Name:

Physics 11

Kinematics 1D Review

Block:

1. What is the difference between average velocity and instantaneous velocity?

2. What is the difference between velocity and speed?

3. What is the definition of acceleration?

4. A high-powered racing car accelerates from rest at a rate of 7.0 m/s^2. How fast will it be moving after 10.0 s? Express your answer in m/s and km/h.

5. A child on a toboggan slides down a snowy hill, accelerating uniformly at 2.8 m/s^2. When the toboggan passes the first observer, it is travelling with a speed of 1.4 m/s. How fast will it be moving when it passes a second observer who is 2.5 m downhill from the first observer?

6. A space vehicle is orbiting the earth at a speed of 7.58×10^3 m/s. In preparation for a return to earth, it fires retro-rockets which provide an acceleration in the opposite direction of 78.4 m/s^2. Ignoring any change in altitude that might occur, how long will it take the vehicle to slow down to 1.52×10^3 m/s?

7. A truck is moving along at 80 km/h when it hits a gravel patch, which causes it to accelerate in the opposite direction at 1.4 m/s^2. How far will the truck travel before it slows down to 20.0 km/h?

8. Avery, a frustrated physics student, drops a physics textbook off the top of the CN tower. If the tower is 5.3×10^2 m high, how long will the book take to reach the ground, assuming there is negligible air resistance?

9. If an electron inside a TV tube accelerates in a space of 5.0 cm from rest to 10.0% of the speed of light, what is its acceleration? (the speed of light is 3.00×10^8 m/s)

10. Snoopy is taking off in his World War I biplane. He coasts down the runway at a speed of 40.0 m/s, then accelerates for 5.2 s at a rate of 4.90 m/s^2. How fast is the plane moving after the 5.2 s?

11. A woman biker is driving along the highway at 80.0 km/h, in a 60 km/h speed zone. She sees a police car ahead, so she brakes so her bike accelerates in the opposite direction at 2.22 m/s^2. How far along the road will she travel before she is at the legal speed limit?

12. Spiderman is crawling up a building at a rate of 0.50 m/s. Seeing Spiderwoman 56 m ahead of him, he accelerates at a rate of 2.3 m/s^2.
    a) How fast will he be moving when he reaches Spiderwoman?
    b) How much time will it take to reach Spiderwoman?
    c) When he reaches Spiderwoman, Spiderman discovers that she is a Black Widow and, as you may know, Black Widows eat their mates! If he is 200.00 m from the road below, how long will it take him to fall to the safety of the road.

13. A stone is dropped from the top of a tall building. How long will the stone take to pass a window that is 2.0 m high if the top of the window is 20.0 m below the point from which the stone is dropped?

14. A car accelerates from rest at 6.00 m/s^2. How far does it move between 10.0 s and 15.0 s?

15. A skier accelerates steadily down a hill from 3.50 m/s to 11.40 m/s in 4.20 s.
    a) What is the average speed for the trip?
    b) What distance is travelled?

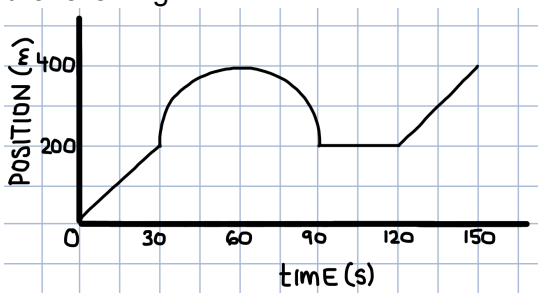
16. An arrow shot straight up into the air at 50.0 m/s accelerates downward at 9.8 m/s^2 until it reaches a speed of zero at its peak. Draw a velocity vs. time graph of this motion.

17. A glider on an air track is made to accelerate uniformly by tilting the track at a slight angle. The distance travelled by the glider was measured at the end of each 0.10 s interval and the following data was gathered:

distance, *d* (cm)	0	0.025	0.100	0.225	0.400	0.625
time, *t* (s)	0	0.100	0.200	0.300	0.400	0.500

    a) Plot a graph with distance, *d*, on the y-axis and time, *t*, on the x-axis.
    b) Plot a second graph with *d* on the y-axis and t^2 on the x-axis.
    c) Use the slope of your second graph to figure out the acceleration of the glider on the air track. (Hint: Write the equation of the line in $y = mx + b$ form and compare it to the equation $d = v_i t + \frac{1}{2}at^2$.)

18. Use the following position vs. time graph to answer the following:
    a) What is the total displacement of the car between 30 and 60 s?
    b) When is the car moving in the positive direction?
    c) What is the velocity of the car between 0 and 30 s?
    d) What is the instantaneous velocity of the car at 60 s?
    e) What is the average speed of the car between 0 and 150 s?



19. Use the following velocity vs. time graph to answer the following:
    a) When is the car moving in the positive direction?
    b) When does the car have a positive acceleration?
    c) Describe the motion of the car from 25 to 40 s.
    d) What is the total displacement of the car over the 40 s?
    e) What is the total distance travelled by the car over the 40 s?
    f) What is the average velocity of the car over the 40 s?