Name: KEY

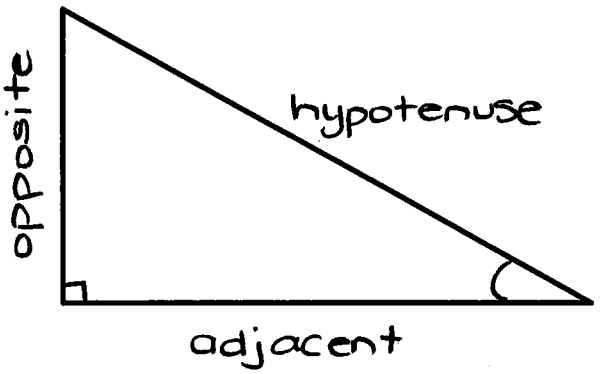
Foundations of Math & Pre-Calculus 10
Chapter 2 ~ Trigonometry

In this chapter, we will be working with right triangles (triangles that have one right, or 90°, angle).

Pythagorean Theorem: $a^2 + b^2 = c^2$
- ✓ use to find missing side length if you know the other two lengths

Sine/Cosine/Tangent Ratios: SOH CAH TOA (set calculator to Degrees)
- ✓ use to find missing angle measures or side lengths

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



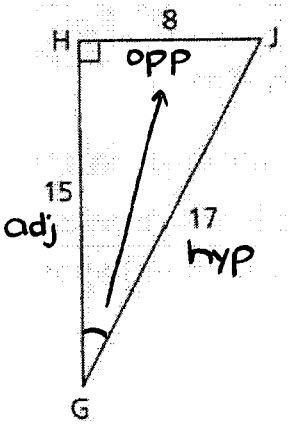
★ **use sin/cos/tan to find sides
**use $\sin^{-1}/\cos^{-1}/\tan^{-1}$ to find angles ★

Angles of Inclination, Elevation, and Depression: the acute angles between lines and the horizon.

***Do not assume the diagrams are drawn to scale.**

Examples for Lesson 2.1 & 2.4

1. Determine $\sin G$, $\cos G$, and $\tan G$, and then determine $\sin J$, $\cos J$, and $\tan J$.



$\sin G = \frac{\text{opp}}{\text{hyp}} = \frac{8}{17}$

$\sin J = \frac{\text{opp}}{\text{hyp}} = \frac{15}{17}$

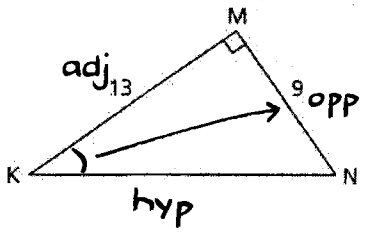
$\cos G = \frac{\text{adj}}{\text{hyp}} = \frac{15}{17}$

$\cos J = \frac{\text{adj}}{\text{hyp}} = \frac{8}{17}$

$\tan G = \frac{\text{opp}}{\text{adj}} = \frac{8}{15}$

$\tan J = \frac{\text{opp}}{\text{adj}} = \frac{15}{8}$

2. Determine the measures of $< K$ and $< N$ to the nearest tenth of a degree.



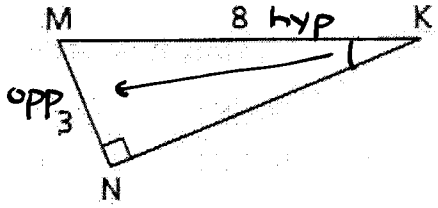
$\tan K = \frac{9}{13}$ $\qquad$ $\tan N = \frac{13}{9}$

$K = \tan^{-1}\left(\frac{9}{13}\right)$ $\qquad$ $N = \tan^{-1}\left(\frac{13}{9}\right)$

$\boxed{K = 34.7°}$ $\qquad$ $\boxed{N = 55.3°}$

check: $90 + 34.7 + 55.3 = 180°$ ✓

3. Determine the measures of $< K$ and $< M$ to the nearest tenth of a degree.



$\sin K = \frac{3}{8}$ $\qquad$ $\cos M = \frac{3}{8}$

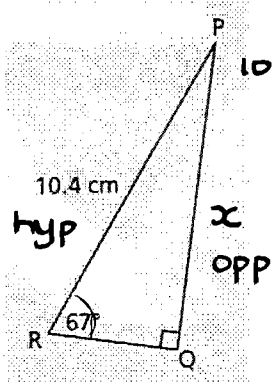
$K = \sin^{-1}\left(\frac{3}{8}\right)$ $\qquad$ $M = \cos^{-1}\left(\frac{3}{8}\right)$

$\boxed{K = 22.0°}$ $\qquad$ $\boxed{M = 68.0°}$

check: $90 + 22 + 68 = 180°$ ✓

Examples for Lesson 2.2 & 2.5

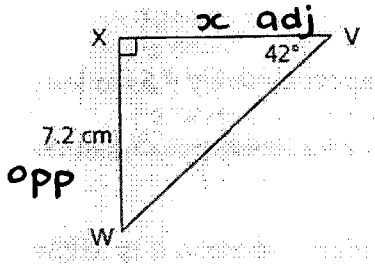
4. Determine the length of PQ to the nearest tenth of a centimeter.



