Defensive-Driving Secrets

How to Drive Safely & Defend Yourself Against Those Who Don’t

A Driving Manual for Experienced Drivers by Dave Leflet

So, let’s go for a ride!
Acknowledgment

I would like to thank Skip Rendall for being my chief editor, technical advisor, and very good friend for more than twenty years. He is experienced in creating reports, manuals, and training material for military and law-enforcement, and he is also a skilled pilot.

Disclaimer

This manual was written for drivers who have completed a driver’s training course and have a permanent driver’s license. The subjects covered in this manual are for informational purposes only, and neither the author nor the publisher assumes any responsibility for the use or misuse of the information contained in this manual. Nothing in this manual should be considered legal advice. Traffic laws vary from state to state, and what might be legal in one state might be illegal in other states. Training can reduce risk, but driving a motor vehicle always carries risk, and the reader must assume the risk.

My first car, a 1967 Oldsmobile 442—
TABLE OF CONTENTS

Copyright ........................................................ i
Table of Contents ........................................... ii
The Problem ................................................... iii
Preface ........................................................... iv
Introduction ..................................................... 1
Observation .................................................... 2
Adjusting Mirrors ............................................. 3
SIR Method ..................................................... 6
Self-Control ..................................................... 7
How to Steer ................................................... 8
How to Brake ................................................ 14
How to Accelerate ........................................... 16
Anticipation ..................................................... 17
Passing on a Two-Lane Road ......................... 18
Curves on a Two-Lane Road .......................... 20
Delayed Apex Line .......................................... 21
Judgment.......................................................... 22
Road Rage ....................................................... 23
Practice ........................................................... 24
Laws of Physics .............................................. 32
Managing Traction .......................................... 34
Skidpan ........................................................... 38
Low-Speed Inservice Driving Program .......... 41
What Truckers Know ....................................... 46
Some Final Thoughts ...................................... 47
Conclusion ...................................................... 48
Glossary ........................................................ 49
Quiz ............................................................... 52
Bibliography .................................................... 56
About the Author ............................................. 58

Additional Disclaimer

The vehicle dynamics in this manual are based on motor vehicles that have a front-engine, rear-wheel drive, and ABS brakes on all four wheels. Vehicles that do not have these features might not respond the same way to steering, accelerating, or braking inputs. If you are not familiar with the features or handling characteristics of any motor vehicle you are driving, contact the company that manufactured the vehicle and request the information you need.
THE PROBLEM

An automobile accident is an undesired event involving motor vehicles that causes unintended injuries, death, or property damage. A near miss can be a threat or hazard that has the potential to cause injuries, death, or property damage but failed to do so because of intervention by one or more drivers or because of luck. When a motor vehicle accident occurs, the driver or drivers who appear to be at fault are usually charged with the accident, but the drivers who were not at fault but might have prevented the accident if they were more alert or better drivers are seldom charged or held accountable.

At the same time technology and better engineering are making vehicles safer, human behavior, such as distracted driving, road rage, and driving while under the influence of alcohol or drugs, has made driving a motor vehicle more dangerous. The reason for this manual is to make people better drivers and show people how to protect themselves against bad drivers. Most drivers are not predators who look for an opportunity to cause property damage or injure other drivers, but incompetent drivers are even more likely to damage your vehicle or cause injuries than predators.

Quotes from NHTSA (National Highway Traffic Safety Administration)

- During daylight hours, approximately 481,000 drivers are using cell phones while driving. That creates enormous potential for deaths and injuries on U.S. roads. Teens were the largest age group reported as distracted at the time of fatal crashes.
- The words, “aggressive driving,” emerged during the 1990s as a label for a category of dangerous on-the-road behaviors. The category comprises following too closely, driving at excessive speeds, weaving through traffic, and running stop lights and signs, among other acts. Aggressive driving occasionally escalates to gesturing in anger or yelling at another motorist, confrontation, physical assault, and even murder….
- Those who drive under the influence of alcohol or drugs, whether obtained legally or illegally, pose a danger to themselves, their passengers, and other road users…. It is illegal everywhere in the United States to drive with a blood alcohol concentration (BAC) of .08 or higher. Yet, almost every year, about one-third of all deaths on our roads involve drunk drivers.
This driving manual goes far beyond the traditional driving rules that most people learned when completing a basic driver’s training program, such as “Always be able to stop within a distance you can see is clear.” If you want to be an advanced driver, you need to do more than follow basic rules. For example, if you are crossing a 4-way intersection on a green light and you know that you can stop within the distance you can see is clear, you might get broadsided by a vehicle you didn’t see that runs a red light.

On the other hand, if you followed a more comprehensive rule, such as “Maintain 360-degree awareness when you drive a motor vehicle,” you might have looked left and right before you entered the intersection and noticed that one of the vehicles approaching the intersection was not slowing down enough to stop for the red light.

Another time the 360-degree rule might prevent an accident is when you are dealing with drivers who believe a yellow light means go faster and they don’t mind running a red light. If you are first in line when a light turns green, do not enter the intersection until you check to the left and right to see if someone who accelerated when the light turned yellow is about to run a red light. It’s better to wait and be safe than to go and be sorry.

Following the 360-degree rule may also prevent another type of accident. If a light turns yellow and you can stop without being rear-ended by the vehicle behind you, you should stop. When you are maintaining 360-degree awareness, which means you are checking your side mirrors and rearview mirror, you will know if someone behind you is following too closely and might hit you in the rear if you stop for a yellow light.

Driving safely requires complex behavior, and in most cases, a driver will need to apply multiple rules, principles, and skills at the same time in order to drive safely. The information presented in this manual will help you make good decisions when facing potential threats or hazards, but driving a motor vehicle is unavoidably a high-risk activity and no amount of caution, training, or practice will ever make driving risk-free.

If there is anything in this manual you don’t understand, speak to a driving instructor before you change the way you drive. Smooth steering, accelerating, and braking will prevent most skids if you are not pushing a vehicle to the limit, and gently easing off the brake or throttle when you start to skid and then looking and carefully steering in the direction you would like to go will help you recover from most skids. If you start to skid and you stomp on the brakes or lift your foot off the brakes instead of just reducing pressure on the brakes, you can turn a 90-degree skid into a 360-degree spin.
INTRODUCTION

This training manual is about driving a vehicle on public roadways, which is more dangerous than driving a racecar on a racetrack or being a stunt car driver. Public roadways do not have the safety features that racetracks have, and racecar drivers are professional drivers who are driving next to other professional drivers. Furthermore, racecar and stunt car drivers use vehicles that have built-in safety features that street vehicles do not have and they wear helmets and protective clothing, such as fire-retardant suits, gloves, and shoes, that reduce the risk of being injured during a crash.

Most of the principles presented in this book relate to safety and what you can do to avoid getting injured or killed because of a mistake that you made or someone else made. Since this book is not about preparing you to drive on a racetrack, knowing the safest line for navigating a curve is more important than knowing the fastest line. Most of the lines used on a racetrack would get you killed if you tried to use them on a two-way street. For a racecar driver, controlling a skid can win a race; for a safe driver, knowing how to prevent skids is more important than knowing how to control them.

Since this book was written for experienced drivers instead of people who are learning how to drive, basic information, such as why you should use a seatbelt or lock your doors, is not included. What this book does cover are topics such as observation skills, emergency stops, and road rage.

Most experienced drivers who want to improve their driving skills are not interested in reading a 250-page book on learning how to drive or a book on vehicle dynamics that combines the laws of physics with mathematical formulas. You do not need a background in math or science to understand that increasing your speed increases your stopping distance and increases your risk of having a collision that results in a serious injury or fatality.

Many of the traditional driving rules are incomplete, such as “Always look were you want to go.” If a swerving truck is heading in your direction, looking where you need to go will not work until you look at the truck long enough to know where you want to go. “Look far ahead” is a good rule, but you also need to scan the area that’s between your vehicle and what you see when you look far ahead. “Avoid backing up” is a good rule if you have a choice. This manual tries to make traditional driving rules more complete.

Running off the road to avoid a head-on collision is not a good option, but it might be the best option you have. It’s possible that running off the road could save lives. This manual tries to focus on good options, but in an emergency, you may need to use judgment, training, and experience to make the best of a bad option when it’s the best option you have.
OBSERVATION

The single most important driving skill is observation. Steering will not be effective unless you can look where you want to go, accelerating will not be safe unless you see that the road ahead is clear, and braking will not be effective unless you see a hazard while you still have time to stop. If your observation skills are good, you will know what’s happening around you.

The easiest way to improve your observation skills is by making certain your seat and your mirrors are properly adjusted. Your seat should be adjusted so you can place your entire left foot on the floor, and when you lean back in your seat and stretch your arms over the top of the steering wheel, both of your wrists should touch the top of the steering wheel. Your knees should be bent, and some cars have a space on the floor called a “dead pedal” that is made for resting or bracing your left foot on the floor.

Your seat should be somewhat upright and you should be able to use the rearview mirror and look out your side windows. Looking over your left or right shoulder so you can look out your left- or right-side windows is called a “shoulder check.” After you check your left- or right-side mirror, it’s usually a good idea to do a left or right shoulder check to make certain there is not a vehicle beside you that was not visible in your side mirrors.

Most drivers do a better job adjusting their rearview mirror than their side mirrors. If the sides of your vehicle are visible when you look though the side mirrors, adjusting the mirrors outward until you cannot see the sides of your vehicle will make it easier to see vehicles that are beside you and behind your side mirrors. Those areas where vehicles are not visible because of improperly adjusted side mirrors are notorious blind spots.

If your mirrors are properly adjusted, you will be able to see a vehicle behind you in your rearview mirror. If the vehicle passes on the right or left, it should be visible in a side mirror when it’s no longer visible in the rearview mirror. After a vehicle is no longer visible in a side mirror, you should be able to see it next to you by doing a shoulder check, and then see it through your front windshield. Using the mirrors and a shoulder check can give you 360-degree awareness, which is the most important kind of awareness.

If you think of the open space that surrounds your vehicle as a “space cushion” and you treat a vehicle that enters your space cushion as a potential threat, maintaining 360-degree awareness so you can detect threats will help you avoid accidents. By staying alert, you might be able to prevent accidents that would not have been your fault even if they occurred. Even if you have 360-degrees awareness, look left, right, and then left again before entering an intersection. This will reduce the risk of being hit by approaching vehicles.
ADJUSTING MIRRORS

Adjusting the rearview and side mirrors will not be the same for every vehicle, but the basic principle will be the same: adjust your mirrors in a way that eliminates or greatly reduces blind spots. As a rule, if you can see the sides of your vehicle when you look in your side mirrors, your mirrors are not properly adjusted. Even if you have your mirrors properly adjusted and you have practically eliminated all blind spots, you will not automatically see a vehicle that’s in the field of view covered by your mirrors unless you actually look in your mirrors. Sometimes just shifting your eyes will be enough to see approaching vehicles, but turning your head will usually give you a more detailed picture of what’s behind or beside you than just shifting your eyes.

Central vision provides more visual information than peripheral vision, but peripheral vision is better at detecting motion. If your peripheral vision detects an unidentified movement, such as a deer walking along the side of the road, you can use your central vision to investigate the movement.

You might be able to increase what you see in your mirrors by changing the way you are sitting in your seat. If you need to check the right side of your vehicle, how far your rear wheel is from a curb, or the area behind your rear bumper, leaning to the right or straightening your back may help. If you need to check the area that’s next to your left door, leaning to the left may help. Moving around in your seat may also help you see into the blind spots that are created by the two metal pillars that support the front of your roof.

Not having your mirrors properly adjusted can result in not yielding the right-of-way to someone who is driving in one of your blind spots. If you are lucky, the driver will see you, tap the horn, and take evasive action. If you are in a lane next to another vehicle, seeing the driver’s face in a side mirror means that the driver may see you—but not that the driver does see you.
Why You Need 360-Degree Awareness

Cutting Other Drivers Off

If you are driving on a four-lane expressway and you monitor your review mirror, you might notice that a driver who was tailgating you while you were in the left lane and getting ready to pass a slow-moving vehicle in the right lane has moved into the right lane and is now to the right of your vehicle. From this position, the driver may accelerate quickly and try to make it through the gap that’s between your vehicle, which is in the left lane, and the vehicle in the right lane that you are trying to pass. If you anticipate this is what the driver beside you is going to try, your best option is slow down and increase the space between your vehicle and the vehicle you are trying to pass. If you speed up, you might close the gap just as the vehicle to your right speeds up and tries to slip though the gap. Closing the gap could result in an accident that involves your vehicle, the vehicle you were trying to pass, and the vehicle that was gambling on being able to make it through the gap.

