CONCEPT ORGANIZER QUESTIONS

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. he 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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