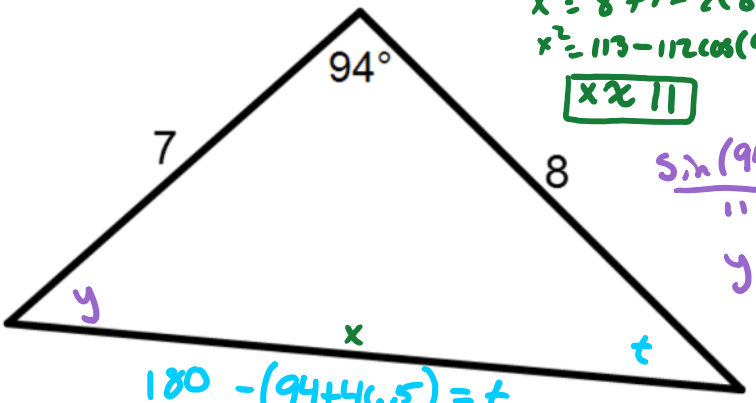
8.5 Problem Solving

Monday, September 23, 2019 7:46 AM

Warm Up

Solve for the remaining parts of this triangle.



$x^2 = 8^2 + 7^2 - 2(8)(7)\cos(94)$

$x^2 = 113 - 112\cos(94)$

$x \approx 11$

$\frac{\sin(94)}{11} = \frac{\sin(y)}{8}$

$y = \sin^{-1}\left(\frac{8 \cdot \sin(94)}{11}\right)$

$y \approx 46.5°$

$180 - (94 + 46.5) = t$

$t = 39.5°$

Essential Question

How can trigonometry be used to solve real-world and mathematical problems?

Needed Vocab:

- **Angle of Depression**
- **Angle of Elevation**

Goal: "I can. . .

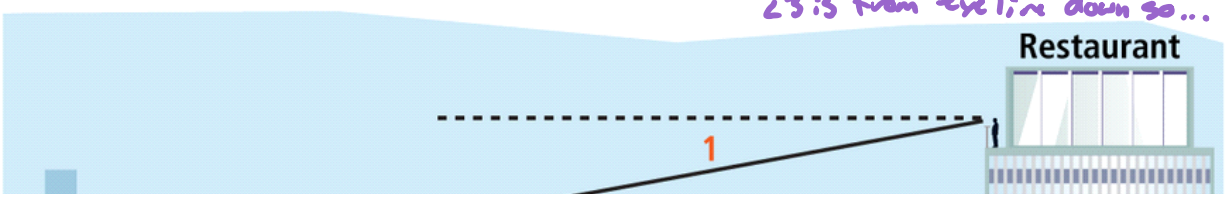
Use trigonometry to solve problems."

Example 1

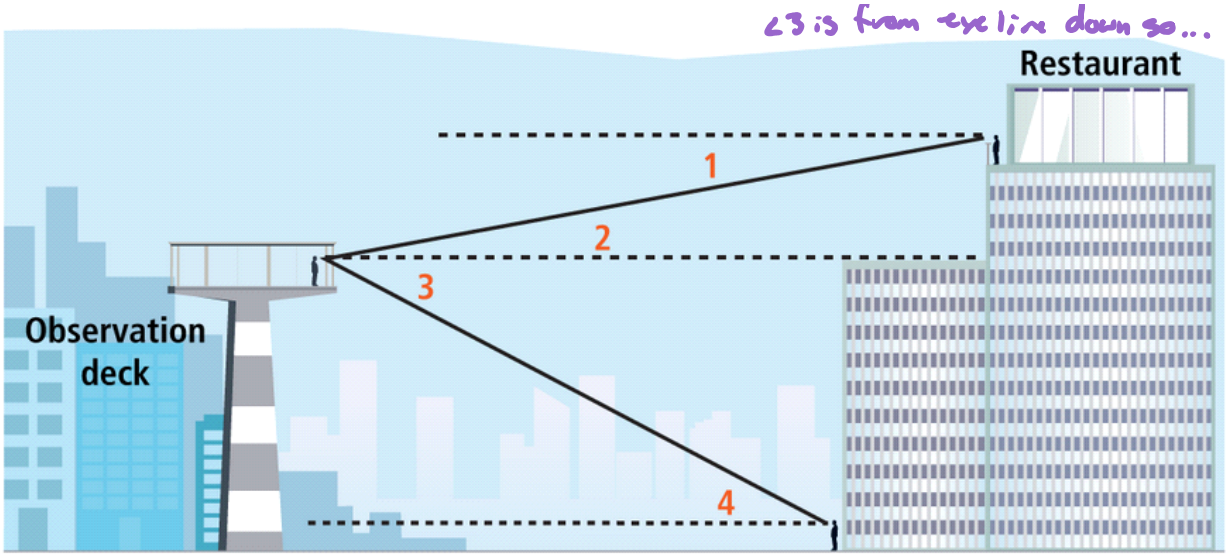
Identify ∠2 as an angle of elevation or an angle of depression.
Do the same for ∠3. Explain your reasoning.

