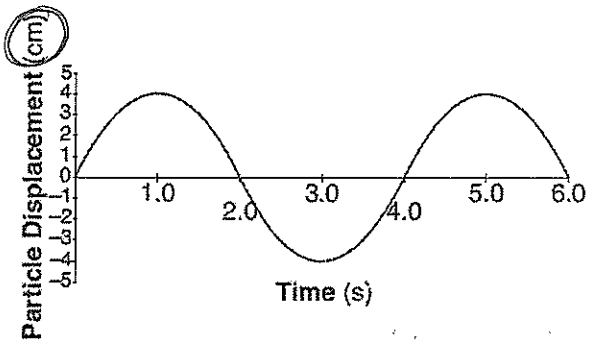
Name _____ Topic 6AB Quiz

201. A pulse travels the length of a stretched spring. The pulse transfers

a. Energy, only
b. Mass, only
c. Both energy and mass
d. Neither energy nor mass

202. The graph below represents the displacement of a particle in a medium over a period of time.



The amplitude of the wave is

a. 0.04m
b. 4m
c. 8 cm
d. 4 s

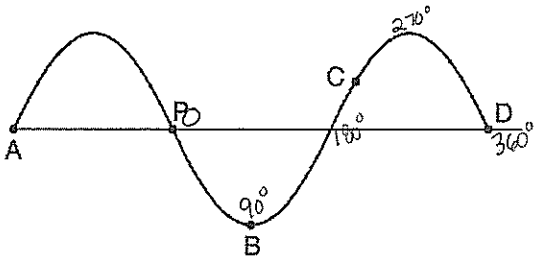
Note scale in cm

203. What is the period of a water wave if 4 complete waves pass a fixed point in 10 seconds?

a. 0.25s
b. 0.40s
c. 2.5 s
d. 4.0 s

$\text{Period} = \frac{\text{seconds}}{\text{cycle}} = \frac{10\text{s}}{4\text{cycle}} = 2.5\text{s}$

204. The diagram below represents a periodic wave.



Which point on the wave is 90^0 out of phase with point P?

a. A
b. B
c. C
d. D

205. What is the wavelength of a 256-hertz sound wave in air at STP?

a. 1.17×10^{6}m
b. 1.29m
c. 0.773m
d. 8.53×10^{-7}m

$f = 256\text{Hz}$
$V = 331\text{m/s}$
$V = f\lambda$
$\lambda = \frac{V}{f} = \frac{331\text{m/s}}{256\text{Hz}}$

206. Which statement correctly describes one characteristic of a sound wave?

a. A sound wave ~~can travel through a vacuum~~
b. A sound wave ~~is a transverse wave~~
c. The amount of energy in a sound wave is directly related to the wave's amplitude.
d. ~~The amount of energy a sound wave transmits is inversely related to the wave's frequency.~~

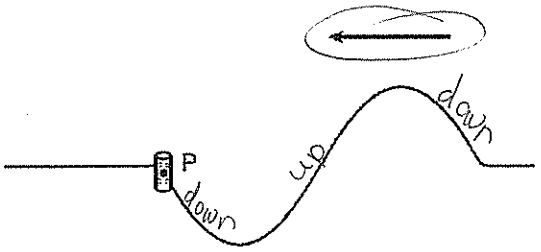
Energy in a mechanical wave is related to amplitude
Sound is a mechanical longitudinal wave

207. Which particles are not affected by the strong force?

a. Hadrons
b. Protons
c. Neutrons
d. Electrons

↗ acts on matter made of quarks

208. The diagram below represents a transverse water wave propagating toward the left. A cork is floating on the water's surface at point P.



