Dr. Bob

1. $v = 1.5\ km/s$ $\quad f = 2\ MHz$

$\lambda = ?$

$$V = \lambda f$$

$$V = \frac{1.5\ km}{s}\left(\frac{10^3\ m}{1\ km}\right) = 1500\ m/s$$

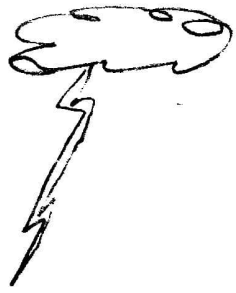
$$f = 2\ MHz\left(\frac{10^6\ Hz}{1\ MHz}\right) = 2\times10^6\ Hz$$

a) $$\lambda = \frac{V}{f} = \frac{1500\ m/s}{2\times10^6\ s^{-1}} = 7.5\times10^{-4}\ m$$

$$\boxed{\lambda = 7.5\times10^{-4}\ m}$$

b) NO. The speed of sound depends on the density of the material. The speed of sound in air is roughly 340 m/s.

2)



$V_s = 330\ m/s$

$C = 3.00\times10^8\ m/s$

$t = 4\ s$

Sound travels how far in 4 s.

$V = \frac{d}{t}$ $\quad d = V\cdot t = (330\ m/s)(4\ s) = 1320\ m$

$$d = 1320\ m$$

How long does it take for light to travel 1320 m

$$t = \frac{d}{V} = \frac{1320\ m}{3.00\times10^8\ m/s} = 4.4\times10^{-6}\ s$$

2) cont'd.

This time is too short for us to to perceive. For us it appears that the light arrives instantaneously. We do not need to take into account the light.

3). $f = 5.2 \times 10^{14}\ Hz$

a) Yes, look at page 31. The table falls yellow.

b) $T = \frac{1}{f} = \frac{1}{5.2 \times 10^{14}\ Hz} = 1.9 \times 10^{-15}\ s$

$$\boxed{T = 1.9 \times 10^{-15}\ s}$$

c) Yes. Travels at the speed of light.

$V = C = 3.00 \times 10^{8}\ m/s \qquad V = \lambda f$

$$\lambda = \frac{V}{f} = \frac{3.00 \times 10^{8}\ m/s}{5.2 \times 10^{14}\ s^{-1}}$$

$$\lambda = 5.77 \times 10^{-7}\ m$$

$$\boxed{\lambda = 577\ nm}$$

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3) d) It would create a diffuse reflection.

4) Because, sound is the movement or vibration of matter that travels through a medium.

Light is a electromagnectic wave, and does not require a physical medium.

5)

$$y(t) = A \sin(\omega t)$$

$$\omega = \frac{2\pi}{T}$$

a) Read off graph $\boxed{T = 5.00\,s}$

b) $$f = \frac{1}{T} = \frac{1}{5.00\,s} = 0.200\,Hz$$

$$f =$$

c) Can not be solved without the velocity.

Assume a velocity : $V = 10\,m/s$

$$\lambda = \frac{V}{f} = \frac{10\,m/s}{0.200\,s^{-1}} = 50\,m$$

$$\lambda = 50\,m$$

d) $$\omega = \frac{2\pi}{5.00\,s} = 1.26\,Hz \qquad y(t) = (2.0\,m)\sin(1.25\,Hz \cdot t)$$