BECA / Dr. Huson / Geometry
Unit 10: Trigonometry
25 April 2023

Name: SOLUTIONS

10.4 Classwork: Tangent applications

CCSS.HSG.SRT.C.8

Write an equation expressing $\tan\theta$ as a ratio of *opposite* over *adjacent*, then solve for the missing length.

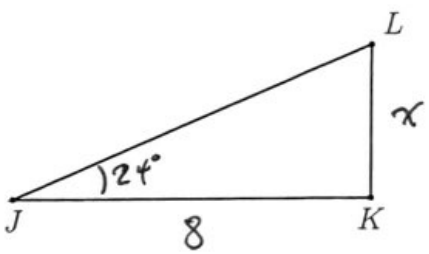
1. Given right $\triangle JKL$ with $\overline{JK} \perp \overline{KL}$, $JK = 8$, $m\angle J = 24°$. Let x be the length of the side opposite $\angle J$, $x = KL$.

$\tan 24° = \frac{x}{8}$

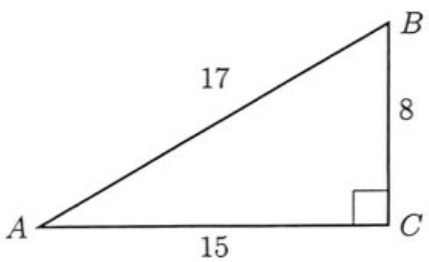
$x = 8 \tan 24$

$= 3.5618...$

≈ 3.56



2. $\triangle ABC$ is shown with $m\angle C = 90°$ and the lengths of the triangle's sides are $BC = 8$, $AC = 15$, and $AB = 17$. (not drawn to scale)



(a) Write down the value of $\tan A$.

$\tan A = \frac{8}{15}$

(b) Find the measure of $\angle A$.

$m\angle A = \tan^{-1}\left(\frac{8}{15}\right) = 28.0724...$

$\approx 28.1°$

3. The diagram shows a building with observer A on the ground looking up at B on the building roof. Point A is 40 feet from the building and the angle of elevation from A to B is 25°.

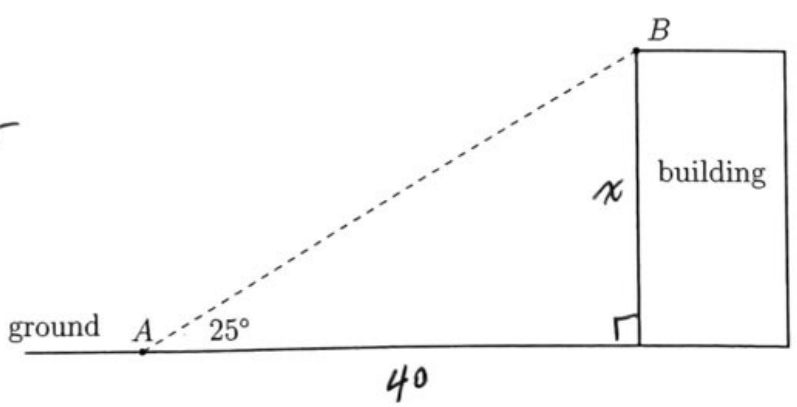
Find the height of the building to the *nearest foot*. (not drawn to scale)

$\tan 25 = \frac{x}{40}$

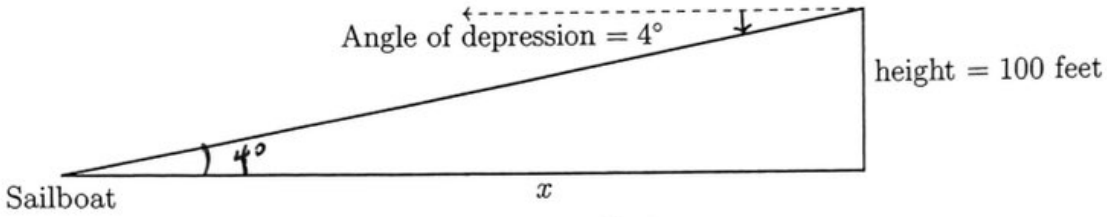
$x = 40 \tan 25$

$= 18.6523...$

≈ 19 ft.



4. From the top of a seaside cliff, a sailboat is visible at an angle of depression of 4°. If the cliff is 100 feet tall, determine the distance of the boat from shore, x, to the *nearest foot.*



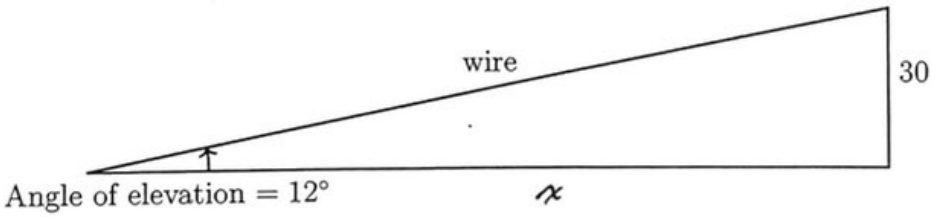
$\tan 4° = \frac{100}{x}$

$x = \frac{100}{\tan 4°} = 1430.0666...$

≈ 1430 ft.

5. A zipline wire is strung from a pole to the ground with an angle of elevation of 12°. If the pole is 30 feet tall, how long is the wire, to the *nearest foot.*

(hint: first find the distance to the pole horizontally, then use the Pythagorean theorem to find the hypotenuse, the wire)



$\tan 12 = \frac{30}{x}$

$x = \frac{30}{\tan 12} = 141.13890...$

$\text{wire} = \sqrt{30^2 + 141.13...^2}$

$= 144.252...$

≈ 144 ft.