In which direction will the cork move as the wave passes point P?

a. Up, then down, then up
b. Down , then up, then down
c. Left, then right, then left
d. Right, the left, then right

209. A deuterium nucleus consists of one proton and one neutron. The quark composition of a deuterium nucleus is

uud udd

a. 2 up quarks and 2 down quarks
b. 2 up quarks and 4 down quarks
c. 3 up quarks and 3 down quarks
d. 4 up quarks and 2 down quarks

210. Which color of light has a wavelength of 5.0×10^{-7}m in air?

Need "f" to determine color

a. Blue $6.1\text{-}6.59 \times 10^{14}$
b. Green $5.2 \text{ to } 6.1 \times 10^{14}\text{Hz}$
c. Orange
d. violet

$n_{air} = 1$ so $V = c/n = 3 \times 10^{8}\text{m/s}$

$f = \frac{V}{\lambda} = \frac{3 \times 10^{8}\text{m/s}}{5 \times 10^{-7}\text{m}} = .6 \times 10^{15}\text{Hz}$
$= 6 \times 10^{14}\text{Hz}$

211. What is the speed of light with a frequency of 5.09×10^{14}Hz when traveling through water?

~~a. 5.6×10^{14}m/s~~

~~b. 3.0×10^{8}m/s~~

c. 2.25×10^{8}m/s

~~d. 4.4×10^{8}m/s~~

$v = \frac{c}{n} = \frac{3 \times 10^{8} m/s}{1.33}$

"Trick" $n = 1$

212. Determine the frequency of a radio wave with a wavelength of 1875m moving in air at STP

a. 1.6×10^{5} Hz

b. 1.77×10^{-1}Hz

c. 1.5×10^{11}Hz

d. 6.1×10^{5}Hz

$\lambda = 1875m$ $v = 3 \times 10^{8} m/s$ $v = f\lambda$ $f = \frac{v}{\lambda} = \frac{3 \times 10^{8} m/s}{1875m}$

$= .0016 \times 10^{8}$ Hz

$= 1.6 \times 10^{5}$ Hz

213. Which of the following waves has the highest frequency?

a. Infrared b. Green Light c. blue light d. yellow light

214. Compared to the speed of a microwave in air, the speed of a radio wave in air is

a. Greater b. less c. the same

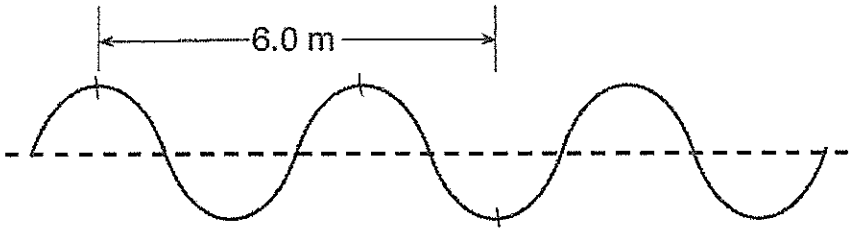
Both EM waves move at "c"

215. Compared to the speed of a radio wave in air, the speed of a sound wave in air at STP is

~~a. Greater~~ b. less c. the same

radio wave moves at $3 \times 10^{8} m/s$ Sound moves at $331 m/s$

216.



a) For the wave pictured above, determine the wavelength of a single cycle [1]

$\lambda = \frac{\text{meters}}{\text{cycle}} = \frac{6.0m}{1.5 \text{cycles}} = 4m$

b) If the entire wave train above took 12 seconds to pass, what is the frequency of the wave? (show work including equation, substitution and units) [2]

$T = \frac{\text{seconds}}{\text{cycle}} = \frac{12 \text{seconds}}{3 \text{cycles}} = 4s$ $f = \frac{1}{T} = \frac{1}{4s} = .25Hz$ $f = \frac{\text{cycle}}{\text{seconds}} = \frac{3 \text{cycles}}{12 \text{seconds}} = .25Hz$

c) Determine the speed of the wave (show all work including equation, substitution and units)? [2]

$v = \frac{\lambda}{T}$ or $v = f\lambda$

$v = \frac{4m}{4s} = 1 m/s$ $v = \left(\frac{1}{4s}\right)(4m) = 1 m/s$