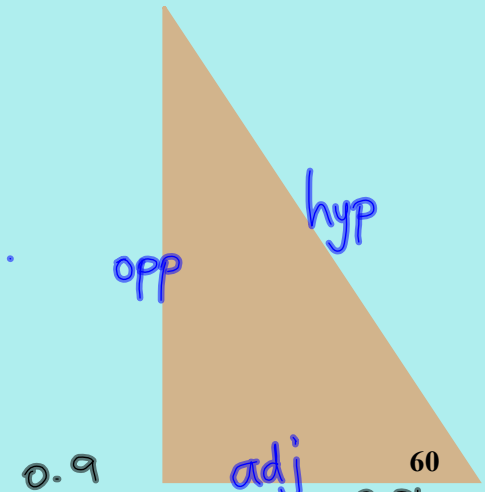
Comparing triangles

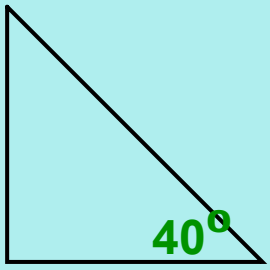


0.9 0.8547 | adj 0.5128 | 0.54 | 1.6 1.66

opp ÷ hyp	adj ÷ hyp	opp ÷ adj
0.8667	0.5063	1.7
0.8615	0.5	1.723

sin 60° Sine **cos 60°** cosine **tan 60°** tangent

Do the same for a right - angled triangle with angle 40^0



opp ÷ hyp	adj ÷ hyp	opp ÷ adj
0.6427	0.7660	0.8390
0.6153	0.7692	0.8

0.6153 0.647 Sin 40° | 0.7692 0.7647 Cos 40° | 0.8 0.8 tan 40°

Pythagoras' Theorem and Trigonometry

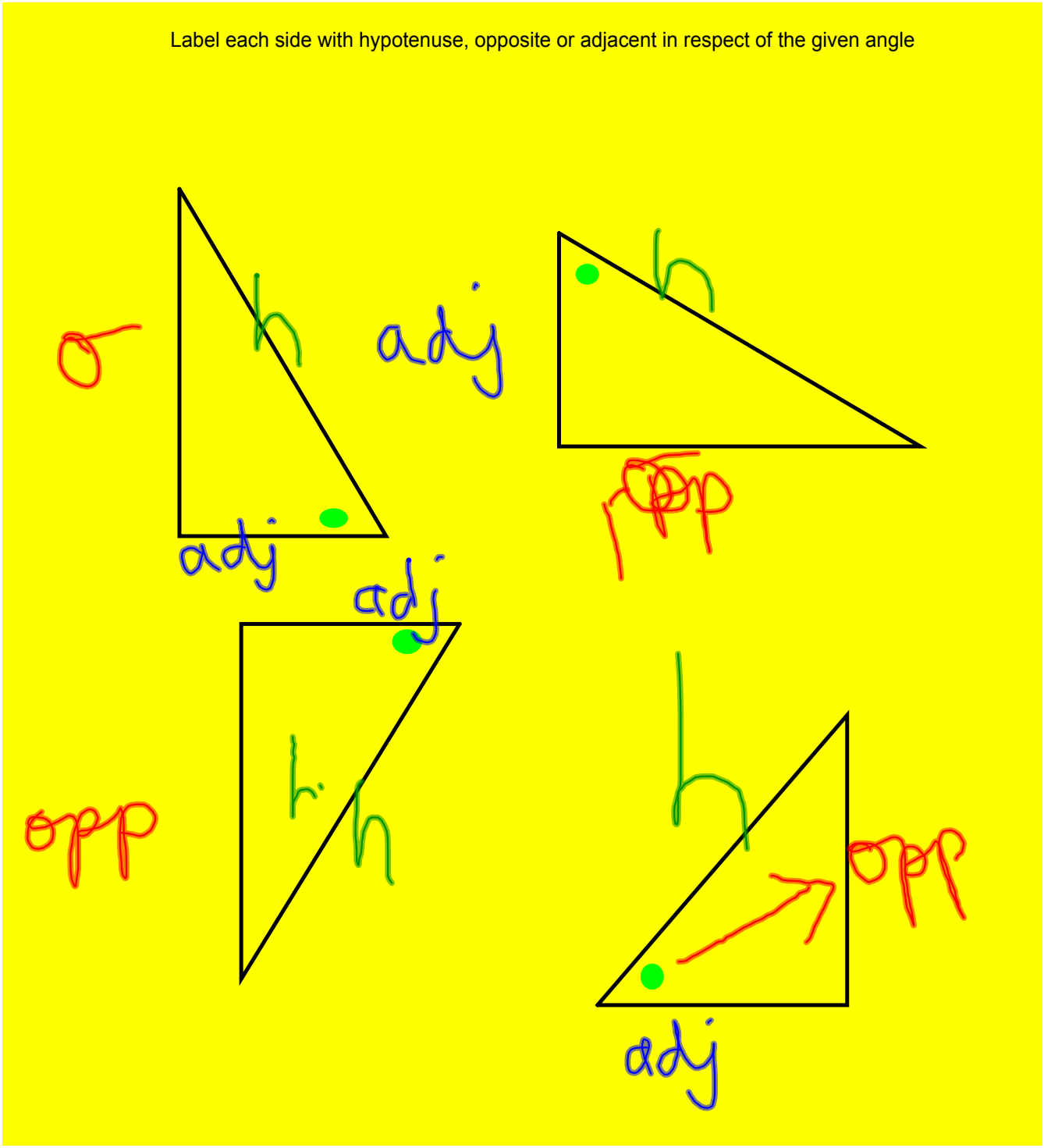
Both

- apply ONLY to right-angled triangles
- enable you to find the length of a side
- require you to locate the hypotenuse

Trigonometry also

- requires you to be able to locate the opposite and adjacent sides
- enables you to find an angle

Label each side with hypotenuse, opposite or adjacent in respect of the given angle



A little algebra to help...

$$15 = \frac{x}{3}$$

