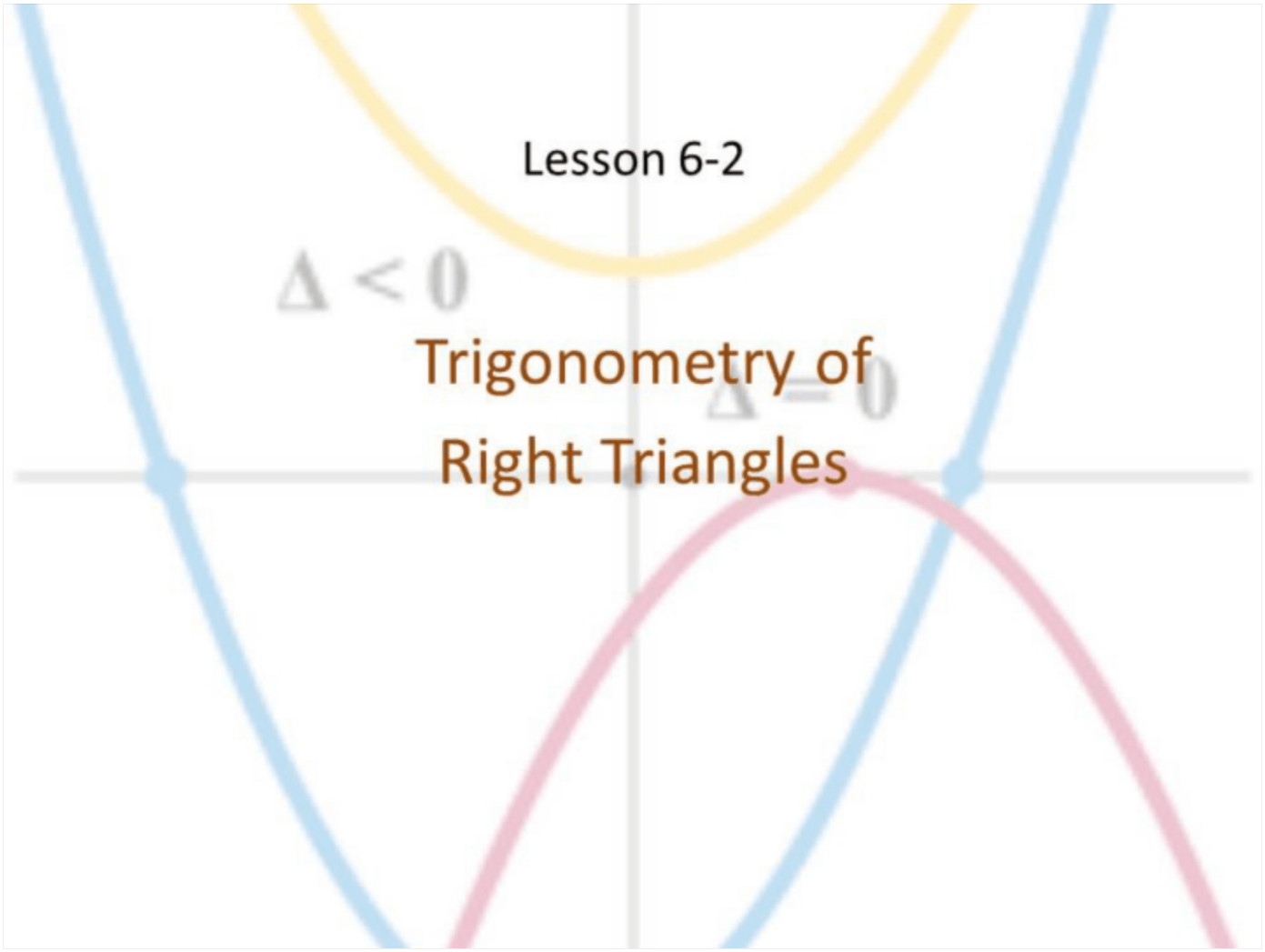

Lesson 6-2
Δ < 0
Trigonometry of
Right Triangles
Δ = 0

Objective

Students will...

- Be able draw, set up, and solve right triangles using trigonometric ratios.
- Be able to understand solve word problems involving right triangles using trigonometric ratios.

