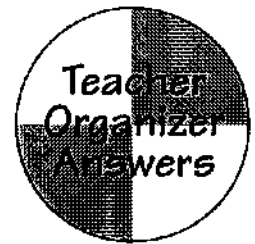


"CRASH COURSE" ACTIVITY

"Understanding Car Crashes It's Basics Physics" Video Concept Organizer



TIME
2:15
2:50
3:20
4:00
4:35

Running Time:

22 minutes

Directions:

To help you remember the key physics concepts discussed while viewing the video, fill in the blanks or circle the correct answer.

Video Scenes & Key Concepts

Test Track Laws

2:15

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

2:50

Isaac Newton's circle one 1st 2nd 3rd Law of Motion states: A body at rest remains at rest unless acted upon by an external force, and a body in motion continues to move at a constant speed in a straight line unless it is acted upon by an external force.

Crashing Dummies

3:20

Now watch what happens when the car crashes into a barrier. The front end of the car is crushing and absorbing energy which slows down the rest of the car.

4:00

In this case, it is the steering wheel and windshield that applies the force that overcomes the dummy's inertia.

Crash-Barrier Chalkboard

4:35

Newton explained the relationship between crash forces and inertia in his circle one 1st 2nd 3rd Law of Motion.

(Fill in the blanks to explain what each letter in the formula represents.)

$F =$ force

$\rightarrow F = ma$

$m =$ mass

$a =$ acceleration

$F = \frac{m\Delta v}{t}$

$\Delta v =$ change in velocity

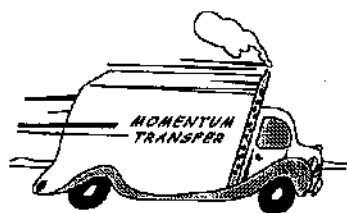
$t =$ time or rate

$Ft =$ impulse

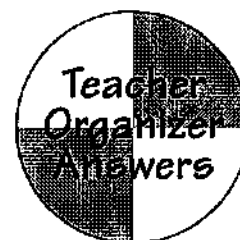
$\rightarrow Ft = m\Delta v$

$m\Delta v =$ change in momentum

"CRASH COURSE" ACTIVITY



"Understanding Car Crashes It's Basics Physics" Video Concept Organizer



TIME
5:20

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

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

5:35

Which has more momentum? An 80,000 pound big rig traveling 2 mph or a 4,000 pound SUV traveling 40 mph? circle one Big Rig SUV same

6:05

Soccer Kicks, Slap Shots, and Egg Toss

What is it that changes an object's momentum? an impulse. It is the product of force and the time for which it acts.

6:18

If the eggs are of equal mass and are thrown at the same velocity they will have the same momenta. The wall and the sheet both apply equal impulses.

6:45

The wall applies a bigger force over a shorter time, while the sheet applies a smaller force over a longer time.

7:10

With panic braking the driver stops in less time or distance and experiences more force.

8:20

Crashing and Smashing

The second animated vehicle's front end is less stiff so it crushes two feet instead of one, causing the deceleration to decrease from 30gs to 15 gs.

9:04

Extending the time of impact is the basis for many of the ideas about keeping people safe in crashes. List three applications in vehicle or highway safety.

1. crumple zones 2. airbags 3. break-away light poles

9:42

Conserving Momentum and Energy - It's the Law!

In a collision of two cars of unequal mass, the occupants of the lighter car would experience much higher accelerations, hence much higher forces than the occupants of the heavier car.

12:55

Motion related energy is called kinetic energy. Energy due to an object's position or conditions is called potential energy.

13:50

At what point in the pendulum's swing is its potential energy equal to its kinetic energy? mid-point When is its kinetic energy at its maximum? bottom

14:30

Circle the correct formula for kinetic energy (KE).

$$KE = 1/2 m2v$$

$$KE = 1/2 2mv^2$$

$$KE = 1/2 mv^2$$

$$KE = 1/2 mv2$$