Newton’s First Law
When two dodgem cars collide, the car may stop or change direction after colliding, but the drivers’ body will continue in their initial direction.

1. Describe your experiences and feelings when you collide:
   a) Head-on with an oncoming dodgem car

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   ________________________________________________________________
   ________________________________________________________________

   b) Head-on with a stationary dodgem car

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   ________________________________________________________________
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   c) Head-on with a guardrail

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   ________________________________________________________________
   ________________________________________________________________

   d) at an angle with a dodgem car

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**Investigating Impacts**

2. Determine the approximate maximum speed of the car, by measuring the time to travel an estimated distance.

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3. The car has a mass of 600 kg. Calculate its momentum and kinetic energy at maximum speed.

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4. Observe the car crashing into the guard rail at maximum speed. Estimate how much the guard rail and the bumper bar on the car are compressed.

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5. The car comes to rest after the impact. Use the data in Questions 2 and 4 to determine the acceleration of the car and the duration of the impact.

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6. After the impact the car’s momentum and kinetic energy are zero. Where have they gone?
   Momentum: _____________________________________________________________
   Kinetic Energy: _________________________________________________________

7. List the features of the car design intended to protect the driver in an impact. For each feature, use physics concepts to explain how it works.

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**What makes the cars move?**

8. Observe the nature of the floor and the footwear of the operator and suggest a mechanism for this ride?

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