can be made about the situation, including the ball's surroundings, size, spin, weight, color, time in the air, speed, and sound when hitting the ground. The first step toward simplifying this complicated situation is to decide what to study, that is, to define the **system.** Typically, a single object and the items that immediately affect it are the focus of attention. For instance, suppose you decide to study the ball's motion in the air (before it potentially reaches any of the other players), as shown in **Figure 5(a).** To study this situation, you can eliminate everything except information that affects the ball's motion.

system

a set of particles or interacting components considered to be a distinct physical entity for the purpose of study

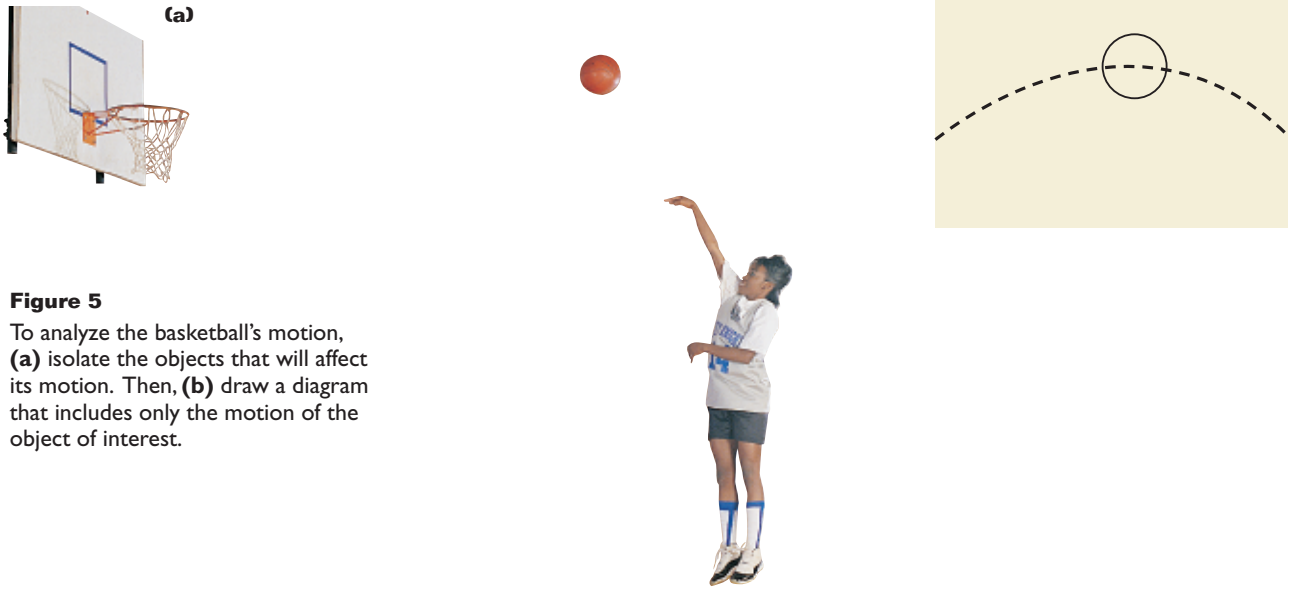

Figure 5
To analyze the basketball's motion, **(a)** isolate the objects that will affect its motion. Then, **(b)** draw a diagram that includes only the motion of the object of interest.

You can disregard characteristics of the ball that have little or no effect on its motion, such as the ball's color. In some studies of motion, even the ball's spin and size are disregarded, and the change in the ball's position will be the only quantity investigated, as shown in **Figure 5(b).**

In effect, the physicist studies the motion of a ball by first creating a simple model of the ball and its motion. Unlike the real ball, the model object is isolated; it has no color, spin, or size, and it makes no noise on impact. Frequently, a model can be summarized with a diagram, like the one in **Figure 5(b).** Another way to summarize these models is to build a computer simulation or small-scale replica of the situation.

Without models to simplify matters, situations such as building a car or sailing a boat would be too complex to study. For instance, analyzing the motion of a sailboat is made easier by imagining that the push on the boat from the wind is steady and consistent. The boat is also treated as an object with a certain mass being pushed through the water. In other words, the color of the boat, the model of the boat, and the details of its shape are left out of the analysis. Furthermore, the water the boat moves through is treated as if it were a perfectly smooth-flowing liquid with no internal friction. In spite of these simplifications, the analysis can still make useful predictions of how the sailboat will move.

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