2. We apply Newton's second law (Eq. 5-1 or, equivalently, Eq. 5-2). The net force applied on the chopping block is $\vec{F}_{\text{net}} = \vec{F}_1 + \vec{F}_2$, where the vector addition is done using unit-vector notation. The acceleration of the block is given by $\vec{a} = \left(\vec{F}_1 + \vec{F}_2\right)/m$.

   (a) In the first case

$$\vec{F}_1 + \vec{F}_2 = \left((3.0\,\text{N})\hat{\text{i}} + (4.0\,\text{N})\hat{\text{j}}\right) + \left((-3.0\,\text{N})\hat{\text{i}} + (-4.0\,\text{N})\hat{\text{j}}\right) = 0$$

   so $\vec{a} = 0$.

   (b) In the second case, the acceleration $\vec{a}$ equals

$$\frac{\vec{F}_1 + \vec{F}_2}{m} = \frac{\left((3.0\,\text{N})\,\hat{\text{i}} + (4.0\,\text{N})\hat{\text{j}}\right) + \left((-3.0\,\text{N})\,\hat{\text{i}} + (4.0\,\text{N})\hat{\text{j}}\right)}{2.0\,\text{kg}} = 4.0\,\hat{\text{j}}\ \text{m/s}^2\ .$$

   (c) In this final situation, $\vec{a}$ is

$$\frac{\vec{F}_1 + \vec{F}_2}{m} = \frac{\left((3.0\,\text{N})\,\hat{\text{i}} + (4.0\,\text{N})\hat{\text{j}}\right) + \left((3.0\,\text{N})\hat{\text{i}} + (-4.0\,\text{N})\hat{\text{j}}\right)}{2.0\,\text{kg}} = 3.0\,\hat{\text{i}}\ \text{m/s}^2\ .$$