



## Basic Emergency Vehicle Operators Course

Stopping, Collision Avoidance, Skids & Skid Control  
Non-Emergency & Emergency Mode





# Stopping

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## Objectives:

**By the end of this module, students will be able to:**

**Identify factors that influence the stopping distance of a vehicle.**

**Identify acceptable collision avoidance methods for use during an non-emergency and emergency response**





# Stopping

**The stopping distance is compromised of three elements:**

**Perception Time**

**Identify the reason for stopping**

**Reaction Time**

**Physically reacts with the pressure on the brake pedal**

**Actual Braking Distance**

**Actual time your brakes are applied**

**Total Stopping Distance**





# Stopping

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**The stopping distance is influenced by three factors:**

**Driver**

**Environment**

**Vehicle**





# Stopping

## Driver

**Driver related factors which will increase the stopping distance include**

- Perception skills
- Attitude
- Attention span
- Physical reaction capabilities
- Physiological impairment
- Emotional Control





# Stopping

## Environment

Environmental conditions which will increase the stopping distance are:

- **Road Surface**
  - » **Wet, Iced, Snow accumulation.. Etc.**
- **Road Grade**
  - » **Percentage**
- **Road Type**
  - » **Improved, Unimproved,**
- **Visibility**
  - » **Rain, Fog**





# Stopping

## Vehicle

Vehicle related factors that will effect the stopping distance:

- **Speed**
- **Braking System**
  - » **ABS or Non ABS**
- **Suspension System**
- **Tires**
  - » **Correct Type**
  - » **Air pressure**
- **Vehicle Weight**

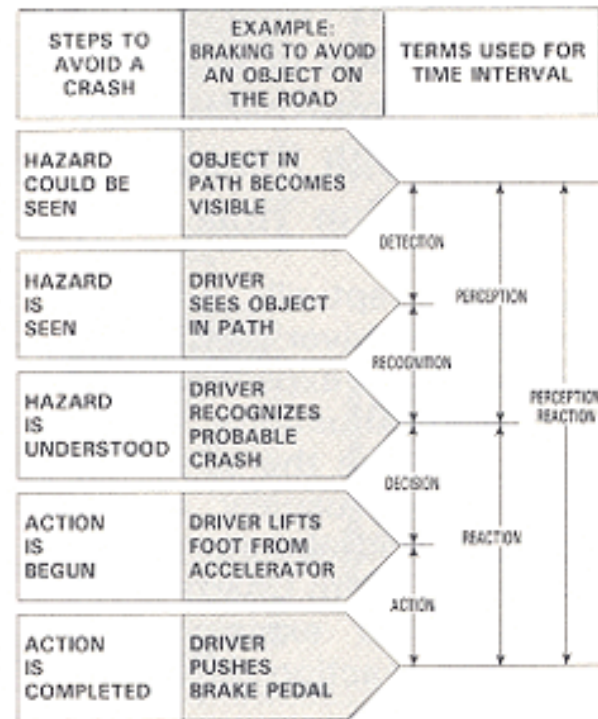




# Stopping

Because there are differences between various vehicles, the following tables are for guidance only. The biggest factor in stopping distances is the speed at which a driver reacts to seeing the hazard in question. Under ordinary driving conditions, very few drivers indeed can get onto the brakes within half a second, and two-thirds of a second to a full second is more typical

## ELEMENTS OF DRIVER PERCEPTION-REACTION TIME



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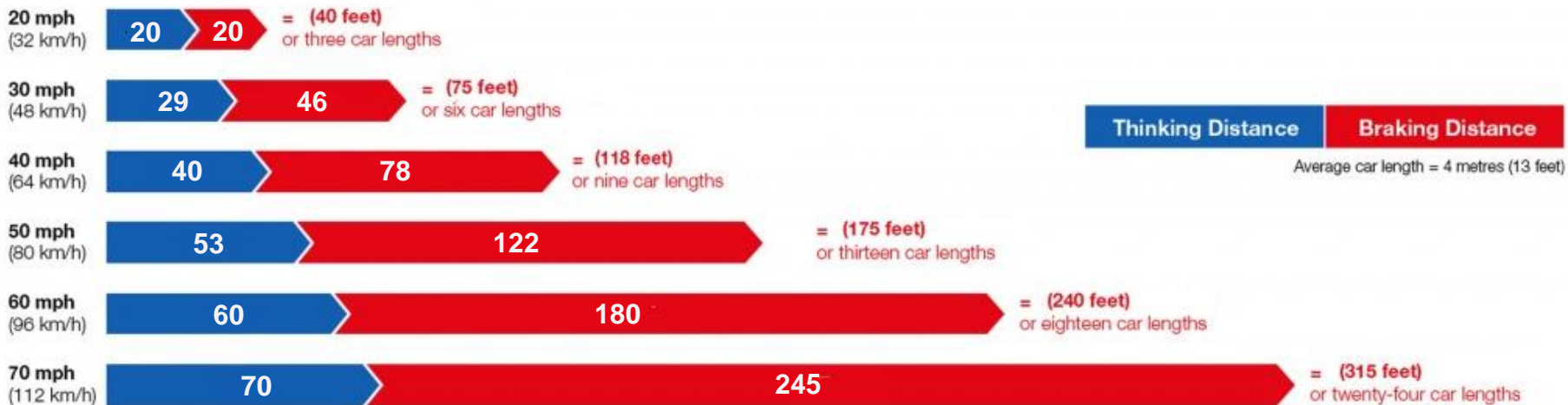




