AP Physics 1
1.6 – Kinematics
Assessment

Remember: When we phall in physics, we learn – we shall not phail!

Name: _____ Period:_____

Directions: Solve each of the following problems and attach worksheets before turning in.

1. A car accelerates uniformly from rest to a speed of 6.6 m/s in 6.5 seconds. Find the distance the car travels during this time.

2. When Maggie applies the brakes of her car, the car slows uniformly from 15.0 m/s to 0.0 m/s in 2.50 s. How many meters before a stop sign must she apply her brakes in order to stop at the sign?

3. Someone who is not Mr. Webber is in a car traveling at a speed of 21.8 m/s and sees a cat in the road 101 meters away (!). How long will it take for the car to accelerate uniformly to a stop in exactly 99 meters?

4. A car enters the freeway with a speed of 6.4 m/s and accelerates uniformly for 3.2 km in 3.5 minutes. How fast, in m/s, is the car moving after this time?

5. A car with an initial speed of 6.5 m/s accelerates at a uniform rate of 0.92 m/s/s for 3.6 s. Find the final speed and the displacement of the car during this time.

6. An automobile with an initial speed of 4.30 m/s accelerates uniformly at the rate of 3.00 m/s/s. Find the final speed and the displacement after 5.00 s.

7. A car starts from rest and travels for 5.0 s with a constant acceleration of -1.5 m/s/s. What is the final velocity of the car? How far does the car travel in this interval?

8. A driver of a car traveling at 15.0 m/s applies the brakes, causing a uniform acceleration of -2.0 m/s/s. 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?

9. A car traveling initially at 7.0 m/s accelerates uniformly at the rate of 8 m/s/s for a distance of 245 m.
    a. What is the velocity at the end of the acceleration?
    b. What is the velocity after it accelerates for 125 m?
    c. What is the velocity after it accelerates for 67 m?

10. A car accelerates uniformly in a straight line from rest at the rate of 2.3 m/s/s.
    a. What is the speed of the car after it has traveled 55 m?
    b. How long does it take the car to travel 55 m?

11. A motorboat accelerates uniformly from a velocity of 65 m/s to the west to a velocity of 1.5 m/s to the west. If its acceleration was 2.7 m/s/s to the east, how far did it travel during the acceleration?

12. An aircraft has a liftoff speed of 33 m/s. What minimum constant acceleration does this require if the aircraft needs to be airborne after a take-off run of 240 m?

13. A certain car is capable of accelerating at a uniform rate of 0.85 m/s/s. What is the magnitude of the car's displacement as it accelerates uniformly from a speed of 83 km/h to one of 94 km/h?

14. You are driving along the street at a speed of 35 mph and 50 m before reaching a traffic light you notice it turns to yellow. You accelerate to make the traffic light within the 3 seconds it takes for it to turn red. What is your speed as you cross the intersection?

15. A jetliner, traveling northward, is landing with a speed of 69 m/s. Once the jet touches down, it has 750 m of runway in which to reduce its speed to 6.1 m/s. Compute the average acceleration of the plane during landing.

16. A cheetah is hunting. Its prey runs for 3.0 s at a constant velocity of +9.0 m/s. Starting from rest, what constant acceleration must the cheetah maintain in order to run the same distance as its prey runs in the same time?

17. A speed ramp at an airport is basically a large conveyor belt on which you can stand and be moved along. The belt of one ramp moves at a constant speed such that a person who stands still on it leaves the ramp 64 s after getting on. Clifford, however, is in a big hurry and skips the speed ramp. Starting from rest and with an acceleration of 0.37 m/s^2, he covers the same distance as the ramp does, but in one-fourth the time. What is the speed at which the belt of the ramp is moving?

18. A dynamite blast at a quarry launches a chunk of rock straight upward and, 2.0 s later, it is rising at a speed of 15 m/s. Assuming air resistance has no effect on the rock, calculate its speed
    a. at launch.
    b. 5.0 s after launch.

19. Two identical pellet guns are fired simultaneously from the edge of a cliff. These guns impart an initial speed of 30 m/s to each pellet. Gun A is fired straight upward, with the pellet going straight up and falling back down, eventually hitting the ground beneath the cliff. Gun B is fired straight downward. In the absence of air resistance, how long after pellet B hits the ground does pellet A hit the ground?

20. Larry the Loser is driving his 1972 Dodge Dart to Carrie Ann's house. After months of trying, she finally agreed to go on a date with him, mostly out of pity. I mean, really, she could do so much better. Larry has the gas pedal of his car floored and the vehicle reaches a top speed of 15 m/s going downhill. While he imagines himself as Mario Andretti, he drives right by Carrie Ann's house. Idiot. He slams on the brakes, which apply a negative acceleration that brings the car to a stop 10 seconds later. He really does need to get those brakes repaired. What distance did Larry's car travel while he applied the brakes?