

## Kinematics Review

Solve the following problems using the principles and equations of kinematics.

- 1) The average velocity of a min-bike is 15.0 km/h, how long will it take to go 35.0 m?
- 2) A sprinter starting from rest reaches a final velocity of 28.8 km/h. What is her average velocity?
- 3) A coin is dropped and strikes the earth with a velocity of 15.15 m/s. For how long was it falling, and from what height did it fall?
- 4) A rocket lifts off from Earth at  $13.3 \text{ m/s}^2$  from the launch pad, how high into the atmosphere does it rise during the first five seconds of its path?
- 5) A truck accelerates from rest to a velocity of 22.4 m/s at a rate of  $0.60 \text{ m/s}^2$ . How long was it accelerating and how far did it travel while accelerating?
- 6) A car in a school zone accelerates from 85 km/h to 120 km/h in 9.2 seconds. What was its acceleration?
- 7) How long will it take for a rock to fall to the ground if dropped from a height of 92.0 m?
- 8) A rock is thrown down from a rail trestle with height 13.0 m at velocity 18.8 m/s. With what velocity will it strike the ground?
- 9) A car travelling at 90.0 km/h comes to a stop in 12.0 s, what was its acceleration?
- 10) A car travelling at 60.0 km/h accelerates to 90.0 km/h at  $2.03 \text{ m/s}^2$ . How long does this take and how far does the car travel in this time?
- 11) A rock is dropped from a bridge and strikes the water below 24.0 seconds later. With what speed did it strike the water and from what height was it dropped?
- 12) A bullet is fired upward from a gun and reaches a maximum height of 2100 m. What is its velocity at the high point, what was its initial velocity, and how long was it in the air?
- 13) A cat is thrown upward from the edge of a building with velocity 2.0 m/s. If the cat then falls the entire height of the building (30.0 m) with what velocity will it strike the ground?
- 14) A cat is thrown off a 25.0 m high building with a horizontal velocity of 5.0 m/s. How far from the base of the building will the cat hit?
- 15) A bomber is carpet bombing a city. If the plane is at an altitude of 12000 m, and flying at 100 m/s how far before reaching the city should the bombs be released?
- 16) A diver jumps from the 15 m platform. If the edge of the pool extends 3.0 m from the base of the platform with what initial velocity must he/she jump in order to clear it?
- 17) A golfer strikes the ball with a speed of 15 m/s at an angle of  $40^\circ$  to the horizon, how far will the ball travel and what will be its maximum height?

**Answers:**

- 1) 8.4 s      2) 4 m/s      3) 1.55 s, 11.7 m      4) 166 m      5) 418 m, 37.3 s      6) 1.01 m/s<sup>2</sup>  
7) 4.3 s      8) -24.7 m/s      9) -2.1 m/s<sup>2</sup>      10) 4.1 s, 85.5 m      11) -235 m/s, 2820 m  
12) 0 m/s, 203 m/s, 41.4 s      13) -24 m/s      14) 11 m      15) 4950 m      16) 1.7 m/s  
17) 22.5 m, 4.7 m