Kinematics Worksheet 2

1. A pitcher throws a ball at a constant rate of 40.2 m/s. If the hitter is 18.4 m away, how long does it take the ball to reach him?

2. A car traveling at 10.6 m/s accelerates at 2.4 m/s^2. How much time does it take to reach 50.0 m/s?

3. A car's velocity increases from 10. m/s to 20. m/s in 5.0 s.
   (a) What is the acceleration of the car?
   (b) How much distance does the car cover?

4. Two motorcycles are traveling due east at different speeds. However, four seconds later, they have the same speed. During this four second interval, motorcycle A has an average acceleration of 2.0 m/s^2 due east, while motorcycle B has an average acceleration of 4.0 m/s^2 due east. By how much did the speeds differ at the beginning of the four-second interval, and which motorcycle was moving faster?

5. In getting ready to slam-dunk the ball, a basketball player starts from rest and sprints to a speed of 6.0 m/s in 1.5 s. Calculate the distance he runs assuming a uniform acceleration.

6. A Porsche reaches a velocity of 42.6 km/h from rest in 15.5 s. What distance does it cover?

7. Starting from rest, a Ferrari covers 100. m in 6.34 s. What is the final velocity of the car?

8. The left ventricle of the heart accelerates blood from rest to a velocity of +26 cm/s. The displacement of the blood during the acceleration is +2.0 cm.
   (a) What is the acceleration (in cm/s^2) of the blood?
   (b) How much time does blood take to reach its final velocity?

9. A bus traveling at 30.6 km/h accelerates at 3.98 m/s^2 for 6.83 s. What is the final velocity (in m/s)?

10. A car accelerates from rest at 5.56 m/s^2. How much time will it take the car to reach a velocity of 28.9 m/s?

11. A train traveling at 44.2 m/s slows down to 22.0 m/s in 11.3 s.
    (a) What is the acceleration of the train?
    (b) What is the displacement of the train during that time?

12. An airplane starts from rest and accelerates at 3.13 m/s^2 for 20.3 s before leaving the ground. What is the displacement during this time?

13. Starting from rest a race car moves 110.0 m in the first 5.00 s. What is the acceleration of the car?

14. A pilot stops a plane in 484 m using a constant acceleration of -8.73 m/s^2. How fast was the plane moving initially?

15. What is the magnitude of the average acceleration of a skier who, starting from rest, reaches a speed of 8.0 m/s when going down a slope for 5.0 s?

16. A driver brings a car traveling at 22.4 m/s to a full stop in 2.68 s.
    (a) What is the acceleration of the car?
    (b) What is the braking distance?

17. Two rockets are flying in the same direction and are side by side at the instant their retrorockets fire. Rocket A has an initial velocity of +5800 m/s, while rocket B has an initial velocity of +8600 m/s. After 15 minutes both rockets are again side by side, the displacement of each being zero. The acceleration of rocket A is -15 m/s^2. What is the acceleration of rocket B?

18. A car is traveling at 20.0 m/s, and the driver sees a traffic light turn red. After 0.530 s (the reaction time), the driver applies the brakes, and the car decelerates at 7.00 m/s^2. What is the stopping distance of the car, as measured from the point where the driver first sees the red light?

19. Two soccer players start from rest, 48 m apart. They run directly toward each other, both players accelerating. The first player's acceleration has a magnitude of 0.50 m/s^2. The second player's acceleration has a magnitude of 0.30 m/s^2.
    (a) How much time passes before the players collide?
    (b) At the instant they collide, how far has the first player run?

20. A car is traveling at a constant speed of 33 m/s on a highway. The instant this car passes an entrance ramp, a second car enters the highway from the ramp. The second car starts from rest and has constant acceleration. What acceleration must it maintain, so that the two cars meet for the first time at the next exit, which is 2.5 km away?