



# SMART CYCLING



Traffic Skills 101

# SMART CYCLING

## TRAFFIC SKILLS 101

An educational program conducted exclusively by League Cycling Instructors

### WELCOME TO TRAFFIC SKILLS 101.

The League of American Bicyclists' Smart Cycling program is designed to develop your knowledge and expertise in the craft and science of bicycling — the ability to use a bicycle with confidence and competence for pleasure, utility and sport under various highway, climate, terrain, and traffic conditions.

The bicycling education program was started in 1974, and continues to be the only nationally recognized cycling education program with trained and certified instructors.

Traffic Skills 101 is the foundation of the program. It provides instruction and guidance in the basic principles of vehicular bicycling. Bicyclists have more fun when they ride with skill and confidence.

This course combines classroom discussion and parking lot activities with on-road practice of the principles of vehicular bicycling. The instructor for this course is certified by the League of American Bicyclists and has years of experience and training.

The League of American Bicyclists was founded in 1880. The founding members of the organization found the unpaved roadways of the era unacceptable for either transportation or recreation. Roadway surfaces we enjoy today are the result of the advocacy and education efforts of the first members. Today, the League has 25,000 members and more than 500 affiliated clubs and advocacy organizations. The League's mission is to promote bicycling for fun, fitness and transportation and work through advocacy and education for a bicycle-friendly America. The League is a 501(c)(3) nonprofit organization.

### COURSE LENGTH

Total of nine hours: Four hours of classroom instruction, five hours of hands-on and on-bike instruction.

### LOCATION OF ON-ROAD EXPERIENCES

Quiet residential streets, minor arterials, multi-lane low- and moderate-speed arterials with posted speeds no greater than 35 mph.

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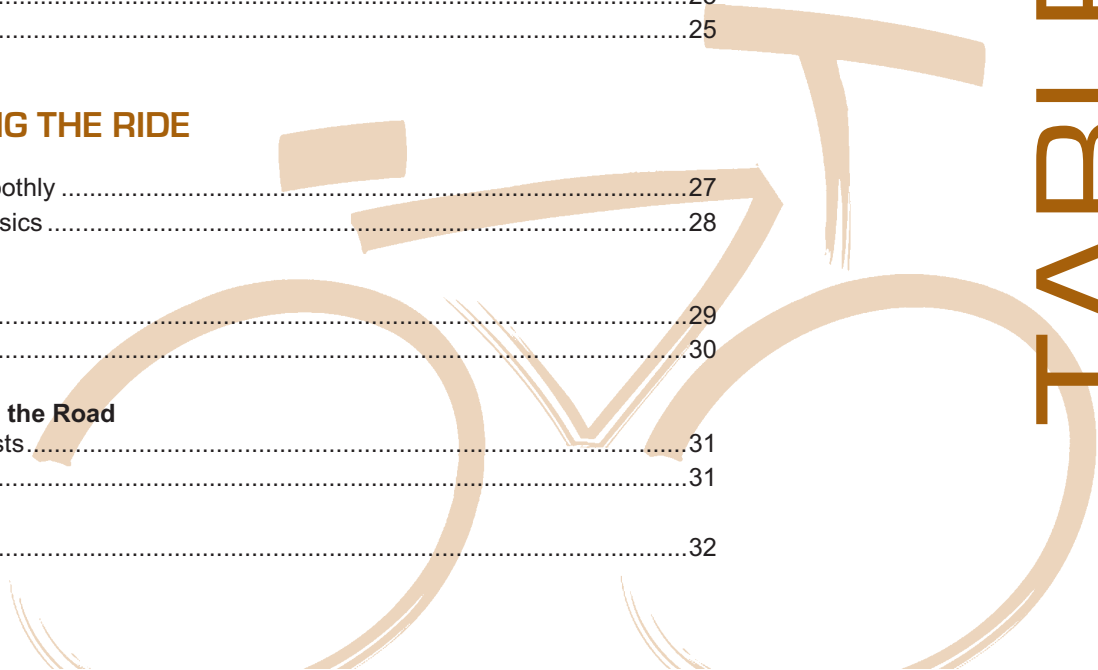
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# PART I

## THE BASICS



*photo courtesy of TREK*

**Bicycling is not only fun, it is a great way to travel: to and from school, work, meetings, stores, restaurants or coffee shops, touring short or long distances, on or off-road. In this class, you will learn how to:**

- **Choose an appropriate, properly fitted and comfortable bicycle for your needs;**
- **Learn about your bicycle and how it works;**
- **Practice the necessary skills to ride and control your bike;**
- **Wear a correctly-fitted, CPSC-approved helmet whenever you ride;**
- **Choose appropriate clothing and accessories for your needs;**
- **Perform a quick inspection of your bike before each ride;**
- **Obey and follow rules of the road;**
- **Review traffic principles;**
- **Be aware, visible, predictable and considerate wherever you ride;**
- **Be an ambassador for cycling wherever you ride.**

## Choose Your Bicycle

Purchasing a bicycle need not be a big job. Only a couple of key decisions need to be made before you begin to shop.

