

Idaho Driver Education and Training

Protecting Occupants



THE THREE COLLISIONS

When a vehicle collides with another vehicle or object, three collisions occur

1. The Vehicle Collision

During a crash, the car stops. As the car crushes, it absorbs some of the force of the collision.



2. THE HUMAN COLLISION

- At the moment of impact, passengers in the car are still traveling at the vehicle's original speed.
- When the car comes to a complete stop the passengers continue to be hurled forward until they come in contact with some part of the automobile.



❖ For example, the steering wheel, the dashboard, the front window or back of the front seat.

- Humans in a crash can also cause serious injuries to other humans when they collide with each other. People in the front seat of a car are often hit by rear-seat passengers as they fly forward with incredible force.

3. THE INTERNAL COLLISION

In a crash, even after a human body comes to a complete stop, its internal organs are still moving. Suddenly, these internal organs slam into other organs or the skeletal system. This "internal collision" is what often causes serious injury or death.

[Click on picture to watch video](#)



Video courtesy of the Insurance Institute for Highway Safety

DID YOU KNOW?

- In a 30 mph crash, a 15 pound child can generate an impact force greater than 300 pounds.



DID YOU KNOW?

- An unbelted back seat passenger of average size can fly forward with a force of 3,000 pounds, enough to seriously injure or kill other passengers



Click on picture to watch video

Video courtesy of the Insurance Institute for Highway Safety

DID YOU KNOW?

- **Passengers are four times more likely to be killed in a crash when thrown from a vehicle**
- **The crash force can throw a person 150 feet - 15 car lengths**



DID YOU KNOW?

There are six different types of crash scenarios



<http://buckleup.ifas.ufl.edu/COLLISION.HTM>

Frontal	Rotational
Rear	Side-to-side rollover
Side	Vault/flip

DID YOU KNOW?

Each type crash can result in injuries

1. Frontal



- Unrestrained occupants are thrown toward the front of the vehicle. They may slide under the dashboard, fly up and hit the steering wheel or windshield, or slide side-to-side if the crash is off center.
- A rear-seated occupant may be hurled over the front seat and land under the dashboard or go through the windshield.

2. Rear-End



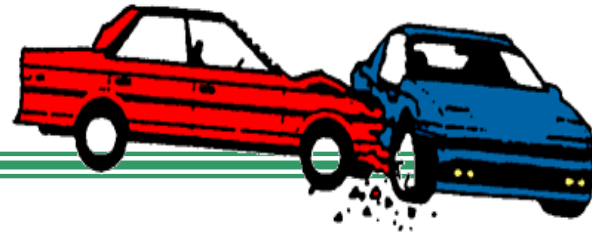
- **A vehicle hit from the rear is often pushed forward. This causes the unrestrained occupant's body to be pressed backward into the vehicle's seat back. The body then rebounds forward.**
- **If the headrest is not adjusted for proper angle and height, the occupant can experience neck injuries known as whiplash; the ligaments and tendons in the back of the neck are stretched and may tear, and cervical fractures may occur.**

2. Rear-End (Cont.)



- **Often a vehicle that is hit from the rear will be pushed forward into another vehicle or object**
- **This causes a secondary frontal impact collision with the possibility of injuries similar to those sustained in head-on collisions**

3. Side Collision



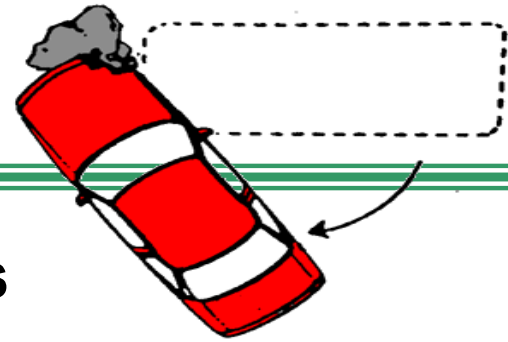
- Occupants are thrown first toward the point of impact
- As the side of the vehicle is deformed and intrudes into the passenger area, an occupant is struck initially on the chest or pelvic area. When this happens, the unrestrained occupant's body is pushed sideways, away from the impact, while the head continues to move forward toward the point of impact.

