CONCEPT ORGANIZER QUESTIONS

# "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***

1:10

***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***

2:00

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

2:15

***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***

3:20

***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.

4:00

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

***Crash-Barrier Chalkboard***

4:20

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

4:50

***7.*** Fill in the blanks to complete the formula.

Ft = _____ ⟶ Ft = mΔv mΔv = _____

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

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5:15

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

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

***Soccer Kicks, Slap Shots, and Egg Toss***

5:50

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

6:35

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

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

***Fighter pilots, astronauts, and crash occupants***

7:40

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

8:00

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

9:04

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

***Conserving momentum and energy - It's the law!***

10:50

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

12:00

***16.*** Weight vs. Size in car crashes:

_____ helps you in all kinds of crashes.

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

***Newton and energy***

12:55

***17.*** Energy is the ability to do _____ .

13:15

***18.*** Motion related energy is called _____ energy.

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

14:15

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

***Engineering safer vehicles***

16:10

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

17:10

***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.

18:40

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

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