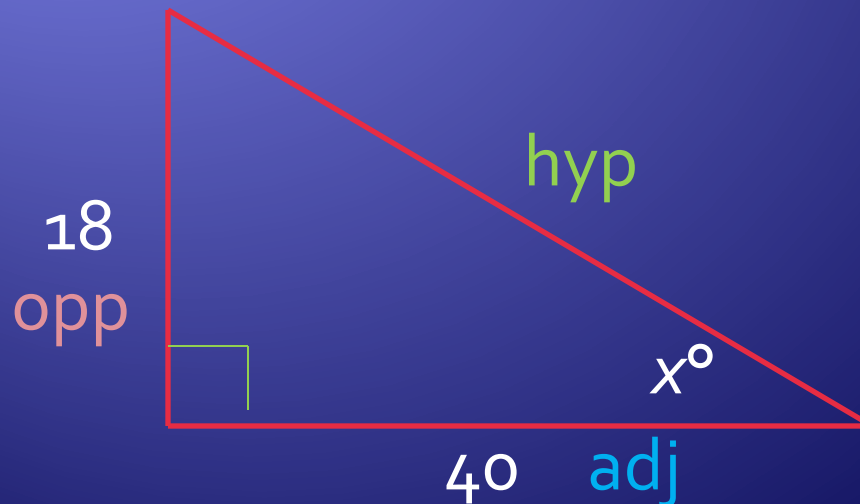tan⁻¹ (0.4500) = x (You don't have to rewrite it this way as long as you know what to do on your calculator)

hyp

18
opp

$x°$

40 adj

Step 4 – Fill in and solve

tan $x°$ = 0.4500   can be rewritten as

tan^{-1} (0.4500) = x

$x = 24.2$
(rounded to nearest tenth)

hyp

18
opp

$x°$

40   adj

Solving for angles of right Δ

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

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