

91. Since they oscillate out of phase, then their waves will cancel (producing a node) at a point exactly midway between them (the midpoint of the system, where we choose $x = 0$). We note that Figure 18-14, and the $n = 3$ case of Figure 18-15(a) have this property (of a node at the midpoint). The distance Δx between nodes is $\lambda/2$, where $\lambda = v/f$ and $f = 300$ Hz and $v = 343$ m/s. Thus, $\Delta x = v/2f = 0.572$ m. Therefore, nodes are found at the following positions:

$$x = \pm\Delta x = \pm 0.57 \text{ m}$$

$$x = \pm 2\Delta x = \pm 1.14 \text{ m}$$

$$x = \pm 3\Delta x = \pm 1.72 \text{ m}$$