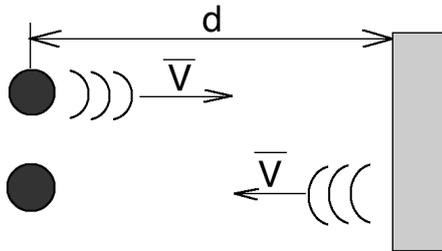A bat emits an ultrasonic sound wave at 35 Hz and receives a reflected signal in the form of an echo 0.20s later. If the speed of sound in air is given to be 330 ms-1 , how far is the bat from the object?
33,45,106or1650m??

Solution:

$V = 330\frac{m}{s}, t = 0.20s$

Before the sound returns to the bat as an echo, it passes the distance from the bat to the object and from the object back to the bat:

$$t = t_{b\to o} + t_{o\to b}$$

The distance to the object and back to the bat:

$$d_{b\to o} + d_{o\to b} = 2d$$

$$2d = t \cdot V$$

$$d = \frac{t \cdot V}{2} = \frac{0.2s \cdot 330\frac{m}{s}}{2} = 33.0m$$

Answer: the bat is on the distance 33m from the object.