Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Lesson 2: How does crash speed affect a vehicle’s crashworthiness?**

Have you ever heard the saying, “speed kills?” Speed limits are posted on roads to keep pedestrians and occupants of vehicles safe. Can you determine the relationship between a vehicle’s speed at the time of a crash and the injuries experienced by the vehicle’s occupants? Rev up your motors and start this simulation.

**Doing the Science**

1. Start the Car Crash Simulation.

2. Select the blue SUV on the left side of the screen.

3. Select the “Soft” crush zone stiffness.

4. Select the “Short” crush zone length.

5. Select the “Crash Center” button at the bottom of the screen.

6. Select the “25 MPH” speed, and then select the “Crash It” button.

7. Note and record in Table 1 the average acceleration and crash duration for the crash.

8. Select the “Analysis Center” button at the bottom of the screen.

9. Select the “Measure” button. Select the green round target, then select the next green round target to measure the crush zone deformation. Record this information in Table 2.

10. Repeat measuring the intrusion for the other two targets (yellow and red). Record this information in Table 2.

11. Select the “Medical Report” button. Record this information in Table 3.

12. Repeat steps 6–11, except choose the “40 MPH” crash speed.

13. Repeat steps 6–11, except choose the “55 MPH” crash speed.

**Table 1. Acceleration and Crash Duration**

|  |  |  |
| --- | --- | --- |
| **Crash Speed (MPH)** | **Average Acceleration (g’s)** | **Crash Duration (seconds)** |
| 25 |  |  |
| 40 |  |  |
| 55 |  |  |

**Table 2. Crash Zone Intrusion**

|  |  |  |  |
| --- | --- | --- | --- |
| **Crash Speed (MPH)** | **Frontend Deformation (green target in meters)** | **Footwell Intrusion (yellow target in meters)** | **Dashboard Intrusion (red target in meters)** |
| 25 |  |  |  |
| 40 |  |  |  |
| 55 |  |  |  |

**Table 3. Possible Injuries**

|  |  |  |  |
| --- | --- | --- | --- |
| **Crash Speed (MPH)** | **Frame Intrusion** | **Body Acceleration** | **Overall** |
| 25 |  |  |  |
| 40 |  |  |  |
| 55 |  |  |  |

**Do You Understand?**

1. How did the crash speed affect the average acceleration and crash duration times?

2. How did the crash speed affect the intrusion for various parts of the frame?

3. How did the crash speed affect the injuries experienced by crash occupants?

4. Based on your overall results, which crash speed tested provided the vehicle’s occupants with the greatest protection during a crash? Provide an explanation for this additional safety.