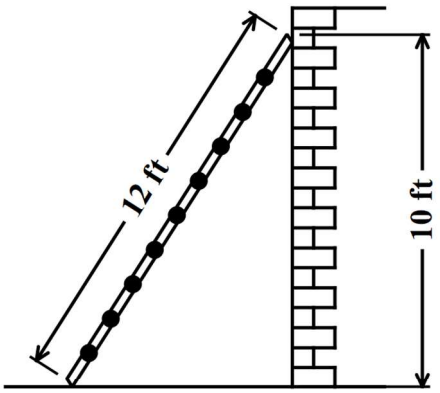
Name: _____ Date: _____

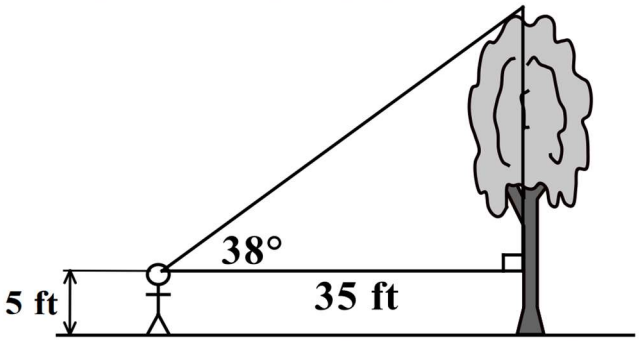
APPLYING RIGHT TRIANGLE TRIGONOMETRY
N-GEN MATH® GEOMETRY

Right triangle trigonometry is one of the most applied topics in all of math. It is used in architecture, engineering, physics, and many other fields. In this lesson, we will see a variety of applications to real-world problems.

***Exercise* #1:** A ladder will be unstable if it makes an angle with the ground greater than $60°$. If a 12-foot-long ladder is used to reach a window that is 10 feet above the ground, will it be unstable? Justify your answer.



***Exercise* #2:** To determine the height of a tree, loggers will measure the **angle of elevation** to the top of the tree from a set distance from its base. If a logger's eyes are 5 feet above the ground and the angle of elevation to the top of the tree is $38°$ when standing 35 feet from its base, determine the height of the tree to the nearest foot.

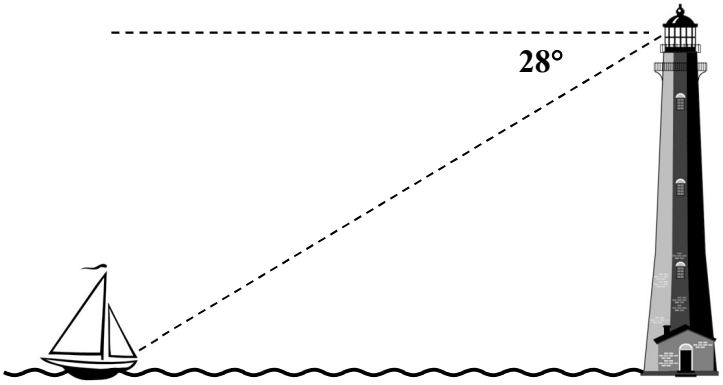


Applying Right Triangle Trigonometry

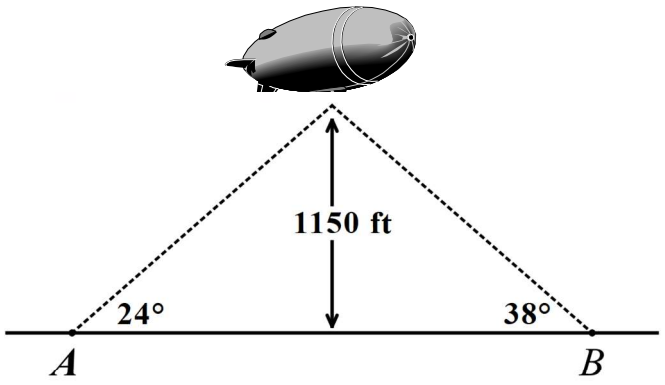
1. Understand whether you are solving for a **missing side length** or a **missing angle measure**.
2. Decide on the appropriate trigonometric ratio that relates your unknown to known quantities.
3. Use the **inverse trigonometric functions** if solving for a missing **angle measure**.
4. Use **algebra** and **the trigonometric functions** if solving for a missing **side length**.

***Exercise* #3:** An isosceles triangle has legs of length 14 cm and a base of length 10 cm. What is the measure of its vertex angle to the nearest degree?

***Exercise* #4:** A lighthouse in Cape Hatteras, North Carolina is 200 feet above sea level. If it spots a boat that is at an **angle of depression** of 28°, as shown, what is the horizontal distance to the base of the lighthouse? Round to the nearest foot.



***Exercise* #5:** A blimp hovers above the ground at a height of 1,150 feet. An observer at point *A* sees the blimp at an angle of elevation of 24°, while an observer at point *B* sees the blimp at an angle of elevation of 38°. What is the distance, to the nearest foot, that separates the two observers?



