Waves HW #2 (TSO1005) p. 225 #3, 7, 8, 11, 18, 19

③ $v_s = 330\ m/s$ What is λ that goes with

a) $f = 256\ Hz$ $\quad \lambda = v/f = \frac{330\ m/s}{256\ Hz} = \boxed{1.29\ m}$

b) $f = 25\ kHz$ $\quad \lambda = \frac{330\ m/s}{25{,}000\ Hz} = \boxed{.0132\ m}$ or $1.32\ cm$.

⑦ Stone dropped on still pond at $t=0$. Wave reach floating leaf at $d = 3.00\ m$. Use Figure 2-21.

a) $\boxed{v = 3.0\ m/s}$

b) $T = 1.5\ s$ $\quad f = \frac{1}{T} = \boxed{0.67\ Hz}$

c) $\lambda = v \cdot T = 3.0\ \frac{m}{s} \times 1.5\ s = \boxed{4.5\ m}$

Amplitude = $\boxed{10\ cm}$

⑧ Sound wave $f = 500\ Hz$ travels from air → water.

$v_{s\,air} = 330\ m/s$ $\quad v_{water} = 1490\ m/s$

What is λ in..

a) air $\lambda = \frac{v_a}{f} = \frac{330}{500} = \boxed{0.66\ m}$

b) water $\lambda = \frac{v_w}{f} = \frac{1490}{500} = \boxed{2.98\ m}$

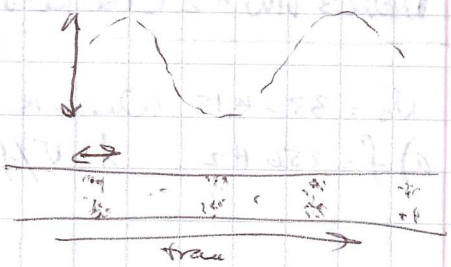
⑪ Ship sends sonar pulse $f = 30\ kHz$ and duration of $1\ ms$. towards a sub and receives a reflection. $3.2\ s$ later $v_{s\,in\,water} = 1500\ m/s$

$\lambda = \frac{v}{f} = \frac{1500}{30{,}000} = .05\ m$ $\quad T = 1/f = \frac{1}{30{,}000\ Hz} = 3.33 \times 10^{-5}\ s$

$d = v \times t = 1500\ \frac{m}{s} \times 3.2\ s = 4800\ m$ (round trip) so $d = 2400\ m$

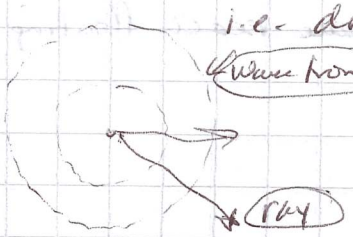
$1\ ms\ pulse = \frac{1 \times 10^{-3}\ s}{3.33 \times 10^{-5}\ \frac{s}{wave}} \approx 30\ waves$

(18) Transverse = Vibration is ⊥ to travel



Longitudinal = vibration ∥ to travel

(19) a) Wave front = a surface made of crests that is always 90° to direction of travel
i.e. dropping a pebble. All pts on wave fronts are in the same phase



b) ray = lines showing direction of wave travel
⊥ to wave fronts