∠2 is from eyeline up so... ∠2 is elevation

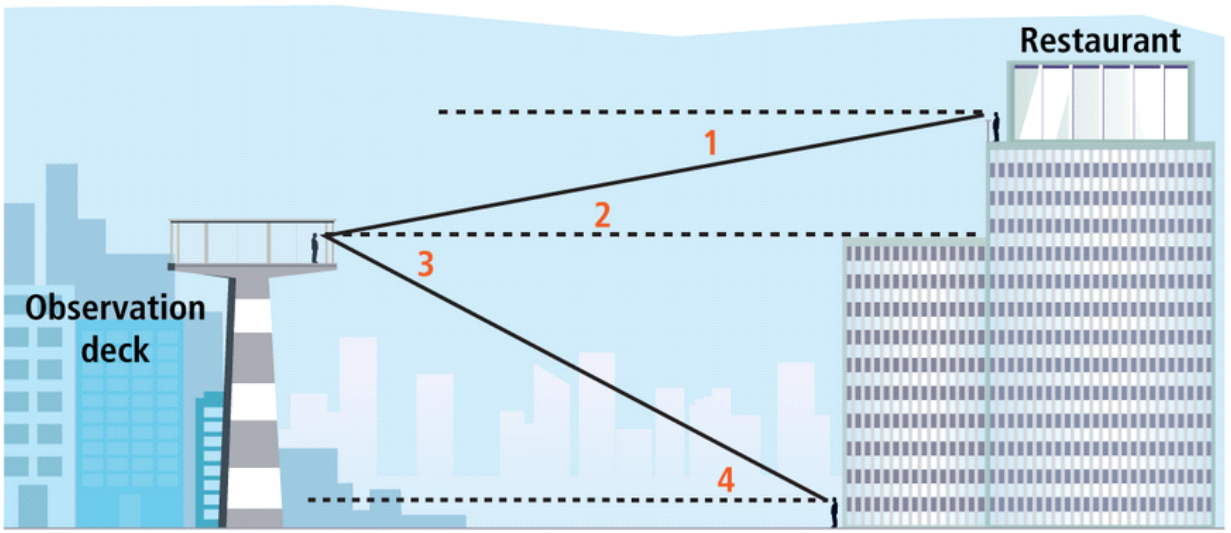
∠3 is from eyeline down so... ∠3 is depression



