

Drawing and Trigonometry

Subject Area: Algebra & Basic AutoCAD or Solid Works

Grade Levels: 9-12

Date: 7/12/12

Lesson Overview

Working on a construction site there are always “on the fly” changes that need to be made that are not on the site drawings. I am going to pose this scenario to the students to see what they come up with:

On the store front of a grocery store construction crews just built a huge awning and they are going to secure it to the existing storefront. On the drawings it appears that the awning is resting against the store with no real designs to secure it. The on site engineer has decided to fabricate a turnbuckle or bracket going from the top corner of each side of the awning to the just above the siding attached with a tie rod. Your job is to design the turnbuckle and tie rod set up and use your knowledge of trigonometry to find all appropriate angles.

Student’s previous knowledge includes a basic understanding trigonometric functions and a basic knowledge of design.

Materials:

Paper

Pencil

Computer

Auto CAD

Solid Works

Calculator

Students will learn:

How to apply trig to a real life setting

Draw angles

Chamfer and fillet corners

3D drawings

Isometric Drawings

Day 1 - Introduction of the activity

Students will have time to ask questions review drawings (that I will provide) and see sample work. They can also begin working on their trig calculations

Day 2 – Design

Students must submit to me a with appropriate angle measurements and length of tie rod

Day 3 – Design

After I have reviewed the designs and checked their math they are to draw up the design on Auto CAD or Solid Works

Day 3 – Completion

Students should have completed the project. They will need to turn in their initial sketches, trig computations, and computer generated drawing.

Trigonometry Standards:

1.0 – Students understand the notion of an angle and how to measure it in both degrees and radians. They can convert between degrees and radians.

12.0 – Students use trigonometry to determine unknown sides or angles in right triangles.

CTE Standards:

Academics - Mathematics

12.0 – Students find and measure sides of interior and exterior angle of triangles and polygons

15.0 – Students use Pythagorean Theorem to determine distance and find missing side lengths

19.0 – Students use Trig functions to find a missing unknown length or angle

Lesson Plan Relevance:

This situation actually occurred when I was on site. The customer did not like the way the awning was attached to the existing hotel so the engineer came up with the turnbuckle and tie rod solution. He and I both went to the location, made some rough measurements, used trig to find the appropriate angles, used the Pythagorean theorem to find the length of the tie rod, then sent the info to the architect to draw up the plans.