Unexpected Left Turn When Going Straight

If someone suddenly turns left in front of you, it’s hard to avoid hitting the vehicle or being hit by the vehicle. You might be able to brake and let the vehicle that made the left turn complete the turn, or you might be able to speed up enough to keep the vehicle from hitting you. The best way to prevent this type of accident is to constantly monitor oncoming traffic and scan for vehicles that have a left turn signal on, vehicles that have slowed down and moved to the left side of their lane, or drivers who are traveling at about the same speed as other vehicles in their lane, but constantly looking to the left. If you see drivers who are giving any indication that they might be planning to turn left in front of you, slow down and stay alert. If you are driving in heavy city traffic, emergency braking will usually be your best option.

A vehicle behind you can be almost as dangerous as a vehicle that turns left in front of you. Tapping the brake pedal to flash your brake lights should signal tailgaters that you might be slowing down and they need to give you more space, but some tailgaters will ignore or fail to notice your brake lights and continue to tailgate. If you are being tailgated by a driver who is constantly looking down at something or failing to drive in one lane and the driver does not respond to your brake lights, you can hope for the best or you can signal a right turn, gradually slow down, and then turn right. Most tailgaters will go straight instead of turn right when you turn right.
Waiting to Turn Left

If you are stopped at an intersection and waiting to make a left turn, a vehicle approaching from your right can be a problem if it turns left when you are turning left and your vehicles collide. Even if it appears that a vehicle approaching you from the right is going to go straight because you cannot see a turn signal and the vehicle is not slowing down, rather than speculate on whether the vehicle is going to go straight or turn left, wait until you know the path you are going to take when you make a left turn will be clear regardless of whether a vehicle goes straight or turns left. Being patient and waiting until your path is clear before you turn can prevent having a collision. If making a left turn is dangerous because of heavy traffic, you can always make a right turn and then look for a safe place to turn around.

Most drivers are cooperative, but some drivers will not give you an opening when you want to make a turn or change lanes. Since two vehicles cannot occupy the same space at the time, accept cooperation when it’s offered, but leave yourself an out if it’s not offered. It’s better to wait longer when making a left turn or miss an exit than to have an accident.

Concealed Vehicles

When driving a motor vehicle, you need to use every means available to see if any vehicles are concealed in front of a vehicle you would like to pass. You might be able to look through the rear and front windshield of the vehicle in front of you or you might be able to see how many vehicles are in front of you when you go around a curve or up or down a hill.

If you try to pass and see one or more vehicles in front of the vehicle you are trying to pass that you didn’t realize were there, you might have a collision. If a driver behind you pulls out to pass at the same time you pulled out to pass, slowing down quickly and trying to get back into the right lane without passing might cause a rear end collision or you might collide with oncoming traffic because you had no way to reenter the right lane.

If you cannot tell how many vehicles are in front of a vehicle you would like to pass, you might be able to enter the passing lane and stay far enough behind the vehicle you are trying to pass so you can get back into the right lane if it’s not safe to pass. The danger here is that a vehicle behind you may decide to move forward and occupy the space that you were going to use if you needed to reenter the right lane. Your best option is to wait until you know how many vehicles are in front of you before you decide to pass. Good driving decisions are based on observation—not speculation.
SIR METHOD

The faster you can scan, interpret, and react to what’s happening around you, the less likely you are to be involved in an accident. An easy way to remember the sequence scan, interpret, and react is to remember the acronym SIR. The number of significant things you need to scan for when driving a vehicle, such as potential threats and road hazards, is quite large, but with adequate practice, these scans will become automatic and require almost no conscious thought. If you can also make interpreting and reacting correctly to what you see after you complete a scan automatic and make your vehicle feel like a natural extension of your body, then using the SIR method will become automatic and driving safely will become a habit.

Warning signs that should get your attention when you are scanning your environment include brake lights, turn signals, traffic signals, a driver texting on a cell phone, or a driver weaving back and forth and running off the road. The actions you take after seeing a warning sign should be almost automatic, such as put yourself on high alert, slow down, speed up, or turn.

Having a large space cushion between your vehicle and any threats or hazards you are scanning for, such as other vehicles, will improve the effectiveness of the SIR method because you will have more time to detect, interpret, and react to things you need to avoid. When trying to increase the size of your space cushion by changing your speed or position, try not to interfere with the normal flow of traffic. Three things that often decrease the size of a space cushion are impatience, speeding, and aggressive driving.

Determining the size of your space cushion requires estimating how far you are from cars in front of you, but using feet to estimate distance is not easy for most people. An easier way to estimate distance is to use seconds. To do this, you start counting seconds from the time a vehicle in front of you reaches a fixed object, such as a telephone pole or signpost, and you stop counting when your car reaches the same object.

For example, if it takes you about one second to say the word “go” plus a number and the count starts at “go-one” when the vehicle in front of you reaches a pole and stops at “go-three” when your vehicle reaches the same pole, your vehicle and the vehicle in front of you are about 3 seconds apart. As a rule, the minimum time between your vehicle and a vehicle in front of you should be 3 seconds. Even when moving slowly, if the time between your vehicle and the vehicle in front of you is less than 3 seconds, you might have time to interpret something as a threat or hazard, but not enough time to stop. At higher speeds, the number of feet you travel per second will increase, but the distance it takes to stop will also increase.
SELF-CONTROL

There is no clear link between the people who drive while distracted, people who drive when their emotions are out of control, and people who drive while under the influence of alcohol or drugs, but anyone who does any of these things is clearly showing a dangerous lack of self-control. Even if your blood alcohol is below the legal limit, the fact you were drinking prior to an accident can hurt you in civil court if you are sued.

A distraction can be anything that interferes with your ability to observe (scan, interpret, and react) correctly. Distractions can be internal, such as daydreams, headaches, or backpain, or external, such as cell phones, children, or objects dropped on the floor of your car. Some distractions are both internal and external, such as wanting to change the radio station and looking for the right button to push on your radio.

What makes a serious or fatal accident caused by distractions even more regrettable is that the people who caused these accidents could have chosen not to do the things that caused them to be distracted, such as texting while driving. Statistically, driving while intoxicated causes more serious accidents than driving while distracted, but most drivers will not admit they were distracted just before an accident occurred, which makes driving while intoxicated easier to prove than driving while distracted.

The two emotions that seem to have the most devastating effect on your ability to drive safely are impatience and anger. Both of these emotions can lead to aggressive driving that endangers the angry driver’s life and the life of anyone who happens to be nearby. Any time you feel that you might be falling into a category called “angry driving,” it’s time to stop driving, take a break, and do whatever it takes to regain your self-control. If angry driving is a chronic problem, consider professional help.

Regardless of whether you believe driving while under the influence of alcohol or drugs is caused by a lack of self-control or a disease, you should get professional help if you cannot stop yourself from being impaired because of alcohol or drugs when you drive on roadways.

Another type of self-control that some drivers lack is the ability to combine driving with tolerance, cooperation, or courtesy. If a driver does something foolish that endangers your life, you are not obligated to approve of what was done, but having someone accidentally put at risk does not give you the right to retaliate. If retaliation escalates the situation and leads to physical violence, a court is unlikely to rule in your favor and you may be facing criminal charges. If a driver commits an intentional act that puts you at risk and you are not a law enforcement officer, file a criminal complaint.
HOW TO STEER

Your normal grip on a steering wheel should be firm, but relaxed, and you should be able to feel the road. If you are turning or braking, you may want to use a slightly stronger grip. Gripping a steering wheel with too much pressure may cause hand fatigue, and gently shaking your hands may help you reduce hand fatigue. If you are bracing for a collision, use a tight grip.

Turning a steering wheel to the right or left as far as it will go and then holding the wheel in place until the vehicle makes a complete circle will let you determine the vehicle’s turning radius, which is the smallest circle the vehicle can make. A vehicle with a small turning radius is easier to maneuver in tight spaces than a vehicle with a large turning radius, and knowing your turning radius will help you decide if your vehicle can make a sharp turn into a parking space or a sharp U-turn without running off the road. When driving in confined spaces, driving in reverse will also increase maneuverability.

Unless you are backing a vehicle with one hand at the top of the steering wheel, most steering should be done with two hands firmly on the steering wheel. Having both hands on the steering wheel will make turning quickly to avoid a hazard easier and faster and it will also make it easier and faster to recover from a skid, regain control of your vehicle after you drive over a deep pothole, and steer your vehicle after you have a flat tire.

If you think of your steering wheel as the face of a clock, the best position for your left hand is about 9:00 o’clock and the best position for your right hand is about 3:00 o’clock. Keeping your thumbs parallel instead of perpendicular to the steering wheel will reduce the risk of having the driver’s airbag injure your thumbs if you have a front-end collision.

Having both hands at the top or bottom of a steering wheel will make it harder to turn quickly or control a skid. When your hands are at 9:00 and 3:00 o’clock, you can generate more turning force and maintain better control over the steering wheel because one hand is pulling downward on the steering wheel while the other is pushing upward. This kind of push-pull movement, which is called a “force couple,” will give you better control than pushing or pulling the steering wheel up or down with only one hand.

When your hands are on opposite sides, such as the 9 and 3 position, you can turn a steering wheel about a quarter-turn without repositioning your hands. If you need to turn more than a quarter-turn, you can reposition your bottom hand to the top, your top hand to bottom, and continue to rotate the steering wheel about a half-turn. Although popular with many drivers, the steering method that will give you the least control is driving with your right hand on the steering wheel and your left hand hanging out the window.
Hand-over-hand steering is the most common method of steering used in the USA and Canada. In the United Kingdom and in some states, you can also use hand-to-hand steering. Most professional drivers use hand-over-hand steering because it’s faster, smoother, and more precise than hand-to-hand steering. The overhand steering method presented in this manual is faster, smoother, and safer than conventional hand-over-hand steering.

If you have rotated a steering wheel as far as you can without repositioning your hands and you need more rotation, you move your bottom hand to the top, your top hand to the bottom, and continue rotating the wheel. When your bottom hand moves to the top, it crosses over the top of the other hand and grabs the steering wheel—which frees the hand that was on top and lets you move it to the bottom of the steering wheel.

If you need more rotation, release your bottom hand, cross your bottom hand over your top hand, grip the steering wheel at about 12:00 o’clock, move your top hand to the bottom of the wheel, and grip it at 6:00 o’clock. This will put your hands in a vertical position and allow you to rotate the steering wheel about 180 degrees. After you rotate 180 degrees, your top hand will be at 12:00 o’clock and your other hand at 6:00 o’clock. After you wind (turn) a steering wheel as far as you need to go in one direction, use the overhand method to unwind it in the opposite direction.

If you are approaching an opening in a median strip and you need to rotate the steering wheel 180 degrees to make a U-turn, you can start with your hands in a horizontal position, turn the wheel 90 degrees, reposition your hands to a horizontal position, and turn the wheel another 90 degrees. On the other hand, if you start with your hands in a vertical position, you can turn the steering wheel a full 180 degrees without repositioning your hands, which can make doing a U-turn easier, smoother, and faster.

The number of degrees you need to rotate the steering wheel to make a U-turn will depend on your vehicle. A sports car might be able to make a sharp U-turn with less than 180 degrees of rotation, but a truck might take more than 180 degrees of rotation to make the same U-turn. Most cars can navigate most turns with less than 180 degrees of rotation.

Driving with one hand is usually a bad technique because it reduces the control you have over the steering wheel, but it may be necessary if you are backing up or if you need to use control switches to activate features such as windshield wipers or headlights. Driving with your palms facing away from your body instead of toward your body will also reduce control.

The following illustrations will demonstrate the movements and explain the terms that are used in overhand steering. After you understand how it works, you can decide if using it will make you a better driver.
Steering Illustrations

The illustrations below show the horizontal and vertical steering positions. Without repositioning the hands, most drivers can rotate a steering wheel about 90 degrees when starting from a horizontal position or about 180 degrees when starting from a vertical position. When turning, do not reposition your hands on the steering more than absolutely necessary. The main reason for a steering wheel is to turn a vehicle, but you can also use a steering wheel to brace yourself during a spin or before a collision.

Steering Wheel Hand Placement

START ROTATION
9:00 o’clock—3:00 o’clock
Horizontal Position—90 degrees

START ROTATION
6:00 o’clock—12:00 o’clock
Vertical Position—180 degrees

END ROTATION

Overhand Steering—Left Quarter-Turn (90 degrees)

Clock 1: Start with horizontal position. Pull down with left hand and push up with right hand. Clock 2: Rotate steering wheel about a quarter-turn (90 degree) to the left and into a vertical position.
Overhand Steering—Left Half-Turn (180 degrees)

When your hands are in the position shown by Clock 2, you can turn the steering wheel to the left about 180 degrees. To do this, you must do a crossover so you can move your left hand to the top of the steering wheel and your right hand to the bottom.

A crossover when turning left: cross your left hand over the top of your right hand and grasp the steering wheel with your left hand.

After you grasp the top of the steering wheel with your left hand, grasp the bottom with your right hand (Clock 3). From this position you can rotate the steering wheel left about 180 degrees (Clock 4).

Overhand steering: pull down with one hand and push up with the other. If you are turning right instead of left, your right hand will be on top during the crossover.

