Calculation Problems

1. How far does a car travel in 45 seconds if it has an acceleration of 0.32 ms–2? Assume that it starts from rest.
2. A toy car starts from rest and accelerates at a uniform rate of 4.0 ms–2 for 3.0 seconds. It then maintains a uniform speed for 12.0 seconds. Finally it takes 6.0 seconds to decelerate uniformly to rest. Find the total distance travelled and the average speed of the entire trip.
3. A car travels 25.0 km of a 50.0 km trip at an average speed of 40.0 kmh–1. It travels the second half of its journey at an average speed of 80.0 kmh–1. A truck makes the same trip but spends half of its time at an average speed of 40.0 kmh–1 and the other half of its time at an average speed of 80.0 kmh–1. Which vehicle got there in the shortest period of time? Show your work.
4. A speeding car is travelling at a constant speed of 44 ms–1 when it passes a stationary police car. The police car immediately accelerates uniformly from rest at a rate of 2.2 ms–2. If the car does not slow down and the police officer maintains the rate of acceleration, how long will it take the police car to catch the speeding car?
5. Two balls are 8.0 metres apart and moving directly towards each other. If the first ball is moving at a speed of 2.5 ms–1 with respect to the ground and the second ball 3.5 ms–1 with respect to the ground, where will they collide?