$$2 \times 12 = \frac{x}{2} \times 2$$

$45 = x$

$24 = x$

$$20 = \frac{a}{4}$$

$c = 51.3$

$80 = a$

$b = 11.5$

$$2.3 = \frac{b}{5}$$

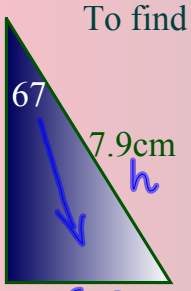
$$5.7 = \frac{c}{9}$$

The Sine Ratio

For any RIGHT-ANGLED triangle:

$$\sin x = \frac{\text{opposite}}{\text{hypotenuse}}$$

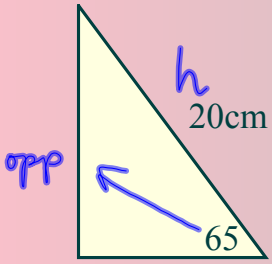
To find the length of the opposite side:



$\sin 67 = \frac{opp}{7.9}$

$7.9 \times \sin 67 = opp$

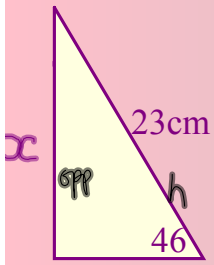
$7.276\text{cm} = opp$



$\sin 65 = \frac{opp}{20}$

$20 \times \sin 65 = opp$

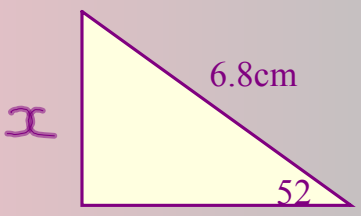
$14.1\text{cm} = opp$



$\sin 46 = \frac{opp}{23}$

$23 \sin 46 = opp$

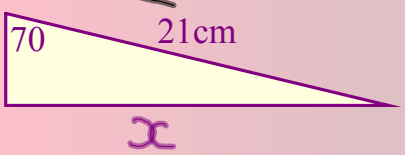
$16.5\text{cm} = opp$



$\sin 52 = \frac{x}{6.8}$

$6.8 \sin 52 = opp$

$5.35\text{cm} = opp$



page 434, B4 onwards

Using Sine to find the hypotenuse

Some algebra to start.
Re-arrange the equations to make x the subject (x=....)

