

Problems Ives

Name _____

We hadn't heard of him either, but "I" names are rare! H.E. Ives and G.R. Stillwell precisely measured the Doppler effect of light in 1938. The Doppler effect is when the frequency of a wave is changed when either the detector or the source of the wave is moving. It is the effect that causes a siren to change pitch as an ambulance passes you. Although they did not know it at the time, Ives and Stillwell helped confirm Einstein's theory of relativity.

1. A student reports a frequency as 3 cycles/4.7 s. How should she report this frequency?

2. The frequency of a pendulum is 10 cycles/s. What is the period? (Can you do it in your head? Does it make sense?)

3. The period of a weight on a spring is 6.78 s. What is its frequency?

4. A pendulum moves from its lowest point up to its highest point 2 cm away in 0.5 seconds. What is the period of the pendulum?

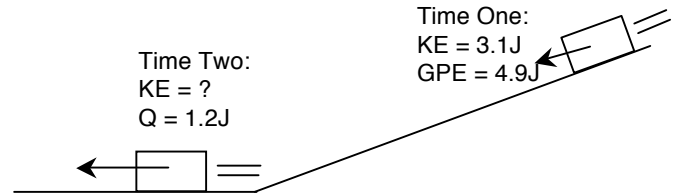
What is the amplitude of the pendulum?

5. A weight on a spring has an amplitude of 6 cm and a period of 0.4 sec. You change the amplitude to 12 cm. What will be the period now?

6. Weight A is on a spring and bounces from the top to the bottom to the top again 10 times in 12 seconds. Weight B is on an identical spring and bounces from the top to the bottom to the top again 10 times in 17 seconds. Which weight is more massive?

7. We change something about a pendulum that makes the period longer. What happened to the frequency?

8. This 3.5-kg block is pushed down the hill so it starts with both KE and GPE as shown. By the bottom of the hill, 1.2 J of heat have been created by friction. I listed all the forms of energy at the two important times for you.



Your job is to figure out the velocity of the block at the second time. **You must show your work formally, as you would for a graded homework.** For example, each step should start with a standard equation, and you should solve before you plug in numbers.