

AP Physics Unit 1 Kinematics – Problem Set 1, 2, 3

Problem Set 1 – Average Velocity and Displacement

1. If Joe rides his bicycle in a straight line for 15 min with an average velocity of 12.5 km/h south, how far has he ridden?
2. Simpson drives his car with an average velocity of 48.0 km/h to the east. How long will it take him to drive 144 km on a straight highway?
3. A bus travels 280 km south along a straight path with an average velocity of 88 km/h to the south. The bus stops for 24 min. Then, it travels 210 km south with an average velocity of 75 km/h to the south.
 - a. How long does the total trip last?
 - b. What is the average velocity of the total trip?

Problem Set 2 – Displacement with Constant Acceleration

1. When Maggie applies the brakes on her car, the car slows uniformly from 15.0 m/s to 0.0 m/s in 2.50 seconds. How many meters before a stop sign must she apply her brakes in order to stop at the sign?
2. A driver in a car traveling at a speed of 21.8 m/s sees a cat 101 m away on the road. How long will it take for the car to accelerate uniformly to a stop in exactly 99 m?
3. A car enters the freeway with a speed of 6.4 m/s and accelerates uniformly for 3.2 km in 3.5 min. How fast (in m/s) is the car moving after this time?

Problem Set 3 – Velocity and Displacement with Constant Acceleration

1. A car with an initial speed of 6.5 m/s accelerates at a uniform rate of 0.92 m/s^2 for 3.6 seconds. Find the final speed and the displacement of the car during this time.
2. An automobile with an initial speed of 4.30 m/s accelerates uniformly at the rate of 3.00 m/s^2 . Find the final speed and the displacement after 5.00 seconds.
3. A driver of a car traveling at 15.0 m/s applies the brakes, causing a uniform acceleration of -2.0 m/s^2 . How long does it take the car to accelerate to a final speed of 10.0 m/s? How far has the car moved during the braking period?