



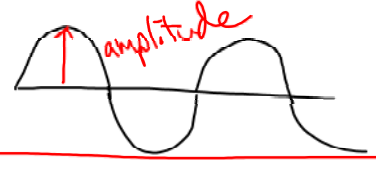
① $V = \lambda f$


② $\lambda = \frac{V}{f}$


③ $f = \frac{V}{\lambda}$



4. Light 

Hard 

5. Higher 



Lower 



Speed of sound

air	343 $\frac{m}{s}$
water	1500 $\frac{m}{s}$
Steel	5000 $\frac{m}{s}$

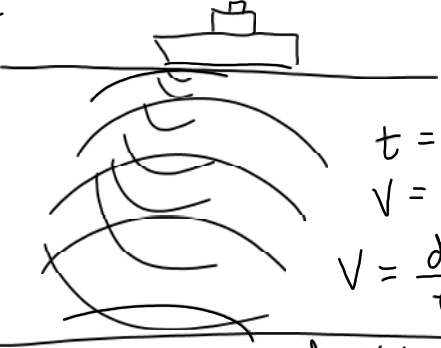
Sound Navigation and Ranging


Energy \rightarrow

A.  Transverse 

B.  Compressional energy 

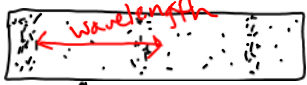
25



$t = 3 \text{ sec}$
 $v = 1500 \frac{\text{m}}{\text{s}}$
 $v = \frac{d}{t}$ 

$d = v t$
 $= 1500 \frac{\text{m}}{\text{s}} (3 \text{ s})$
 4500 m
 $4500 \text{ m} \div 2$
 $= \boxed{2250 \text{ m}}$

26.



↑ rarefaction
 ↑ compression

28. What is wavelength (λ) of a 512 Hz sound?

$\lambda = ?$
 $f = 512 \text{ Hz}$
 $v = 343 \frac{\text{m}}{\text{s}}$

$v = \lambda f$
 $\frac{v}{f} = \lambda$
 $\frac{343}{512} = \lambda = \boxed{.67 \text{ m}}$

29. If $f = 320 \text{ Hz}$
 $\lambda = 1.34 \text{ m}$


$v = \lambda f$
 $= (1.34 \text{ m})(320 \text{ Hz})$
 $= \boxed{428.8 \frac{\text{m}}{\text{s}}}$

30.

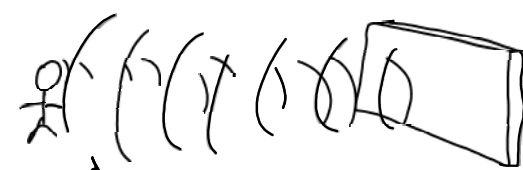
$$f = 15000 \text{ Hz}$$

$$v = 343 \frac{\text{m}}{\text{s}}$$

$$\lambda = \frac{v}{f} = \frac{343}{15000} = .0228 \text{ m}$$

$$\frac{2 \text{ m}}{.0228 \text{ m}} = 87.46 \text{ waves}$$


35



$$v = \frac{d}{t}$$

$$t = 6 \text{ sec}$$


$$v = 343 \frac{\text{m}}{\text{s}}$$

$$d = ? = vt$$

$$= 343 \frac{\text{m}}{\text{s}} (6 \text{ sec})$$

Round trip $\rightarrow 2058 \text{ m}$

one way $\rightarrow 1029 \text{ m}$



38

$$v = 700 \frac{\text{m}}{\text{s}}$$

$$\text{mach I} = 343 \frac{\text{m}}{\text{s}}$$

$$\frac{700}{343} = 2.04$$

Mach 2.04