$4+x = y$

$x = y-4$

$\frac{x}{5} = 6$

$x = 6 \times 5$

$x = 30$

$2x + y = 10$

$2x = 10-y$

$x = \frac{10-y}{2}$

$\frac{5}{x} = 6$

$5 = 6x$

$\frac{5}{6} = x$

$\frac{x}{7} = 5$

$x = 5 \times 7$

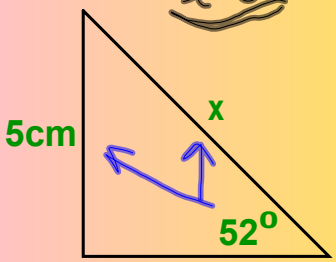
$x = 35$

$\frac{12}{x} = 6$

$12 = 6x$

$\frac{12}{6} = x$

$2 = x$



$\sin x = \frac{opp}{hyp}$

$\sin 52 = \frac{5}{x}$

$x \sin 52 = 5$

$x = \frac{5}{\sin 52^\circ} = 6.3cm$

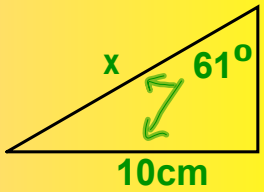
$\sin x = \frac{opp}{hyp}$

$\sin 61 = \frac{10}{x}$

$x \sin 61 = 10$

$x = \frac{10}{\sin 61}$

$x = 11.4cm$



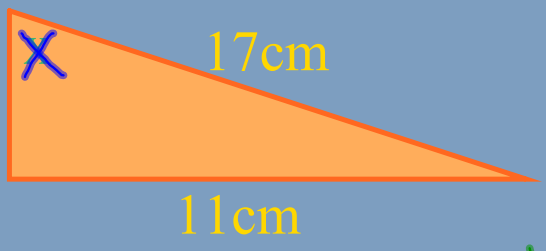
page 436

$\sin x = \frac{p}{h}$

$h \sin x = p$

$h = \frac{p}{\sin x}$

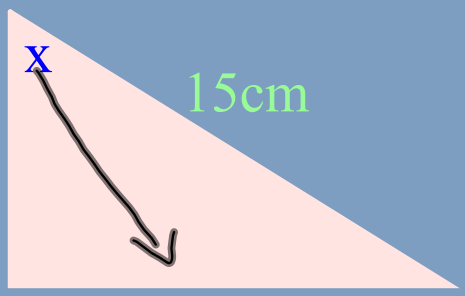
To find an angle using sine:



$\sin x = \frac{opp}{hyp}$

$\sin x = \frac{11}{17}$

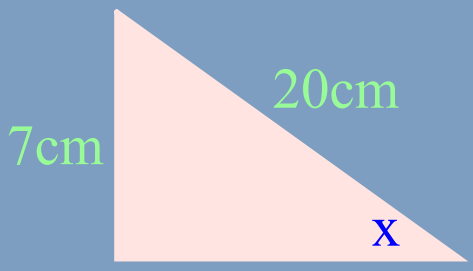
shift sin (11 ÷ 17) = 40.3°



$\sin x = \frac{opp}{hyp}$

$\sin x = \frac{9}{15}$

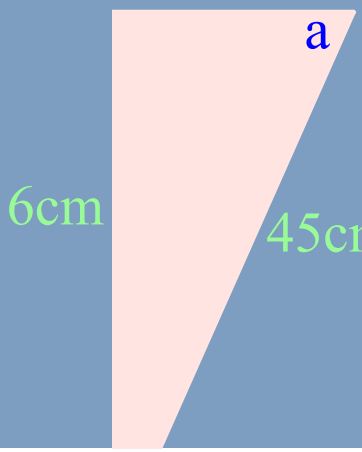
shift sin (9 ÷ 15) = 36.9°

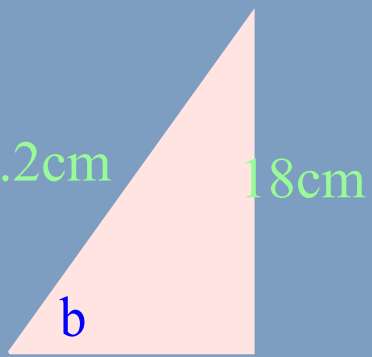


$\sin x = \frac{7}{20}$

$\sin^{-1}(7 \div 20) = 20.5°$

$x = 20.5°$



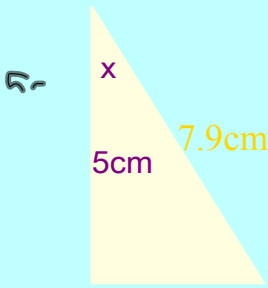


The Cosine Ratio

For any RIGHT-ANGLED triangle:

