

1.16. Model: Represent the tennis ball as a particle.

Visualize: The particle falls freely for the three stories under the acceleration of gravity. It strikes the ground and very quickly decelerates to zero (while decompresses) and finally travels upward with negative acceleration under gravity to zero velocity at a height of two stories. The downward and upward motions of the ball are shown in the figure. The increasing length between the dots during downward motion indicates increasing average velocity or downward acceleration. On the other hand, the decreasing length between the dots during upward motion indicates acceleration in a direction opposite to its motion; that is, in the downward direction.

Assess: For a free-fall motion, acceleration due to gravity is always vertically downward.

