Architecture Truss In Trigonometry

Math 1275 STEM Application

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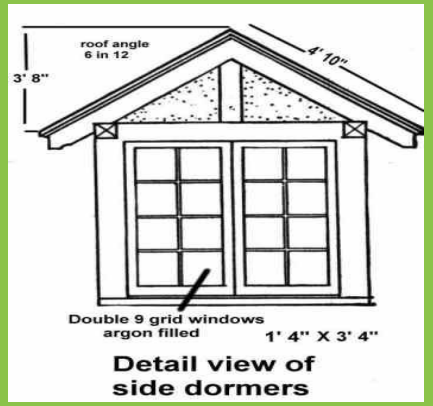
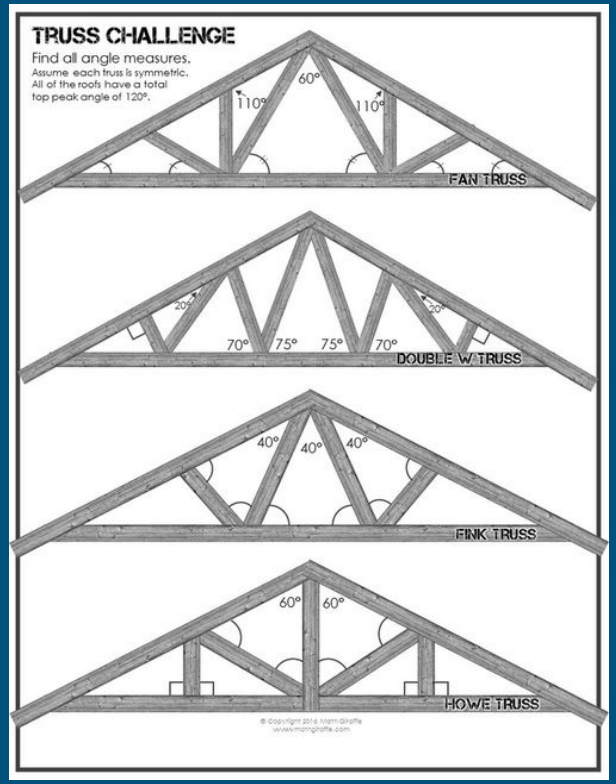
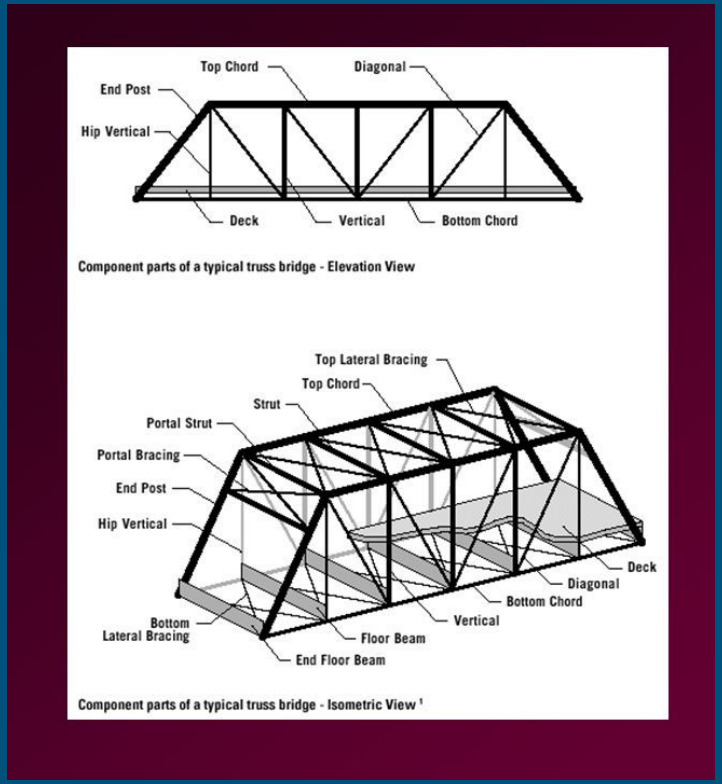
What are some of the real life applications?

One of my favorite applications of trig is in architecture because it has so many uses such as bridges, buildings, roofs and construction in general. Architects also use it more often because it is more accurate than measurements and other measurement tools which can have human error and mistakes. One of the best uses is the calculation on the truss system.



