11.2 Cosine and Tangent

Today we are going to utilize cosine and tangent and determine when it is best to use each trig ratio. As a reminder:

SOH	CAH	TOA
$\sin(\theta) = \frac{\text{opposite}}{\text{hypotenuse}}$	$\cos(\theta) = \frac{\text{adjacent}}{\text{hypotenuse}}$	$\tan(\theta) = \frac{\text{opposite}}{\text{adjacent}}$

1) Use the triangle to the right to complete each equation.

$\sin(C) = \frac{12}{13}$

$\cos^{-1}\left(\frac{12}{13}\right) = x$

$\cos(67°) = \frac{5}{13}$

$\sin(B) = \frac{13}{13} = 1$

$\tan(67°) = \frac{12}{5}$

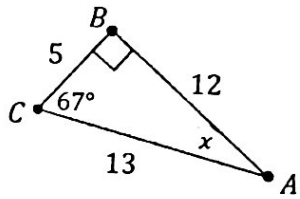
$\sin(x) = \frac{5}{13}$

$\sin(A) = \frac{5}{13}$

$\tan(A) = \frac{5}{12}$

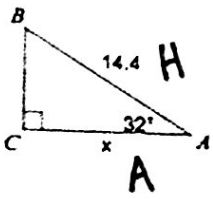
$\sin(67) = \frac{12}{13}$ O H

$\cos(x) = \frac{12}{13}$



2) Find the missing side for each right triangle below.

a.



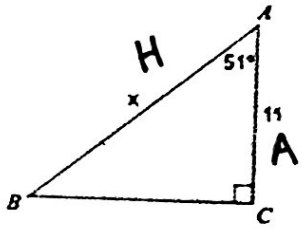
H A

$14.4 \cdot \cos 32 = \frac{x}{14.4} \cdot 14.4$

$x = 14.4 \cos 32$

$\approx \boxed{12.21}$

b.



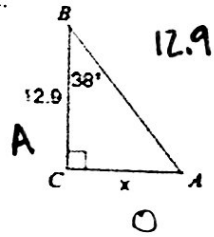
H A

$\cos 51 = \frac{11}{x}$

$11 \cdot \frac{1}{\cos 51} = \frac{x}{11} \cdot 11$

$x = \frac{11}{\cos 51} \approx \boxed{17.48}$

c.



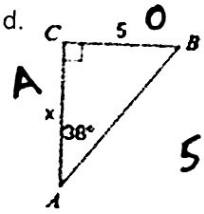
A O

$12.9 \cdot \tan 38 = \frac{x}{12.9} \cdot 12.9$

$x = 12.9 \tan 38$

$\approx \boxed{10.08}$

d.



A O

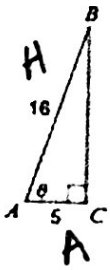
$\tan 38 = \frac{5}{x}$

$5 \cdot \frac{1}{\tan 38} = \frac{x}{5} \cdot 5$

$x = \frac{5}{\tan 38} \approx \boxed{6.40}$

3) Find the missing angle for each triangle.

a.

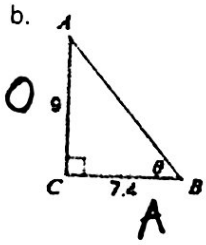


H A

$\theta = \cos^{-1}\left(\frac{5}{16}\right)$

$\approx \boxed{71.80°}$

b.



O A

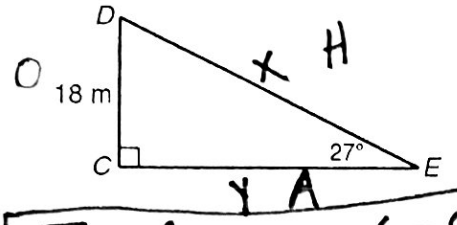
$\theta = \tan^{-1}\left(\frac{9}{7.4}\right)$

$= \boxed{50.57°}$

Solving a triangle means that we need to mind the measure of every side and angle. We can use three main tools to do this: trig, Pythagorean Theorem, and the fact that all angles in a triangle add to 180°.

4) Solve each triangle.

a. Solve the triangle below.



$\overline{DC} = 18\text{ m}$ $\quad m\angle C = 90°$

$\overline{DE} = 39.65\text{ m}$ $\quad m\angle D = 63°$

$\overline{CE} = 35.33\text{ m}$ $\quad m\angle E = 27°$

$m\angle D = 180 - 90 - 27 = 63°$

$\sin 27 = \frac{18}{x}$

$18 \cdot \frac{1}{\sin 27} = \frac{x}{\cancel{18}} \cdot \cancel{18}$

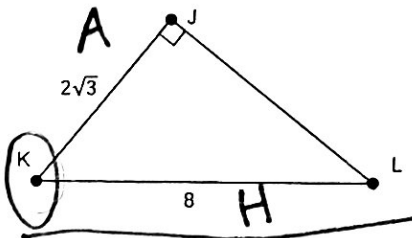
$x = \frac{18}{\sin 27} \approx 39.65$

$\tan 27 = \frac{18}{y}$

$18 \cdot \frac{1}{\tan 27} = \frac{y}{\cancel{18}} \cdot \cancel{18}$

$y = \frac{18}{\tan 27} \approx 35.33$

b. Solve for all parts and pieces of the triangle below.



$\overline{KJ} = 2\sqrt{3}$ $\quad m\angle K = 64.34°$

$\overline{JL} = 2\sqrt{13}$ $\quad m\angle J = 90°$

$\overline{KL} = 8$ $\quad m\angle L = 25.66°$

$(2\sqrt{3})^2 + b^2 = 8^2$

$4 \cdot 3$

$12 + b^2 = 64$

$\sqrt{b^2} = \sqrt{52}$

$b = \sqrt{52} = 2\sqrt{13}$

2 | 26
2 | 13

$m\angle K = \cos^{-1}\left(\frac{2\sqrt{3}}{8}\right) \approx 64.34°$

$m\angle L = 180 - 90 - 64.34 = 25.66°$