cosine x = $\frac{\text{adjacent}}{\text{hypotenuse}}$

$\cos x = \frac{adj}{hyp}$



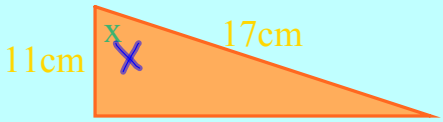
$\cos x = \frac{5}{7.9}$

Shift cos(5÷7.9) = 50.7°

$x = 50.7$

To find an angle:

Remember to use shift cos for an angle

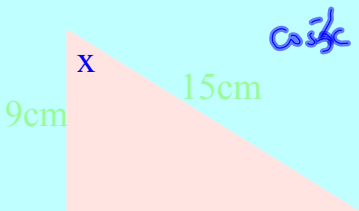


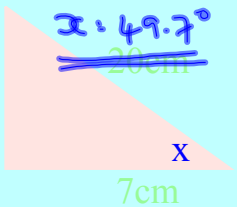
$\cos x = \frac{adj}{hyp}$

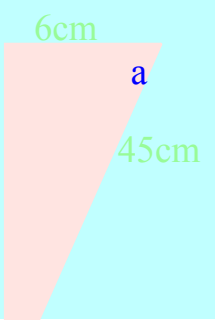
$\cos x = \frac{11}{17}$

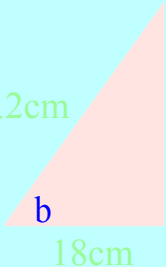
shift cos(11÷17) = 49.7°

$x = 49.7°$









To find the adjacent side using cosine

$\cos x = \frac{adj}{hyp}$

1. 

$\cos 40 = \frac{x}{34}$

$34 \times \cos 40 = x$

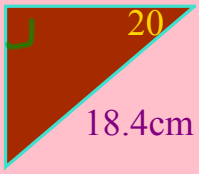
$26.0_{cm} = x$

2. 

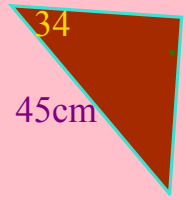
a x

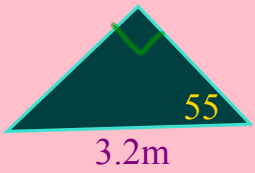
$\cos x = \frac{a}{h}$

$\cos x = \frac{x}{22}$

3. 

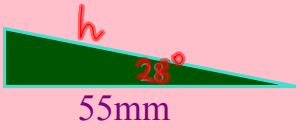
$x = 19.1cm$

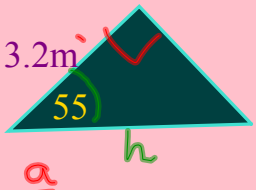
4. 

5. 

6. 

To find the hypotenuse using cosine

1. 

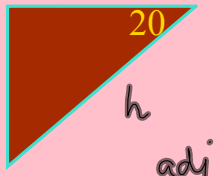
2. 

$\cos x = \frac{a}{h}$

$\cos 55 = \frac{3.2}{h}$

$h \cos 55 = 3.2$

$h = \frac{3.2}{\cos 55} = 5.5 cm$

3. 