If you do two quarter-turns in a row, you will rotate the steering wheel 180 degrees and your hands will be in a horizontal position. To straighten a vehicle after you do two quarter-turns, do two quarter-turns in the opposite direction.

Most turns do not require more than a 90-degree rotation of the steering wheel, and if your hands are in a 9—3 position, you can make a 90-degree turn without taking your hands off the wheel. If you turn more than 90 degrees, at least one hand should have a firm grip on the steering wheel. A quarter-turn and half-turn equal 270 degrees.
Complete Overhand Steering Sequence: Quarter Turn and Half Turn

To be safe, fast, and effective, overhand steering must be smooth, continuous, and automatic. If you see a hazard, you need to be focused on where you need to go to avoid the hazard and turning the steering wheel should not require conscious thought. If you are using a 9—3 position and driving on a fairly straight road, your hands will be in a horizontal position most of the time and most course corrections will not require more than a quarter turn, which means you will not need to reposition your hands. Depending on your vehicle and on your flexibility, you might be able to turn your steering wheel more than 90 degrees without repositioning your hands.

To complete a half turn after you complete a quarter turn: release your left hand—which will be on the bottom of the steering wheel—rotate the steering wheel to the left with your right hand, cross your left hand over your right hand, and grab the steering wheel. The movements of your right and left hand should be almost simultaneous. *The two illustrations for the half turn to the left are on page 11.*

To complete the half turn: Grab the bottom of the steering wheel with your right hand (thumbs pointing right), rotate the steering wheel a half turn to the left (thumbs pointing left). If done properly, the steering wheel will not stop rotating until the quarter turn and half turn are completed.
The sequence for making a right quarter turn and a right half turn is the same, but the hand positions will be reversed when you make the turns.
HOW TO BRAKE

It was much harder to teach emergency braking when most cars did not have ABS (anti-lock braking system) brakes. If you failed to pump the brakes correctly, you locked the wheels and caused a skid, and if you needed to turn, you had to release the brakes before you could turn.

With ABS brakes, emergency braking is much easier: slam the brake pedal to the floor as hard and fast as you can and maintain maximum pressure on the brake pedal until you stop or slow down to a safe speed. When activated, ABS brakes will vibrate or pulsate. ABS brakes can prevent skids and reduce your speed if you cannot recover from a skid.

Even though most vehicles will be easier to control if maximum brake pressure is applied while a vehicle is moving along a straight line, driving a vehicle that has ABS brakes and an ESP (Electric Stability Program) will reduce the risk of losing control of your vehicle if you apply maximum brake pressure while making a turn. Even with ABS brakes and ESP, maximum braking while making a fast, sharp turn is not recommended because the braking and turning may reduce tire traction and cause a skid or spin.

If you have ABS and ESP, your owner’s manual or the company that manufactured your vehicle should be able to give you information on how to use these features correctly. The common mistakes that people with ABS brakes often make are not hitting the brakes fast enough or hard enough and not keeping maximum pressure on the brakes long enough.

The stopping distance for brakes that do not lock up will be shorter than the stopping distance for brakes that do, but if regular brakes do not lock up, their stopping distance will be similar to ABS brakes on dry pavement and on some slippery surfaces. ABS brakes will have shorter stopping distances on loose gravel, sand, or snow, and unlike standard brakes, they prevent skids and let you brake and turn at the same time.

Emergency braking is not a common occurrence for most safe drivers because they use their observation skills to identify hazards quickly and they normally have enough time and space to slow down or stop without using emergency braking. Covering your brake, which is holding your right foot over your brake pedal when you see a potential hazard, can also shorten your stopping distance. Drivers who do a lot of hard braking or swerving are often the same people who tailgate or drive when distracted or fatigued.

If you cannot stop or turn fast enough to avoid a front-end collision, having a seatbelt on, having an airbag, and having a properly adjusted head-neck restraint can reduce your risk of injury. Grabbing the steering wheel and pushing yourself back into your seat may also give you some protection.
Total Stopping Distance

Even though it’s possible that doubling your speed may quadruple your braking distance, your total stopping distance includes the time it takes to recognize a hazard, the time it takes to apply the brakes, and the time it takes to stop a vehicle after you apply the brakes. These three variables are called perception distance, reaction distance, and braking distance, and changing any of them can change your total stopping distance.

Perception distance is the distance a vehicle travels from the time you scan something until the time you interpret what you scanned as a hazard. If you can decrease the time it takes to recognize a hazard, you will decrease your perception time and increase distance you have available if you need to apply your brakes to avoid hitting the hazard. If you are slow to recognize a hazard, you might not be able to stop before you hit the hazard. Good training, driving experience, and scanning the road as far ahead as possible can make it easier to realize that something you see is a hazard. Distracted drivers often hit vehicles that they failed to see until after the collision.

Reaction distance is the distance a vehicle travels between the time you recognize a hazard and the time you apply your brakes. Drivers with fast reflexes might have a slightly shorter reaction distance than drivers with normal reflexes and a much shorter reaction distance than people with very slow reflexes, such as drivers under the influence of alcohol or drugs.

Braking distance is the distance your vehicle will travel while your brakes are applied, and the way you apply your brakes can have a major effect on the braking distance. If you have ABS brakes, pumping the brakes will increase your braking distance and keeping the brakes pressed to the floor will decrease your braking distance. Even if you apply your brakes correctly, the quality of your brakes or tires, the condition of the road surface, and the weight (mass) of your vehicle can affect your braking distance.

To lower the risk of not having enough time or space to stop: learn how to use your brakes correctly, scan far down the road for hazards, drive slower if you have limited visibility, and take your foot off the gas and cover the brake so you can apply pressure quickly if you recognize a hazard.

Since most drivers cannot tell if the distance between their vehicle and a hazard is 300 feet or 400 feet, they usually rely on driving experience when trying to decide if they have enough time or space to stop before they have a collision. If you have ABS brakes and you cannot stop before you hit a hazard or reduce your speed enough to avoid serious damage if you hit the hazard, your best option might be to brake and steer at the same time and try to find an escape route that allows you to drive around the hazard.
HOW TO ACCELERATE

The Bad: Increasing your speed will increase your risk of having a fatal accident, and doubling your speed may quadruple your stopping distance. If you increase your speed relative to other vehicles, you might decrease your space cushion and increase the risk of following too closely. If you are traveling at speeds that exceed the speed limit, you may get a speeding ticket that will have an adverse effect on your driver’s license and insurance rates. If you drive at extremely high speeds, you might be convicted of reckless driving, lose your driver’s license, and go to jail. In some cases, driving at the speed limit can be driving at an unsafe speed.

The Good: Increasing your speed when you are passing another vehicle will reduce the time traveling next to the vehicle you are passing, and when you are passing on a two-lane road, it will reduce the time you are traveling in the same lane as oncoming traffic. Increasing your speed when you are on an entrance ramp that leads to a high-speed expressway will usually make it easier to merge with the flow of traffic that is already on the expressway. If you are entering a high-speed road that does not have an entrance ramp and hills or curves make it hard to see as far down the road as you would like to see, accelerating as you turn and enter your lane will help you avoid being broadsided by oncoming traffic or rear-ended by traffic moving in the same direction.

The belief that slow drivers are always good drivers and fast drivers are always bad drivers is unrealistic. People who consistently drive more than 10 mph below the speed limit force drivers who want to drive at the speed limit to pass them, and having a large number of vehicles pass a slow driver will increase the probability that someone will be involved in an accident. Passing another vehicle is a high-risk activity, and colliding with an oncoming vehicle often results in a serious or fatal accident.

The belief that drivers who drive more than 10 mph above the speed limit cause a disproportionate number of accidents would be hard to prove, but these drivers do receive a disproportionate number of speeding tickets and speed is one the main factors that increase the severity of an accident. If you are involved in a serious accident and it can be proven that you were speeding prior to the accident, the fact that you were speeding can be used against you in a criminal or civil court.

Regardless of how much space there is between you and a vehicle in front of you, never drive at a speed that prevents you from stopping if the vehicle in front of you stops. Factors that may increase the space you need are bad weather, darkness, or a poorly designed road.
ANTICIPATION

Most people will agree that you cannot be a safe driver without having both driving skills and observation skills. Most driving skills are based on being able to use the steering wheel, accelerator, and brake correctly, and most observation skills are based on being able to scan, interpret, and react to what you see correctly. What many people do not realize is that being able to recognize potential threats can give you more time to react than waiting until you know for certain a threat is real.

When trying to anticipate a traffic hazard, your most important weapon is your brain. Physical traits, such as better than average reflexes or vision, may help you avoid an accident if you take remedial action just before an accident occurs, but using your brain to anticipate the possibility of a hazard will help you avoid the element of surprise, give you more time to react, and make the actions you take to avoid a hazard more likely to be effective.

If a car coming toward you in the opposite lane slows down and starts moving toward the left side of the lane and the driver is looking to the left, you should anticipate the possibility that the driver might turn left in front of you and start slowing down in case you need to make a sudden stop. Most drivers do not anticipate what other drivers are going to do, and when something they failed to anticipate happens, they may not have enough time to take evasive action, such as brake or turn, to avoid having an accident.

Anticipation can be a powerful tool when you are trying to be a safe driver, but it’s not a perfect tool. Some traffic hazards are almost impossible to anticipate because they occur too quickly and without any signs that would let you anticipate the hazard. People who turn left in front of you because they almost missed a left turn might not give you any warning signs.

The problem with anticipation is that people often indicate they are going to do one thing and then do something else. If you plan to pass a vehicle that has the right-turn signal on, staying behind the vehicle until it turns right is safer than assuming the vehicle will turn right and then have it turn left when you start to pass. Acting on assumptions that may cause harm if you’re wrong is dangerous, but acting on assumptions that will not cause harm if you’re wrong and may prevent an accident if you’re right is usually a good choice. If a light turns green and you do not enter an intersection because you believe that someone is going to run a red light, no harm is done if your assumption is wrong, but you may prevent an accident if you are right. Before you act on any assumption, consider the benefits if you are right and the consequences if you are wrong. It’s usually best not to act on any assumption that might have grave consequences if you are wrong.
PASSING ON A TWO-LANE ROAD

Passing is a high-risk maneuver. Before you try to pass, ask yourself if passing is necessary, safe, and legal. If the speed limit is 55 mph and someone in front of you is traveling at 60 mph, you will probably need to exceed the speed limit by at least 15 mph to pass. If a driver in front of you is traveling 10 mph below the speed limit and traffic is backing up behind you, it might be a good time to pass if passing is safe and legal.

To know if passing is safe, you need to look for potential threats and hazards in front of the vehicle you would like to pass, such as oncoming traffic, intersections, or a train crossing. If anything makes it hard to see the road ahead, such as curves or the crest of a hill, it will be hard to know what kind of dangers you could be facing if you try to pass. Adverse weather conditions or a bad road surface can make passing unsafe at any speed.

Vehicles entering or exiting the road you are on and pedestrians or bicycles traveling along the road are also potential hazards. Regardless of what the hazards are, you will have a better chance of being able to detect hazards if you maintain a following distance behind a vehicle you are going to pass that gives you a clear view of the road ahead. In some states, you might be required to tap your horn or flash your headlights before you pass.

One hazard that doesn’t involve the road ahead is having someone behind you try to pass you just as you start to pass a vehicle that’s in front of you. Always check your mirrors, do a shoulder check, and turn on your left-turn signal before you decide to pass. If a vehicle tries to pass you before you are in the passing lane, wait until the vehicle passes you and the vehicle in front of you before you try again to pass the vehicle that’s in front of you. If you are in the passing lane, complete the pass and exit the passing lane.

If it looks like a vehicle that just passed you might get hit by oncoming traffic, slow down in case the vehicle slows down and tries to exit the passing lane by getting in front of you. Slowing down will also increase the distance between you and any collisions that are caused by the passing vehicle, but you might get rear-ended if someone is following you too closely. Passing more than one vehicle at a time makes it hard to see the road ahead and you might have a hard time finding enough open space to exit the passing lane.

If you enter a passing lane and see danger ahead, try to pull back into your own lane if you are still behind the vehicle you were trying to pass. If you are next to the vehicle, try to complete the pass and exit the passing lane. If the driver of the vehicle you passed expects a head-on collision and slows down, slowing down fast enough to get behind the vehicle and exit the passing lane might be impossible and your best option might be to speed up.
Passing Checklist

- Do not pass unless you have a valid reason for passing and do not pass when passing is illegal or unsafe.
- Take a following position behind the vehicle you plan to pass that gives you a good view of the road ahead. Moving to the left side of the lane you are in before you pass may improve your view.
- Your starting position should let you move into the passing lane, overtake, and exit the passing lane as quickly as possible.
- If you get too close to the vehicle you are planning to pass, you might not be able to avoid a rear-end collision if the vehicle suddenly slows down or stops. The good minimum following distance is 3 seconds.
- Before you enter the passing lane, check your rearview and side mirrors and do a shoulder check to see if someone behind you has entered or is about to enter the passing lane. If the passing lane is clear behind you and in front of you, turn on your left-turn signal, enter the passing lane, accelerate, and complete the pass.
- The passing lane is a danger zone that you should try to exit quickly.
- When you can see the vehicle you just passed in your rearview mirror, turn on your right-turn signal and exit the passing lane.

