4.3 A Short Catalog of Forces

4.4 Identifying Forces

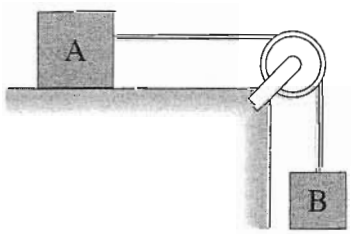
Exercises 4–8: Follow the six-step procedure of Tactics Box 4.2 to identify and name all the forces acting on the object.

4. An elevator suspended by a cable is descending at constant velocity.

5. A compressed spring is pushing a block across a rough horizontal table.

6 A brick is falling from the roof of a three-story building.

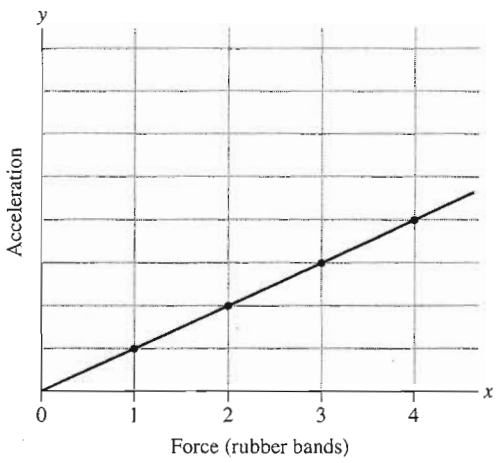
7. Blocks A and B are connected by a string passing over a pulley Block B is falling and dragging block A across a frictionless table. Let block A be "the system" for analysis.



8. A rocket is launched at a 30° angle. Air resistance is not negligible.

4.5 What Do Forces Do?

9. The figure shows an acceleration-versus-force graph for an object of mass m. Data have been plotted as individual points, and a line has been drawn through the points.



Draw and label, directly on the figure, the acceleration-versus-force graphs for objects of mass

a. $2m$ b. $0.5m$

Use triangles ▲ to show four points for the object of mass $2m$, then draw a line through the points. Use squares ■ for the object of mass $0.5m$.

10. A constant force applied to an object causes the object to accelerate at 10 m/s^2. What will the acceleration of this object be if

a. The force is doubled? _____ b. The mass is doubled? _____

c. The force is doubled *and* the mass is doubled? _____

d. The force is doubled *and* the mass is halved? _____

11. A constant force applied to an object causes the object to accelerate at 8 m/s^2. What will the acceleration of this object be if

a. The force is halved? _____ b. The mass is halved? _____

c. The force is halved *and* the mass is halved? _____

d. The force is halved *and* the mass is doubled? _____

12. The quantity y is inversely proportional to x and $y = 4$ when $x = 9$.

a. Write an equation to represent this inverse relationship for all y and x.

b. Find y if $x = 12$ _____ c. Find x if $y = 36$ _____

d. Compare your equation in part a to the equation from your text relating a and m, $a = \frac{F}{m}$.

Which quantity assumes the role of x? _____

Which quantity assumes the role of y? _____

What is the constant of proportionality relating a and m?