Chapter 5.8: Problem Solving with Trig

Knowing what we know now about right triangle trigonometry enables us to solve some interesting and common applications.

Example 1:
A 50-foot ladder leans against a building. If the base of the ladder is 6 feet from the base of the building, what is the angle formed by the ladder and the building? Would you climb this ladder?

Definition

An **angle of elevation** is the angle through which you must look up from horizontal to see something above you.

An **angle of depression** is the angle through which you must look down from horizontal to see something below you.

Example 2:
The angle of depression of a bouncing baby buoy from the top of the Landa Park Lighthouse 150 feet above the surface of the water is 7°. To three decimal places, determine the distance (in feet) from the base of the lighthouse to the bouncing baby buoy.

Example 3:
From the top of the famous 100-ft tall Newton Hall, a math student observes a car moving toward the building. With his homemade sextant, he measures the angle of depressions to the moving car at two different times to be 23° and 57°. During this period in between the student's readings, how far does the car travel? If the two readings were taken 3 seconds apart, what is the speed of the car (in mph)?

Example 4:
A large, helium-filled Cat-In-The-Hat balloon is moored at the beginning of the Macy's Day parade route awaiting the start of the wonderful parade. Two cables attached to the same point on the underside of the Cat-In-The-(aforementioned) Hat's belly make angles of 48° and 36° with the ground. If the cables are attached to the ground 20 feet from each other on the same side, how high above the ground (in feet) is the Cat-Balloon- Thingy?

Example 5:
A patrol boat leaves port at Camp Comal and averages 35 knots (nautical mph) for two hours on a bearing of 53° and then changes its bearing to 143° and travels at the same speed on this new course for another 3 hours. What bearing and how far (in nautical miles) must this patrol boat now travel to return to Camp Comal.

Example 6:
An ambitious precal student with a homemade sextant and a proclivity for shenanigans has commandeered a cutter ship from a private marina for a mathematical experiment. He starts out going due west at 20 knots for 5 hours, then travels at the same speed for 3 hours on a bearing of 220°. At the end of 8 hours, how far away is he from the marina, and on what bearing must he travel to return directly to the marina (where the police are waiting)?