Questions

3. a) Longer $\lambda$

b) Smaller amplitude

Higher frequency

Shorter period

4. $v_1 = v_2$, $f_1 = 2f_2$

$v = \lambda f \rightarrow \lambda = \frac{v}{f}$

$\lambda_1 = \frac{v_1}{f_1} = \frac{v_2}{2f_2} = \frac{1}{2} \frac{v_2}{f_2} = \frac{1}{2} \lambda_2$

$\lambda_1 = \frac{1}{2} \lambda_2$

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.
Q5

11.

\[ t = 1 \text{ sec} \]

\[ t = 2 \text{ sec} \]

\[ t = 1 \text{ sec} \]

\[ t = 2 \text{ sec} \]

Resultant flat
13.

\[ Q_s \]

13.

\[ t = 2 \text{ sec} \]

\[ t = 3 \text{ sec} \]

\[ t = 5 \text{ sec} \]

14.

5 antinodes (peaks)
6 nodes (midlines)

19.

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

1. 4.5 pushes in 1.5 minutes
   \[ f = \frac{\text{pushes}}{\text{second}} = \frac{4.5 \text{ pushes}}{90 \text{ seconds}} = \frac{1}{2} \text{ push/sec} \]
   \[ f = \frac{1}{2} \text{ Hz} \]

2. \( f = 0.33 \text{ Hz} \) \( t = 15 \text{ sec} \) \# waves = ?
   \[ f = \frac{\# \text{ waves}}{\text{second}} \]
   Total \# waves = \( f \times t = 0.33 \text{ Hz} \times 15 \text{ sec} \)
   \[ \approx 5 \text{ waves} \]

3. \( \lambda = 9 \text{ ft} \) \( f = 0.33 \text{ Hz} \)
   \[ v = \lambda f = 9 \text{ ft} \times (0.33 \text{ Hz}) = 3 \text{ ft/sec} \]

4. \( v = 12 \text{ m/sec} \) \( T = 3 \text{ sec} \) \( \lambda = ? \)
   \[ \lambda = \frac{v}{f} \]
   \[ T = \frac{1}{f} \]
   \[ \therefore \lambda = 2T = 12 \text{ m/sec} \times 3 \text{ sec} \]
   \[ \lambda = 36 \text{ m} \]
   Cannot tell what the amplitude is.

5. (b)

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

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