# Stopping

The following chart shows the distance traveled while the driver perceives a hazard (thinking/perception distance) and reacts to bring the car to a stop.

## Typical Stopping Distances





# Stopping

The most important point for any driver to remember is that if you double your speed -- say from 30 mph to 60 mph -- your braking distance does not become twice as long, it becomes almost *four times* as far.

***Remember - 1:*** When road conditions are wet your stopping distances are approximately 2X as far, then on a smooth dry road at about 50 MPH.

***Remember - 2:*** When the road is icy or covered with compacted snow, or diesel fuel has been spilled (which is a particular risk near certain gas stations) *the 'stopping distance' for your vehicle can be as much as ten times further* than for dry roads/pavement.

***Remember - 3:*** .....*Any fool can drive fast enough to be dangerous!*

Lastly, don't forget the intelligent driver will error on the safe side and leave room for thinking/perception time and less than perfect conditions. That driver will also hone the braking skills to give more of a margin of safety. That margin can save lives. Pay attention to the need to react quickly.

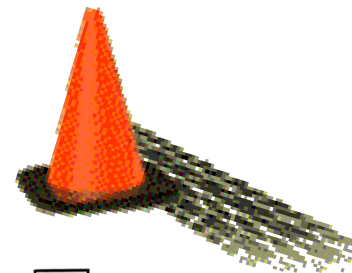




# Stopping

## Summary

**Braking is a lost skill. With so many cars with anti-lock brakes (ABS) , people just slam on the brakes in any situation. This can be a good option, but it is not always the best. Braking (even with ABS) can cause reduced handling capabilities and actually place you in more danger. It's better to learn how to brake properly if you want utmost safety and control.**





## REVIEW QUESTIONS

1) Stopping distance is made up from what three elements?

2) What three factors influence stopping distance?





## Basic Emergency Vehicle Operators Course

Collision Avoidance

Non-Emergency & Emergency Mode

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# Collision Avoidance

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## Objectives:

**By the end of this module, students will be able to:**

**Identify factors that influence the stopping distance of a vehicle.**

**Identify acceptable collision avoidance methods for use during an non-emergency and emergency response**





# Collision Avoidance

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**There are various methods that can be used for collision avoidance:**

**Quick Sudden braking**

**Evasive Steering or sudden lane change**

**Clearing Intersections**





# Collision Avoidance

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## Quick Sudden Braking

**Produce the shortest possible stopping distance without locking the wheels or loss of control.**







# Collision Avoidance

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## Quick Sudden Braking

Vehicles equipped with ABS

Vehicles equipped without ABS





# Collision Avoidance

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## Quick Sudden Braking

Vehicles equipped with ABS

Allows the driver to steer while braking

The driver maintains directional control





# Collision Avoidance

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## Quick Sudden Braking

### Vehicles equipped without ABS

#### Threshold braking

- Hard pressure to brake pedal just shy of lock up.
- Rapid deceleration could cause a rear end collision.
- In some cases, a rear end collision is preferable to the alternative (e.g., hitting a pedestrian). Each case must be judged independently.





