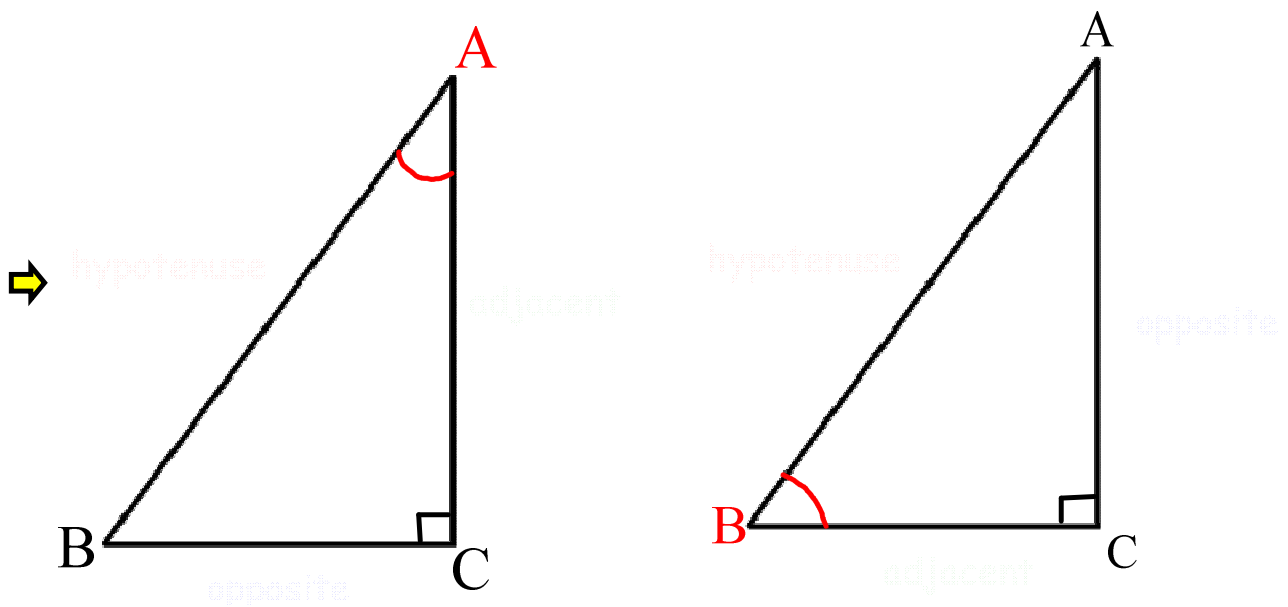


4.1 Primary Trigonometric Ratios

↳ ONLY right angle triangles



➡ Depending on what angle we look at we classify the sides as: adjacent or opposite to that angle

$$\sin A$$

$$\sin A = \frac{\text{opp}}{\text{hyp}}$$

$$\cos A$$

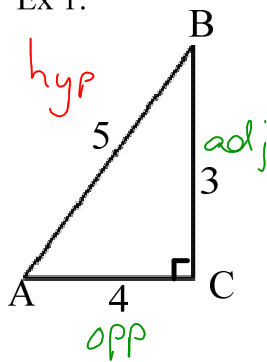
$$\cos A = \frac{\text{adj}}{\text{hyp}}$$

$$\tan A$$

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

SOH CAH TOA

Ex 1:



Angle A

$$\sin A = \frac{3}{5}$$

$$\cos A = \frac{4}{5}$$

$$\tan A = \frac{3}{4}$$

Angle B

$$\sin B = \frac{4}{5}$$

$$\cos B = \frac{3}{5}$$

$$\tan B = \frac{4}{3}$$

Angle C

~~$$\sin C$$~~

~~$$\cos C$$~~

~~$$\tan C$$~~

Primary trig ratios

Sin and Cos

Tan

Ex 2:

a) Use your calculator to find the ratio \leftarrow 4 decimals

$\sin 45^\circ = 0.7071$ $\cos 78^\circ = 0.2079$ $\tan 32^\circ = 0.6249$

$\boxed{\text{SIN}} \boxed{45} =$

b) Use your calculator to find the angle: \leftarrow Nearest degree

$\sin A = 0.9511$
 $\boxed{2ND} \boxed{\text{SIN}} \boxed{0.9511}$
 \sin^{-1}

$A = 72^\circ$

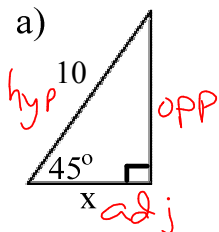
$\cos B = -0.2079$

$B = 102^\circ$

$\tan C = 0.2679$

$C = 15^\circ$

Ex 3: Find a side

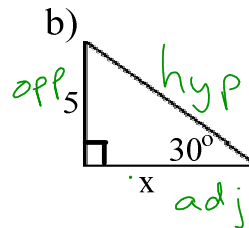


$\cos \theta = \frac{\text{adj}}{\text{hyp}}$

$\cos 45^\circ = \frac{x}{10}$

$10(\cos 45^\circ) = x$
 $7.1 = x$

- Find which angle
- Label sides
- Set up the ratio
- substitute givens
- solve

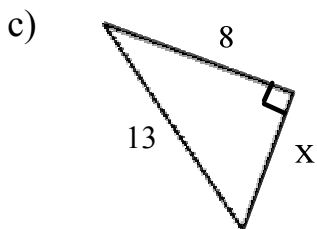


$\tan \theta = \frac{\text{opp}}{\text{adj}}$

$\tan 30^\circ = \frac{5}{x}$

$x \tan 30^\circ = 5$
 $x = \frac{5}{\tan 30^\circ}$

$x = 8.7$



3 sides?

\hookrightarrow Use pythagorus!

$\text{hyp}^2 = a^2 + b^2$

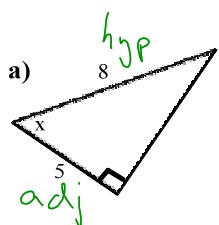
$13^2 = 8^2 + x^2$

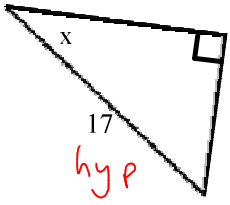
$169 - 64 = x^2$

$105 = x^2$

$10.2 = x$

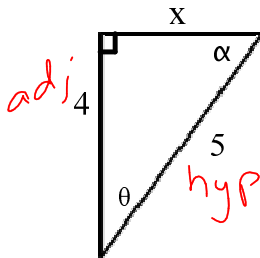
Ex 4: Find an angle

a)  $\cos \theta = \frac{\text{adj}}{\text{hyp}}$
 $\cos x = \frac{5}{8}$
 $x = \cos^{-1}\left(\frac{5}{8}\right)$
 $x = 51^\circ$

b)  $\sin \theta = \frac{\text{opp}}{\text{hyp}}$
 $\sin x = \frac{7}{17}$
 $x = \sin^{-1}\left(\frac{7}{17}\right)$
 $\approx 24^\circ$

Ex 5: Find all missing sides and angles

you choose order

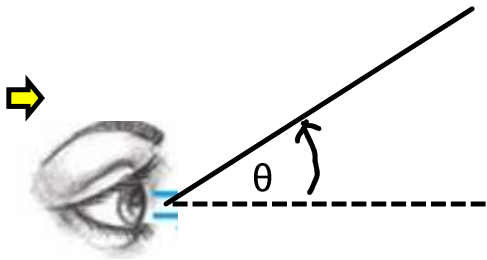


$\cos \theta = \frac{\text{adj}}{\text{hyp}}$
 $\cos \theta = \frac{4}{5}$
 $\theta = \cos^{-1}\left(\frac{4}{5}\right)$
 $\approx 37^\circ$