3. Side Collision (Cont.)



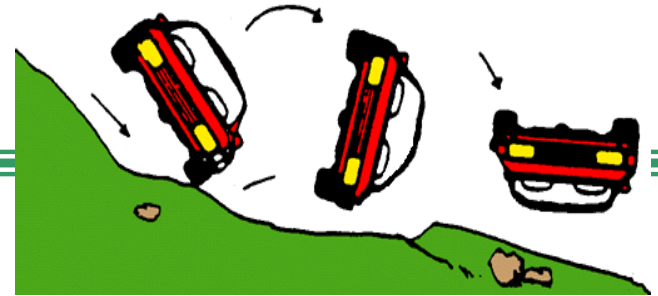
- **In addition to pelvic injuries and internal and compression injuries to the chest and abdomen, this collision can cause ligament and tendon injuries on the side of the neck opposite the impact.**
- **Facial injuries, skull fractures, and brain injury can occur if the head strikes the window or doorpost on the side of the impact. Ejection from the vehicle is possible.**

4. Rotational Collision



- An off-center crash between two vehicles or between a vehicle and a fixed object.
- The part of the vehicle where the impact occurs comes to a stop, and the other parts of the vehicle continue spinning or pivoting around that point.
- Unrestrained occupants strike the door and window posts, causing traumatic injury to the head and chest. Partial or full ejection may occur.
- Other injuries are similar to the injuries in frontal, rear, and side impacts.

5. Side-to-Side Rollover



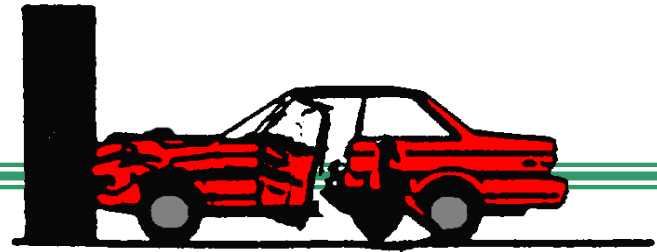
- An impact that causes the vehicle to roll over on its side one or more times frequently causes unrestrained occupants to be partially or totally ejected through smashed or open windows or doors.
- Since the occupants hit several points in the vehicle, their injuries are many and affect many parts of their bodies.

6. Vault/Flip



As the vehicle flips end over end one or more times, the unrestrained occupants hit several points in the vehicle; may be ejected and can receive a wide range of injuries

Ejection



- While some people believe they are safer if they are thrown from a vehicle, the fact is that ejected occupants are four times more likely to be killed than those who remain inside.
- People who are ejected, either partially or totally, may be thrown out a window or open door, skid along the pavement, or be pinned or crushed under the victim's own vehicle or another vehicle.
- Landing gently on a soft and forgiving surface is highly unlikely.

AIRBAGS AND SEATBELTS

Seat belts are designed to be used with airbags

Airbags alone will not stop an unrestrained body from moving violently in a vehicle

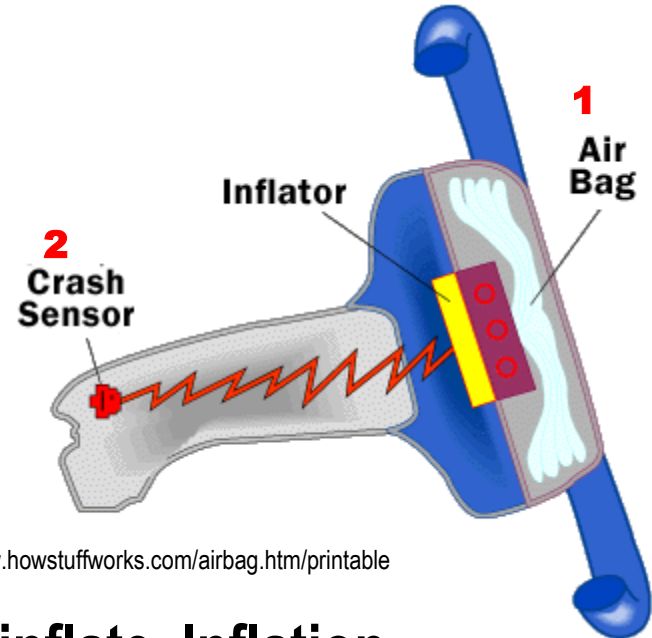
Click on picture to watch video



Video courtesy of the Insurance Institute for Highway Safety

HOW AIRBAGS WORK

1. The **bag** itself is made of a thin, nylon fabric, which is folded into the steering wheel or dashboard or, more recently, the seat or door.



