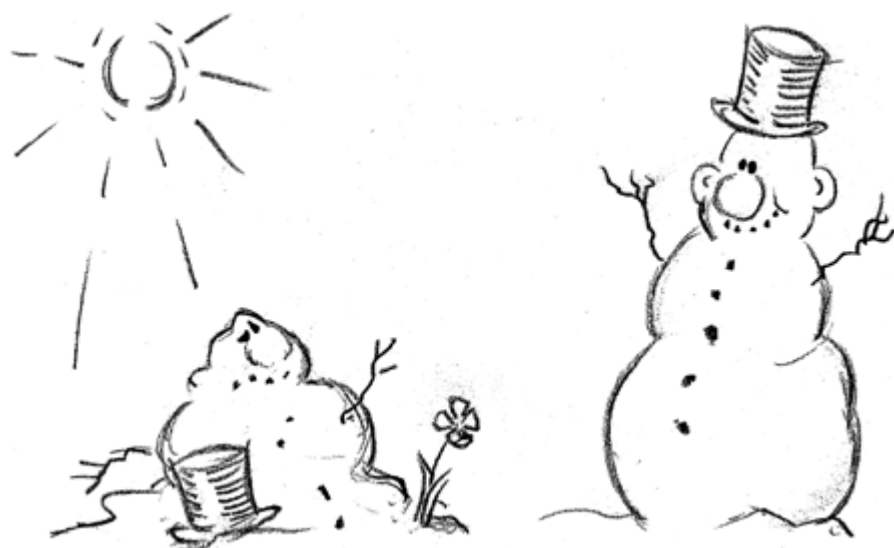


Describing Motion in One Dimension



The aim of physics is to understand the rules by which nature plays. As participant-observers, we try to deduce the rules from our observations. The success of our efforts will depend not only on our powers of observation but on what questions we ask and how carefully we formulate them.

What might early humans have asked about the points of light they saw in the night sky? They might have asked why a few looked redder than the rest. But we know now that the red ones include the planet Mars and several distant stars. For that reason, a question that lumped them together would have been unlikely to advance their understanding. They might instead have wondered about their motions, noticed that like the sun and moon, they all rise and set, and left it at that. Or they might have inquired about the motions in greater detail and noticed that although most stars move in formation, a few do not. Like a drum major moving up and down a formation of marchers in a parade, they change their positions against the fixed patterns of the constellations. The ancient Greeks called these stars *planetes*, meaning wanderers. We call them planets. Before telescopes, it was the planets' motions alone that distinguished them from other stars.



“We can often describe the changes that we see in terms of ... matter in motion.”

At each stage, then, we try to pose questions that advance our understanding. But there is no rule for how to do this, no fixed “scientific method.” What should we ask about in dealing with all of nature? What aspects should we focus on? A dominant aspect of what happens in the physical world is change. We can often describe the changes that we see in terms of rearrangements of the matter or “stuff” that makes up everything in our world. This in turn requires us to think of *matter in motion*.

Copyright © 2004 by John Wiley & Sons, Inc. or related companies. All rights reserved.