Points to Consider

- If the passing lane is clear and you can see the entire front of a vehicle behind in your side mirror, it’s usually safe to enter the passing lane.
- Increasing your speed when you pass reduces the time it takes to pass.
- Do not pass when approaching intersections with traffic signals.
- Roads that curve to the left will usually give you a better view of the road ahead than roads that curve to the right.
- If someone you are trying to pass speeds up, slow down and exit the passing lane. This rarely happens, but it does happen.
- Knowing that oncoming vehicles look like dots when they are far away and you can see their shape and color as they get closer may help you estimate their distance. If you see the driver, the vehicle is very close.
- If a vehicle you are trying to pass decides to pass another vehicle, do not follow behind it and try to pass the same vehicle. After the vehicle you are following exits the passing lane, you might not have enough space to exit the passing lane yourself or you might be facing an oncoming vehicle that was hidden by the vehicle you were following.
Racecar drivers spend a lot of time trying to determine what the fastest racing line is for navigating a curve. For them, failure to negotiate a curve correctly may cause an accident or lose a race. When you are driving a vehicle on a public roadway, driving safely is your only concern.

Trying to use racetrack techniques to negotiate a curve on a public roadway will usually result in doing something illegal or unsafe. If you are driving through a curve at legal speeds, you cannot drive faster without breaking the speed limit. If you are using a racing technique that prevents you from looking as far around a curve as possible so you can spot potential dangers, such as oncoming traffic or an animal in the road, you will not be driving safely. What some drivers also seem to forget is that, unlike public roadways, all of the traffic on a racetrack is moving in the same direction, there are no trees or telephone poles along the edge of a racetrack, and racecar drivers don’t need to worry about speed limits.

The best line for navigating a blind curve on a public roadway is called a “delayed (late) apex.” “Apex” refers to a point along the inner edge of a curve that you will be closest to when you complete the curve and straighten up, and “midpoint” refers to the center of the curve. When using a delayed apex, the apex will be after the midpoint of the curve:

- Slow down before you enter a curve if required because of a speed limit, the sharpness (tightness) of the curve, or other existing conditions.
- Move toward the outside edge of your lane, which will let you look around the curve and down the roadway as far as possible.
- Move back to the middle of the lane after you exit the curve and straighten up (apex point). After you pass the apex, you will be moving in a straight line and have a longer view of the road than you had when you were on the curve. If the speed limit increases, increase your speed.

Compared to other lines that might be faster, using a delayed apex reduces risk because it reduces the probability of having a collision with oncoming traffic or other dangers and it puts you in the best position for getting off a roadway if you need to take evasive action to avoid an accident. If you are navigating a sharp curve, you will normally brake before you enter the curve and accelerate as you complete the curve.

After you enter a curve, look as far as possible into it as you round the curve. This will make it easier to calculate the curvature of the curve and see hazards that might be in front of you. Slow down if you enter a blind curve that severely limits your view of the road in front of you.
DELAYED APEX LINE

Unlike driving on a racetrack, when you are driving on a two-lane public road, you are expected to stay in the right lane and not use both lanes when you negotiate a curve. If you are on a 12-foot lane and your vehicle is 6 feet wide, the maximum distance between driving along the outside edge of the lane and driving down the center of the lane will be about 3 feet. If driving along the outside edge when you are going around a curve does not improve your ability to see oncoming traffic or other hazards farther down the road, it’s safer to drive in the center of your lane. You are more likely to encounter road debris when you drive along the outer edge than when you drive in the center, and you might stand a better chance of seeing an animal, such as a deer, that crosses in front of you.

If you are looking far down the road and it appears that the road has ended, you might be approaching a dead end or a very sharp curve. Your ability to see around a curve will decrease as the sharpness of the curve increases. Slowing down will give you more time to study the road.

If you are entering a sharp curve and you need to slow down, try to complete whatever braking is needed before you enter the curve. If you accelerate as you exit the curve, you will stabilize your vehicle and reduce the risk of getting rear-ended by someone who could not stop because of driving too fast or not being able to see far enough ahead. Using a delayed apex when you negotiate a sharp curve will put you in the best position to see around a curve and give you more time if you need to stop.
JUDGMENT

4-way stops illustrate the need for good judgment because the first person to stop usually has the right-of-way, but most of the time it’s hard to tell who stopped first and many drivers do not seem to care who stopped first. If you do not know who stopped first, it’s safer to yield the right-of-way until there is no question about who stopped first. Even if you have the right-of-way, it’s better to let another vehicle go first if there is any indication that the other vehicle might not yield the right-of-way. Sometimes a light tap on the horn will remind other vehicles that you have the right-of-way.

Another situation that requires judgment is dealing with a driver who has the right-of-way at a 4-way stop, but will not cross the intersection so you can turn left. If motioning the driver to come forward does not help, you are facing a problem. Normally a vehicle turning left must yield the right-of-way, which means if you turn left and the vehicle sitting at a stop sign suddenly pulls forward and hits you, it’s likely that you will be given a ticket for not yielding the right-of-way and causing the accident.

To make matters worse, the vehicle behind you might be honking the horn because you will not make the turn. One way to get out of this kind of situation is to do something that you would rather not do but is a better option than having an accident and getting a ticket: turn right, find a place to turn around, stop at the same 4-way stop, and go straight.

Good judgment does not eliminate risk, but it will reduce risk. If you are forced to choose between bad alternatives, try to select the option that is most likely to be the least painful. For example, if you know your vehicle is out of control and you are going to hit something, try to hit something that is soft instead of hard. Some types of judgment require experience, such as learning to estimate the distance you are from oncoming traffic when you pass another vehicle. If you need to make hard choices, it’s usually better to err on the side of too much caution than not enough.

Some drivers will let impatience stop them from exercising good judgment. Drivers who are stopped at a stop sign and waiting to turn left will sometimes turn their front wheels to the left and ease their vehicle forward rather than wait until they have the right-of-way and then turn their front wheels left and make the turn. If your front wheels are turned left while you are waiting for the right-of-way and someone hits you in the rear, your vehicle may lunge forward, turn left, and hit an oncoming vehicle.

Herd instinct can also interfere with good judgment. If going with the flow of traffic results in a speeding ticket, the claim that other people were also speeding will not be a good defense if you end up in traffic court.
ROAD RAGE

Road rage is aggressive behavior that the driver of one vehicle directs at another driver. In extreme cases, road rage can lead to serious injuries or death. If you are threatened by someone with road rage:

(1) If you can legally use hazard lights while driving, using them to draw public attention to road rage might cause an aggressive driver to flee.
(2) If another driver becomes abusive, do not retaliate by saying or doing anything that might provoke additional anger or aggression.
(3) If you have a cell phone, call the police, give them your location, explain the problem, and describe the aggressor and the vehicle.
(4) If possible, take a picture of the aggressor and the aggressor’s vehicle with your cell phone. Taking photos may prevent further aggression.
(5) Do not stare at the aggressor, but keep your eyes on the aggressor to the extent that you can observe what the aggressor is doing.
(6) Try to deescalate the situation by increasing the distance between your vehicle and the aggressor’s vehicle as much as possible.
(7) Increasing the distance between you and the aggressor does not justify reckless driving or driving in a way that endangers other drivers.
(8) Try not to stop and get out of your vehicle until you have reached an area that you consider safe, such as a police or fire station.

One way to avoid road rage is to make your steering, accelerating, and braking smooth and predictable. Making sudden turns or changes in speed can be necessary, but some drivers get angry when surprised by unexpected maneuvers and they respond with aggressive behavior. Road rage can also be triggered by tailgating, cutting people off, or blocking the passing lane.

If someone with road rage is following you and you need to stop because a vehicle in front of you stopped, stop far enough back so that you can drive around the vehicle and escape if someone rams your vehicle and tries to box you in. If you get boxed in and a person with road rage is approaching your vehicle on foot and has a gun, jumping out of your vehicle and trying to flee on foot is usually safer than staying in your vehicle, rolling up the windows, and locking your doors. When dealing with road rage, if you cannot do both, protecting your life is much more important than protecting your vehicle.

Almost without exception, if you have a choice between fight or flight, choosing to flee instead of fight will reduce your risk of injury. If you decide to fight instead of flee—even if you survive the fight—physical injuries might be the least of your problems if you are charged with a crime or sued because you decided to fight instead of flee. On the other hand, if fighting to defend yourself is your only option, be ruthless and fight to win.
Besides correcting your own mistakes, you can look for a good driving instructor who can give you hands-on training. If the instructor has a skidpan, you can practice recovering from a spin by keeping your brake pedal pressed to the floor, which is the fastest way to reduce speed until the vehicle stops. Even with ABS brakes, flooring the brakes will usually worsen a skid.

Some low-speed skills that might be worth practicing are driving your vehicle forward and backward in tight circles or seeing if you can drive a front tire over a small wooden block. Knowing where your wheels are can be a valuable skill if you are parking along a curb, trying to drive up a service ramp, or trying to avoid hitting a pothole. If you drive a car with a low front bumper and you need to park with the front bumper parallel to a high curb, driving over a 1-inch thick board with both front tires will help you estimate where your front bumper is. You can also practice using your side mirrors to see how far a rear wheel is from a rubber cone or a board. If you want to be creative, you can try to park with your front or rear wheels on the board.

If you do not have access to a paved surface, you can practice on a flat, grassy surface by using flexible flagpoles that are made to stick in the ground instead of using rubber (thermoplastic) cones and sticking a flagpole into the hole on top of a cone. You can also use 55-gallon plastic barrels, which are easier to see than rubber cones, on a hard surface or on grass.

Driving skills, such as parallel parking, are perishable motor skills, and you can lose a driving skill that you acquired years ago if you don’t practice it enough to preserve the skill. You may also lose a driving skill because the vehicle you were driving years ago is much different from the one you are driving today. Backing a vehicle that lets you look through the rear window and see what’s behind you is different from backing a vehicle that makes it impossible to see what’s behind you without using a backup camera.

If you want to be a safe driver, you need to be familiar with the driving characteristics of any vehicle you drive and you need to know where all of the basic controls are, such as the switches that control the lights and windshield wipers. If you drive the same vehicle most of the time, you should be able to operate most of the controls without looking at them. This will help you keep your eyes on the road and help you avoid being a distracted driver.

Read the operator’s manual that came with your vehicle. Because of modern climate control systems, what your manual tells you to do when your windows fog up might be different from what you normally do. If you don’t understand all of the features your vehicle has that relate to safety, you might want to make reviewing these features part of a practice session.
Slow-Speed Practice

Besides building skill and confidence, slow-speed practice will help you feel like your vehicle is a natural extension of your body. Try to make steering, accelerating, and braking as smooth as possible, and try to stay alert and maintain 360-degree awareness. Some of these courses are not easy, but they will be worth the effort if they improve your driving skills. So, relax, enjoy learning, work at your own pace, and be creative.

The items you need to construct these courses are easy to find. The warm-up course does not require anything but a flat surface you can drive on, and you can build a parking lot or backyard course with four 28-inch rubber traffic cones, four flags mounted on lightweight wood or plastic flagpoles, and a wooden block that’s 2 inches thick and 4 inches square. If you are building a backyard course, you will not need to use cones if you use flagpoles that stick in the ground. Both courses require one composite deck board that is 4 inches wide, 10 feet long, and 1 inch thick. The barrel course requires four 55-gallon plastic barrels (empty), which are also called “industrial plastic drums.” Do not use any poles or barrels that have a finish that might rub off on your vehicle or cause dents or scratches.

Warm-Up Course

The warm-up course will help you determine the turning radius of your vehicle, test your ability to do sharp U-turns, and improve your overhand steering. Most people enjoy the warm-up course.

- Drive your vehicle in the smallest circle possible. Drive the first circle in a clockwise (CW) direction and the second in a counterclockwise (CCW) direction. The diameter of the smallest circle you can make, which is called a “turning radius,” will usually be about 35 feet.
- Make the sharpest U-turn you can make, straighten your vehicle, make another sharp U-turn, and straighten your vehicle again. Do CW and CCW double U-turns. This exercise will tell you how much space you need to make a U-turn and not run off the road. Starting a sharp U-turn with your steering wheel in a vertical position will help you keep your turning radius as small as possible because you can get about 180 degrees of rotation without repositioning your hands.
- The final warm-up exercise is doing CW and CCW figure eights, which will help you improve your overhand steering.

Figure Eight → ○ ○
Parking Lot and Backyard Course

(1) The parking lot course uses a rectangle that is formed by four rubber cones with a flag in each cone so you can see where the cone is when your vehicle is close to the cone. After you place one cone at each corner, you will have a rectangle that’s about 24 feet long and 10 feet wide.