Trigonometric Ratios

Recall the trigonometric ratios we've learned in the past.

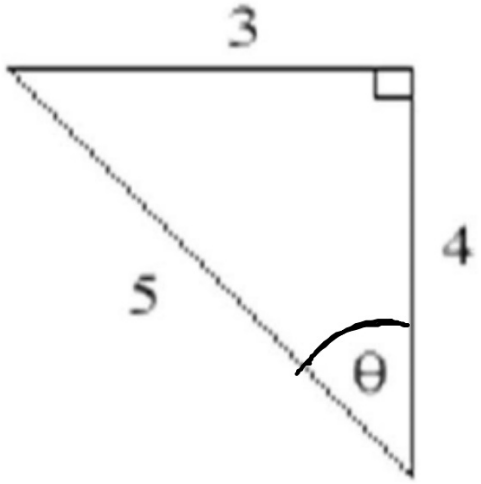
Trigonometric Ratios "Soh Cah Toa"

$$\sin\theta = \frac{opposite}{hypotenuse} \qquad \cos\theta = \frac{adjacent}{hypotenuse} \qquad \tan\theta = \frac{opposite}{adjacent}$$

$$\csc\theta = \frac{hypotenuse}{opposite} \qquad \sec\theta = \frac{hypotenuse}{adjacent} \qquad \cot\theta = \frac{adjacent}{opposite}$$

Remember, these ratios only apply to **right** triangles.

Example



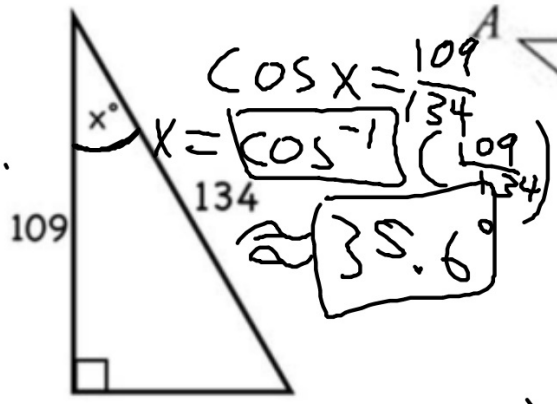
$\sin\theta = \frac{3}{5}$ $\cos\theta = \frac{4}{5}$ $\tan\theta = \frac{3}{4}$

$\csc\theta = \frac{5}{3}$ $\sec\theta = \frac{5}{4}$ $\cot\theta = \frac{4}{3}$

Solving Right Triangles

Using these ratios, we can solve for missing angles or sides of right triangle. (Be sure to identify whether the angles are in **radian or degree**)

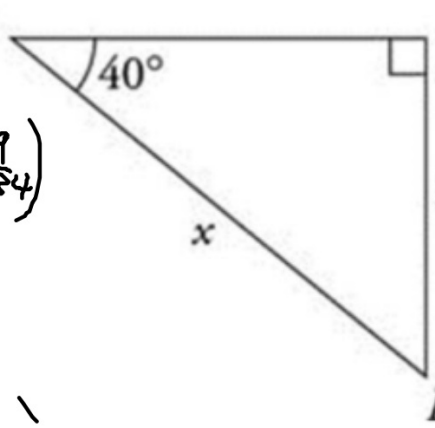
Find x.



$\cos x = \frac{109}{134}$

$x = \cos^{-1}\left(\frac{109}{134}\right)$

$\approx 35.6°$

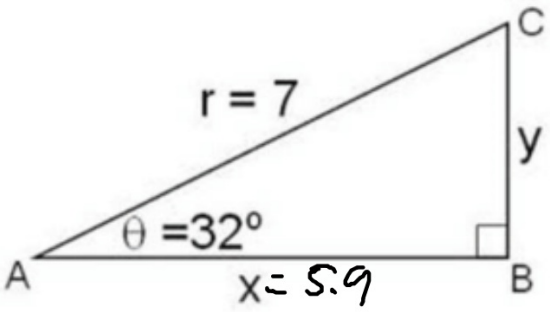


$\sin(40) = \frac{2000}{x}$

$x = \frac{2000}{\sin(40)}$

$x = 3111.4$

Find x and y.



