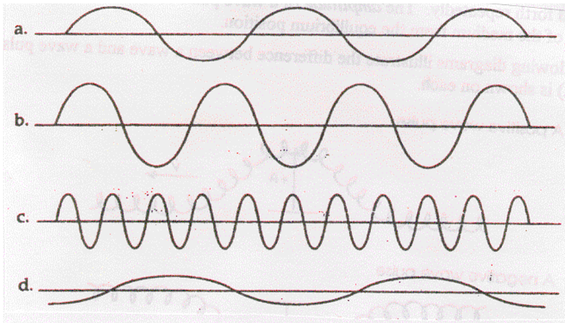
Physics 20 - Lesson 29
Waves in One-Dimension – Answer Key

/ 97

1) /4



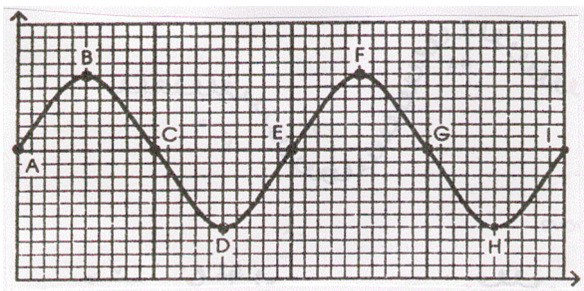
a) $\lambda = 4.0cm$

b) $\lambda = 3.0cm$

c) $\lambda = 1.0cm$

d) $\lambda = 5.5cm$

2) /8



$a) B, F$

$b) D, H$

$c) G$

$d) D$

$e) = 2.00m$

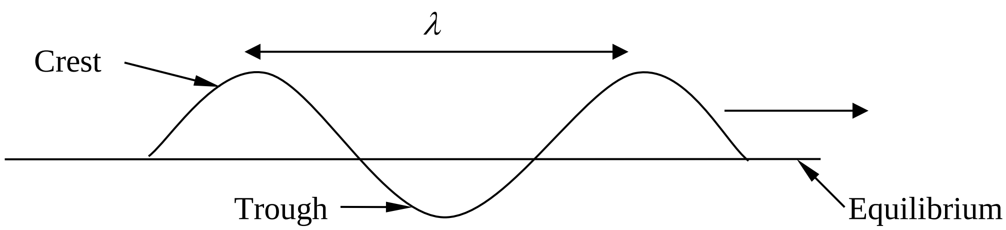
$f) A = 60cm$

$g) v = f\lambda = (40Hz)(2.00m) = \boxed{80m/s}$

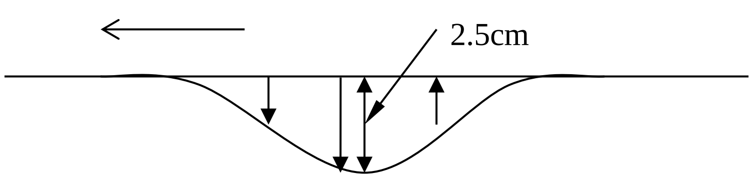
3) A wave is a form of energy that moves through a medium by vibratory motion of the particles of the medium.

/1

4) /2



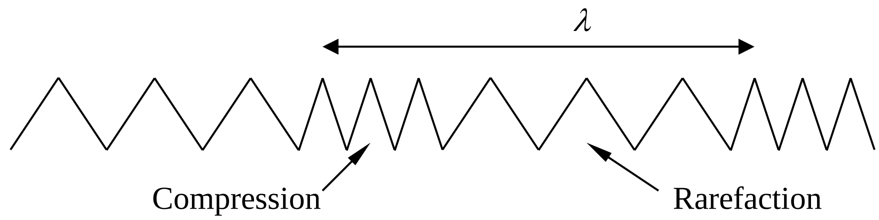
5) /2



6) Wave energy is converted into heat energy.

