

## Advanced Kinematics 2

### Solve the following problems

1. Just as a traffic light turns green, a waiting car starts off with a constant acceleration of  $6 \text{ m/s}^2$ . At the instant the car begins to accelerate, a truck with a constant speed of  $21 \text{ m/s}$  passes the car and proceeds on in the same direction the car is accelerating. How far will the car be from the intersection when it catches up with the truck? How fast will the car be moving when it passes the truck?
2. A hot air balloon leaves the ground and rises at  $5 \text{ m/s}$  for 20 seconds at which time the pilot cuts loose a sandbag. What is the sandbag's maximum height above the ground, how long does it take to hit the ground and how fast will it be traveling?
3. As Romeo begged for forgiveness Juliet dropped a flower pot from 45 m high. The moment Juliet dropped the pot, Romeo threw a rock straight up with an initial velocity of  $20 \text{ m/s}$ . When and where will the rock and flower pot collide? Will the rock hit the pot or will the pot hit the rock?
4. A runner travels at a constant speed of  $2 \text{ m/s}$  over a distance of 160 m. Seeing a questionable dog, she accelerates at  $0.3 \text{ m/s}^2$  for 10 sec. and getting past the danger, she then accelerates at  $-0.1 \text{ m/s}^2$  until she is again moving at  $2 \text{ m/s}$ . How far has she run and how long was she running during our observation?

