With your small group, compare and contrast the infinite square well (ISW) in quantum mechanics and periodic waves on an infinite string in classical mechanics. Generate as many similarities and differences as you can. Be specific.

Solution Some answers include:

- Both are modelled as partial differential equations.
- One is a solution of Schrödinger's equatione; the other, the wave equation.
- Schrödinger's equation has one time derivative and therefore one intial condition. The wave equation has two time derivatives and therefore two initial conditions.
- The boundary conditions for the ISW are Dirichlet (the function goes to zero at the spatial boundaries). The boundary conditions for the wave equation are periodic.
- The spatial eigenbasis for the ISW is

$$|n\rangle \doteq \sin\left(\frac{n\pi x}{L}\right) \qquad \text{for } n \text{ a non-negative integer}$$

  The spatial eigenbasis for the wave equation is

$$|n\rangle \doteq \sin\left(\frac{2n\pi x}{L}\right) \qquad \text{for } n \text{ a non-negative integer} \tag{1}$$

$$|n\rangle \doteq \cos\left(\frac{2n\pi x}{L}\right) \qquad \text{for } n \text{ a non-negative integer} \tag{2}$$