# Collision Avoidance

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## **Evasive Steering or sudden lane change:**

**Usually performed when the driver's intended path-of-travel is suddenly blocked by an object, pedestrian or other vehicle**

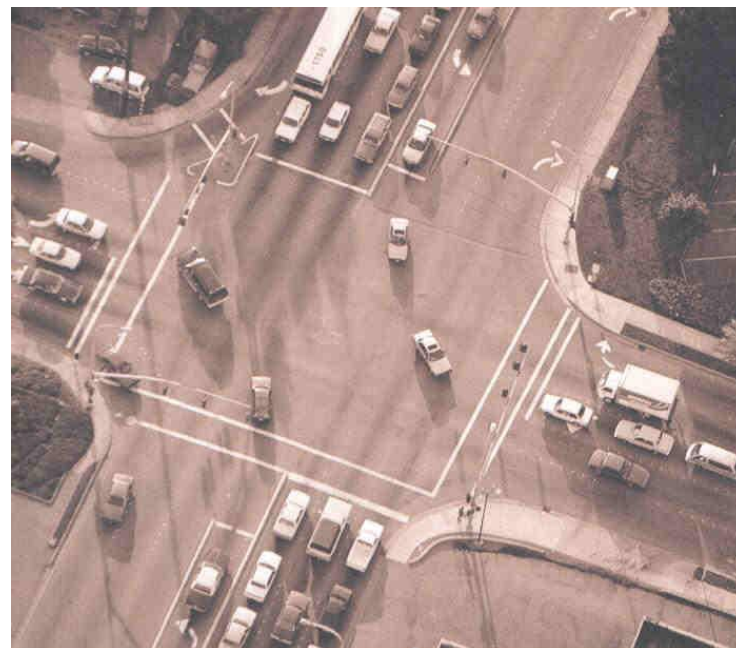




# Collision Avoidance

## Clearing Intersections:

**Keep in mind that lights and siren are informing traffic of an approaching EV and requesting that traffic clear the intersection**





# Collision Avoidance

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## Summary

**The EV Operator should attempt to drive in a manner which will not require the use of collision avoidance maneuvers.**

**However, under emergency response conditions, the potential for collision avoidance maneuvers increases.**

**By identifying these methods and identifying personal skills, the EV operator can choose the most appropriate collision avoidance maneuver when necessary.**





## REVIEW QUESTIONS

1) Name two methods that can be used for collision avoidance?

2) Under what circumstance should an operator consider using an evasive maneuver?

3) What is the goal of Quick Sudden Braking?





## Basic Emergency Vehicle Operators Course

Skids

Non-Emergency & Emergency Mode







# Skids

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## Objectives:

**By the end of this module, students will be able to:**

**Identify the primary causes of all skids.**

**Identify different types of skids.**

**Identify factors to deal with skid control**





# Skids

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## Objectives:

**By the end of this module, students should be aware of:**

Every EV operator has the potential of becoming involved in a skid

Skids do not only occur in bad weather or while driving at high speeds

The EV operator will become aware that there are many ways in which the driver, the environment and the vehicle can create a skid situation.





# Skids

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## Primary causes of all skids:

**Too sudden a change of speed or direction**

**Any change in speed or direction under conditions of poor or reduced traction**





# Skids

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## Regaining Control During a Skid:

**Stay off the brakes**

**Stay off the accelerator**

**Counter steer**





# Skids

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## Rear wheels lock up:

If the rear wheels lock, their reduced traction will cause them to move forward faster than the front wheels.

Get off the brakes & steer

The vehicle may spin 180 degrees (depending on speed, road conditions, etc.). The vehicle may actually end up traveling in the opposite direction





# Skids

## Stay off the accelerator:

The back end of the EV may skid to one side, trying to overtake the front end.

The tendency for the rear end to slide will be greatest if the front wheels are turned.

The vehicle may spin all the way around.





# Skids

## Counter Steering:

Steer in the direction you wish to go.

Steering wheel does not have to be turned violently to correct a skid.

Once the wheel has been turned to counter steer, it may be necessary to immediately counter steer in the other direction.

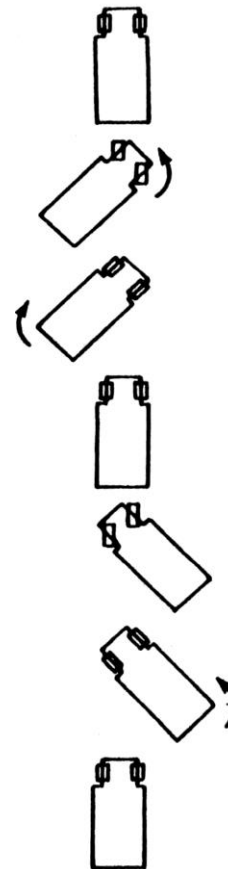




# Skids

## Counter Steering:

Steer in the direction you wish to go.







# Skids

## Different Types of Skids

**Braking Skids**

**Cornering Skids**

**Power Skids**

**Hydroplaning Skids**





# Skids

## Types of Skids:

### Braking skids

This kind of skid occurs when, due to sudden, hard brake pressure, one or more of the vehicle's wheels lock. If brakes are evenly adjusted, all wheels will lock at the same time.