End cones with flags

24-foot edge

1. Drive through the length of the rectangle while moving forward and backward.
2. Park the right side and then the left side of your vehicle within one foot of the two end cones while moving forward and backward.
3. Parallel park within the rectangle and keep the right side of your vehicle within 12 inches of one of the 24-foot edges.

24-foot edge

10-foot board

(2) Stop with your front bumper about 6 inches from the 10-foot board. You will need to estimate where the board is because you will not be able to see it. This exercise will help you avoid hitting a high concrete curb that’s at the end of a perpendicular or 45-degree parking space.

(3) Place the 4-inch wooden square on the ground and run over it with your left or right front tire. Backing over it with a right rear tire is hard.

Barrel Course

Place the barrels at the corners of an 8-foot square. Besides driving forward and backward between the barrels when turning or going straight, you use can use barrels to test an ultrasonic sensor that measures the distance between your vehicle and other objects. If you drive slowly though the barrels and stop when you pass the last two barrels and have a clear field of view when you look right and left, you will see how much of your front end will be exposed to approaching traffic if you try to look around a vehicle to your left that is stopped at a red light when you want to turn right on a red light or try to look around a vehicle on your right that is trying to make a left U-turn at the same time you are trying to make a left U-turn.

If you are making a left U-turn through an opening in a median strip, staying to the far right will prevent other vehicles from blocking your view to the right, but in other cases, waiting until you have a clear view is safer than blindly entering the lane in front of you and trying to make a left turn.
You can move the barrels to make the square larger or smaller, which will increase or decrease the space between the barrels and your vehicle. After passing through all four barrels, you can circle around and pass through the four barrels from a different direction. Driving through the barrels while turning or backing is usually harder than driving straight through them while moving forward. Keeping the barrels clean reduces the risk of scratching your vehicle if you move them or brush against them.

Alternate Parking Lot or Backyard Course

This course gives you more variety than a basic course. After you learn how to complete a maneuver, try to improve your consistency until completing the same maneuver becomes almost automatic. You can move the cones or flags to make the size of the parallel parking space smaller.

Park with your left or right side parallel to the board and about 12 inches from the board.

Parallel park within the 24-foot space and try to keep your right side within 12 inches of the board. The minimum width for a parallel parking space is about 8 feet.

Park with the wheels on left or right side on top of board.

Park with front or rear bumper about 6 inches from board or with front or rear tires on top of board.

Head in and back out or back in and head out. Back up with one hand on the steering wheel when looking through the rear window or two hands on the steering wheel when using the side mirrors or a backup camera. If you are using your side mirrors when backing into a space, you can drive forward perpendicular to the space, turn right or left away from the space so your vehicle is parallel to the space, and then back up. To see the borders of a space when backing up, you can rotate your side mirrors downward.
Autocross

Autocross is a competitive sport and many of the vehicles used in autocross have been modified to improve their performance, but since the goal is precision driving, not speed, you do not need to use a modified vehicle and driving through an autocross course in first gear at low speeds without knocking down a cone is an excellent way to improve your driving skills.

For training to be useful, it needs to be realistic, and driving through an autocross course will help you develop the same kind of driving skills that you need almost every time you drive on public highways. High-speed training, such as controlling a high-speed skid, can be useful, but very few accidents are caused by failure to control a high-speed skid.

On the other hand, traffic accidents often occur when a driver is backing up because the side or rear end of a vehicle hits an object that the driver failed to see. A backup accident occurs when a driver who is backing up hits a person, and many of the backover fatalities are children. To make an autocross course even more realistic, you should drive through at least part of the course in reverse while using the side mirrors or a backup camera.

When trying to complete an autocross course, drive your vehicle the same way you try to drive it on public highways: scan the road as far ahead as possible, look for the safest route, and make your steering, accelerating, and braking inputs as smooth as possible. Using an autocross course is a good way to improve your driving skills because it’s better to make a mistake and knock over a cone than to make a mistake have an accident.

Driving is a perishable skill, which means that driving skills degrade over time without regular practice. After you develop precision driving skills by learning how to navigate a low-speed autocross course, you can practice the same skills when you drive on a public highway. An autocross course can teach you where your tires and the sides of your vehicle are, and knowing where your tires and the sides of your vehicle are can help you avoid hitting a deep pothole or a curb and then running off the edge of a road.

Most autocross courses combine increasing, constant, and decreasing radius curves with straight lines (straightaways). You drive along a straight line when driving through a square that has one cone on each corner. If you have two squares, you can drive through one square, make one or more turns, and then drive through the other square. Moving cones closer together or making a curve sharper tends to make a course more difficult. Regardless of how a course is laid out, knocking a cone over means you made a mistake and gives you a chance to learn something from making a mistake that might damage your ego, but won’t damage your vehicle or cause an injury.
Autocross courses often include decreasing, constant, and increasing radius curves, but positive cambers are more common on racetracks and negative cambers are more common on public highways.

**Decreasing, Constant, and Increasing Radius Curves**

1. **Decreasing radius curve**: radius decreases from beginning to end.
2. **Constant radius curve**: radius is the same from beginning to end.
3. **Increasing radius curve**: radius increases from beginning to end.

**Positive (Banked) Camber and Negative (Off) Camber**

A positive camber *increases traction* when making a turn.

You can negotiate a curve with a positive camber at higher speeds than you can negotiate a curve with a negative camber.

A negative camber *decreases traction* when making a turn.
Backup Cameras

Backup cameras became mandatory in 2018 because the rear window in most modern vehicles has a field of view that is way too small to prevent backover accidents when backing up. When using a backup camera, instead of putting your left hand on the steering wheel and looking through the rear window, use a 9-3 hand position on the steering wheel and maintain 360-degree awareness by scanning your backup camera, side mirrors, side windows, and front windshield. A backup camera should be used to supplement—not replace—traditional observation skills, and always check your surroundings before you start to back up.

How much a camera increases your safety will depend on the quality of your camera and your ability to use the camera. High-quality cameras will give you a better image than low-quality cameras and might be more reliable. Backup cameras, like radar-based sensors, can prevent accidents when used correctly, but they are not 100 percent reliable and conditions such as heavy rain or poor lighting will decrease their effectiveness.

When drivers started using ABS brakes, many drivers were less safe instead of safer because they didn’t know how to use ABS brakes correctly, and many drivers still don’t know how to use ABS brakes correctly. No training or poor training probably causes at least as many accidents as distracted, impaired, or reckless driving. According to the National Highway Traffic Safety Administration (NHTSA), traditional driver education focuses more on helping drivers pass a licensing exam and get a driver license than it does on training drivers how to drive safely and avoid accidents.

Having an accident because of camera failure will not automatically protect you from criminal or civil liability. If a backup camera stops working and you have a rear window that’s just barely large enough to give you an adequate field of view than using your rearview mirror, you will probably need to rely on the side mirrors more than your rear window if you need to back up. If you have any doubts about what’s behind you, you should get out of your vehicle and check to see what’s behind you before you back up.

Some of the vehicles that have a backup camera also have radar-based distance sensors that tell you how far you are from objects that might not be detected by your backup camera. Most distance sensors use lights or beeps to let you know how close you are to a solid object. In addition to satisfying the mandatory backup camera requirement, some vehicles have a multi-camera system that provides a 360-degree view of the area that surrounds your vehicle. Having a 360-degree multi-camera view can make backing up and parallel, perpendicular, or angular parking easier and safer.
Mental Practice

Mental practice has three levels of mental awareness (condition green, yellow, and red) and using mental practice can make it easier to deal with dangerous situations that you might face in the real world. You would be at condition green if you were sitting in a parked car and looking out the window. You might be aware of what’s happening around you, but you would not be looking for potential threats or hazards that might affect the way you drive.

You would be at condition yellow if you were trying to drive safely, maintain 360-degree awareness, and scan for potential threats or hazards, and you would be at condition red if your scans detected a threat or hazard and you needed to react quickly and correctly to avoid having an accident.

In the real world, when something happens that forces you to go from condition yellow to condition red, you might not have much time for conscious thought and the actions you take will need to be almost automatic. If you have developed good driving habits, automatically using these habits might reduce your risk of having or causing an accident. If you see a hazard that might cause an accident, keeping your mind focused on finding ways to avoid having an accident or finding ways to reduce the consequences if an accident cannot be avoided will lower the risk of letting panic or fear cloud your judgment when clear thinking and good judgment are essential.

Mental practice can help you focus your mind and be decisive when you need to make quick decisions under pressure. To use mental practice, you need to pretend that you are faced with a serious threat or hazard and then formulate a response that will help you avoid the threat or hazard.

For example: pretend that a vehicle ahead of you suddenly swerved into oncoming traffic and caused a head-on collision and then mentally rehearse a plan that could help you avoid hitting wrecked vehicles or road debris, such as using emergency braking and then braking and turning at the same time. Mental practice usually starts by asking yourself a hypothetical what-if question and then mentally rehearsing realistic options. Mental practice can help you prevent the kind of accidents that often occur when a driver sees an accident coming but doesn’t know how to react.

To get the most benefit from mental practice, make your imaginary problems and solutions realistic and ask yourself the same kind of questions a driving instructor who was sitting in a car with you might ask. Build flexibility into your solutions because no two problems are exactly the same and some problems will have more than one solution. If you create an imaginary problem that you cannot solve, look for someone who can help you find an answer. Do not let mental practice interfere with your ability to drive safely.
LAWS OF PHYSICS

Unlike traffic laws, which can vary from one jurisdiction to another, the laws of physics remain the same. You might be able to violate a traffic law without consequences, but violating the laws of physics will have immediate consequences—and some of them might be serious or fatal. When driving a motor vehicle, most of the laws of physics you need to be familiar with relate to steering, braking, or accelerating. If you completely run out of traction, you will not be able to steer, brake, or accelerate, and your vehicle will go into an uncontrollable skid or spin. Most people who have driven on snow or ice are familiar with what it feels like when your tires have no traction and you have lost control over your vehicle.

This section will not explore the formulas or mathematics that relate to physics, but it will present some basic principles and facts that will help you manage risk when dealing with the laws of physics. The best way to avoid violating the laws of physics and having an accident is to make your steering, braking, and accelerating inputs smooth, rational, and legal.

Two factors that affect traction are your tires and the surfaces that make contact with your tires. Good quality tires and treads may increase traction if the treads are appropriate for the surfaces you are driving on, but bald tires will decrease traction. Tires that increase traction when driving on snow may decrease traction when driving on dry pavement.

The company that manufactured your vehicle can usually help you decide which tires are going to be best for your vehicle and the kind of driving you normally do. Some of the things to consider when buying tires are noise, comfort, grip, handling, durability, style, and price.

Wet roads are usually the most slippery at the beginning of a rain and the least slippery after a rain has washed most of the dirt and oil away and the road is fairly clean. Hydroplaning may cause a loss of traction if a layer of water builds up between your tires and the surface of a wet road, but having good tires, keeping your tires properly inflated, and driving below 50 mph will reduce the risk. If you start to hydroplane, try to avoid turning, braking, or accelerating as much as possible until you regain traction.

Driving at a slower than normal speed will also give you a better chance of being able to control your vehicle if you hit a deep pothole or rut that was concealed by water. When driving on wet, icy, or slippery roads, using cruise control is dangerous because it may cause your vehicle to accelerate when it tries to keep your vehicle running at a constant speed. If you need to apply the brakes when a road is wet, icy, or slippery, having ABS brakes will help you avoid going into a skid or spin.
When driving on public streets, aerodynamics and suspension will have less effect on how much traction you have than how you turn, brake, or accelerate. Turning, braking, and accelerating reduce traction, and the more you turn, brake, or accelerate, the more you reduce traction. You can preserve traction by not accelerating or braking when you are turning. The safest time for braking is before you enter a curve, and the safest time for accelerating is when you exit a curve and start to straighten up.

- “Centrifugal force” is an outward force generated by vehicles when they go around a curve. If you enter a sharp curve with too much speed, you may notice that some of the loose objects in your vehicle are moving toward the outside edge of the curve. If you are turning to the left, the objects in your vehicle will be moving to right.

- When you are going around a curve, centrifugal force will make it feel like you and your vehicle are being pulled outward toward the outer edge of a curve, and it may force your vehicle completely off the road if making a sharp turn depletes most or all of your traction. After all traction is lost, the vehicle will travel along a straight line.

- If you have ABS and EPS, braking is unlikely to cause a skid, but it will transfer weight to the front of your vehicle, reduce the weight on the rear wheels, and reduce rear-wheel traction. Braking causes the front of a vehicle to drop and accelerating causes it to rise. If your tires have good traction, heavy braking and moderate turning at the same time is possible, but heavy braking and sharp turning at the same time may deplete your traction and cause a skid or spin.