Architectural Truss System



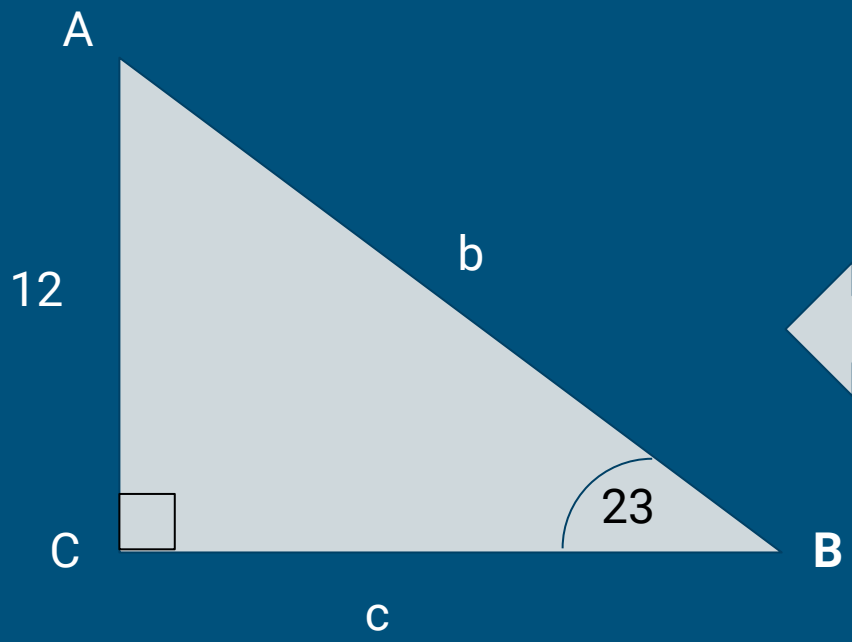


Triangles are known as the strongest shape due to their ability to reinforce each other. Architects have created something know as a truss system where a bunch of triangles are put together in order to support large structures. The diagonal/ hypotenuse of a triangle is what creates such a strong structure due to its ability to cross and support beams and columns.

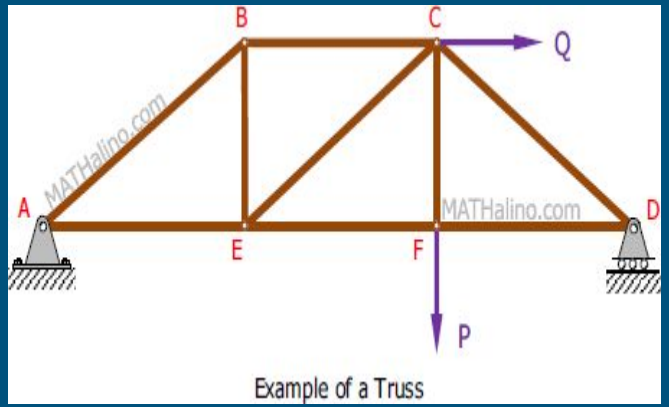
Architecture Truss Theory

In structural design a structure is composed of triangles that are interconnecting. This reason is because the geometry of the triangles is very important in structural analysis. We must be able to relate the angle of the triangle to the length of the sides. A truss is one of the major types of engineering structures and is especially used in the design of bridges and buildings. Trusses are designed to support loads, such as the weight of people. A truss is exclusively made of long, straight members connected by joints at the end of each member

Architecture Truss Trig Problem



This is a single repeating triangle in a truss system find the angles and sides using trig functions.



Solution

Angles -	Sides -
A - 67	a - 12
B - 23	b - 28.27
C - 90	c - 30.71

In order to find the angles…

180 - 90 - 23 = 67 because a total triangle is 180 and I was given 2 angles (90, 23) so i just subtracted.

Now to find the sides, SOH CAH TOA,

We have 12 as Opposite so Sine or Tan so C can be found with Sine 12/Sine(23) =30.7.

Now use the pythagorean theorem to find the final side a^2+b^2 = c^2. We have 12^2 + b^2 = 30.7^2. Then you subtract 942.49 - 144 = sqrt(796.49) And the final side is 28.27.

Why should we appreciate trig?

Trig lets us be more accurate with our measurements so we can avoid any mishaps and disasters in structural integrity when in architecture or any other fields. As you can see trusses can be calculated very simply but in other fields we use different varitations of trig to understand measurements and comparisons better.