Ch 14

What change in temperature occurs when 10 kcal of heat is applied to 7.0 kg of a substance that has a specific heat capacity of 670 Cal / kg °C?

a. I've got my answer

2 min

What change in temperature occurs when 10 kcal of heat is applied to 7.0 kg of a substance that has a specific heat capacity of 670 Cal / kg °C?

$Q = c * m (T_f - T_i)$

$$(T_f - T_i) = \frac{(10 \times 10^3 \text{ Cal})}{(7.0 \text{ kg} \times 670 \text{ Cal / kg °C})}$$

$= 2.13$ °C

How does the vacuum liner of a thermos bottle provide the major component of insulating ability?

a. I've got my answer

2.5 min

How does the vacuum liner of a thermos bottle provide the major component of insulating ability?

The three methods of heat transfer are conduction, convection, and radiation. Conduction and convection depend upon the presence of materials to transfer heat. By lining a thermos bottle with a vacuum lining, energy cannot escape the contents of the bottle by two of the three forms of heat transfer.

Ch 16, 17

A tuba oscillates with a frequency of 850 Hz.
How long does it take to make 50 vibrations?

a. I've got my answer

2 min

A tuba oscillates with a frequency of 850 Hz.
How long does it take to make 50 vibrations?

f = 1 / T, where T is the time in sec to make one cycle or vibration

T = 1 / 850

50 * T = time to make 50 vibrations

0.059 seconds

A spring vibrates at 300.0 Hz when a weight is hung from it. If the spring constant is 102.9 kg/s^2, what is the mass of the weight?

a. I've got my answer

2.5 min

A spring vibrates at 300.0 Hz when a weight is hung from it. If the spring constant is 102.9 kg/s^2, what is the mass of the weight?

$T = 2\pi * \sqrt{(m/k)}$, and $f = 1/T$

$1/f = 2\pi * \sqrt{(m/k)}$

$(1 / 2\pi f)^2 = (m / k)$

$m = k (1 / 2\pi f)^2$

$m = 102.9\ kg/s^2 * (1 / 2\pi\ 300.0\ Hz)^2$

$m = 2.89 \times 10^{-5}\ kg$

A spring stretches when a 150 kg mass is suspended from it. If the spring constant is 6500 N/m, how much will it stretch?

a. I've got my answer

2 min

A spring stretches when a 150 kg mass is suspended from it. If the spring constant is 6500 N/m, how much will it stretch?

$F = k * x$

$(150.0\ kg * 9.8\ m/s^2) = 6500\ N/m * x$

$$x = \frac{1470\ N}{6500\ N/m}$$

$x = 0.23\ m$

A stationary siren emits a sound of 1850 Hz. If an observer is traveling toward it at 90 km/hr, what frequency does the observer hear?

a. I've got my answer

2.5 min

A stationary siren emits a sound of 1850 Hz. If an observer is traveling toward it at 90 km/hr, what frequency does the observer hear?

$$f = f_o \bullet \frac{v + v_r}{v + v_s}$$

$$f = 1850 \text{ Hz} * \frac{(343 + 90 \text{ km/hr} * 1\text{hr}/3600 \text{ s} * 1000 \text{ m/km})}{(343 + 0 \text{ m/s})}$$

f = 1984.84 Hz

An earthquake wave travels with a speed of 7.9 km/s. If it's frequency is 12,000 Hz, what is it's wavelength?

a. I've got my answer

2 min

An earthquake wave travels with a speed of 7.9 km/s. If it's frequency is 12,000 Hz, what is it's wavelength?

$v = \lambda * f$

$7.9 \text{ km/s} * 1000 \text{ m/1 km} = \lambda * 12{,}000 \text{ Hz}$

$$\lambda = \frac{7.9 \text{ km/s} * 1000 \text{ m/1 km}}{12{,}000 \text{ Hz}}$$

or 0.66 m

What is the frequency of sound whose wavelength is 2.5 nm at 32 °C?

a. I've got my answer

2 min

What is the frequency of sound whose wavelength is 2.5 nm at 32 °C?

$v = 331\ m/s + (0.6\ m/s\ °C * 32\ °C)$

$v = \lambda * f$

$$f = \frac{331\ m/s + (0.6\ m/s * 32\ °C)}{2.5 \times 10^{-9}\ m}$$

$f = 1.4 \times 10^{11}\ Hz$