3 Linear Motion

Solutions to Chapter 3 Exercises

4. The speeds of both are exactly the same, but the velocities are not. Velocity includes direction, and since the directions of the airplanes are opposite, their velocities are opposite. The velocities would be equal only if both speed and direction were the same.

5. Constant velocity means no acceleration, so the acceleration of light is zero.

14. A vertically-thrown ball has zero speed at the top of its trajectory, but acceleration there is *g*.

16. An object moving in a circular path at constant speed is a simple example of acceleration at constant speed because its velocity is changing direction. No example can be given for the second case, for constant velocity means zero acceleration. You can't have a nonzero acceleration while having a constant velocity. There are no examples of things that accelerate while not accelerating.

28. In the absence of air resistance, the acceleration will be *g* no matter how the ball is released. The acceleration of a ball and its speed are entirely different.

35. The acceleration due to gravity remains a constant *g* at all points along its path as long as no other forces like air drag act on the projectile.

40. The ball on B finishes first, for its average speed along the lower part as well as the down and up slopes is greater than the average speed of the ball along track A.

Chapter 3 Problem Solutions

2. $a = \frac{\textit{change in velocity}}{\textit{time interval}} = \frac{-100 \text{ km/h}}{10\text{s}} =$ **-10 km/h·s**. (The vehicle decelerates at 10 km/h·s.)

6. $a = \frac{\textit{change in velocity}}{\textit{time interval}} = (25 \text{ m/s} - 0)/10 \text{ s} =$ **2.5 m/s²**.