∠3 is from eye line down so... ∠3 is depression

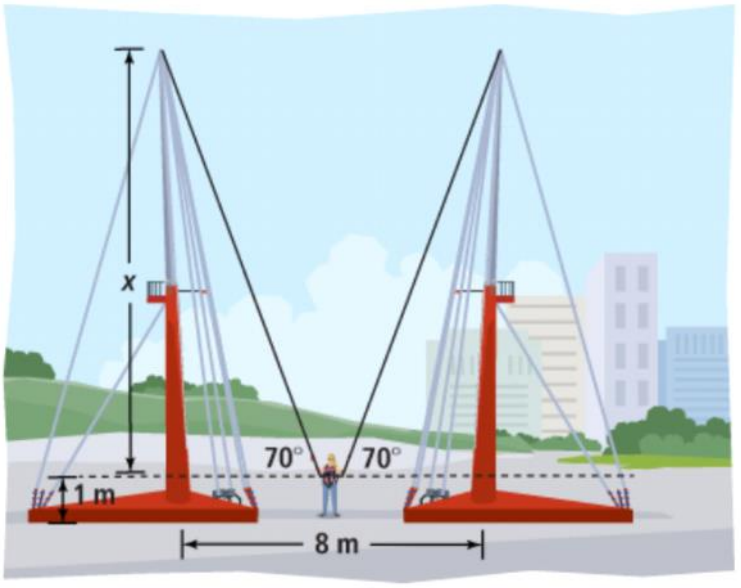


1. How does the angle of depression, ∠1, compare with the angle of elevation, ∠2? Explain your reasoning. They are ≅ since both eye lines should be parallel.



Example 2

For a reverse bungee ride, Reagan stands halfway between two vertical posts. Two bungee cords extend from the top of the posts to Reagan's waist at a height 1m above the ground. How tall are the vertical posts?



$\tan(70°) = \frac{x}{4}$

$x = 4 \cdot \tan(70°)$

$x \approx 11$ So... $11+1 = \boxed{12}$

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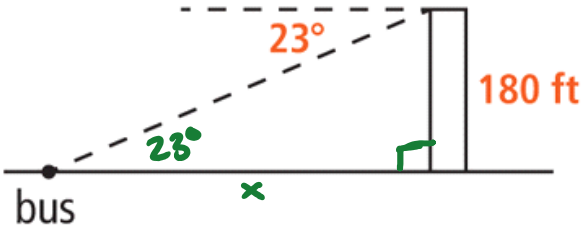
2. Nadeem sees the tour bus from the top of the tower. To the nearest foot, how far is the bus from the base of the tower?

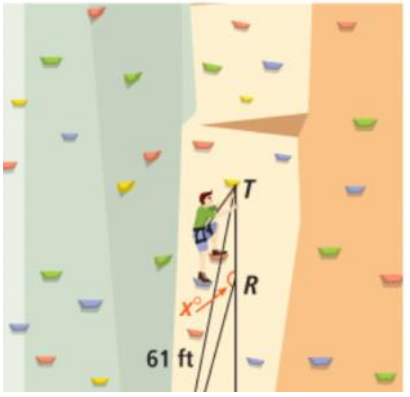


$\tan(23°) = \frac{180}{x}$

$x = \frac{180}{\tan(23°)}$ $\boxed{x \approx 424}$

Example 3

An instructor holds a safety rope at point *C* for a student to rappel from the anchor point *T*. The rope between them currently measures 61 ft. How much more rope should the instructor let out so the student can make it to a resting point at point *R*?



$79 = y + 75$

$4 = y$

$x = 90 + 75$

$x = 165$

$4 = y$

$\frac{t}{\sin(4)} = \frac{61}{\sin(165)}$

$t = \frac{61 \cdot \sin(4)}{\sin(165)}$

$t \approx 16.4$

16 ft.

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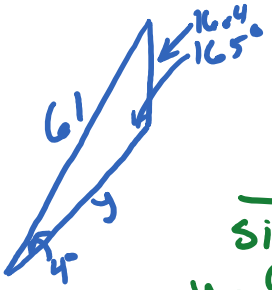
3. How far is the student from the instructor at the resting point?



$165 + 4 = 169$

$180 - 169$

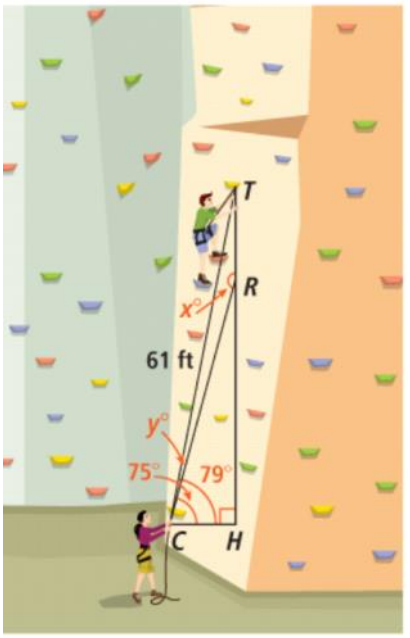
11

$\frac{y}{\sin(11)} = \frac{61}{\sin(165)}$

$y = \frac{61 \cdot \sin(11)}{\sin(165)}$

$y \approx 45.0$

45 ft.