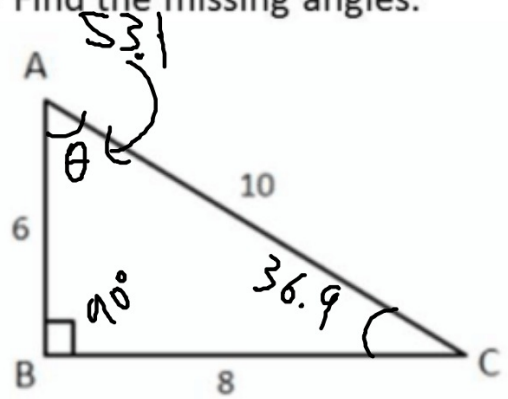
$\frac{8}{2}x=2$

~~$\tan 32 = \frac{y}{x}$~~ $(7)\sin(32)=\frac{y}{7}(7)$

$(7)(\cos 32)=\frac{x}{7}(7)$

$x=5.9$ $y=3.7$.

- Find the missing angles.



$\sin\theta=\frac{8}{10}$

$\theta=\sin^{-1}\left(\frac{8}{10}\right)=53.1$

Sketch a triangle that has acute angle θ, and find the other five trigonometric ratios of θ.

$a^2+b^2=c^2$

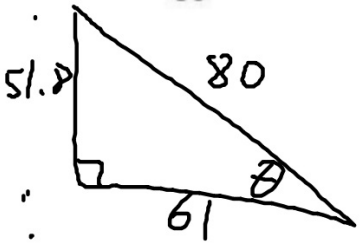
a) $\cos\theta=\frac{61}{80}$ $\frac{a}{h}$

$61^2+b^2=80^2$

$3721+b^2=6400$

$\sqrt{b^2}=\sqrt{2679}$

$b\approx 51.8$



$\csc\theta=\frac{80}{51.8}$

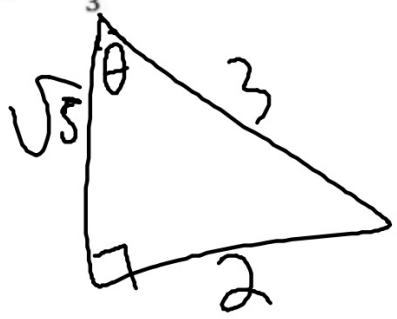
$\sin\theta=\frac{51.8}{80}$ $\sec\theta=\frac{80}{61}$

$\tan\theta=\frac{51.8}{61}$ $\cot\theta=\frac{61}{51.8}$

c) $\sin\theta=\frac{2}{3}$

$\cos\theta=\frac{\sqrt{5}}{3}$

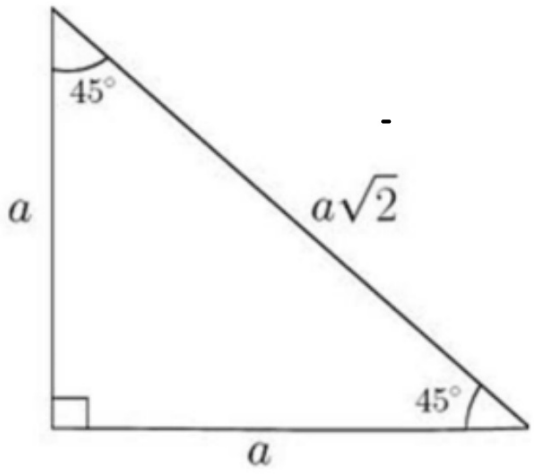
$\tan\theta=\frac{2}{\sqrt{5}}$



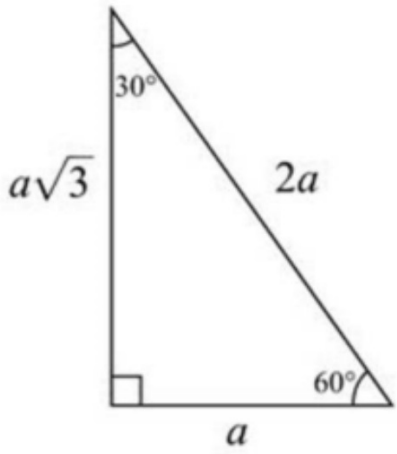
Special Right Triangles

Also resulting from applying trigonometric ratios, we have what are called, **"Special" right triangles**.

