A "No Passing Zone" sign has the shape of an isosceles triangle. The width of the sign is 5 inches greater than its height. The top and bottom edges of the sign are 42.54 inches. width is 2x sides are 42.54 and 2x+5 A) What is the Width? B) What is the Height?

Solution

Cut the isosceles triangle in half and you end up with two right triangles stuck together. Using the Pythagorean theorem you know that A^2+B^2=C^2 and you know that A (the height) is equal to X, B (half of the width) is equal to (x+5)/2, and C (the side or hypotenuse of the right triangle) is equal to 42.54. Plug these values in and solve for X.

A^2+B^2=C^2

x^2 + ((x + 5) / 2)^2 = 42.54^2

x^2 + ((x + 5) / 2) * ((x + 5) / 2) = 1809.6516

x^2 + (((x + 5) * (x + 5)) / 4) = 1809.6516

(((x + 5) * (x + 5)) / 4) = 1809.6516 - x^2

(x + 5) * (x + 5) = 7238.6064 - 4x^2

x^2 + 10x + 25 = 7238.6064 - 4x^2

5x^2 + 10x + 25 = 7238.6064

5x^2 + 10x - 7213.6064 = 0

(x - 36.97) * (x + 38.97) = 0

x = 36.97, x = -38.97

x is the height of the triangle and since the height cannot be negative, you can throw out the negative answer above. So the height of the triangle is 36.97. Since the width of the triangle is x+5, the width is equal to 41,97.

H = 36.97

W = H+5 = 41.97