Name: Partner: Teacher:

Waterstreet Cab Co

QUALITATIVE QUESTIONS

1. Describe the velocity of each car before and after a collision when:
   a. one bumper car is not moving.

   b. a rear end collision occurs.

   c. there is a collision with a stationary object such as a side.

   d. cars sideswipe.

2. Make a momentum vector sketch for each car before and after the following collisions:
   a. one bumper car is not moving

   b. a rear end collision occurs

   c. a collision with a stationary object occurs

   d. cars sideswipe

QUALITATIVE QUESTIONS (continued)

3. When you collide with a stationary car, are you pushed out of your seat? Explain.

4. How is electrical energy supplied to the bumper cars? Describe the complete circuit for one of the cars.

5. Do you think momentum is conserved in the bumper car collisions? Explain.

6. Answer these questions using concepts of energy, impulse and Newton's Laws of Motion.
   a. What is the reason for having rubber bumpers around the cars?

   b. Why would you not design a bumper car with very soft bumpers?

   c. Why would you not design a bumper car with no bumpers at all?

7. During collisions, is kinetic energy always conserved? Explain your answer.

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QUANTITATIVE QUESTIONS

1. Estimate the top speed of a bumper car in motion

2. Estimate the stopping distance of a bumper car in an average collision. Try to observe the approximate distance of 'give' of a bumper in a number of different collisions where the car comes close to stopping after the collision.

3. Assuming the mass of the car to be 40.0 kg and the mass of the rider to be 60.0 kg, calculate the kinetic energy of a car.

4. Calculate the momentum of a bumper car at full speed.

5. Find the average acceleration of a bumper car in a typical collision. How many g's is this?