- Maximum acceleration may cause a loss of rear-wheel traction because of wheelspin and the rear wheels may fishtail from side to side because of oversteer skidding. In most cases, you will still have enough front-wheel traction to steer and easing off the throttle will usually stop the wheelspin and the oversteer skids. If you lift your foot off the throttle or hit the brakes, the sudden loss of rear wheel traction can turn power (acceleration) oversteer skids into spins.

- Highly-skilled drivers can use a technique called “drifting,” which means they are using extreme oversteer so they can skid around a curve on their rear tires without losing control of their vehicles. During a four-wheel drift, all four wheels will be sliding at the same time. Exhibition drivers are more likely to use drifting than racecar drivers because the extreme oversteer that is needed for drifting will usually increase the time it takes to navigate a curve. Using drifting on a public street would be dangerous and serve no good purpose.
MANAGING TRACTION

Whereas most of this manual has emphasized what you should do, this section will focus on the things you should not do. Traction is the grip that results because of the friction between your tires and the surface of the road, and losing control of a vehicle because you failed to manage traction correctly is one of the main reasons for having a single-vehicle accident.

If something uses up all of your traction—such as a slippery road or a sharp turn—you will not have any control over your vehicle unless you regain traction. It’s possible for steering, braking, or accelerating to use up most of your traction, but a complete loss of traction is usually caused by turning while either braking or accelerating, such as using heavy braking or rapid acceleration after you enter a curve. If a loss of traction results in a 4-wheel skid, you will lose directional control unless you can regain traction and replenish your traction reserve. If you enter a curve that becomes progressively sharper (decreasing-radius curve), the increased steering input you will need to make as the turn gets tighter will decrease traction.

A traction pie-chart shows that tires have a limited amount of traction and turning, braking, or accelerating decrease traction. To preserve traction, try to avoid turning while you are braking or accelerating.

A dry, flat, clean, or warm road surface tends to increase traction and a wet, irregular, or cold road surface tends to decrease traction. Improperly inflated tires, cold tires, an unstable suspension can reduce traction, and ice or oil on a road can instantly deplete all of your traction.

To become an advanced driver, you need to master a wide variety of physical and mental skills, and learning how to manage traction is one of the most important skills you will need to master. If you lose all traction, you will need to regain traction before you can turn, brake, or accelerate.
When weather conditions reduce traction, you can wait for the weather to improve or you can modify the way you drive: (1) look farther ahead, (2) constantly monitor your rearview mirror, (3) reduce your speed, (4) increase the size of your space cushion, and (5) make your steering, braking, and accelerating inputs smooth and gradual.

Environmental changes, such as rain, can decrease traction, but if you have normal traction, the decisions you make are more likely to affect the availability or distribution of traction than external factors. Factors that will deplete traction quickly when navigating a curve are too much speed before you enter or exit a curve and braking before you exit a curve.

If you are driving at a safe speed and the radius of a curve is constant or increases as you approach the end of the curve, you should not have a problem with traction. If you are driving at a safe speed and the radius of a curve decreases, you may need to ease off the throttle slightly and let engine braking slow your vehicle down. The increase in traction caused by reducing your speed should be more than enough to compensate for the loss of traction that occurs when a curve becomes progressively sharper.

If rear-wheel engine braking caused by easing slightly off the throttle does not increase traction enough to prevent you from running off a curve and you have ABS brakes, you might be able to stay on the road by gently braking and steering at the same time. Under normal circumstances, you should try to avoid using your brakes when you are on a curve.

If you apply the brakes, front-wheel traction increases and rear-wheel traction decreases. If you are on a curve when you apply the brakes, the rear wheels may break free because of less traction and cause a rear-wheel oversteer skid. If you lift your foot completely off the accelerator when you are on a curve, engine braking may decrease rear-wheel traction and cause a lift-off oversteer skid. If an oversteer skid occurs on a curve and centrifugal force is pulling your vehicle outward, the rear end, which has lost traction, will swing outward and the front end will point inward.

When making a fast turn, the lateral forces on the outside tires may cause a vehicle to roll over, or a vehicle may roll over because the outside tires “tripped” over a curb or pothole. If you run off a curve and skid sideways, dirt or sand plowed up by your outside tires may also cause a rollover.

Braking lowers the front end and you feel like you are being pulled forward, acceleration raises the front end and you feel like you are being pushed backward, and on a curve, centrifugal force tilts a vehicle outward and you feel like your body is leaning outward. Being aware of which way your hood is moving and whether your body is upright or leaning over will help you anticipate which tires will gain traction and which will lose traction.
Traction and Skids

Front-Wheel Traction and Rear-Wheel Traction are about Equal
Vehicle Stays Within Lane

No Skid

Front-Wheel Traction is less than Rear-Wheel Traction
Vehicle Moves Outward and then Tries to Go Straight

Understeer
Skid

Rear-Wheel Traction is less than Front-Wheel Traction
Rear End Swings Outward and Vehicle Enters Wrong Lane

Oversteer
Skid
Rollovers

Rollover accidents are not very common, but they are very dangerous. Only about 3 percent of all serious passenger-vehicle crashes involve rollovers, but rollovers cause about 30 percent of the passenger-vehicle fatalities. Four ways to reduce the risk of becoming a rollover fatality are keep your seatbelt (driver restraint) fastened when you are driving a motor vehicle, develop good driving habits, use good judgment, and stay alert.

Some rollovers are caused by swerving and sliding sideways, but most are caused by “tripping” over a solid object, such as a rock. If you are sliding sideways, your outside tires may dig into the dirt and form a mound of dirt that your wheels trip over. If you swerve into a curb or pothole, one of your tires may trip over the curb or pothole and cause a rollover. Other things that may cause a rollover are colliding with a vehicle or bush, driving into a ditch or guardrail, or driving off the edge of a ramp or up or down a steep hill.

The vehicles that increase your risk of rolling over will usually have a low static or dynamic stability rating. The static stability factor (SSF), which measures a vehicle’s static stability, is calculated by dividing a vehicle’s track width by twice the height of the vehicle’s center of gravity. Dynamic stability is determined by having a vehicle make a sharp U-turn (J-shaped turn) or swerve in one direction and then swerve in the opposite direction (fishhook turn). This maneuver measures what might happen if a driver swerves to avoid a pothole and then swerves again to avoid running off the road or hitting an oncoming car. Vehicles that keep all four wheels on the ground during a fishhook maneuver are considered more stable than vehicles that “tip up” because two wheels are off the ground or vehicles that roll over.

The easiest ways to improve a vehicle’s stability are lower the vehicle’s center of gravity or add an active (computerized) suspension. If all else is equal, a vehicle with a wide track width will have better stability than one with a narrow track width. Electronic stability programs might reduce the risk of losing control and having a rollover, and having a strong roof, a rollover bar, or rollover air bags might prevent fatalities if a vehicle does roll over.

Having good driving habits—such as braking before you enter a curve and driving at safe speeds—will help you prevent rollovers. About 40% of all fatal rollovers involve excessive speed. You can also prevent rollovers by scanning as far down the road as possible so you don’t put yourself in a position where you need to swerve to avoid hitting a road hazard.

If you cannot drive around a pothole, release your brakes and try to straighten your wheels as much as possible before you hit the pothole. This will reduce the risk of tripping over the pothole and causing a rollover.
SKIDPAN

A skidpan (skidpad) is an area on flat pavement that can be used to test or improve driving skills. Using a skidpan without a professional driving instructor would be like learning to swim by jumping into the deep end of a swimming pool when no one else is around and hoping you don’t sink.

Rather than teach you how to use a skidpan or do other driving exercises on a flat surface, this section will give you some ideas about what you might be able to learn if you work with a driving instructor who can give you hands-on training. Most of the exercises will be different from the ones you would do if you wanted to become a racecar or stunt-car driver.

One of the things you can learn on a skidpan is how to recover from a skid. The two basic skids that are covered when using a skidpan are the understeer skid and the oversteer skid. During an understeer skid, front wheel traction is lost, front wheel traction is less than rear wheel traction, and your vehicle turns less than expected and tries to go straight.

To recover from an understeer skid, ease off the throttle, let the front wheels regain traction, and then look and gently steer in the direction you would like to go. Accelerating or turning the steering wheel even more in the direction you wanted to turn before you have lost front wheel traction will increase the loss of front wheel traction and make the skid worse or turn an understeer skid into an oversteer skid.

Oversteer skids occur when rear wheel traction is less than front wheel traction, and a power-oversteer skid occurs because too much acceleration caused the rear wheels to spin and lose traction. The rear end may swing outward or swing back and forth (fishtail). To recover from a power-oversteer skid, ease off the throttle, let the rear wheels regain traction, and then look and gently steer where you would like to go. Hitting the brakes or jerking the steering wheel will make almost any kind of oversteer skid worse.

During an oversteer skid, steering in the direction you would like to go is called “countersteering” or “turning into the skid” because you turn the steering wheel to the left if the rear end swings to the left and to the right if it swings to the right. If your countersteering is too slow or too fast and you start to spin, keep the brake pedal fully depressed until you stop spinning.

Racecar drivers use techniques that street drivers seldom use. To recover from an understeer skid, they might straighten the steering wheel and reduce speed at the same time and then wait for the front tires to regain traction. To recover from an oversteer skid that was not caused by acceleration, they might accelerate instead of easing off the throttle, which will transfer more weight to the rear tires and increase rear-wheel traction.
The standard methods for dealing with an oversteer skid might not be effective when applied to a front-wheel-drive vehicle, and you may need to gently accelerate when you countersteer. Your skidpan instructor should be able to answer any questions you have about the differences between rear-wheel-drive vehicles and front-wheel-drive vehicles.

Wet skidpans are good when learning about skids, but dry skidpans are better when doing other exercises, such as braking and turning at the same time, emergency braking or turning, running a slalom or chicane course, or collision avoidance. With the exception of training exercises that relate to pursuit driving, such as PIT (Pursuit Immobilization Technique) maneuver, the exercises that law enforcement officers do on a skidpan will usually improve your street driving skills more than racecar or stunt-car exercises. If your car doesn’t have a manual transmission, non-ABS brakes, or a manual emergency brake, you will not be able to do many of the exercises that are normally done with a racecar or stunt car.

Many of the slow-speed exercises described in this manual can be done at higher speeds if you are working with a professional driving instructor. Driving around in a tight circle, making sharp U-turns, driving between cones, or stopping on a mark (wheel placement) becomes increasingly harder as the speed of your vehicle increases.

Parking at faster than normal speeds is a good exercise. You turn a steering wheel about 90 degrees to enter a 45-degree parking space and about 270 degrees to enter a 90-degree parking space. Turning a steering wheel until it stops in one direction and then turning it until it stops in the opposite direction is called “lock-to-lock” steering. It takes about 540 degrees of rotation to go from lock to lock. Making turns while traveling in reverse is also good practice because you will learn how to use the rear wheels as a pivot to increase maneuverability and you will learn how to avoid accidents by remembering that when you back in one direction, the front of your vehicle will be swinging outward in the opposite direction.

When looking for an instructor who offers skidpan training, ask if the training is designed to improve street-driving skills or racing skills. For training to be useful, it needs to be realistic and it needs to improve the kind of driving skills you are trying to improve.

Because of the danger and the liability, fewer companies are offering skidpan training to the general public, and the training that is available might cost about $1000 per day. Because of the advances in computer technology and computer programming, people who study vehicular dynamics, airplane pilots, racecar drivers, and some police officers are already using computer simulations to evaluate theories, improve motor skills, or train personnel.
Controlling Understeer Skids

An understeer skid is caused by a loss of front wheel traction when you are negotiating a curve. Instead of turning and following the line of the curve, your vehicle will try to follow a straight line as it moves forward.

Turning the steering wheel even more into the turn may increase the loss of front wheel traction and make an understeer skid even worse. Hitting the brakes or engine braking caused by lifting your foot off the accelerator may cause a sudden loss of rear wheel traction and turn an understeer skid into an oversteer skid. The type of oversteer skid that occurs when you lift your foot off the throttle instead of easing your foot off the throttle is called a *lift-off oversteer skid*. An understeer skid may cause a rollover if a vehicle goes off the road, and an uncontrolled oversteer skid can turn into a spin.

The best procedure for controlling an understeer skid is to ease your foot off the accelerator and do not try to force your vehicle to turn by turning the steering wheel in the direction of the turn. Turning the steering wheel a few degrees away from the turn may increase front wheel traction, and if you have ABS brakes, light pressure on the brake can transfer weight to the front tires and help you regain front wheel traction.

Controlling Oversteer Skids

An oversteer skid is caused by a loss of rear wheel traction and the rear of your vehicle will swing to the side. If you are on a curve and you are going too fast or you hit the brakes, a sudden loss of rear wheel traction may cause an oversteer skid and the rear of your vehicle may swing far enough outward to cause a spin if you cannot get the skid under control. Rapid acceleration and wheelspin may cause a power oversteer, and the rear of your vehicle may swing from side to side (fishtail).

