Solution

Consider a particle in a 2D well, with $L_x = L_y = L$.

1. Compare the energies of the (2,2), (1,3), and (3,1) states?

   a. $E_{(2,2)} > E_{(1,3)} = E_{(3,1)}$

   b. $E_{(2,2)} = E_{(1,3)} = E_{(3,1)}$

   c. $E_{(2,2)} < E_{(1,3)} = E_{(3,1)}$

$$E_{(1,3)} = E_{(3,1)} = E_0 (1^2 + 3^2) = 10\, E_0$$

$$E_{(2,2)} = E_0 (2^2 + 2^2) = 8\, E_0$$

$$E_0 \equiv \frac{h^2}{8mL^2}$$

2. If we squeeze the box in the x-direction (*i.e.*, $L_x < L_y$) compare $E_{(1,3)}$ with $E_{(3,1)}$.

   a. $E_{(1,3)} < E_{(3,1)}$

   b. $E_{(1,3)} = E_{(3,1)}$

   c. $E_{(1,3)} > E_{(3,1)}$