Release the brakes immediately; it should then be possible to steer.

Releasing the brakes allows the wheels to turn again.

If braking is still necessary (to reduce speed or avoid an obstacle), apply with less pressure so that wheels don't lock again.





# Skids

## Types of Skids:

### Power skids

This kind of skid occurs due to sudden, hard acceleration. Since power may be delivered to either the front or rear wheels, depending on your drive train, sudden acceleration can cause those wheels to lose traction. Even though the cause is **different, a power skid is very similar to a braking skid.**





# Skids

## Types of Skids:

### Corning skids

The vehicle may continue to travel straight ahead, not in the intended path of travel around the turn.

This is sometimes called “plowing”, when all four wheels lose traction.

The rear end of the vehicle may overtake the front end, if just the rear wheels lose traction.

This is sometimes called “spinout”



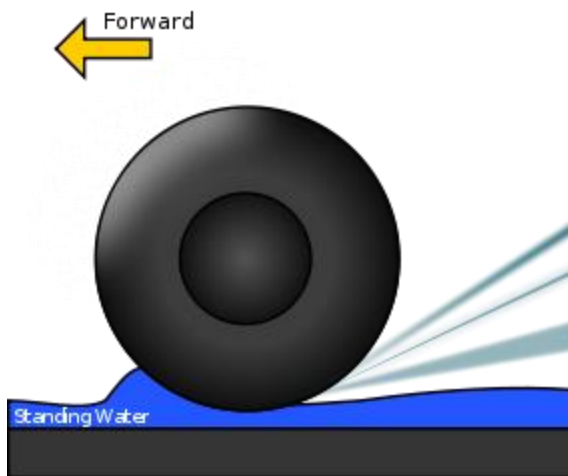


# Skids

## Types of Skids:

### Hydroplaning skids

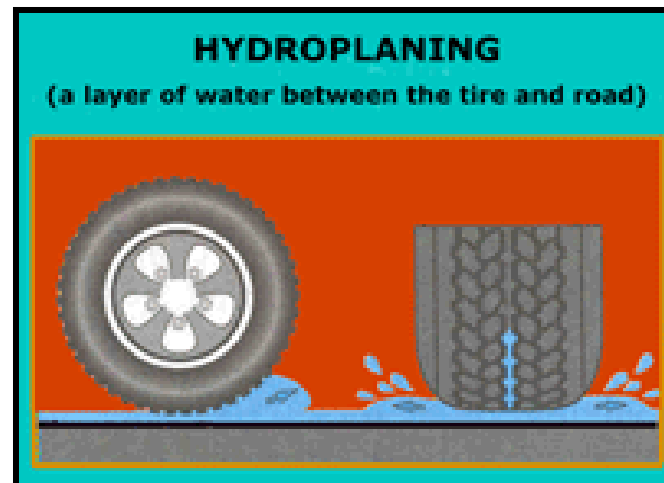
**Hydroplaning occurs when the tire is moving too fast for the water on the road to escape (to flow around it or through the tread). A small wedge of water builds up in front of the tire and lifts it off the surface of the road**





# Skids

## Hydroplaning:



If your vehicle starts hydroplaning, **do not jerk on the wheel or slam on the brakes**. While a car is hydroplaning, the driver has little control over its trajectory, and these actions can cause the car to move violently and potentially dangerously. The best thing to do is to **let up on the gas** and to gently guide the tires with a movement of the wheel,





# Skids

## Summary

The occurrences and conditions listed in this unit should be handled according to the procedures outlined

While all drivers may or may not experience the different types of skids covered, it is essential that each EV operator at least understand the principles covered





## REVIEW QUESTIONS

1) What three steps do you use to gain control during a skid?

2) Give an example of a Power Skid

3) How does Hydroplaning occur?







## Basic Emergency Vehicle Operators Course

Identify Methods for Skid Avoidance  
& Skid Control





# Identify Methods for Skid Avoidance

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## Objectives:

**By the end of this module, students should be aware of:**

**A vehicle in a skid is a vehicle out of control**

**The factors influencing skid avoidance**

**Identify types of power assist steering loss**





# Identify Methods for Skid Avoidance

## Factors influencing skid avoidance

Perception

Steering

Braking

Speed Control

Roadway Positioning





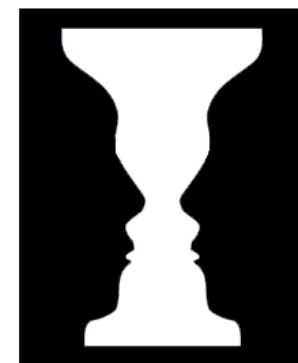
# Identify Methods for Skid Avoidance

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## Factors influencing skid avoidance

