

Farwell Students Conquer Coal Tower Challenge

Kids Learn Real World Application For Trigonometry

By Dianne Alward-Biery
Clever Staff Writer

LAKE – How does one measure a vertical distance when there is no way to climb up and drop a plumb bob? Well, if one is local historian and Clare County Historical Society member Marty Johnson, one enlists the aid of a local geometry class.

Johnson did precisely that when he contacted Farwell High School math instructor Ben Bryant. Johnson explained that the historical society had been seeking to preserve the old railroad coal tower site at the former Lake Station, and to place informational signage there. While the historical society knows who the tower's architect was, it has no information about how it actually operated. Johnson said there are 15 such towers remaining in the state, but all are a bit different in design and structure, and any information available about them sheds no light on the Lake Station tower.

Johnson said the tower [which was used to fill coal tenders on steam-driven locomotives] was designed much earlier than it was built – it had to wait for electricity to come to the area before becoming operational. Electricity was not in place locally until 1929, by which time diesel locomotives were coming on the scene. And so, the coal tower's useful years were limited.

Bryant said solving this problem meshed with what his Geometry-B students had been studying, and happily requested they be allowed to make the outing to Lake. Fortunately, the school administration also was on board with the idea.

Thus, 52 students boarded a bus the morning of May 26 and headed out to the site. They brought with them a measuring rope, calculators, pencils and a "can do" attitude.

Bryant said his students are primarily 11th-graders, with some 10th-graders, along with one eighth-grader.



At left, Farwell High School instructor Ben Bryant watches as his student takes an angle of elevation for his two Geometry-B classes' height-finding project May 26 at the old coal tower in Lake.

At lower left, students reveal to instructor Ben Bryant their findings as to the height of the coal tower.



Bryant had divided the students into teams, who took their measurements from three sides of the tower. Measuring from the fourth side was precluded by large trees and other undergrowth, which obstructed the students' line of sight.

They measured out a set distance from the base of the tower [one leg of an angle], and at that point took aim at the top of the tower using a sighting gun to determine the angle of elevation. They then added to that the height from the ground to the tower's height.

Using that data, the teams calculated the tower's height.

Bryant said they could have used the Pythagorean Theorem: The square of the length of the hypotenuse of a right triangle equals the sum of the squares of the lengths of the other two sides.

However, he said this problem was a good way for the classes to use the trigonometry functions they had been studying.

"Using trigonometry, we can find the height by figuring how far away we are and getting our theta angle, and plugging it into the tangent function," Bryant said. "Then we add the height of the gun that the person is holding down to the ground. "They don't get many math field trips," Bryant said. "And anytime you can show them it's actually related to real life is a huge, huge plus."

He said the two classes were divided into four teams each, and each team took two measurements. So each class had eight total measurements of height, which would be averaged to arrive at a height.

"You multiply the distance you are from the coal tower by the tangent of our angle of elevation," Bryant said. "Then you add to that the height at which our elevation was obtained. We could have used a range finder and done Pythagorean Theorem, but we were just working with trig stuff, so it was perfect."

After roughly 45 minutes of measuring and relatively few minutes of calculating, both class groups arrived at exactly the same distance. The height of the old coal tower in Lake Station is – drum roll – 68.2 feet. That's more than 35 percent taller than the average wooden barn found locally [typically 50 feet, foundation to peak].

After completing their calculation chore, the students were given a few minutes to carefully explore the concrete operations structure, and to look over the site. The students were told that soon the windows and door would be getting boarded up, and that they could be among the last people to actually go inside.

There are many rules and

guidelines which the state places on relics such as the coal tower. It even disallows painting over the rogue artwork or removal of graffiti in some cases because it could damage the structure.

Johnson invited any interested students to participate Wednesday,

June 15 in clearing out brush and sprucing up the site. He said Garfield Township, Clare County Parks and Recreation, the historical society and the DNR will be cutting down all the vegetation and closing off the buildings.

"Some people in Garfield want

it torn down because it's an eyesore," Johnson said. "They see it as a place for vandals to go in. We want it to look nicer. This is one of only 15 in the state, one of only two you can come close to. It should be preserved. This is part of Clare County's history."

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The old coal tower in Lake is shown from below. The adjacent bike path affords an opportunity for up-close viewing of the historical site.

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