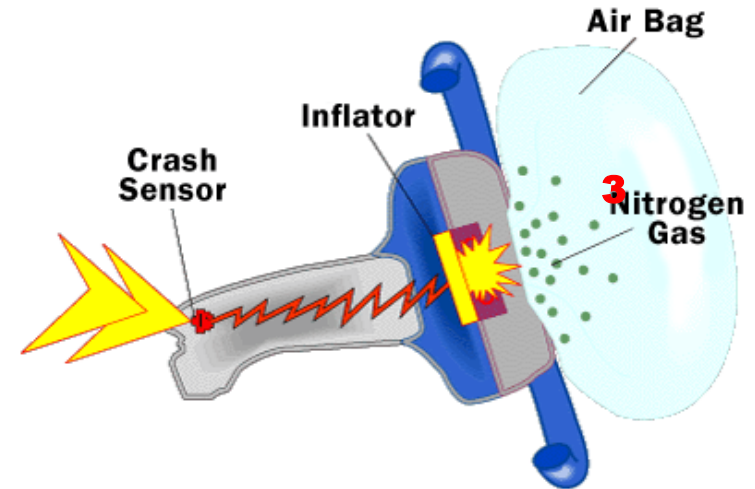
<http://www.howstuffworks.com/airbag.htm/printable>

2. The **sensor** tells the bag to inflate. Inflation happens when there is a collision force equal to running into a brick wall at 10 to 15 mph. A mechanical switch is flipped telling the sensors that a crash has occurred.

HOW AIRBAGS WORK

3. The air bag's **inflation system** produce **nitrogen gas**. Hot blasts of the nitrogen inflate the air bag.

The bag then literally bursts from its storage site at up to 200 mph (322 kph) — faster than the blink of an eye! A second later, the gas quickly dissipates through tiny holes in the bag, thus **deflating** the bag so you can move as shown in the movie to the right.



<http://www.howstuffworks.com/airbag.htm/printable>



Click on picture to see video

Video source: NHTSA

HOW AIRBAGS WORK

When deployed, the airbag on the driver's side extends out about 12 inches



Photo courtesy of the Insurance Institute for Highway Safety

When deployed, the airbag on the passenger's side extends out about 24 inches

HOW AIRBAGS WORK



**The whole process happens in only
one-twenty-fifth of a second!**

HOW SEAT BELTS PROTECT

Seat belts allow occupants to come to a more gradual stop by helping passengers to “ride down” the crash forces



Neither the driver nor the passenger wore a seat belt

HOW SEAT BELTS PROTECT

Seat belts keep passengers in place so that the head, face and chest are less likely to strike the windshield, dashboard, and other vehicle interiors



HOW SEAT BELTS PROTECT

Seat belts help keep occupants from being thrown out of their vehicle



**The driver was wearing a seat belt.
The passenger was not.**

HOW SEAT BELTS PROTECT

Seat belts help the driver maintain control of the vehicle



COMMON EXCUSES FOR NOT WEARING A SEAT BELT

I'm just going to the store.

I'm a good driver.

I'm not in the habit of wearing them.

They don't feel comfortable.

It's nobody's business but my own.

I'm afraid of being trapped in a fire or under water.

I don't want to be a "meany" by making my child buckle up.

IDAHO SEAT BELT FACTS

The **Idaho Seat Belt Use Act** requires the use of seatbelts by the driver and each occupant of each vehicle. **State law** also requires child safety restraint systems for children under the age of six or weighing less than 60 pounds.

- The penalty for failure to use a seat belt is \$20.
- The penalty for failure to use a child safety restraint system is a fine of not more than \$100.

