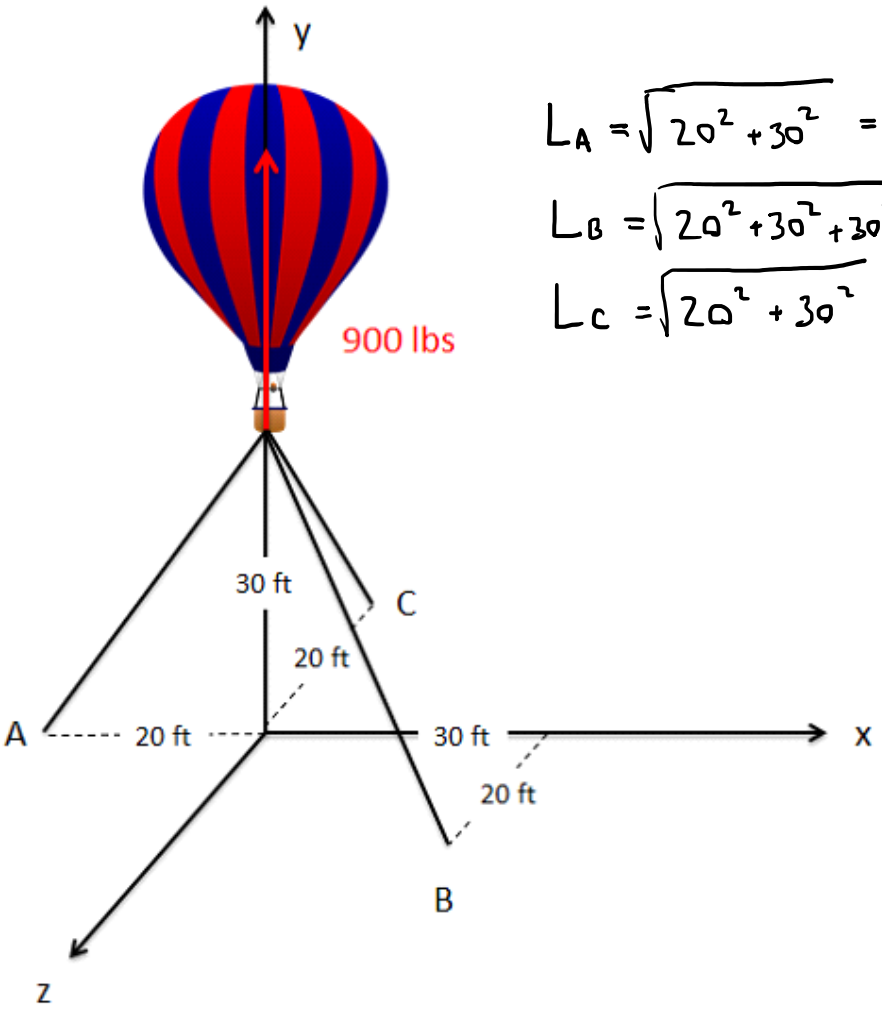
Question 8:

A hot air balloon is tethered to the ground with three cables as shown below. If the balloon is pulling upwards with a force of 900lbs, what is the tension in each of the three cables?



$$L_A = \sqrt{20^2 + 30^2} = 36.1 \text{ ft}$$

$$L_B = \sqrt{20^2 + 30^2 + 30^2} = 46.9 \text{ ft}$$

$$L_C = \sqrt{20^2 + 30^2} = 36.1 \text{ ft}$$

$$\sum F_x = -\frac{20}{36.1} T_A + \frac{30}{46.9} T_B + 0 = 0$$

$$-.554 T_A + .640 T_B = 0$$

$$\sum F_y = -\frac{30}{36.1} T_A - \frac{30}{46.9} T_B - \frac{30}{36.1} T_C + 900 = 0$$

$$-.831 T_A - .640 T_B - .831 T_C + 900 = 0$$

$$\sum F_z = 0 + \frac{20}{46.9} T_B - \frac{20}{36.1} T_C = 0$$

$$.426 T_B - .544 T_C = 0$$

Use Wolfram alpha

$T_A = 466.8$ lbs

$T_B = 396.8$ lbs

$T_C = 310.7$ lbs