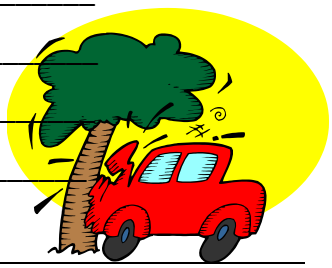
Crash Math: May the Force(s) be with you!

Name _____ Hour ____ Score___/31

Activity #1: Use the website LINK #1 to answer the following 5 questions. Use the top two "boxes".

Calculate the Force on the Car in a crash.

1. What is the formula for calculating kinetic energy? _____
2. What is the speed of the blue car as it crashes into the tree? _____
3. What is the mass of the blue car? _____
4. How much does the blue car crumple after it hit the tree? _____
5. How much force is generated in this collision? _____



Instructions: Use box #3 and input the variable that will calculate the FORCE.

Question#	Car type	Weight in lbs	Speed In mph.	Crumple Zone in ft.	Force of Collision in tons
6	Taurus	3500	30	1	?
7	Taurus	3500	***60***	1	?
8	Taurus	3500	***60***	***1.5***	?
9	Suburban	6000	30	1	?
10	Suburban	6000	**60**	1	?
11	Suburban	6000	**60**	*1.5*	?
12	*Your car*	?	30	1	?
13	*Your car*	?	**60**	1	?
14	*Your car*	?	**60**	***1.5***	?
15	*Partner car*	?	30	1	?
16	*Partner car*	?	**60**	1	?
17	*Partner car*	?	**60**	***1.5***	?

18. Explain the relationship between weight and force?_____
Use numbers or percentages to show relationship>

19. Explain the relationship between **speed** and **force**? _____
Use numbers or percentages to show relationship

20. Explain the relationship between **crumple zone** and **force**?_____
Use numbers to Use numbers or percentages to show relationship relationship>

21. When the speed was *doubled* from ***30 mph to 60 mph*** what happened to the force?

A. cut in half B. doubled C. tripled D. quadrupled

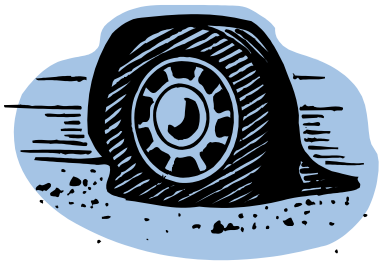
More on back

Activity #2 Use website LINK #2 for the next section.

Calculate the distance needed to stop a car.

22. What is the *coefficient of static friction* used in the website demonstration? _____

Question	Speed	Coefficient	Distance to stop
23	30	0.8	?
24	60	0.8	?
25	70	0.8	?
26	***30***	***0.4***	?
27	***60***	***0.4***	?
28	***70***	***0.4***	?



29. How does the speed of the car affect the distance needed to stop? _____

_____

_____

30. When the speed doubles, the distance needed to stop changes how much?

A. cut in half B. doubled C. tripled D. quadrupled

31. Explain why tires are the number one safety device on a car*? (Assume the brakes are working properly.)*

_____

_____

_____

Activity #3: ***How to Calculate the Force on the driver of a car in a crash.***

Use website LINK #3

32. What is the difference between a stretching and a non-stretching seatbelt in a collision.

_____

_____

33. Now that you have computed the force on the car using various speeds, weight and crumple zones it is your turn to **compute the force exerted when wearing a seat belt**. ***Create a table*** similar to the first activity.

Activity web links:

LINK #1. Forces on a car : http://hyperphysics.phy-astr.gsu.edu/hbase/carcr.html
LINK #2. Coefficient of friction http://hyperphysics.phy-astr.gsu.edu/hbase/crstp.html Activity
LINK #3. Forces on a driver of a car: http://hyperphysics.phy-astr.gsu.edu/hbase/carcr2.htm

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