Name: _____ Period: ____ Date: _____ EN: _____

UNDERSTANDING CAR CRASHES- ITS BASIC PHYSICS

Newton's 1st law: Inertia

1. Why did the dummy fall off the truck? Explain

2. Why is it important to wear a seat belt and have an air bag?

Newton's 2nd law: F=ma

3. The force ___ is what is needed to move the mass ___ with an acceleration ____.
4. Or, acceleration is the rate at which _____ changes.
5. Newton actually talked about changing momentum with an _____ .

   The equation for impulse is ___ = $m\Delta v$

Momentum and Impulse

6. What changes an object's momentum?
7. How is the impulse changed for the two eggs? The wall applies _____ , while the sheet _____ .
8. Fighter pilots feel as much as 9 g's during maneuvers, astronauts as many as 11. How many g's does a belted driver feel with a 1 ft crumple zone? _____ With a 2 ft crumple zone? _____ This is because the time the force acts is _____ /
9. What are some other ways to increase crash time?

Collisions

10. What is remembered or saved in the collision of the metal balls?

    This is called the Law of _____ of _____ .

11. What happens when two cars moving with equal mass and speed collide head on (an inelastic collision)?
12. This would feel the same as a single car colliding into a _____ .
13. In an inelastic collision between a light and heavy car, which would be better off?

Energy – the ability to do work

14. What kind of Energy is important in car crashes?

    This is the Energy of _____ objects.

15. When is the PE = KE of the pendulum?

16. On what two things does KE depend? _____ and _____ .

    The formula is: KE = _____ .

    Which of these two is more critical in a car crash?

17. To reduce KE requires a decelerating force applied over a _____ . This is WORK!

Crash Worthiness

18. In a good design, the safety cage will _____,
    while the front end or the crumple zone will _____ .

19. The previous design is good for front-end crashes but another important issue is the
    _____ impact crash. The only crush space is the width of the door, the padding
    and now some cars have side _____ .