Recitation

Forces

In your workbook, complete item 9 found in **4.5 What Do Forces Do?** and items 13-22 found in sections **4.6 Newton's Second Law** and **4.7 Free-Body Diagrams.**

TACTICS BOX 4.2: Identifying forces

1 Identify the object of interest. This is the object whose motion you wish to study.

2 Draw a picture of the situation. Show the object of interest and all other objects—such as ropes, springs, and surfaces—that touch it.

3 Draw a closed curve around the object. Only the object of interest is inside the curve; everything else is outside.

4 Locate every point on the boundary of this curve where other objects touch the object of interest. These are the points where *contact forces* are exerted on the object.

5 Name and label each contact force acting on the object. There is at least one force at each point of contact; there may be more than one. When necessary, use subscripts to distinguish forces of the same type.

6 Name and label each long-range force acting on the object. For now, the only long-range force is weight.

TACTICS BOX 4.3: Drawing a free-body diagram

1 Identify all forces acting on the object. This step was described in Tactics Box 4.2.

2 Draw a coordinate system. Use the axes defined in your pictorial representation (Tactics Box 2.2). If those axes are tilted, for motion along an incline, then the axes of the free-body diagram should be similarly tilted.

3 Represent the object as a dot at the origin of the coordinate axes. This is the particle model.

4 Draw vectors representing each of the identified forces. This was described in Tactics Box 4.1. Be sure to label each force vector.

5 Draw and label the *net force* vector $\vec{F}_{\text{net}}$. Draw this vector beside the diagram, not on the particle. Then check that $\vec{F}_{\text{net}}$ points in the same direction as the acceleration vector $\vec{a}$ on your motion diagram. Or, if appropriate, write $\vec{F}_{\text{net}} = 0$.