

1. A seismometer is located 90 km from the epicenter of an earthquake that occurred at exactly 8:00:00 am. If the earthquake has a focal depth of 7 km, calculate the times at which the P and S waves will arrive at the seismometer. Assume the waves follow a straight line path through a limestone formation.

The limestone has the following properties:

$$\text{Density} = 2600 \text{ kg/m}^3$$

$$\text{Bulk Modulus} = 28 \text{ GPa}$$

$$\text{Shear Modulus (rigidity modulus)} = 20 \text{ GPa}$$

Hint: Be sure to check that the units in the answer are correct.

2. V_p and V_s measured at a soil site are 2,500 ft/sec and 660 ft/sec, respectively. The soil has a moist weight of 125 lb/ft³. Calculate Young's modulus, E , the shear modulus, G , and Poisson's Ratio, ν , for the soil.

3. An astute observer feeling an earthquake noted that he felt the P-wave arrival at 9:30:23 am and the S-wave arrival at 9:31:07 am. Focal depths in the area are about 10 km. The bedrock is limestone with the same properties as in problem 1. Calculate the approximate distance from the epicenter to the observer in kilometers.