If braking caused an oversteer skid, gently ease off the brakes; if acceleration caused an oversteer skid, gently ease off the accelerator. If you can tell which way the rear of your vehicle is moving, gently turning your steering wheel in the same direction, which is called *countersteering*, may stop an oversteer skid. To stabilize a vehicle just before you fully recover from an oversteer skid, gently increase your speed—which will transfer more weight to the rear wheels and may help you increase rear-wheel traction.

Safe driving habits will prevent most understeer and oversteer skids. When trying to control a skid, try to be smooth and gentle when you steer, brake, or accelerate. This will help you avoid causing a rapid transfer of weight that can make controlling a front or rear wheel skid more difficult.
LOW-SPEED INSERVICE DRIVING PROGRAM

The low-speed inservice driving program will give police departments and government agencies an easy way to improve tactical driving skills and present updated policies, procedures, or technology. Modern technology can make driving safer when properly used, but safety devices should be used to supplement not replace tactical driving skills.

Every inservice driving program should start with a candid discussion about one of the major causes for serious or fatal accidents—which is using poor judgment. Almost every year, police officers with good driving skills get killed because they refused to wear a seatbelt or they were driving too fast.

After discussing issues that relate to judgment, the second part of the program would be to discuss issues that relate to outdated techniques. Many police officers have never learned how to use ABS brakes correctly and they still believe that you cannot brake and turn at the same time. Other outdated techniques that you might find in a few training manuals are hand-to-hand steering and trying to make a handbrake turn instead of a sharp U-turn.

Even traditional skid-control training has limited value unless you live in an area where snow or ice increase the risk skidding. Most skids can be avoided if your vehicle is well maintained and you drive at safe speeds. ABS brakes have reduced the risk of having a front-wheel skid, and electronic stability programs help you avoid dangerous rear-wheel skids when you are driving at safe speeds and not using excessive steering or braking inputs.

If you are teaching a driving skill that requires practice and you do not give drivers enough practice to master the skill, you might be elevating a driver’s level of confidence without elevating the driver’s level of skill, and few things are more dangerous than drivers who overestimate their skills.

Since driving is a perishable motor skill, the quality of a driving skill will degrade over time without realistic and regular practice. After drivers learn a driving skill, they need to practice and reinforce the skill. Many of the most essential driving skills, such as the ones that help you avoid accidents, can be maintained or improved with low-speed practice. Furthermore, low-speed training is safer than high-speed training and less expensive to administer.

Unskilled drivers often make unnecessary movements when steering, such as overcorrecting while trying to recover from a sharp U-turn, and being able to eliminate these unnecessary movements (motion economy) will make your steering inputs faster and smoother. It’s easier to recognize and eliminate unnecessary movements when vehicles are moving at low speeds instead of high speeds, which is a good reason for using low-speed training. At high-speeds, overcorrecting on a curve may cause a skid, spin, or rollover.
According to a study published by the National Highway Traffic Safety Administration (NHTSA) in 2011, which was titled *Characteristics of Law Enforcement Officers’ Fatalities in Motor Vehicle Crashes*:

The law enforcement officers killed in motor vehicle crashes accounted for only 29 percent of the total law enforcement officers killed in the 1980s, but increased to 35 percent in the 1990s and 48 percent in the 2000s. Recently, the law enforcement officers killed in motor vehicle crashes have exceeded 50 percent – 52 percent in 1999, 53 percent in 2003, 52 percent in 2006, and 53 percent in 2008.

According to a National Law Enforcement Officers Memorial Fund, in 2018, law enforcement officers had 52 firearms-related fatalities and 50 traffic-related fatalities. Traffic fatalities are clearly a serious problem. Despite the high number of traffic-related fatalities, most departments and agencies do not have regular training that relates to tactical driving skills, and the reasons for not offering remedial or inservice training include not enough time, wear and tear on vehicles, no place to train, the cost of setting up a skidpad, and the possibility that someone might get injured. On the other hand, failure to help officers or agents improve their driving skills can result in a loss of life, time off from work because of traffic injuries, early retirements, bad publicity, and very expensive lawsuits.

One possible compromise between failure to train and the high cost of training is to simplify and improve the way tactical driving is being taught. Rather than use a traditional skidpan training course, which might require hundreds of cones and a large, paved surface, you can construct a simplified training course with four 55-gallon plastic barrels and a small paved area. Since four barrels do not take up much space, transporting or storing the barrels should not be a problem. Plastic barrels are preferred over plastic cones because the barrels are higher, easier to see, and more durable.

Since these practice exercises are done at low speeds (first gear) or at slow speeds (walking speed), the risk of injury is very small and wear and tear on vehicles will be minimal. The safety protocols when doing slow or low speed practice are about the same as the ones used when doing high-speed practice. Hitting a barrel is unlikely to injure a driver or damage a vehicle, but a rolling, bouncing, or flying barrel might cause an injury.

With four barrels, you can construct the six geometric figures that are normally used on skidpans: circles, ovals, figure eights, squares, rectangles, and slaloms. After the barrels are in place, marking their location with a chalk circle on the ground can help you reposition the ones that get moved.
With four barrels, you can form squares or rectangles. Squares can be used to practice emergency stops or swerve avoidance, and rectangles can be used for judging the distance between the barrels and your vehicle or for practicing parallel, angled, or perpendicular parking. If you build a slalom by placing all four barrels along a straight line, you can practice weaving in and out when going forward or backward. Weaving though barrels when backing up will give you practice using a backup camera, the side mirrors, and the front and side windows. The backup camera and side mirrors will help you avoid backing into barrels, and the windows will help you avoid hitting a barrel with the front of your vehicle. If you have no way to avoid backing up, knowing how to back up safely is a good skill to have.

You can drive circles around one barrel or around a four-barrel square, and you can drive ovals or figure eights by driving around one barrel at each end or between two barrels at each end. Moving the two barrels at the end of an oval or figure eight closer together will make the course more difficult.

Besides helping officers improve their driving skills, barrel training will also help them recognize their limitations. If you are given a signal to start a swerve evasion, such as a light shined to a barrel that you need to avoid, you may find that your observation skills are not as good as they should be or your reflexes are not as fast as you thought they were.

If barrel training improves your observation skills, it might take you less time to recognize a road hazard and give you more time to react before you hit the hazard. You may also find that your depth perception is not as good as you thought it was, but depth perception, like observation skills, can often be improved with practice and experience.

Good driving skills can help you avoid accidents, but no amount of training will make much difference if you drive beyond the limits of your vehicle, drive while distracted, or drive while you can barely stay awake. To drive safely, you need to combine good driving skills with good judgment.

Wearing a seatbelt while driving is one of the easiest ways to avoid a fatal traffic accident, yet every year, many of the law enforcement officers who die because of a traffic accident were not wearing a seatbelt. According to the HNTSA, between 1980 and 2008, only 45 percent of the 733 officers who died because of a traffic accident where wearing a seatbelt.

For a tactical driving program to be effective, it needs to include both classroom training and hands-on training. The classroom training should focus on departmental policies, new technology, and good judgment, and the hands-on training should focus on tactical driving skills. Students should be encouraged to ask questions and be required to submit a written evaluation of the program. Except for the barrels, no special equipment is required.
Barrel Course

When using a four-barrel square, you can drive forward and pass between the four barrels or drive backward and drive between the four barrels. A good starting point is to give drivers about four inches of open space between the side mirrors and the barrels.

Try to avoid touching, moving, or knocking over barrels, but also remember that making and correcting mistakes will improve your driving skills.

The rectangle can be used for parallel or perpendicular parking, and a good starting point is a 10-foot by 24-foot rectangle. You should try to place the outer edge of the tires on the right side less than 12 inches from the right side of the rectangle when parallel parking and center the vehicle in the space when practicing perpendicular parking. Before you start to parallel park, your vehicle should be parallel and about two feet from the long side of the rectangle and your rear axle should be parallel and about even with the short side of the rectangle. You can use the barrel that is next to your rear axle as a reference point when you start backing up into the parking space.

When practicing perpendicular parking, backing in is harder than heading in, but heading out is usually faster and easier than backing out.

You can use the long side of a rectangle to practice sharp U-turns. Park less than 12 inches from one of the long sides, make a sharp U-turn, stop when you are parallel to the long side, make another sharp U-turn, and then stop less than 10 inches from the long side—which will be your starting position for another U-turn.
Racecar drivers sometimes drive around a 50-foot circle (skidpad), when they are testing the capabilities of a racecar and the car’s tendency to understeer or oversteer. The circle shown below should not be used as a skidpad, and you should never get the feeling that lateral forces are pulling you outward from the center of the circle. If these lateral forces continue to strengthen, your front or rear wheels may lose traction and your vehicle may understeer or oversteer. The same thing can happen on public highways if you try to negotiate a curve with too much speed. Ignoring lateral forces on a skidpad will seldom cause a serious accident, but ignoring lateral forces on a sharp curve may cause your vehicle to skid, spin, or roll over.

The circular exercise shown below is done at low speeds and it should be done with the steering wheel locked as far as it will go in one direction and then locked as far as it will go in the opposite direction. This will show you how far your steering rotates when you turn it lock-to-lock, and it will also show the minimum turning radius of your vehicle. The lock-to-lock rotation for most steering wheels is about 540 degrees.

The illustration below and on the right is a *figure eight*, and you can form a figure eight with circles or ovals. If you do not rotate the steering wheel fast enough, you will not be able to stay on course when you stop circling in one direction and start circling in the opposite direction.

The illustration to the right is a slalom, which means you need to weave in and out as you go from one barrel to the next. Staying close to a barrel when going forward is much easier than staying close when backing up.
WHAT TRUCKERS KNOW

Truck drivers who work for large trucking companies or companies like UPS (United Parcel Service) normally complete a better driver’s training program and have better safety records than the average driver, and they drive far more miles per year than the average driver. Driving a truck is different than driving car, but many of the driving skills that apply to driving a truck can also be applied when driving other vehicles.

- If you need to back up and you can’t see what’s behind your vehicle, get out of your vehicle and take a look at what’s behind you.
- Back up as slowly as possible, this will give people time to get out of the way and it might reduce the severity of a collision.
- When backing up, if you believe you are too close to an obstacle or your approach angle is incorrect, pull out and start over again.
- As a rule, try to scan 12 to 15 seconds ahead of your vehicle.
- Try to scan at least a quarter mile (440 yards) ahead of your vehicle when driving on expressways and 1 or 3 blocks ahead when driving in a city.
- When driving a truck or car at 60 mph (88 fps) on dry pavement, you will need more than the length of a football field (100 yards) to stop.
- Try to avoid sudden stops, sudden lane changes, and radical changes in speed unless you are trying to avoid an accident.
- Do not expect other drivers to read your mind: use your turn signals, signal early, and turn them off when your maneuver is completed.
- Obtain a driver’s manual from each state you drive in so you can be familiar with the traffic laws that apply to those states.
- Following too closely and traveling alongside other vehicles will decrease the size of your space cushion and increase the risk of having an accident.
- If you see a hazard and you don’t have time to stop, look for escape routes.
- If your view of the road ahead is reduced because of a blind curve or steep hill, slow down and be able to stop within your field of view.
- Most skids are caused by a sudden change in speed, direction, or traction.
- Three good reasons for not speeding are accidents, tickets, and insurance.

If you can set your own delivery route, right-hand turns are safer than left-hand turns because you can make a right-hand turn without crossing an oncoming traffic lane and you will spend less time in intersections, which is a high-risk area because about 50 percent of all collisions occur within an intersection. In the military, removing yourself from a danger zone, such as an intersection, as quickly as possible is called getting off the X.
SOME FINAL THOUGHTS

(1) Pay special attention to your rearview mirror when you are slowing down to stop. If you see a vehicle that’s following too closely, tap your brakes to activate your brake lights and bring your vehicle to a slow stop. After you stop, tap your brakes to warn the vehicles behind you that you are stopped. If you are about to be rear-ended, hard braking may help you avoid being pushed into the intersection.

(2) If you are stopping behind another vehicle, stay far enough back to see the back tires. This should give you enough room to go around the vehicle if you need to and also make it less likely you will hit the vehicle in front of you if someone rear-ends you.

(3) If you have a tailgater, try to stay in the right lane and drive slightly below the speed limit. Most tailgaters will get tired of driving below the speed limit and pass you. Make it easy for a tailgater to pass by not getting too close to the vehicle in front of you. If a tailgater will not pass, try to pass the vehicle in front of you. Rather than pass the vehicle you passed and tailgate you again, most tailgaters will tailgate the vehicle that you just passed. Hitting your brakes when someone is tailgating you may cause an accident or road rage, and hitting the accelerator and trying to outdistance a tailgater can lead to a speeding ticket. If you need to slow down or stop, tap your brakes before you start to slow down. If all else fails, exit the road you are on, make three turns, and take a break. If a tailgater follows you, you might be dealing with road rage or someone who wants to rob you.

