Answer on Question #50140, Physics, Mechanics | Kinematics | Dynamics

Two hills have 700m distance between them. A man fired with a gun standing between these two hills. He heard the 1st echo after 1s of firing and 2nd echo after 3s of firing. Determine the temperature of that place in Celsius scale. Velocity of sound in air at 0°C is 332m/s.

Solution:

The distance between hills

$$d = d_1 + d_2 = 700\ m$$

$$d_1 = \frac{vt_1}{2}$$

$$d_2 = \frac{vt_2}{2}$$

$$d = \frac{vt_1}{2} + \frac{vt_2}{2} = \frac{v}{2}(t_1 + t_2)$$

The velocity of sound is

$$v = \frac{2d}{t_1 + t_2} = \frac{2 * 700}{1 + 3} = 350\ m/s$$

The speed of sound in air is given approximately by

$$v = 332 + 0.6 * T$$

Thus the temperature is

$$T = \frac{v - 332}{0.6} = \frac{350 - 332}{0.6} = 30℃$$

Answer: $T = 30℃$.