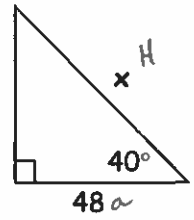
Trig Problems

Pairs of triangles ✱similar

Ex/ Determine the missing values:

a)



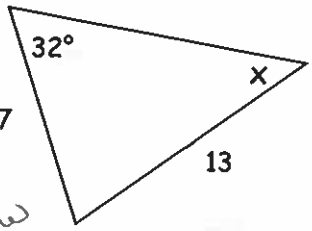
Right-angled SOH CAH TOA

$\cos 40 = \frac{48}{x}$

$x\cos 40 = 48$

$x = 62.66$

b)



Not right but a pair = Sine Law

$\frac{\sin 32}{13} = \frac{\sin x}{17}$

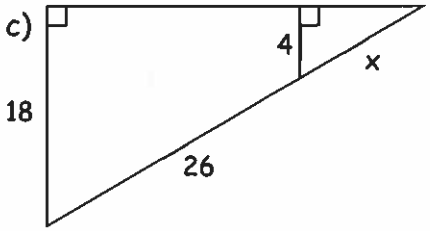
$\frac{17\sin 32}{13} = \sin x$

$0.693 = \sin x$

$x = \sin^{-1}(0.693)$

$= 43.87°$

c)



$\frac{4}{18} = \frac{x}{x+26}$

$4(x+26) = 18x$

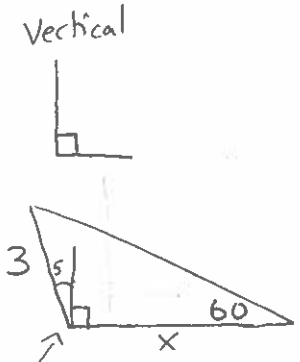
$4x + 104 = 18x$

$104 = 18x - 4x$

$104 = 14x$

$x = 7.43$

Ex/ A 5 m tree is leaning 5° away from the vertical. To prevent it from leaning any farther, a rope needs to be fastened 2 m from the top of the tree at an angle of 60° with the ground. How far from the base of the tree must the stake be?



whole angle = 95°

other angle = 180 − 95 − 60 = 25°

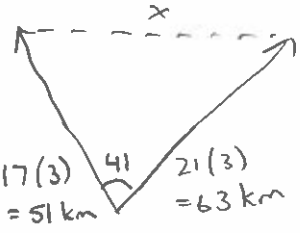
Pair of side-Angle = Sine Law

$\frac{\sin 60}{3} = \frac{\sin 25}{x}$

$\frac{x\sin 60}{\sin 60} = \frac{3\sin 25}{\sin 60}$

$x = 1.46$

Ex/ Two cyclists leave an intersection at the same time at an angle of 41°. The first cyclist can cycle at 17 km/h and the second at 21 km/h. How far apart are the cyclists after 3 hours?



$x^2 = 51^2 + 63^2 - 2(51)(63)\cos 41$

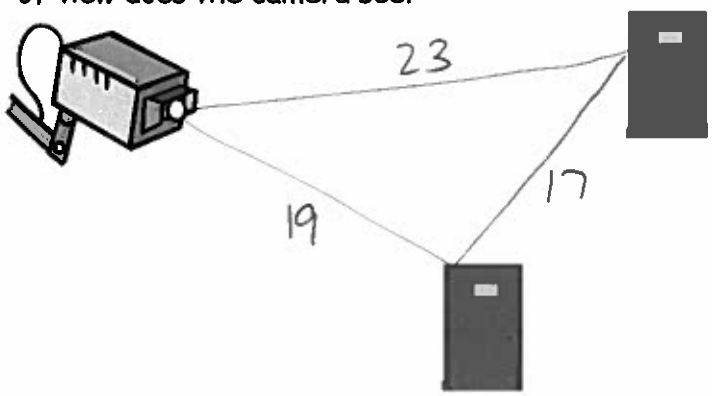
$x^2 = 1720.236$

$x = \sqrt{1720.236}$

$= 41.48$ km apart

✱2 sides with angle between = Cosine Law

Ex/ A security camera needs to be placed so that it can see two entry doors at once. The near door is 19 m from the camera, and the far door is 23 m. The two doors are 17 m apart. What angle of view does the camera see?



3 sides (No right angle)
= Cosine Law

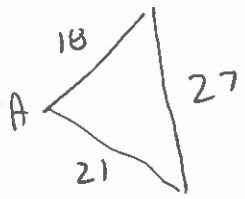
$$\cos A = \frac{23^2+19^2-17^2}{2(23)(19)}$$

$$\cos A = \frac{601}{874}$$

$$A = \cos^{-1}(601/874)$$

$$= 46.55^\circ$$

Ex/ Jim has a triangular backyard with lengths of 27 m, 21 m and 18 m. His bag of fertilizer covers 400 m^2. Does he have enough?



↑ same kind of problem → find any angle → Need area

$$\text{Area} = \frac{21(18)\sin 87.27}{2}$$

$$= 188.79$$

∴ Yes, the fertilizer will cover

$$\cos A = \frac{18^2+21^2-27^2}{2(18)(21)}$$

$$\cos A = \frac{36}{756}$$

$$A = \cos^{-1}(36/756)$$

$$= 87.27$$

Homework: Pg. 450 #'s: 3,6,7,11