$\alpha = 180^\circ - 37^\circ - 90^\circ$
 $= 53^\circ$

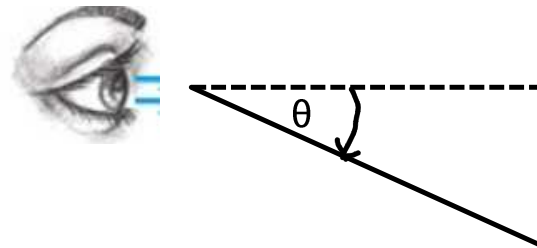
$\frac{x}{\text{hyp}}^2 = a^2 + b^2$
 $5^2 = 4^2 + x^2$
 $25 - 16 = x^2$
 $9 = x^2$
 $3 = x$

Angle of Elevation



compared to looking straight out
how far do you need to look up

Angle of Depression

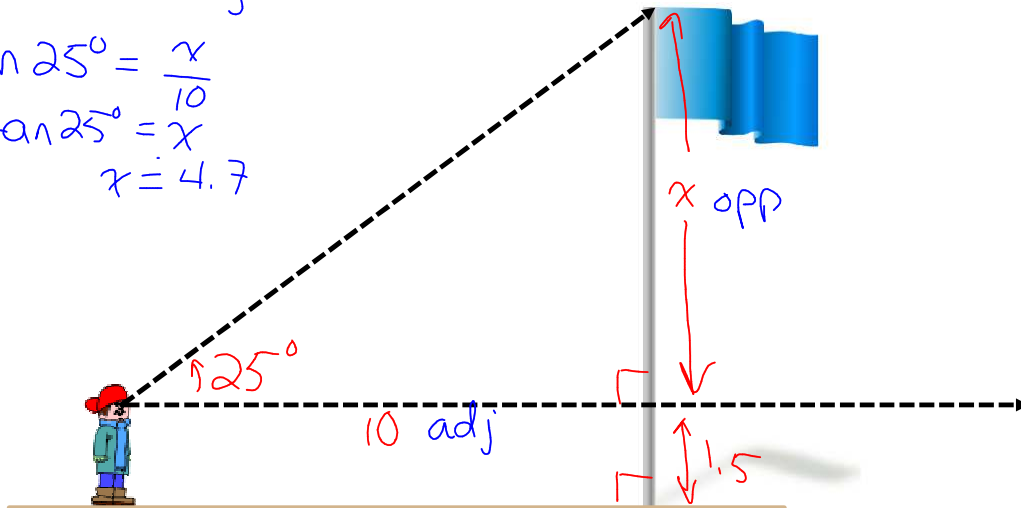


compared to looking straight out
how far do you need to look down

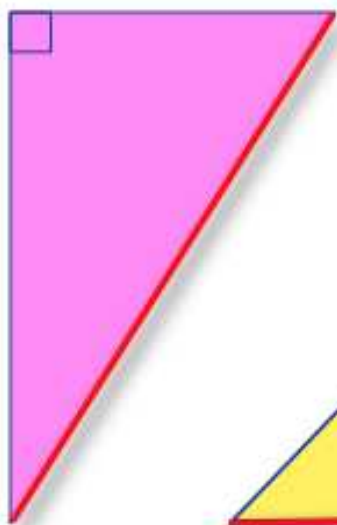
Ex 5:

Dave is standing 10 m away from a flagpole. His eyes are 1.5 m above the ground. The top of the flagpole has an angle of elevation of 25° . How tall is the flagpole?

$$\begin{aligned} \tan \theta &= \frac{\text{opp}}{\text{adj}} \\ \tan 25^\circ &= \frac{x}{10} \\ 10 \tan 25^\circ &= x \\ x &= 4.7 \end{aligned}$$



$$\begin{aligned} \text{Height} &= x + 1.5 \\ &= 6.2 \\ \therefore \text{Height of the pole is approx } &6.2\text{m} \end{aligned}$$



Hmwk:
p 271 # 1, 2, 4, 5, 7 - 10, 17

