

6.6. Visualize: Please refer to Figure EX6.6.

Solve: For the diagram on the left, three of the vectors lie along the axes of the tilted coordinate system. Notice that the angle between the 3 N force and the $-y$ -axis is the same 20° by which the coordinates are tilted. Applying Newton's second law,

$$a_x = \frac{(F_{\text{net}})_x}{m} = \frac{5 \text{ N} - 1 \text{ N} - (3 \sin 20^\circ) \text{ N}}{2 \text{ kg}} = 1.49 \text{ m/s}^2$$

$$a_y = \frac{(F_{\text{net}})_y}{m} = \frac{2.82 \text{ N} - (3 \cos 20^\circ) \text{ N}}{2 \text{ kg}} = 0 \text{ m/s}^2$$

For the diagram on the right, the 2-newton force in the first quadrant makes an angle of 15° with the positive x -axis. The other 2-newton force makes an angle of 15° with the negative y -axis. The accelerations are

$$a_x = \frac{(F_{\text{net}})_x}{m} = \frac{(2 \cos 15^\circ) \text{ N} + (2 \sin 15^\circ) \text{ N} - 3 \text{ N}}{2 \text{ kg}} = -0.28 \text{ m/s}^2$$

$$a_y = \frac{(F_{\text{net}})_y}{m} = \frac{1.414 \text{ N} + (2 \sin 15^\circ) \text{ N} - (2 \cos 15^\circ) \text{ N}}{2 \text{ kg}} = 0 \text{ m/s}^2$$