### How much to spend?

Bicycles are available in a wide range of prices from under \$100 to several thousand dollars. What is the difference between a \$300 bike and a \$2,000 bike? As the price of the bicycle increases, the overall quality of the workmanship, frame materials and components improves. Know your personal budget.

### What kind of bicycle to buy?

Ask yourself several questions:

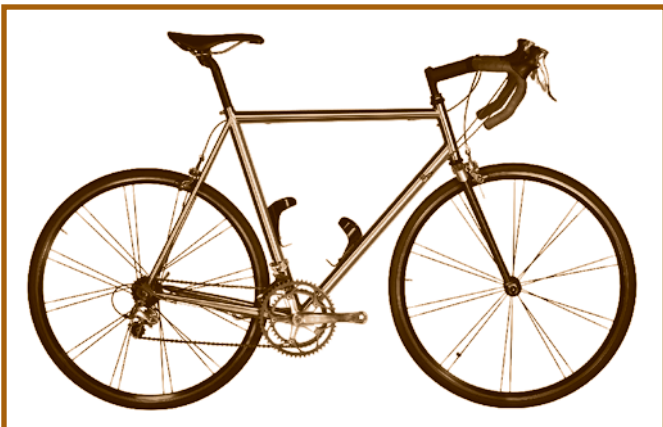
- Why am I buying a bike?
- How fit am I?
- Where will I ride?
- What kind of terrain will I be riding?
- Will I need carrying capacity?
- Will I ride with a group?
- Do I want to ride off-road?

### Where to buy?

Bicycle shops carry a wide range of quality products and have skilled personnel who can help you select a

bike that fits your needs. Bike shops also provide skilled assembly, bike fit, and maintenance that are unavailable from other retailers. Specialty bicycle retailers are your one-stop shop for equipment, riding tips and local cycling information.

Not all bicycle retailers are equal. Find a shop where the sales people listen to you and help you make the correct purchasing decision. If they aren't listening, find another shop.



ROAD BIKE



MOUNTAIN BIKE



HYBRID BIKE



RECUMBENT BIKE



photo courtesy of TREK

BIKE DESIGNED FOR A WOMAN

### What kind of bike is right for me?

Basic qualities of a good bike that will serve you well for many miles:

- Frame – Strong, but light: steel, aluminum, titanium or carbon fiber.
- Wheels – Aluminum rims, stainless steel spokes.
- Brakes – strong enough to stop you quickly and easy to use.
- Shifters – responsive and easy for you to use. Try different types.
- Saddle – Make sure the seat is comfortable for the kind of riding you'll be doing.

### What type of bike?

**Road bikes** are built for riding on paved roads. People use road bikes to race, tour, commute and have fun. The ability to carry cargo depends on what the bicycle is designed for and how it is equipped. Manufacturers equip road bikes with different types of gearing based on their intended uses.

**Mountain bikes** have a flat or slightly upward-curved handlebar. The heads-up riding position, the larger, lower pressure tires and wide range of gears provide a comfortable ride. They can be as light as road bikes even though they are designed for riding on unpaved, challenging terrain. Most mountain bikes have front suspension and some have dual suspension.

**Hybrid or comfort bikes** are generally more stable and comfortable than a road bike. Hybrid bikes tend to be more efficient on paved roads than mountain bikes because of their narrower tires. They are not as capable of handling off-road conditions as mountain bikes, but handle unpaved roads well.

**Recumbent bikes** place the rider in a reclined position, and come in a wide variety of styles. These bikes tend to be primarily for road riding. Because of the various types, be sure to test ride a number of different bikes before purchasing a recumbent.

**Tandem bikes** are bicycles built for two riders and come in all the above styles. They can be a great way for two riders of unequal ability or fitness to share the joy of cycling.

**Bikes designed specifically for women** better accommodate female rid-

ers who generally have shorter torsos and arms relative to their height than men. Women-specific bikes generally have shorter top-tubes and components designed for smaller hands and narrower shoulders. A step-through style frame may be a good bike for anyone who cannot or does not want to lift a leg over the traditional bicycle — these are no longer considered “girl’s bikes.” Some men may find that bikes designed to fit women fit them better than other models.

**BMX bikes** are designed for racing or stunt riding. Now many people use them as utility bicycles in towns and neighborhoods. With only one speed and small frames, they are not well-suited for long distances but are very strong and can be used for shorter commutes and errands.

### What size bike?

Bike fit is what is important. Because different manufacturers measure bike frames differently, use frame measurement as an approximation. Frame size is usually measured from the center of the bottom bracket to the center (or top) of the top tube where it joins the seat tube: generally in centimeters for road bikes, inches for hybrid and mountain bikes.