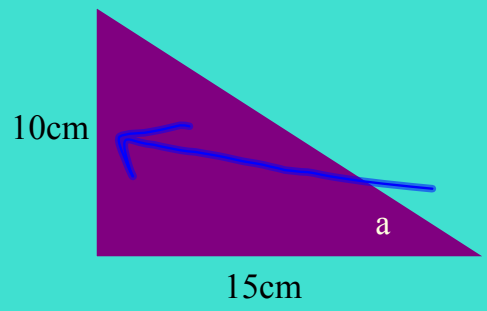
$\cos x = \frac{adj}{hyp}$

$\cos 20 = \frac{18.4}{h}$

$h \cos 20 = 18.4$

$h = \frac{18.4}{\cos 20} = 19.6cm$

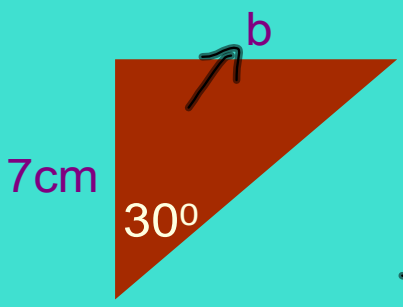
The Tangent Ratio



$\tan x = \frac{opp}{adj}$

$\tan a = \frac{10}{15}$

shift tan (10 ÷ 15) = 33.7°



$\tan x = \frac{opp}{adj}$

$\tan 30 = \frac{b}{7}$

$7 \times \tan 30 = b$

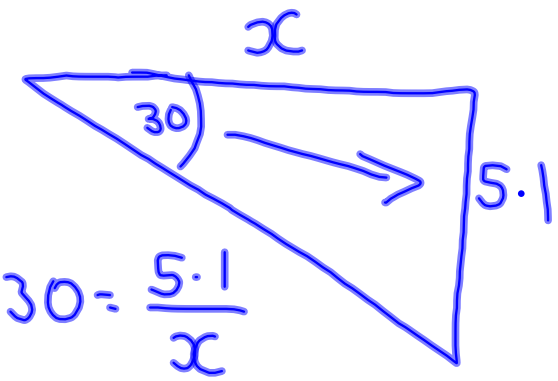
$4.0cm = b$

p364

page 201

B3 p 367

b)



$\tan 30 = \frac{5.1}{x}$

$x \tan 30 = 5.1$

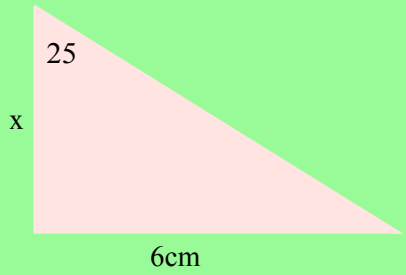
$x = \frac{5.1}{\tan 30^\circ} = 8.8 \text{ cm}$

A little algebra to start..

$$15 = \frac{5}{x} \qquad 12 = \frac{5}{a}$$

$$21 = \frac{13}{x} \qquad \sin 34 = \frac{8}{h}$$

$$\tan 15 = \frac{6.5}{a}$$



Find the length of x

page 215

Tomorrow's Lesson

You are going to measure the height of a building or tree or some other high object.
You need to think about :

- what you are going to measure
- how you will do it
- what equipment you will need
- what you could do to improve accuracy
- how you want to display your findings.

Now you need to make notes on the above.

SOHCAHTOA

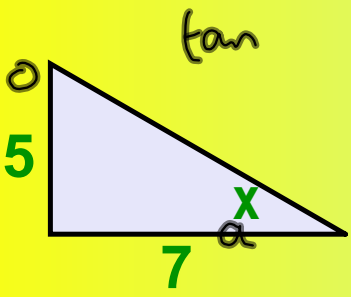
sine opposite hyp

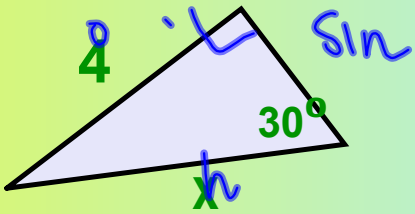
cosine adjacent hyp

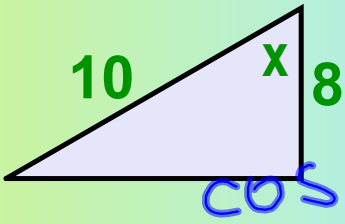
tangent opposite adjacent

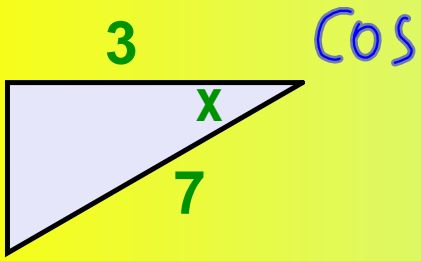
So which function do I choose?

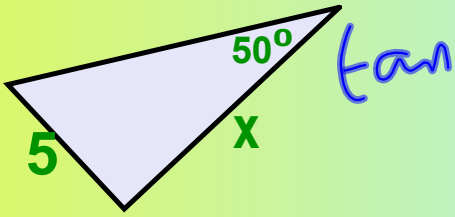
For finding x:











Practice from red or green books

Attachments

trig.ppt