HWU4-16

QUESTION 16a:

Consider a 2470-lb automobile clocked by law-enforcement radar at a speed of 85.5 pmh (miles/hour). If the position of the car is known to be within 5.0 feet at the time of the measurement, what is the uncertainty in the velocity of the car?

ANSWER 16a:

$∆v \geq $ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mph

QUESTION 16b:

If the speed limit is 75 mph, could the driver of the car reasonably evade a speeding ticket by invoking the Heisenberg uncertainty principle?

ANSWER 16b:

YES or NO

HINT:

The Heisenberg uncertainty principle is expressed by the following equation

$$\left(∆x\right)\left(∆p\right)\geq \frac{h}{4π}$$

where Δx is the uncertainty in position, Δp is the uncertainty in momentum, and *h* is Planck’s constant. The uncertainty in momentum can be expressed in terms of mass, *m*, and the uncertainty in velocity, Δv.

Δp = m(Δv)