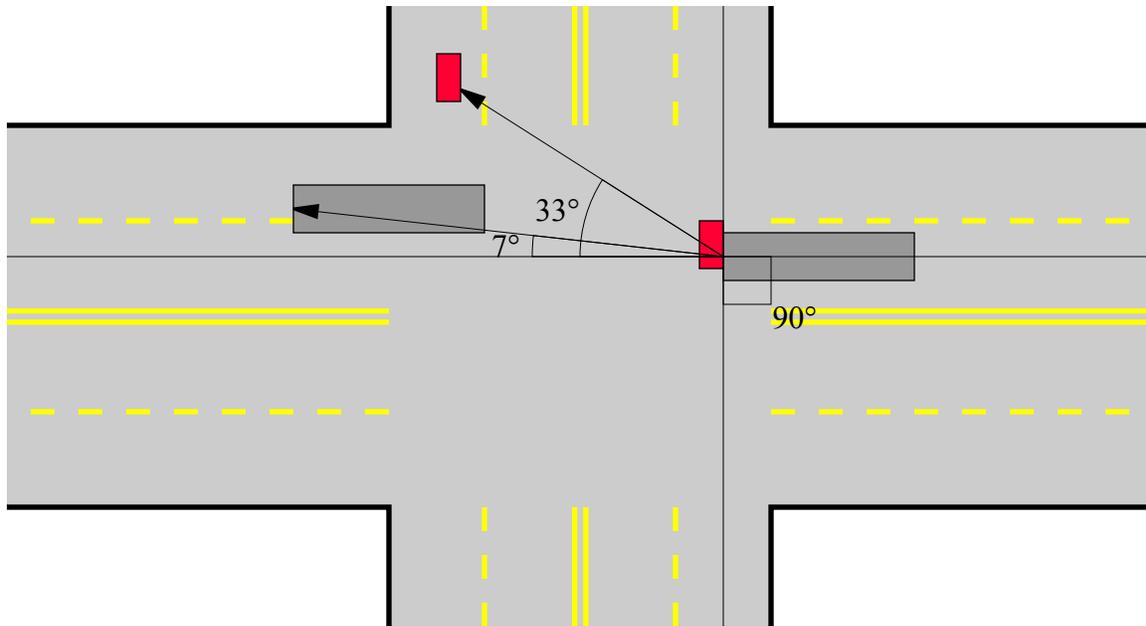


## ACCIDENT RECONSTRUCTION



☞ Your consulting agency, with its extensive knowledge of physics, has been subpoenaed to provide expert testimony at an automobile accident case in civil court. The case involves a crash between a Ford Escort car and a tractor-trailer truck. Answer all questions completely on the paper I provide. Show the work done in arriving at your answers. Do not put more than one question on a sheet. Write only on the front of the pages. When you are finished, assemble all the sheets in order and staple them together. Write your names on the top of the first page. Submit only one report for your group.

1. The police department determined that the force required to drag a 130 N (29 lb) car tire across the pavement at a constant velocity is 100 N (23 lb). Specifications from the truck's manufacturer claim that (for technical reasons) the effective coefficient of friction for truck tires is only 70% that of car tires. What was the coefficient of kinetic friction between the tires and the road for both the car and truck?
2. After collision, the truck and car skidded at the angles shown in the diagram. The car skidded a distance of 8.2 m (27 ft) before stopping while the truck skidded 11 m (37 ft) before stopping. The weight of the car is 13,600 N (3050 lb) and the weight of the truck is 69,700 N (15,695 lb). What was the speed of each vehicle just after the collision?
3. The pre-crash angle between the velocities of the truck and car was 90°. What was the speed of each vehicle just before the collision?
4. At this intersection, the truck driver had a flashing yellow light while the car driver had a flashing red light.
  - The car driver claims to have made a full stop at the light before entering the intersection. He also claims that the truck driver did not see him until after the collision. This would make the truck driver partially liable.
  - The truck driver claims that the car ran the flashing red light. He also claims to have begun braking in anticipation of a collision; traveling at only 6.7 m/s (15 mph) at the moment of impact.
  - Police measurements show that the distance for the car from the traffic light to the collision point was 13.0 m (42.5 ft).
  - Ford Motor Corporation specifications indicate that the maximum acceleration of a comparably loaded Ford Escort is about 3.0 m/s<sup>2</sup>.

Cases in traffic court revolve around determining who is at fault. As an expert witness, what is your assessment of the claims of the two drivers? Address both of them. Justify your response with the appropriate calculations.

☞ Source: Bernard J. Feldman. "Elementary Physics in a Real Automobile Accident." *The Physics Teacher*. vol. 35, no. 6 (September 1997): 335-338.