

## Advanced Kinematics 1

### Solve the following problems

1. A driver traveling at 15 m/s, sees a traffic signal change to red. If her reaction time is 0.6 seconds, and the car can decelerate at  $-2.5 \text{ m/s}^2$ , what is the total distance needed to stop her vehicle?
2. A rocket, initially at rest, is fired vertically with an upward acceleration of  $10 \text{ m/s}^2$ . At an altitude of 500 m the engine shuts off. What is the maximum altitude the rocket achieves and how long will it take to get there?
3. A car and a truck travel toward each other on a roadway. Initially they are 20 m apart. The truck travels west and begins to speed up at  $1 \text{ m/s}^2$  from an initial speed of 10 m/s. The Car travels east and begins to speed up at  $0.5 \text{ m/s}^2$  from an initial speed of 12 m/s. How long will it take for the car and truck to pass each other on the roadway.
4. A parachutist jumps from an airplane and falls 150 m without opening his chute. When the parachute opens, he decelerates at  $2 \text{ m/s}^2$  and reaches the ground moving downward at 3 m/s. How long is he in the air and how high was the airplane when he bailed out?

