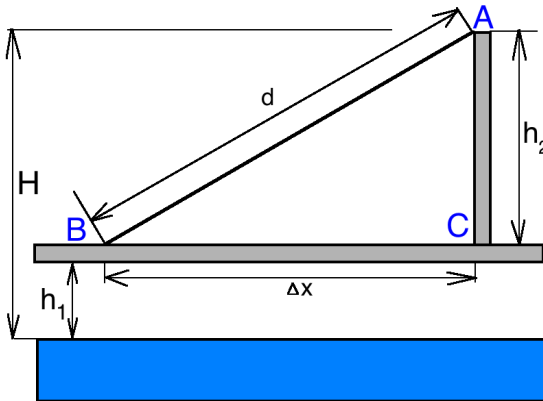The palm springs aerial tramway extends 3.88 km from the valley station, which is located 0.8 km above sea level, to the mountain station atop san jacinto peak. the actual path of the tramway's cables is not along a straight line, but if it were, the horizontal displacement of the tramway would be 3.45 km. how far is san jacinto peak above sea level?

Solution:

$d = 3.88\ km$ - distance from the valley station to the mountain station;

$\Delta x = 3.45\ km$ - horizontal displacement of the tramway;

$h_1 = 0.8\ km$ – height of the valley station above sea level;

H - height of the san jacinto peak above sea level

Height of the san jacinto peak above valley station (from the right triangle ABC):

$$d^2 = \Delta x^2 + h_2^2$$

$$h_2 = \sqrt{d^2 - \Delta x^2} = \sqrt{(3.88\ km)^2 - (3.45\ km)^2} = 1.78 km.$$

Height of the san jacinto peak above sea level:

$$H = h_1 + h_2 = 0.8\ km + 1.78\ km = 2.58\ km$$

Answer: height of the san jacinto peak above sea level is $2.58\ km$