45-45-90 Triangle

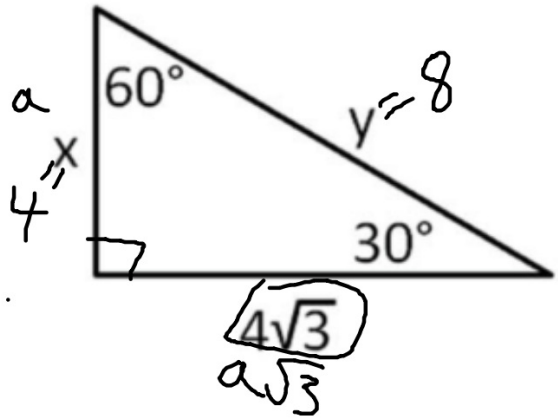


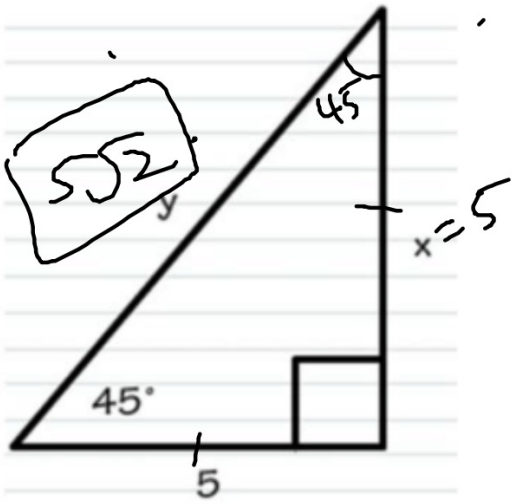
30-60-90 Triangle



Example

Find x and y.

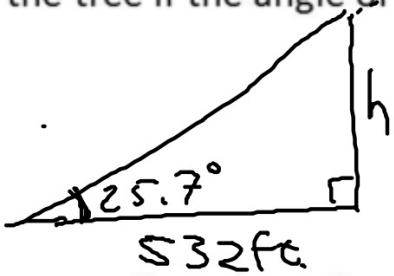




Application of Trigonometric Ratios

We can also solve word problems using these ratios.

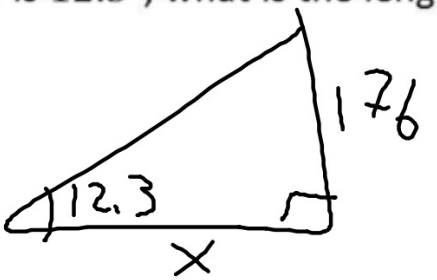
A giant redwood tree casts a shadow that is 532ft long. Find the height of the tree if the angle of elevation of the sun is 25.7°.



$(532)\tan 25.7 = \frac{h}{532}(532)$

$h \approx 256$ ft

A giant redwood tree has a height of 176ft. If the angle of elevation of the sun is 12.3°, what is the length of the tree's shadow?

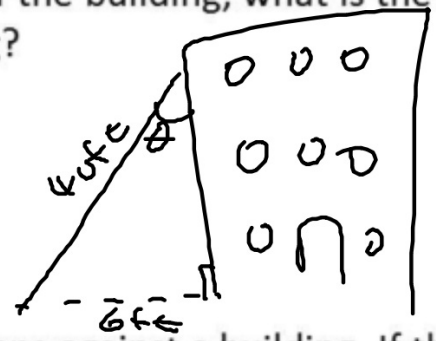


$\tan 12.3 = \frac{176}{x}$

$x = \frac{176}{\tan 12.3} \approx 807$ ft.

A 40ft ladder leans against a building. If the base of the ladder is 6ft from the base of the building, what is the angle formed by the ladder and the building?

$\sin\theta = \frac{6}{40}$



A 50ft ladder leans against a building. If the base of the ladder is 7ft from the base of the building, what is the angle formed by the ladder and the ground?

Homework 2/3

TB pg. 484 #9, 11, 17, 18, 29, 31, 33, 45, 51