A Day in the Life of Janice Henry, Traffic Cop

Part 1.
At 13:20 on the last Friday in September, 1989 a frantic call was received at the local police station. There had been a serious automobile accident at the intersection of Main Street and State Street, with injuries involved. Lt. Janice Henry arrived at the scene 10 minutes after the phone call and found that two cars had collided at the intersection. In one car, the driver was unconscious and in the other car both driver and one passenger were injured.

After the emergency vehicles transported the injured to the hospital, Lt. Henry's responsibility is to investigate the accident in order to determine whether one of the drivers (or both) are responsible. With the severity of injury in this accident, the investigation is critical.

Questions:

1. What questions does Janice Henry have to answer in this investigation? What measurements does she need to take? What data should she collect? What other information does she need to record in order to aid the investigation? What physics principles will Janice Henry need to use in order to help analyze the data and answer her questions?

2. If two cars moving at right angles to each other collide, in what direction do you expect the cars to be moving after the collision?

3. What factors will influence the direction and distance traveled after impact?

Part 2.
Refer to the attached sketch. Main street, a thoroughfare, has a 45 mile per hour speed limit. State Street also has a 45 mile per hour limit, but has a stop sign on either side of the road. Vehicle 2, which weighs 5800 lbs, skidded for 24 feet before coming to a stop next to the utility pole, marked Dec #20. Vehicle 1, which weighs 2060 lbs, showed no skid marks after the impact and came to a rest next to the house on the corner. Looking at the impact areas of the cars, it was clear to Lt. Henry that the cars impacted at right angles, hitting the front right bumper of vehicle 2 and the front left bumper of vehicle 1. After impact, they initially were traveling in the same direction. Lt. Henry noted that the weather was clear and sunny, 69° and the roadway was dry.

Before Janice Henry got any further in her analysis, she was informed that driver who was unconscious at the scene of the accident was in a coma at the hospital.

Questions:

4. Can you make an educated guess about which driver is in a coma based on the evidence so far? Justify your answer.

5. Why would Janice Henry note the weather and the condition of the road?

6. Why did vehicle 1 travel further than vehicle 2?

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Part 2, continued
Janice Henry has to determine whether the driver of vehicle 2 ran the stop sign and/or if the
driver of vehicle 1 was speeding. Outline a procedure that Lt. Henry can use to answer these
important questions. Be sure that your reasoning is sound, since she will have to testify in
court on the evidence.

Question:

7. Does Janice Henry have all the information she needs to determine the velocities?

Part 3.
Lt. Henry used a drag sled to determine that the coefficient of friction between the tires and
road was 0.60. She can’t use the drag sled to determine the coefficient of friction between
the tires of vehicle 1 as they roll over the roadway and grass.

Questions:

8. Does she need this information? What procedure can she use to find out this
information?

9. Using your outlined procedures, find the velocities of the two vehicles just prior to
impact and estimate the coefficient of friction between the rolling tires of vehicle 1
and the roadway and grass. Be sure to state any assumptions that you make and
justify them.

10. During the collision, which vehicle delivered the greater force of impact? Justify your
reasoning using physics principles.

11. How can Lt. Henry determine the speeds of both vehicles just before they applied
their brakes? What further information will she need?

Part 4.
Lt. Henry measured the skid marks made by both vehicles prior to impact. The skid marks
for vehicle 1 were 20 feet in length and for vehicle 2 were 7 feet in length.

Questions:

12. How fast were both cars going just prior to hitting their brakes?

13. Which driver do you recommend Janice Henry cite in the accident? Justify your
answer, since Lt. Henry will need to make an airtight case in court.
Field Sketch

Weather & Road Conditions
Clear Dry Asphalt, 69 deg.

Additional Resources

- National Highway Traffic Safety Administration
  - http://www.nhtsa.gov/
- Custom Design & Consultation: Accident Reconstruction Resources
- National Association of Investigative Specialists: Links related to accident investigation, highway safety, and accident reconstruction
- Texas Association of Accident Reconstruction Specialists: Hot links to related sites
  - http://www.taars.org/links.htm
- PBS Nova Online: Escape!: Car Resources