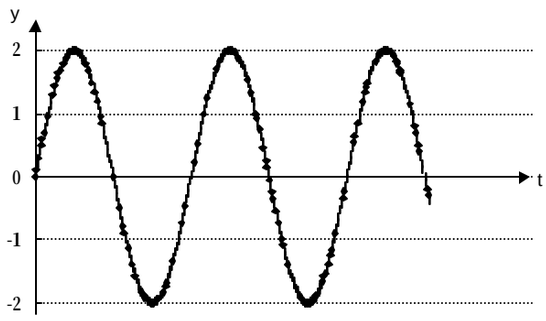
P.24 (8 – 9)

8. (a) Period T is the time taken for one complete disturbance.
Wavelength λ is the distance between two successive wave particles that are always moving with same phase.

(b) $y = 2\cos\left(\frac{2p}{T}t\right)$

(c) (i) phase angle $f = 2p\frac{x}{l} = 2p\frac{\left(\frac{1}{4}l\right)}{l} = \frac{p}{2}$

(ii) $y = 2\cos\left(\frac{2p}{T}t - \frac{p}{2}\right) = 2\sin\left(\frac{2p}{T}t\right)$



9. (a) Longitudinal waves : the vibrations are parallel to the direction of wave propagation.
Transverse waves : the vibrations are perpendicular to the direction of wave propagation.

(b) (i) $v_p = \frac{700\times10^3}{75}$
$= 9.33 \times 10^3 \text{ m s}^{-1}$

$v_S = \frac{700\text{x}10^3}{120}$
$= 5.83\text{x}10^3 ms^{-1}$

(ii) $v_p = \sqrt{\frac{E}{\rho}}$

$9.33 \times 10^3 = \sqrt{\frac{E}{2.5\times10^3}}$

$E = 2.18\times 10^{11} \text{ N m}^{-2}$

(c) (i) Smallest *S-P* interval, amplitude largest, earliest registered signal

(ii) A : 700 km
B : 420 km

Note: $\frac{A}{v_S} - \frac{A}{v_P} = 45$ and $\frac{B}{v_S} - \frac{B}{v_P} = 27$

Position Z

(d) The natural frequency of bridge F is close to the (driving) frequency of the quake waves. Therefore bridge F absorbs energy more efficiently and therefore develops a larger amplitude of vibration (resonance).