

Cubes question

A scientist in a laboratory does a series of experiments with identical cubes. The cubes are the same mass, same material, and same shape, and all start at room temperature. In every experiment, the scientist drops the cubes into a pot of boiling water. The cubes stay in the water for five minutes and then are dumped onto a table, and the scientist measures their temperature.

- (a) In one of these experiments, the temperature of one of the cubes is much higher than the temperature of the other two. How do you make sense of this?*
- (b) In another experiment, all three cubes have the same temperature. How do you make sense of this?*
- (c) In yet another experiment, one of the three cubes has a temperature less than room temperature (i.e., the cube got colder in the water). How do you make sense of this?*



Particles question

Imagine it were possible for a scientist to track single gas particles in a sealed container and measure their speed at different moments. In a series of experiments, this scientist takes a sealed container of gas and identifies three identical gas particles, all moving with the same initial speed but in different (random) directions. Five minutes later, the scientist locates the same three particles and measures their speeds again.

- (a) *In one of these experiments, the scientist finds that five minutes after the initial measurement, one of the three particles has a much higher speed than the other two particles. How do you make sense of this?*
- (b) *In another experiment, the scientist finds that five minutes after the initial measurement, the three particles have the same speed as one another. How do you make sense of this?*
- (c) *In yet another experiment, the scientist finds that five minutes after the initial measurement, one of the particles has a speed much lower than the initial particle speeds (i.e., the particle slowed down). How do you make sense of this?*

