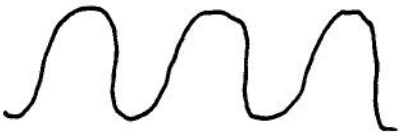
Ch. 14 Homework

Qs 3, 4, 5, 10, 11-14, 19
Ps 1-5

Questions

(3.) a) 

Longer λ

b) 

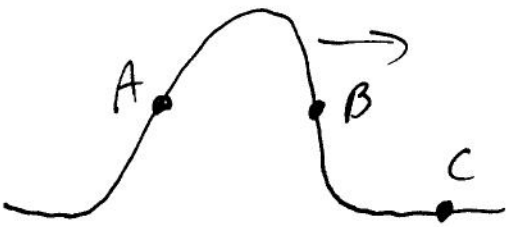
Smaller amplitude
Higher frequency
Shorter period

(4.) $v_1 = v_2 \qquad f_1 = 2f_2$

$v = \lambda f \rightarrow \lambda = \frac{v}{f} \quad \therefore \quad \lambda_1 = \frac{v_1}{f_1} = \frac{v_2}{2f_2} = \frac{1}{2}\frac{v_2}{f_2} = \frac{1}{2}\lambda_2$

$$\boxed{\lambda_1 = \tfrac{1}{2}\lambda_2}$$

(5.)



Transverse wave
Pt. A string moving down
Pt. B string moving up
Pt. C string not moving yet

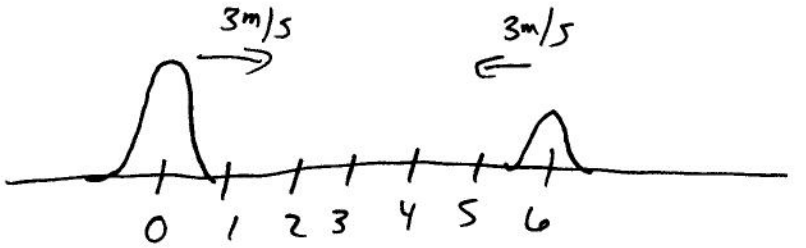
(10.) The more dense the medium the slower the wave.

Ch. 14 HW

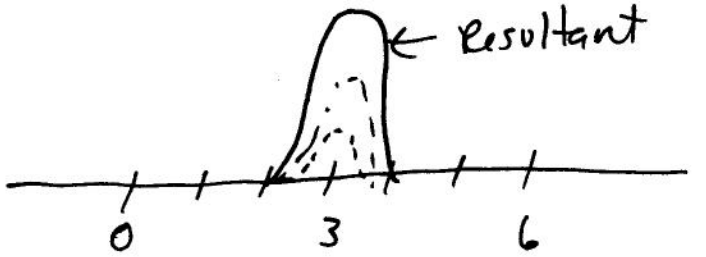
Phy 101

Qs

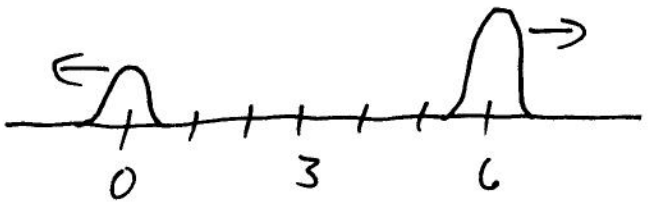
(11.)



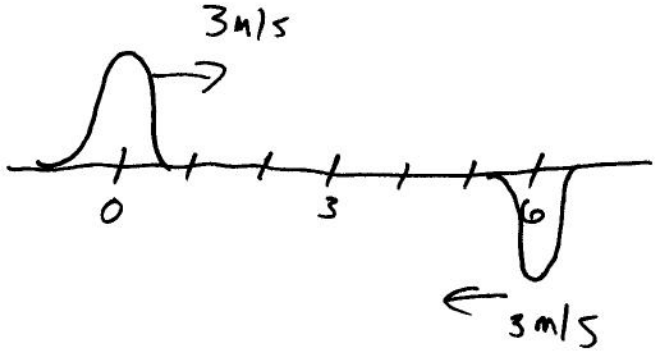
t = 1 sec



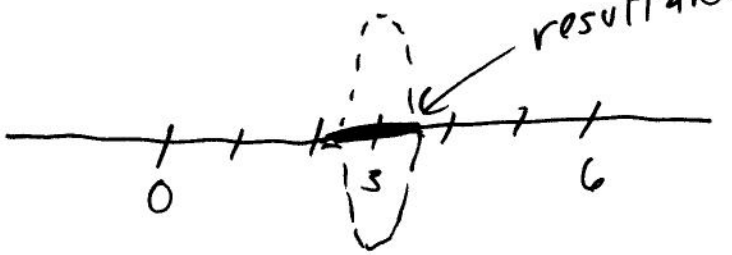
t = 2 sec



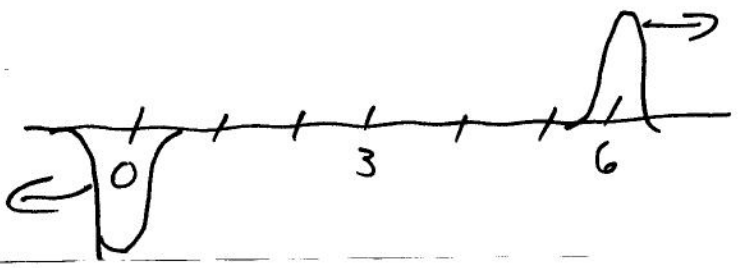
(12.)