$10.4 \times \sin 67° = \frac{x}{10.4} \times 10.4$

$\boxed{x = 9.6 \text{ cm}}$

5. Determine the length of VX to the nearest tenth of a centimeter.



$x \times \tan 42° = \frac{7.2}{x} \times x$

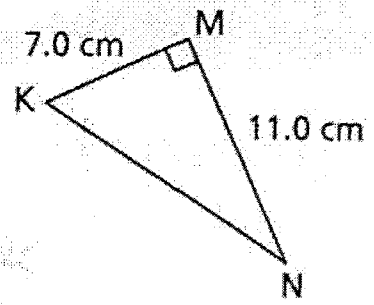
$\frac{x \tan 42°}{\tan 42°} = \frac{7.2}{\tan 42°}$

$x = \frac{7.2}{\tan 42°}$

$\boxed{x = 8.0 \text{ cm}}$

Examples for Lesson 2.6

1. **Solve** this triangle. Give the measures to the nearest tenth.



$\tan N = \frac{7}{11}$

$N = \tan^{-1}\left(\frac{7}{11}\right)$

$\boxed{N = 32.5°}$

$K = 180 - 90 - 32.5$

$\boxed{K = 57.5°}$

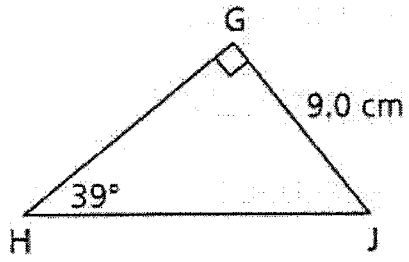
$7^2 + 11^2 = c^2$

$49 + 121 = c^2$

$\sqrt{170} = \sqrt{c^2}$

$c = \boxed{KN = 13.0 \text{ cm}}$

2. **Solve** this triangle. Give the measures to the nearest tenth where necessary.



$J = 180 - 90 - 39$

$\boxed{J = 51°}$

$9 \times \tan 51° = \frac{GH}{9} \times 9$

$GH = 9\tan 51°$

$\boxed{GH = 11.1 \text{ cm}}$

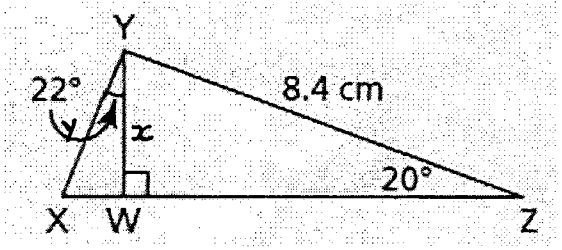
$\sin 39° = \frac{9}{HJ}$

$HJ = \frac{9}{\sin 39°}$

$\boxed{HJ = 14.3 \text{ cm}}$

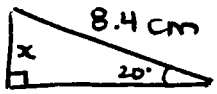
Examples for Lesson 2.7

1. Calculate the length of XY to the nearest tenth of a centimeter.



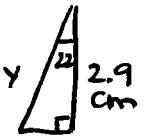
$8.4 \times \sin 20° = \frac{x}{8.4} \times 8.4$

$x = 2.9 \text{ cm}$

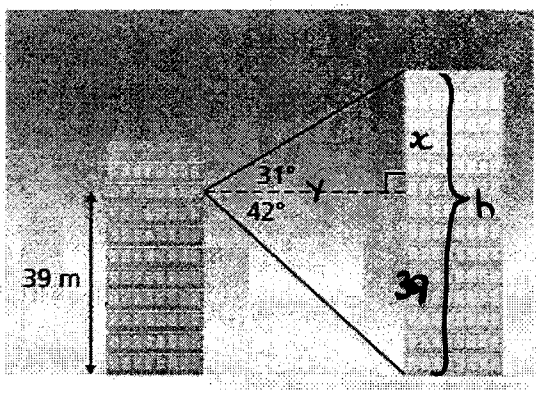


$\cos 22° = \frac{2.9}{y}$

$y = \frac{2.9}{\cos 22°} = \boxed{3.1 \text{ cm}}$



2. A surveyor stands at a window on the 9th floor of an office tower. He uses a clinometer to measure the angles of elevation and depression of the top and the base of a taller building. The surveyor sketches this plan of his measurements. Determine the height of the taller building to the nearest tenth of a metre.



$\tan 42° = \frac{39}{y}$

$y = \frac{39}{\tan 42°}$

$y = 43.3 \text{m}$

$\tan 31° = \frac{x}{43.3}$

$x = 43.3 \tan 31°$

$x = 26.0 \text{ m}$

$h = 39 + 26 = \boxed{65 \text{m}}$