/1

7) /2



8) /4

$a)T = 0.30s \quad f = 3.33Hz$

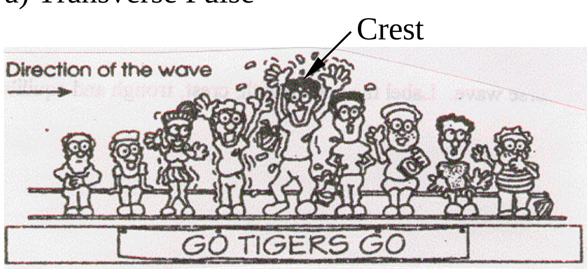
$b)T = 1.67s \quad f = 0.60Hz$

$c)T = 0.20s \quad f = 5.0Hz$

$d)T = 0.50s \quad f = 2.0Hz$

9) /1

a) Transverse Pulse



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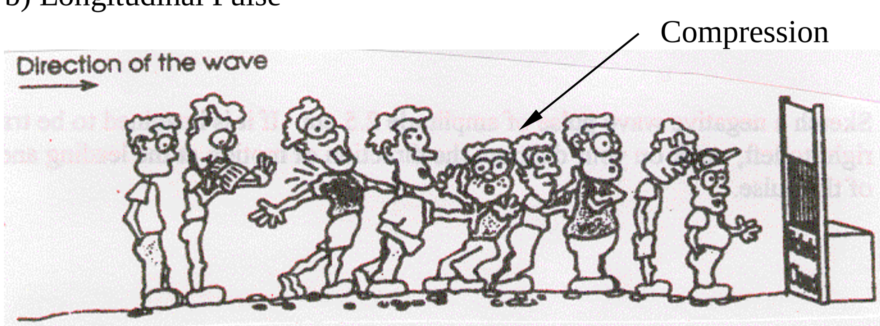
b) Longitudinal Pulse



10) /7

__**f**__ Period	a. the motion of a pendulum
__**c**__ Frequency	b. an S shape on its side
__**g**__ Amplitude	c. number of vibrations per second
__**e**__ Displacement	d. the completion of one cycle
__**b**__ Sine Curve	e. the location of an object
__**d**__ Vibration	f. time to complete one vibration
__**a**__ Simple Harmonic Motion	g. position of maximum displacement

11) a) Equilibrium**: 26cm**

b) Amplitude: **6.0cm**

c) Displacement:

/6 20cm: **+6cm**

24cm: **+2.0cm**

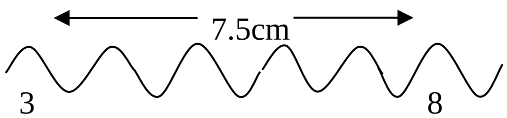
26cm: **0.0cm**

30cm: –**4.0cm**

12) $v = \frac{60cm}{2.0s} = 30cm/s$ $f = \frac{v}{\lambda} = \frac{30cm/s}{0.50cm}$

/4 $f = 60Hz$

13)



$v = f\lambda = 6.0Hz(1.5cm)$

/4 $\boxed{v = 9.0cm/s}$

$\lambda = \frac{7.5cm}{5} = 1.5cm$

14) $f = \frac{v}{\lambda} = \frac{3.00\times10^{8}m/s}{0.21m}$

/2 $f = 1.43\times10^{9}Hz$

15) $v = f\lambda = 256Hz(1.30m)$

$v = 332.8m/s$

/2

/2 a) $v = f\lambda = \frac{\lambda}{T} = \frac{10.5m}{1.613\times10^{-3}s}$

$v = 6510m/s$

b)

i) $v = 3.00\times10^{8}m/s$ $\Delta t = \frac{d}{v} = \frac{500m}{3.00\times10^{8}m/s} = 1.67\times10^{-6}s$

/6

ii) $v = 6510m/s$ $\Delta t = \frac{500m}{6510m/s} = 7.6\times10^{-2}s$

iii) $v = 332.8m/s$ $\Delta t = \frac{500m}{332.8m/s} = 1.5s$

16) **<u>Speed</u>** and **<u>wavelength</u>** are determined by properties of the medium, while **<u>frequency</u>** is
/3 determined by the source of the wave

17) /4

a) $\lambda = \frac{v}{f} = \frac{10cm/s}{2Hz} = 5.0cm$

b) No, the speed remains constant, but the wavelength will become ½

c) Wavelength becomes 10.0cm

18) /4

<u>$20Hz$</u>

$\lambda = \frac{v}{f} = \frac{340m/s}{20Hz}$

$\lambda = 17m$

<u>$20000Hz$</u>

$\lambda = \frac{v}{f} = \frac{340m/s}{20000Hz}$

$\lambda = 0.017m$

19) /2

$f = \frac{v}{\lambda} = \frac{1/4v}{4\lambda} = \frac{1}{16}f$

Frequency decreases by a factor of 16

20) /1

Decrease.

