Don't Be a Human Projectile

Tractor fenders, grain wagons, and pickup cargo beds are dangerous places for passengers. They may be thrown from the vehicle when impact with another vehicle or object takes place. This can also happen when the vehicle stops suddenly. Serious injury or death can result from the force of a body hitting the ground or another object.

ACTIVITY 1
Impact of Speed   Targeted Age: High School

Learning Objective: Students will determine the impact when ejected from a vehicle
Concept: When an object falls, it picks up speed as it falls because of gravitational pull. This is called acceleration. Being thrown from a vehicle is referred to as ejection. The object will make contact with the ground or another object with a deadly velocity.

Problem:
Suppose that you're riding in the back of a pickup or on the fender of a tractor at 33 mph (that's pretty fast for a tractor, but slow for a pickup). The vehicle swerves and you are thrown into something solid, like a wall or vehicle.

Definitions:

- Velocity (v) – rate of motion; speed of a moving object in a direction
- Distance (d) – the length an object has traveled
- Acceleration (a) – increase in speed
- Ejection – thrown out forcefully

Given:

- Velocity = acceleration X time (v=at)
- Distance= ½ acceleration X time squared (d= ½ at2)
- 1 mile = 5280 feet
- a= 32 ft/sec2 (for falling objects on earth)

Proof:
Conversion of 33 miles per hour to feet per second.

$$\frac{33\ mile}{1\ hour} \times \frac{1\ hour}{60\ mins} \times \frac{1\ minute}{60\ seconds} \times \frac{5280\ feet}{1\ mile} = \frac{33 \times 1 \times 1 \times 5280}{1 \times 60 \times 60 \times 1} = \frac{174{,}240\ feet}{3{,}600\ seconds} = 48.4\ feet\ per\ second$$

In order to figure velocity, you must know how long it takes to fall 36 feet. For this assignment, we calculated the elapsed time as 1.5 seconds. Now you can figure the velocity at impact.

$$V = at$$

$$V = \frac{32\ feet \times 1.5\ seconds}{Seconds^2}$$

$$V = 48\ feet\ per\ second$$

This educational piece was originally developed by Farm Safety For Just Kids

Don't Be a Human Projectile (continued)

ACTIVITY 2
Impact of Velocity   Targeted Age: All ages

Learning Objective: Students will visualize the impact of being thrown from a moving vehicle when an object is hit from a distance.

Concept: The faster a vehicle moves the greater the distance an object (or body) is thrown if they are not restrained. When a flying object (or body) hits a hard surface (road, tree, guard rail, etc.) damage will occur.

You will need:

▸ A watermelon or cantaloupe approximately the size of a person's head

▸ Markers

▸ Plastic covering if doing the demonstration indoors

▸ Ladder or deck where an object can fall onto the ground

Draw a face on the melon with the markers. Talk about the head as the most important part of the body and its approximate size. The average head weighs approximately 8 to 12 pounds, approximately 8% of the weight of the whole body. The brain is about 1/3 of the weight of the total head.

Place plastic covering on floor if doing demonstration indoors. A preferred format would be outside if the weather is nice. The demonstration will make a mess.

Drop the melon from a distance, the higher the better, making sure participants and not in line with the falling melon. Discuss the resulting melon breakage and the correlation to a head hitting an object.

Questions to Ponder

▸ Instead of riding in an exposed area, where might be a safer place to ride?

▸ If you were a driver of a tractor or pickup and were asked by your peers to ride along on the tractor fender or pickup cargo area, what might be a reasonable and safe reply?

▸ What preventive procedures influences the damage done by two objects colliding during a collision? (slow down, wear seat belts, driving cautiously, proper brakes, etc.)