t = 1 sec



t = 2 sec



Ch. 14 HW

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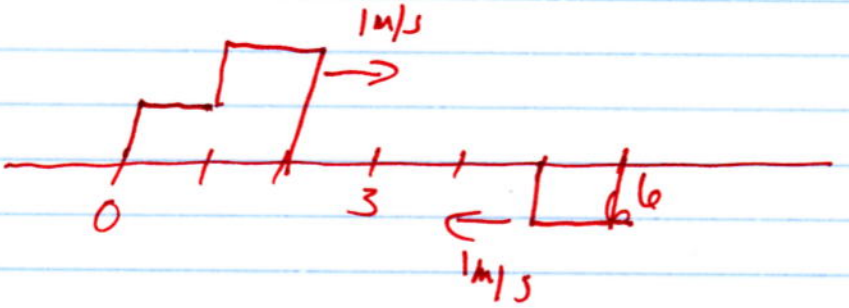
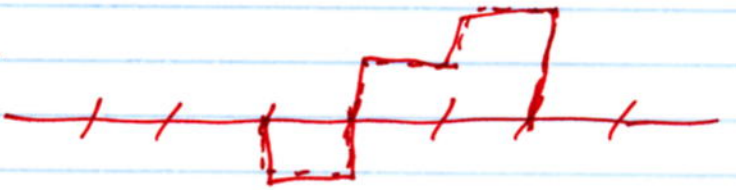
Qs

(13.)

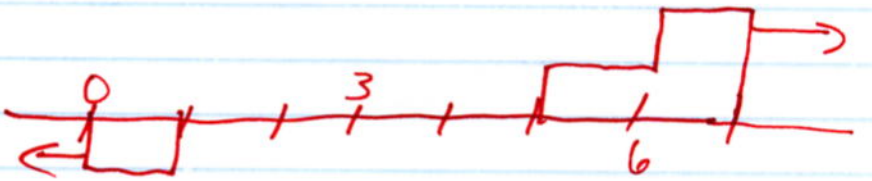


t = 2 sec

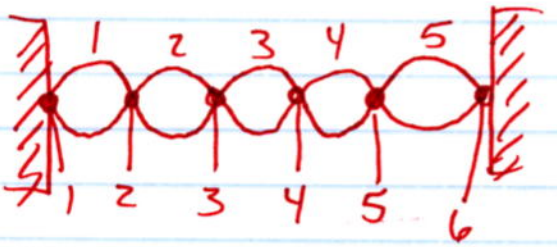
t = 3 sec



t = 5 sec



(14.)



5 antinodes (peaks)
6 nodes (mid-line)

(19.)

Rogue wave of 50 ft is too high.
If 2 waves added constructively, the highest it would be is 15+25 = 40 ft

Ch. 14 HW

Phy101

(4)

Problems

(1.) 45 pushes in 1.5 minutes

$$f = ? = \frac{\text{pushes}}{\text{second}} = \frac{45 \text{ pushes}}{90 \text{ seconds}} = \frac{1}{2} \text{ push/sec} \quad \boxed{\text{or } \frac{1}{2} \text{ Hz}}$$

(2.) $f = 0.33$ Hz $\quad t = 15$ sec $\quad$ # waves = ?

$$f = \frac{\#\text{waves}}{\text{second}} \qquad \text{Total \# waves} = f\,t = 0.33 \text{ Hz } (15 \text{ sec})$$

$$\boxed{\simeq 5 \text{ waves}}$$

(3.) $\lambda = 9$ ft , $f = 0.33$ Hz

$$v = \lambda f = 9 \text{ ft } (0.33 \text{ Hz}) \simeq \boxed{3 \text{ ft/sec}}$$

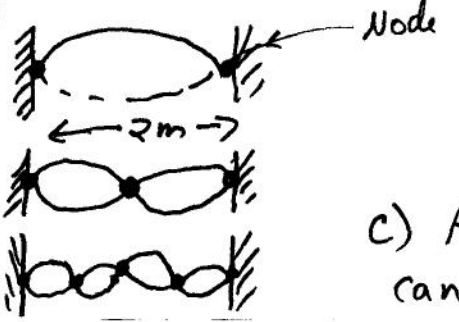
(4.) $v = 12$ m/s $\quad T = 3$ sec. $\quad \lambda = ?$

$$\lambda = \frac{v}{f} \qquad T = \frac{1}{f} \qquad \therefore \lambda = v\,T = 12 \text{ m/s } (3 \text{ sec})$$

$$\boxed{\lambda = 36 \text{ m}}$$

Cannot tell what the amplitude is.

(5.) b)



a) With 2 nodes, have $\frac{1}{2}\lambda$.
3 nodes, have 1λ.
5 nodes, have 2λ

c) Any integer number of $\frac{1}{2}\lambda$ can be found in this case.