

Aim # 15 – Motion Problems

1. A penny is dropped from the top of the empire state building (381 m). Neglecting air resistance, what will be the speed of the penny just before hitting the ground?
2. During a 45 second interval, the speed of a rocket rose steadily from 50 m/s to 650 m/s. How far did the rocket travel in this time?
3. A rock dropped from the top of the Tower of Pisa lands on the ground 3.30 seconds later. With what speed will the rock hit the ground?
4. An object initially traveling at 20. m/s west accelerates uniformly at 4.0 m/s^2 east for 2.0 seconds. What is the displacement of the object during these 2.0 seconds (include magnitude and direction)?
5. Starting from rest, an object rolls freely down a 10. meter long incline in 2.0 seconds. What is the acceleration of the object?

6. A basketball is thrown straight up with a speed of 15 m/s. How high will it go?

7. A truck moving at a speed of 30 m/s (\approx 66 mph) sees a red light and slams on the brakes. If the brakes decelerate the truck at a rate of 20 m/s^2 , then how far will the truck travel before coming to a stop?

8. A car moving at a speed of 8.0 m/s enters a highway and accelerates *uniformly* at 3.0 m/s^2 . How fast will the car be moving after it has accelerated over a distance of 56 meters?

9. A skier starting from rest skis down a slope 50 meters long in 5 seconds. What is the skier's acceleration?

10. An object traveling at 5.0 m/s accelerates at a rate of 2.0 m/s^2 for 4.0 s. What distance does the object cover in the 4.0 seconds?

11. Two similar cars driven by crash test dummies are the same distance from a wall, but one is traveling at a speed of 50 mph while the other is moving at 70 mph. They both slam the brakes with equal force and at the same instant. The car initially moving 50 mph is able to stop just before hitting the wall. With what speed will the car initially traveling 70 mph hit the wall?