Decreased frequency $\rightarrow$ Increased wavelength

21) /4

$f = \frac{v}{\lambda} = \frac{12cm/s}{1.5cm} = 8.0Hz$

$\lambda = \frac{v}{f} = \frac{8.0cm/s}{8.0Hz}$

$\boxed{\lambda = 1.0cm}$

22) /4

$f = \frac{v}{\lambda} = \frac{12cm/s}{1.5cm} = 8.0Hz$

$v = f\lambda = 8.0Hz(2.0cm)$

$\boxed{v = 16cm/s}$

23) /4

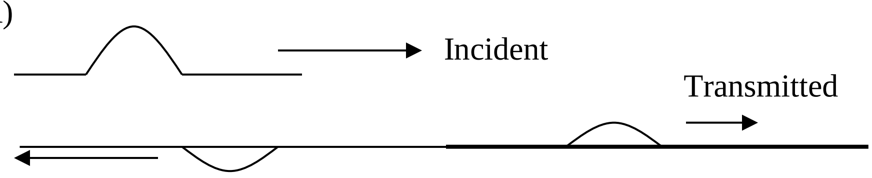
<u>Deep</u>

$\lambda = \frac{v}{f} = \frac{20cm/s}{12Hz} = 1.67cm$

<u>Shallow</u>

$\lambda = \frac{v}{f} = \frac{16cm/s}{12Hz} = 1.37cm$

24) A)


Incident
Transmitted
Reflected

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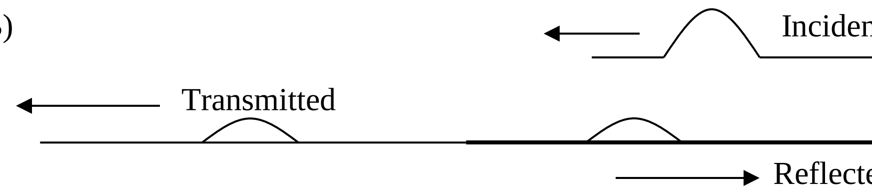
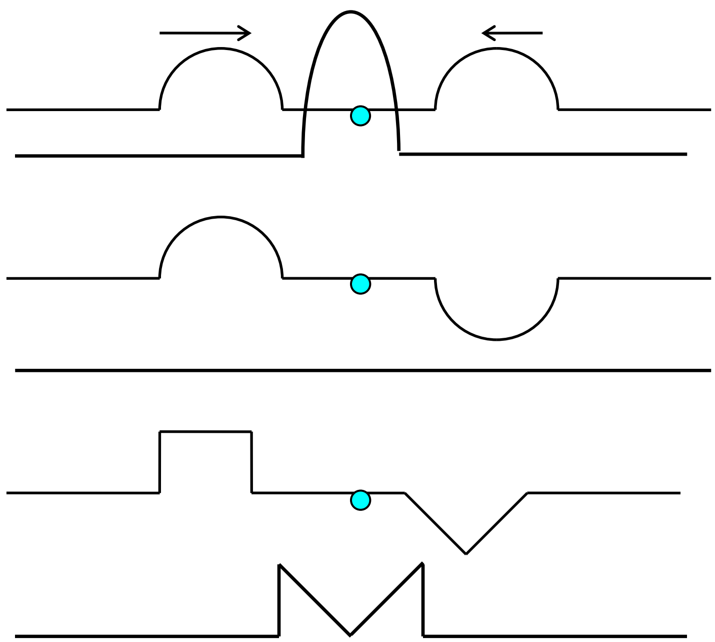
B)


Incident
Transmitted
Reflected

25)



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