### Perception

The process by which an individual receives or extracts information about the environment and attaches or assigns meaning to it





# Identify Methods for Skid Avoidance

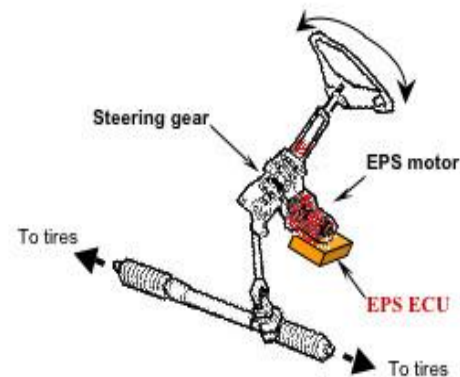
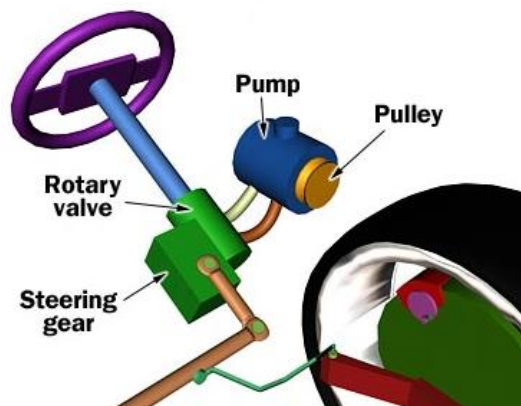
## Factors influencing skid avoidance

Steering (Power Assist vs. EPS *electronic power steering system*)

Steering wheel bind

Lockup

Kickback

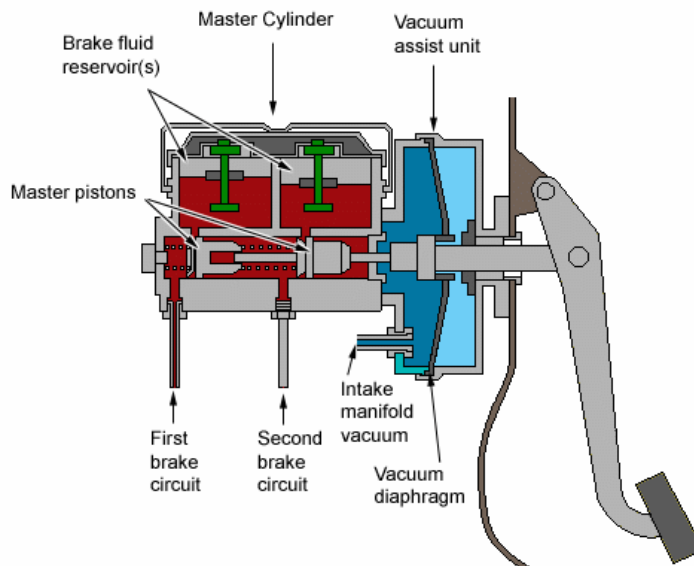




# Identify Methods for Skid Avoidance

## Factors influencing skid avoidance

### Braking





# Identify Methods for Skid Avoidance

## Factors influencing skid avoidance

### Speed Control

Two key points that motorists should be aware of are:

- 1. Half of all fatal accidents occur at an *impact speed* of less than 35 MPH. "Low speed" collisions can be deadly. This is due to Newton's physics and the frailty of the human body.
- 2. Every 5 MPH above the speed limit doubles the risk of being involved in a fatal crash. In a 35 zone, traveling at 40 MPH doubles the risk and traveling at 45 MPH quadruples the risk.





# Identify Methods for Skid Avoidance

## Factors influencing skid avoidance

### Roadway Positioning



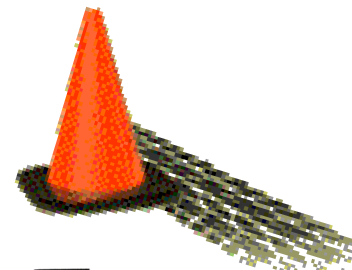




# Identify Methods for Skid Avoidance

## Summary

**All drivers have the potential of becoming involved in a skid. EV operators spend more time on the road than the average driver and have an even greater chance of becoming involved in a skid. By identifying the factors that can cause skids and practicing the methods necessary to prevent and control skids, the EV operator significantly reduces skid potential and increases vehicle control.**





## REVIEW QUESTIONS

1) Define perception?

2) How far ahead of your vehicle should you be doing a visual search?

3) Name thee types of steering failure?

