P #35

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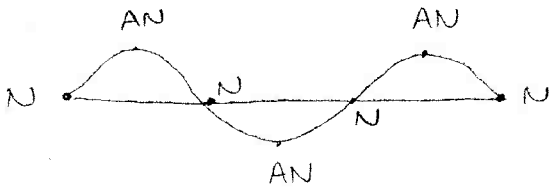
a) Find velocity

$m = 40g = .040\ kg$
$l = 8.0\ m$
$F = 49\ N$

$$v = \sqrt{\frac{F}{m/l}} = \sqrt{\frac{(49N)}{(.040kg)/8.0m)}}$$

$v = 99.0\ m/s$



Nodes occur at the ends of the string and at $1/3 \cdot L$ and $2/3 \cdot L$

$N = 1/3 \cdot L = 1/3(8m) = 2.67\ m$
$= 2/3 \cdot L = 2/3(8m) = 5.33\ m$

Nodes: 0m, 2.67m, 5.33m, 8

Antinodes occur at $1/6 \cdot L$, $1/2 \cdot L$, $5/6$

$AN = 1/6 \cdot L = 1/6(8m) = 1.3\ m$
$= 1/2 \cdot L = 1/2(8m) = 4\ m$
$= 5/6 \cdot L = 5/6(8m) = 6.67m$

Antinodes: 1.33m, 4m, 6.67m

b) $v = 99.0 m/s$

$\lambda = 2/3 \cdot L = 2/3(8m)$

$\lambda = 5.33m$

$v = f \cdot \lambda$

$(99 m/s) = f \cdot (5.33m)$

$f = 18.6\ Hz$