

CHAPTER 2 | *KINEMATICS IN ONE DIMENSION*

1. (b) Displacement, being a vector, conveys information about magnitude and direction. Distance conveys no information about direction and, hence, is not a vector.
3. (c) The average speed is the distance of 16.0 km divided by the elapsed time of 2.0 h. The average velocity is the displacement of 0 km divided by the elapsed time. The displacement is 0 km, because the jogger begins and ends at the same place.
6. (c) The average acceleration is the change in velocity (final velocity minus initial velocity) divided by the elapsed time. The change in velocity has a magnitude of 15.0 km/h. Since the change in velocity points due east, the direction of the average acceleration is also due east.
10. (c) The equations of kinematics can be used only when the acceleration remains constant and cannot be used when it changes from moment to moment.
13. (d) According to one of the equation of kinematics ($x = v_0t + \frac{1}{2}at^2$, with $v_0 = 0$ m/s), the displacement is proportional to the acceleration.
19. (b) Free-fall is the motion that occurs while the acceleration is solely the acceleration due to gravity. While the rocket is picking up speed in the upward direction, the acceleration is not just due to gravity, but is due to the combined effect of gravity and the engines. In fact, the effect of the engines is greater than the effect of gravity. Only when the engines shut down does the free-fall motion begin.
22. (d) The acceleration due to gravity points downward, in the same direction as the initial velocity of the stone thrown from the top of the cliff. Therefore, this stone picks up speed as it approaches the nest. In contrast, the acceleration due to gravity points opposite to the initial velocity of the stone thrown from the ground, so that this stone loses speed as it approaches the nest. The result is that, on average, the stone thrown from the top of the cliff travels faster than the stone thrown from the ground and hits the nest first.
24. (a) The slope of the line in a position versus time graph gives the velocity of the motion. The slope for part A is positive. For part B the slope is negative. For part C the slope is positive.