



Name: _____ Class: _____ Date: _____

“UNDERSTANDING CAR CRASHES: IT’S BASIC PHYSICS”

Concept Organizer

TIME*

Part I: Before the Video

Directions: Before viewing the video, answer the question below. Be prepared to discuss your answer.

Why do some spectacular racecar crashes produce only minor injuries?

Part II: During the Video

Directions: While viewing the video, complete the fill-in-the blank statements with the correct terms OR circle the correct answers if provided. (Times in left margin indicate when each item is discussed.)

IIHS’s Vehicle Research Center

1:15

1. It is a fascinating place where research engineers assess the crash performance of vehicles by running tests and where they evaluate new _____ to prevent injuries.

Test Track Laws

2:05

2. Why did the dummy get left behind? It’s called _____, the property of matter that causes it to resist any change in its motion.

2:20

3. Isaac Newton’s First Law of Motion states: A body at rest remains at _____ unless acted upon by an external force; and a body in motion continues to move at a constant _____ in a straight line unless it is acted upon by an external force.

Crashing Dummies

3:30

4. Now watch what happens when the car crashes into a barrier. The front end of the car is crushing and absorbing _____ which slows down the rest of the car.

3:55

5. In this case, it is the steering wheel and windshield that apply the _____ that overcomes the dummy's inertia.

Crash-Barrier Chalkboard

4:30

6. Newton explained the relationship between crash forces and inertia in his (Circle one): 1st 2nd 3rd Law of Motion.

4:45

7. Fill in the blanks to complete the formula.

$F_t = \underline{\hspace{2cm}}$ \longrightarrow $F_t = m\Delta v$ $m\Delta v = \underline{\hspace{2cm}}$

*These times are for the full-length video. Disregard times if watching individual video chapters.



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5:20

Surfers, Cheetahs, and Elephants ...oh my!

8. Momentum is inertia in motion. It's the product of an object's mass and its _____.

6:00

Soccer Kicks, Slap Shots, and Egg Toss

9. Impulse is the product of _____ and the time interval during which the force acts.

6:30

10. The wall applies a _____ force over a shorter time.

11. The sheet applies a smaller force over a _____ time.

7:50

Fighter pilots, astronauts, and crash occupants

12. People often refer to **g**'s as forces but they are not. A **g** is a standard unit of _____.

8:05

13. People in serious car crashes experience high **g**'s and this can cause _____.

9:05

14. Three things that extend the time of impact in a collision are: crumple zones, _____, and _____.

10:55

Conserving momentum and energy - It's the law!

15. Momentum has a directional property, so it is called a _____ quantity.

12:15

16. Weight vs. Size in car crashes:

_____ helps you in all kinds of crashes.

_____ is primarily an advantage in a crash with another vehicle.

13:00

Newton and energy

17. Energy is the ability to do _____.

13:20

18. Motion related energy is called _____ energy.

Energy due to an object's position or condition is called _____ energy.

14:20

19. At what point in the pendulum's swing is its potential energy equal to its kinetic energy? _____

16:20

Engineering safer vehicles

20. We use the term _____ to describe the protection a car offers its occupants during a crash.

17:20

21. If we can _____ the front end of the car without allowing any damage to the occupant compartment then the people inside can be protected against serious injury.

18:45

22. When the _____ collapses, you are going to have injuries to the occupants.

22:15

23. The rear seats of most cars lack seat belt systems with crash tensioners and _____.

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