(4) If you focus too long on a hazard you want to avoid (target fixation) instead of looking where you want to go, you may hit the hazard.

(5) Driving a motorcycle is not the same as driving a car, but some of the principles that apply to motorcycles also apply to other vehicles.

- Start your brain before you start your vehicle.
- Do not let other drivers control the way you drive.
- Anticipate, but always be ready for the unexpected.
- Going fast is easy, stopping when going fast is hard.
- Give drivers who are reckless or incompetent extra space.
- Impatience, anger, and apathy can get you killed.
- Avoiding one hazard does not mean others do not exist.
- Make your vehicle easy to see and hard to hit.
- Having an accident is a bad way to test your limits.
- If you die defending your right-of-way or ego, you’re still dead.
To be a safe driver, you need to have reliable observation skills. If you do not see a threat or hazard while you still have time to take evasive action, such as speed up, slow down, or swerve, your risk of having an accident will be extremely high. If the accident you are trying to avoid involves another driver, you might get lucky and not have an accident if the other driver is alert and takes evasive action at the same time you were taking evasive action.

If you cannot avoid having an accident, you might be able to reduce the damage by using good judgment. If you skid off the road but you can still steer, it’s better to hit something soft, such as a bush, than something hard, such as a large tree. If all else fails, do not panic or freeze, try to control your vehicle until it stops, give yourself first aid if needed, and try to call for help.

If you use the SIR method (scan, interpret, and react), do not forget that just looking at something is less important than interpreting what you see. If you are entering a blind curve and the only thing you can see ahead of you are the tops of a line of telephone poles, correctly interpreting what you see may tell you that the curvature of the blind curve probably follows the curvature of the line of telephone poles.

You should also practice looking farther than the vehicle in front of you. Whenever possible, look farther down the road by looking through the windows of the vehicle in front of you or to the side of the vehicle in front of you. Looking down the road should include looking at what’s near, what’s far, and what’s in between. If you are scanning correctly, instead of being focused on one thing, such as the rear bumper of the vehicle in front of you, your scan should cover both the road ahead as far as you can see it and your mirrors. When you are checking your mirrors, rotating your head will give you a better view of what you are looking at than just rotating your eyes.

After observation, the second most important skill a driver can have is self-control, which is a thinking skill. No matter how good your other skills are, they will not help you much if you cannot control yourself. It’s hard to be a good driver and have a bad attitude at the same time. There is no universal rule you can follow that will make you a safe driver, but the Driver’s Golden Rule comes very close: Drive the way you would like other people to drive.

A quality that most good drivers have is the ability to monitor how they drive, recognize their own mistakes, and try to avoid making the same mistakes again. It’s almost impossible to avoid making at least a few mistakes when you drive, but recognizing and fixing these mistakes will help you develop good driving habits and make it easier for you to remain calm and make the right decisions when facing a high-stress situation.
360-degree awareness—Using your windows and mirrors to monitor what’s happening in front of, beside, and behind your vehicle.

3-Second Rule—Keep a minimum of 3 seconds between your vehicle and the vehicle in front of you.

ABS brakes (Antilock Brake System)—A computerized braking system designed to keep the front and rear wheels from locking and then skidding.

Acceleration—The rate at which the velocity of a vehicle increases per unit of time.

Apex—The point on a curve where a vehicle negotiating the curve comes closest to the inside edge of the curve.

Center of gravity—a point where an object’s weight (mass) is centered.

Centrifugal (lateral) force—Force toward the outside of a circle or curve.

Centripetal force—Force toward the center of a circle or curve.

Constant-radius curve—A curve where the radius does not change.

Countersteer—During a rear-wheel skid, gently turn to the left just as the rear end starts to swing to the left and to the right as it swings to the right.

Covering the brake—resting your foot lightly on top of a brake pedal until you activate the brakes or you take your foot off the brake pedal.

Decreasing-radius curve—A curve where the radius become smaller and the curve becomes tighter (sharper) toward the end of the curve.

Delayed apex—The apex is after the midpoint of a curve. This is usually the safest line when driving on public highways, and sometimes it’s the fastest line on a racetrack.

Drift—Keeping an unstable vehicle stable when the tires are either near the limits of traction or beyond the limits of traction and spinning or sliding.
ESP (Electronic Stability Program)—A computer program that increases the stability of a vehicle by detecting a loss of traction.

Fishtail—The end of a vehicle swings from side to side. Fishtailing can be caused by too much acceleration or driving on a slippery surface.

Friction—A force that resists motion when one surface rubs against another.

Hydroplane—When riding on a wet road, the tires cannot displace enough water and they lose contact with the surface of the road.

Increasing radius curve—A curve where the radius becomes larger and the curve becomes wider toward the end of curve.

Lateral force (centrifugal force)—A force that pushes a vehicle outward or sideways. Decreasing the radius of a curve by 50% will double the lateral force, but doubling your speed around a curve will quadruple the lateral force.

Load transfer—The transfer of load from one tire to another. If load is considered weight: acceleration transfers weight to the rear wheels, braking transfers weight to the front wheels, lateral force transfers weight to the outside wheels, driving downhill transfers weight to the front wheels, and driving uphill transfers weight to the rear wheels.

Lock-to-lock—After a steering wheel is rotated until it stops in one direction, measure the number of degrees it rotates in the opposite direction until it stops. The lock-to-lock rotation for most passenger vehicles is about 540 degrees. If your tires are pointed straight forward, your steering wheel will lock if you rotate the wheel about 270 degrees in either direction.

Midpoint—The center point of a curve.

Oversteer—Turning sharper than expected because the back tires have lost traction and the rear end is skidding outward toward the outside edge of a turn and the front end is turning inward. A rear-end skid can swing from side to side (fishtail) or swing in one direction and change into a spin.

Pitch—Acceleration (positive longitudinal force) causes the rear to “squat,” and braking (negative longitudinal force) causes the front to “dive.”
Perception time—the time it takes to scan something and then interpret what you scanned as a hazard.

Roll—If lateral acceleration causes the weight of a vehicle to shift from one side to the other, all of the weight might be shifted to the two wheels on one side and the two wheels on the opposite side might lift off the ground.

SIR—A rapid and comprehensive method for observing your surrounding area: Scan–Interpret–React. Constantly using the SIR method when you drive will help you avoid distracted driving and tunnel vision.

Space cushion—the open area that surrounds a vehicle, which includes the space in front of you, the space behind you, and the space to the right and left side of your vehicle. Increasing the size of your space cushion will decrease your risk of having an accident.

Target fixation—Focusing on an object you are trying to avoid and then subconsciously moving toward the object.

Traction (Grip)—The friction between your tires and the surface of a road. Skidding tires (kinetic friction) have less traction than rolling tires (static friction).

Traction control—vehicle safety feature that helps vehicles make better use of all available traction when accelerating on low-friction road surfaces.

Traction reserve—Tires provide a limited amount of traction, and turning, braking, or accelerating can reduce or eliminate your traction reserve.

Tunnel vision—if you are driving a motor vehicle and you have normal vision, tunnel vision is a 70% reduction in your field of view that is normally caused by focusing on a single object.

Understeer—A turn is wider than expected because the front tires have lost traction and the vehicle is trying to skid sideways and then go straight. Turning the front tires even more into the turn can make understeer worse.

Yaw—The rear of a vehicle swings in one direction at the same time the front of the vehicle swings in the opposite direction. If yaw goes beyond 90 degrees of rotation, a skid can turn into a spin.
1. What will prevent most skids?
   a. Improve your hand and eye coordination
   b. Look far ahead and keep your eyes moving
   c. Smooth steering, accelerating, and braking inputs
   d. Drive at or below the limits of your vehicle

2. Which action will not help you recover from a skid?
   a. Hitting the brakes fast and hard
   b. Ease off the brakes
   c. Ease off the throttle
   d. Steer in the direction you would like to go

3. What is the single most important driving skill?
   a. Turning
   b. Observation
   c. Braking
   d. Accelerating

4. The dead pedal is a
   a. Gas pedal that sticks
   b. Brake pedal that falls to the floor
   c. Place on the floor for your left foot
   d. Loose clutch pedal

5. What kind of awareness is most important?
   a. Shoulder check awareness
   b. Side mirror awareness
   c. Rearview mirror awareness
   d. 360-degree awareness
6. Before entering an intersection look
   a. Left, right, and then left again
   b. Forward only
   c. Right only
   d. Left only

7. The acronym SIR stands for
   a. Signal, Identify, Respond
   b. See, Interact, Retreat
   c. Stop, Inspect, Reverse
   d. Scan, Interpret, React

8. Which steering wheel position gives you 180 degrees of rotation?
   a. Vertical position
   b. Angled position
   c. Horizontal position
   d. Reverse position

9. During emergency braking, how do you apply ABS brakes?
   a. Softly at first and then progressively harder.
   b. As hard and fast as you can
   c. Fast at first and then slowly
   d. Pump your brakes

10. When using ABS brakes, which one is not recommended
    a. Maximum braking while making a mild turn
    b. Maximum braking to avoid making a fast, sharp turn
    c. Maximum braking while making a fast, sharp turn
    d. Forgetting to pump your brakes as fast as you can
11. When you make an assumption, you should
   a. Never make assumptions
   b. Make assumptions but do **not** act on them
   c. Act on any assumptions you make
   d. Consider the consequences if you are wrong

12. Do **not** pass unless passing is
   a. Legal
   b. Safe
   c. Necessary
   d. All of the above

13. A good minimum following distance is?
   a. One car length
   b. 1 second
   c. 3 seconds
   d. 20 feet

14. What is the best line for navigating a blind curve?
   a. Early apex
   b. Midpoint apex
   c. Delayed (late) apex
   d. Floating apex

15. If you are being threatened by someone with road rage
   a. Ignore speed limits
   b. Observe but do not provoke
   c. Make illegal left turns
   d. Use a PIT maneuver

16. Keep the brake pedal pressed to the floor during a
   a. Skid
   b. Spin
   c. Lowside crash
   d. Highside crash
17. Driving skills are
   a. Perishable
   b. Permanent
   c. Overrated
   d. Optional

18. If you are being tailgated
   a. Repeatedly hit your brakes
   b. Try to pass the vehicle in front of you
   c. Get behind the tailgater and flash your lights
   d. Use provocative hand gestures

19. Focusing too long on a hazard you are trying to avoid is called
   a. Target fixation
   b. Hyper focus
   c. Tunnel vision
   d. Target acquisition

20. What is the second most important skill a driver can have?
   a. Steering
   b. Braking
   c. Self-control
   d. Judgment

Bonus Question: Which vehicle must yield the right-of-way at a 4-way stop sign if both vehicles arrived at the same time (A or B)?

Answers
1c–2a–3b–4c–5d–6a–7d–8a–9b–10c

Bonus question: yield to the driver on your right.
   Driver B must yield to Driver A
BIBLIOGRAPHY


ABOUT THE AUTHOR

I’ve been driving for over 50 years, my first car was an Oldsmobile 442, and the car I drive now is a Mercedes SLK55. I have never had any points on my license, but I probably deserved a few. I’m retired from the Miami-Dade Police Department, where I worked in the Planning and Research Bureau, was a Hostage Rescue Team sniper, and a Special Response Team Sergeant. My last assignment was the Training Bureau, and after I retired, I wrote a training program for the Florida Department of Law Enforcement.

At MDPD, we used a skidpan to practice emergency braking and skid control, but we didn’t have ABS brakes or a driving simulator. Except for a large bush I ran over to avoid a head-on collision during a high-speed chase, I haven’t had any traffic accidents during the past 50 years.

After I retired from MDPD, I was the motorcycle safety coordinator for Michigan State University and I wrote a motorcycle training manual for law enforcement officers. I also have a Master of Science degree in Criminal Justice from Michigan State University. The three things that taught me the most about safe driving were driving on the ice and snow when I lived in Michigan, riding a motorcycle, and driving a police car in downtown Miami.

I have been in more high-speed chases than I can remember, and most of them involved drunk drivers. The chase I remember best started in Miami, ended after the stolen car I was chasing ran off the road and rolled over, and then turned into a foot chase until I caught the driver.

I cannot tell you how to be a racecar or stunt car driver, but if you would like to improve the way you drive on public highways, I can help you update your driving skills and give you some thoughts about how to drive safely and protect yourself against those who don’t. The picture below is from a tactical training manual I was writing in 2016.
Defensive-Driving Secrets

Now, it’s your turn to drive!

Good drivers avoid traffic accidents by not violating traffic laws. Great drivers avoid traffic accidents because they have learned how to protect themselves against drivers who do violate traffic laws.

Motor-vehicle technology has improved rapidly since the 1970s, and most people are driving vehicles that have ABS brakes and power steering. Despite the advances in technology, many drivers are less safe now than they were in the 1970s because they are using outdated braking and steering techniques. This manual will help drivers update old driving skills and learn new driving skills, which will make driving safer and more enjoyable.