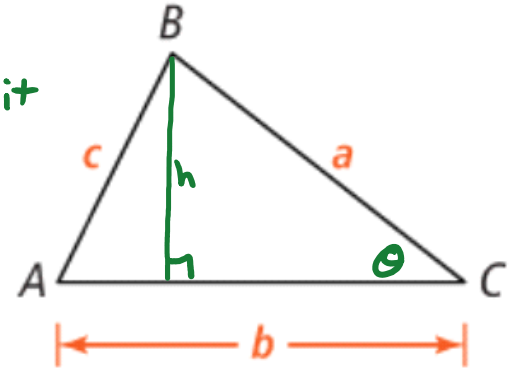
Example 4

$A_\Delta = \frac{1}{2} \cdot b \cdot h$

A. How can you use trigonometry to find the area of $\triangle ABC$?

If we don't know h we can find it

$\sin(\theta) = \frac{h}{a}$ so $h = a \cdot \sin(\theta)$

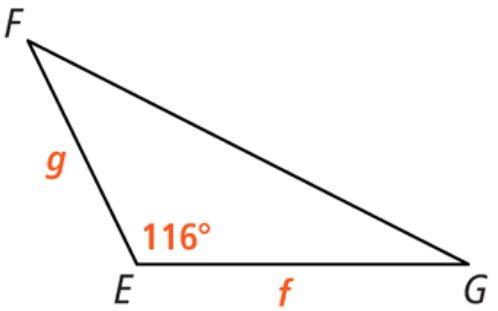


So ...

$A_\Delta = \frac{1}{2} \cdot b \cdot a \cdot \sin(\theta)$

Note θ is the included angle of a and b.

B. What is the area of $\triangle FEG$?



$A = \frac{1}{2} \cdot g \cdot f \cdot \sin(116°)$

Let $g=3$ and $f=4$
Find the area.

$A = \frac{1}{2} \cdot 3 \cdot 4 \cdot \sin(116°)$

$A \approx 5.4$

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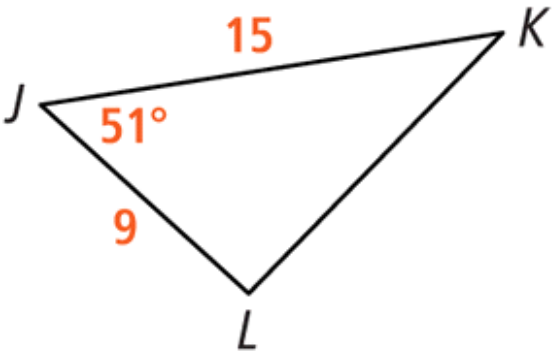
4. a. What is the area of $\triangle JKL$?



$A = \frac{1}{2} \cdot 15 \cdot 9 \cdot \sin(51)$

$A \approx 52.5$

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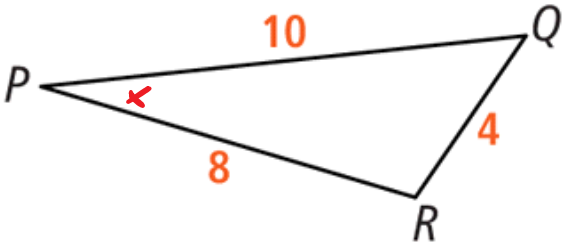
4. b. What is the area of $\triangle PQR$?

Find an angle first.



$16 = 164 - 160\cos(x)$

$x \approx 22.33°$

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$A = \frac{1}{2} \cdot 10 \cdot 8 \cdot \sin(22.33)$

$A \approx 15.2$

R

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https://tinyurl.com/utdxzgk

Homework

Pg. 378
13, 15, 17, 19-22, 26, 27