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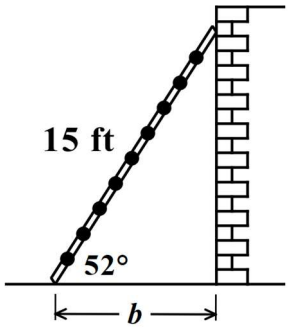
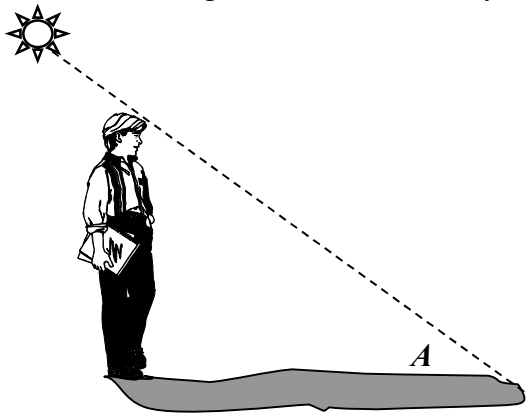
APPLYING RIGHT TRIANGLE TRIGONOMETRY
N-GEN MATH® GEOMETRY HOMEWORK

APPLICATIONS

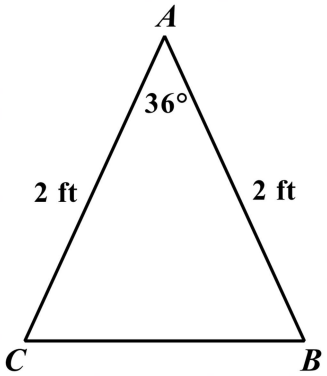
1. How far, to the nearest tenth of a foot, does the bottom of a ladder lie from the base of a building if the ladder is 15 feet long, and it makes a $52°$ angle with the horizontal ground?



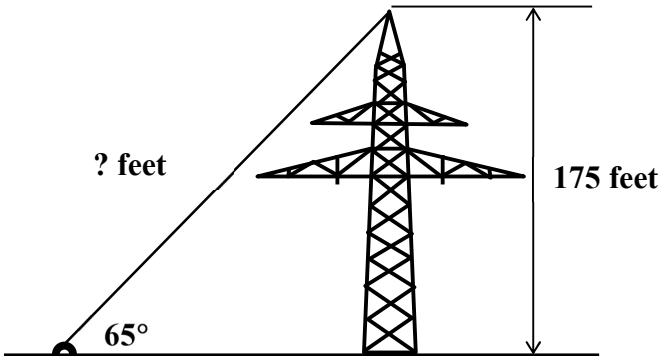
2. A boy who is 5 feet 6 inches tall casts a shadow that is 8 feet and 3 inches long. What is the measure of the angle of elevation of the sun, *A*, as shown in the picture? Round to the nearest degree. Be careful with your units in this problem.



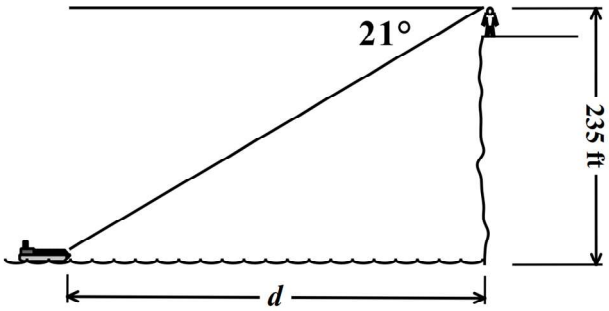
3. An isosceles triangle *ABC* has legs that have lengths of 2 feet each and a vertex angle that measures $36°$. Determine the length of its base, $\overline{BC}$, to the nearest *tenth* of an *inch*. (Watch your units on this one!)



4. A long wire is attached to the top of a 175-foot-tall electrical transmission tower. If the wire needs to make an angle of $65°$ with the ground, then how long must it be? Round your answer to the nearest foot.

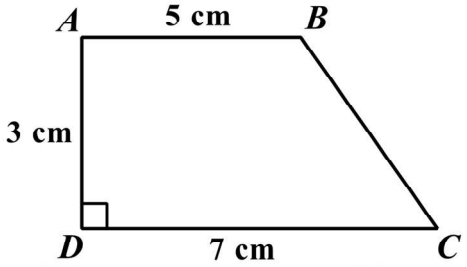


5. A person sights a boat from 235 feet above sea-level as shown. If the angle of depression from the man to the boat is $21°$, then determine the boat's distance, *d*, to the base of the cliff to the nearest foot.



6. In trapezoid *ABCD*, $\overline{AB} \parallel \overline{CD}$ and $\overline{AD} \perp \overline{CD}$.

   (a) Find the measure of $\angle C$ to the nearest degree.



   (b) *Without* using trigonometry, find the length of $\overline{BC}$ to the nearest *tenth* of a centimeter.