



Name: _____ Class: _____ Date: _____

“UNDERSTANDING CAR CRASHES: WHEN PHYSICS MEETS BIOLOGY”

Concept Organizer

TIME*

Part I: Before the Video

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

1. Why is it that some spectacular race car 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

1:00

1. The study of injury _____ in crash testing has helped us learn what happens to the human body in passenger car crashes.

3:05

2. Using sophisticated tools like instrumented _____, instrumentation in the car, and slow-motion film, engineers can analyze every detail and construct a precise picture of the crash.

History of crash research

4:20

3. In one of his many tests, Dr. Stapp reached a speed of _____ miles per hour before one of the most powerful braking systems of all time stopped him in _____ seconds, subjecting him to more than 40 times the pull of gravity.

Crash test dummy lab

6:20

4. Inside the Side Impact Dummy, the accelerometers give us the _____ of the mass. The load cell measures force. And the potentiometers measure the _____.

7:35

5. The higher the _____, the more like a human being the crash test dummy is.

Crash Anatomy

8:30

6. The human body contains more than 100 trillion cells. The body is structurally organized into four levels: cells, _____, organs, and _____.

The third collision

9:55

7. The first collision is between the car and the _____.
The second is between the driver and the _____.
The third is between the driver’s _____ and the inside walls of his or her body cavities.

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



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11:40

Brain Injury Demonstration

8. Predict which way the balloon or “brain” will move during the impact. I predict the balloon will: (CIRCLE ONE)

- A. move forward
- B. move backward
- C. stay in the same spot

9. Observation: The initial movement of the balloon or “brain” was _____ .

13:20

Heart Injury Demonstration

10. Predict what will happen to the unsupported section of gel or “aortic arch” during the collision. I predict the gel will: (CIRCLE ONE)

- A. move forward
- B. move backward
- C. stay in the same spot

11. Observation: The unsupported section of gel _____ and tears away from the supported gel.

14:10

Stress and Strain

12. Stress produces strain. _____ is a measure of how much the tissue deforms as a result of the stress.

15:40

Shockwaves

13. Bigger and more concentrated impact _____ produce bigger and potentially more damaging shockwaves moving through your body.

16:45

Cell Damage and Death

14. High forces create _____ waves, which can cause tissues and organs to stretch, tear, or compress. This starts a cascade of chemical events that ends in cell _____ .

18:50

Building Safer Racecars

15. List ANY 2 racecar safety features brought about by the study of injury biomechanics:

21:00

Bed of Nails Demonstration

16. Pressure = _____ / Area

22:15

Sundown

17. Keeping people safe in crashes has to do with extending _____, keeping the occupant compartment _____, and tying the occupants to the compartment.

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