Linear motion practice problems.

Show all work in smooth form.

Name:_____

1. The fuel in a bottle rocket burns for 2s. While burning, the rocket moves upward with an acceleration of $30m/s^2$. What is the vertical distance traveled while the fuel is still burning and how fast is it traveling at the end of the burn?

2. An engineer is designing the runway for an airport. Of the planes that will use the airport, the lowest acceleration rate is likely to be $3 m/s^2$. The takeoff speed for this plane will be 65 m/s. Assuming this minimum acceleration, what is the minimum allowed length for the runway?

3. An airplane accelerates down a runway at $3.20 m/s^2$ for 32.8 s until is finally lifts off the ground. Determine the distance traveled before takeoff.

4. A car starts from rest and accelerates uniformly over a time of 5.21 seconds for a distance of 110 m. Determine the acceleration of the car.

5. A race car accelerates uniformly from 18.5 m/s to 46.1 m/s in 2.47 seconds. Determine the acceleration of the car and the distance traveled.

6. A bike accelerates uniformly from rest to a speed of 7.10 m/s over a distance of 35.4 m. Determine the acceleration of the bike.

7. A plane has a takeoff speed of 88.3 m/s and requires 1365 m to reach that speed. Determine the acceleration of the plane and the time required to reach this speed.

8. While concentrating on catching the football, a wide receiver on a football team runs into the goal post. He was originally moving at 10m/s and bounced back at 2m/s. A video of the collision indicates that it lasted 0.020s. Determine the acceleration of the receiver during the collision.