Stand-over height and top tube length must suit the rider’s inseam, torso and arm length. For non-standard bikes like recumbents, the leg and arm extension is more important than the stand-over height.

To do a quick sizing on a standard bicycle frame, stand over the bike, straddling the top tube with both feet flat on the floor, about shoulder-width

apart. Lift the bike by the handlebar and saddle as far off the ground as comfortable. With a road bike, there should be about 1" to 2" of clearance between the tires and the floor. For a mountain or hybrid bike, there should be 3" to 4". When seated, you should be able to reach the handlebars comfortably. When sitting on the saddle and holding the handlebars, you should not feel stretched out, hunched or cramped.

**Bicycle fit summarized: you shouldn't hurt!**

## WHAT SIZE BIKE?



**QUICK SIZE CHECK:** Lift the bike by the handlebar and saddle as far off the ground as comfortable. With a road bike (above left), there should be about 1" to 2" of clearance between the tires and the floor. For a mountain or hybrid bike (above right), there should be 3" to 4".

# Adjusting Your Bicycle

Riding should be fun, not painful. A few minor adjustments can dramatically improve your comfort and efficiency on the bike. A bike shop employee can help fit your bike to your body. Changes in components like the saddle, handlebar stem or handlebars can be made to improve fit or match your desired riding style. After each adjustment, it's vital to test ride your bicycle. The only way to decide whether the changes increase your riding comfort and efficiency is to ride.



## Saddle

- **Height** — With the ball of your foot on the pedal, there should be a slight bend in your knee when the pedal is at point of greatest leg extension. If your hips rock when pedaling, the pedals are too far away. For recumbent bicycles, leg extension is the best judge of frame size.
- **Angle** — The saddle should be level, not pointing down or up. Any slant to your saddle puts unnecessary pressure on your pelvis, torso and arms.
- **Position** — The forward or backward position of the saddle should be adjusted so that the front of your knee is directly above the center of the pedal when the cranks are horizontal. This does not apply on non-traditional frames.
- **Type** — A saddle should support your pelvic bones and be narrow enough to prevent chafing. If your saddle is not comfortable then ask your bike shop to change it until you find a saddle that you can ride without discomfort.

## Handlebars

Select handlebars that are comfortable for you. Depending on style, they usually should be about the same width as your shoulders. For drop bars, handlebars should be adjusted so that your elbows are slightly bent when grabbing the top of the bar. For flat or riser bars, position the handlebars so that your elbows are slightly bent with your hands on the grips and your forearms and wrists in a straight line.

## Handlebar Stem

Length and rise of the handlebar stem should be determined by your riding style. Generally, the stem will be longer and lower for more aggressive riders, and shorter and higher for more casual riders.

## Brake position

You should be able to comfortably apply the brakes when your hands are on top of the brake hoods. For drop bars, changing the stationary part of the brake lever requires unwrapping and re-wrapping handlebar tape — you may consider taking your bike to the shop for this adjustment. For flat or riser bars, the angle and reach of the levers can be adjusted easily with screws and bolts on the brakes.

## Toe Clips/Clipless Pedals

Although platform or flat pedals suit many people, using a device that securely attaches your shoe to the pedal — either toe clips or clipless pedals (with shoe cleats that lock onto the pedals) — has several advantages. These products help you produce more power with each pedal stroke, keep your shoes from slipping off the pedals, and make it easier to raise a pedal after you have stopped so that you can get going again. Practice with these types of ped-



TOE CLIP



CLIPLESS PEDAL

als on quiet streets before you ride in heavy traffic — many people fall once or twice while getting used to them.

## Cranks

Cranks come in different lengths, and generally need no adjustments. If your riding style or body dimensions are significantly different than the average rider, you may want to try different length cranks to see if they make your ride easier and more enjoyable.







# Parts of the Bike

Label the parts of the bicycle: Place the letter of the bicycle part at the appropriate location on the diagram. (If you need help, turn to the back of the book for the key.)

## Frame

- A. Top tube
- B. Head tube
- C. Seat tube
- D. Down tube
- E. Fork
- F. Seat stays
- G. Chain stays
- H. Dropouts
- I. Headset
- J. Bottom Bracket

## Drive train

- K. Pedal
- L. Cranks
- M. Chainrings
- N. Front derailleur
- O. Chain
- P. Cassette
- Q. Rear derailleur
- R. Shifters and cables
- S. Wheel - hub, spokes, rim, tire, rim strip, tube, valve

## Other components

- T. Saddle
- U. Seat post
- V. Handlebar
- W. Handlebar stem
- X. Brake lever and cables
- Y. Brakes

# Pre-ride Safety Check

## ABC Quick Check

To insure your bike is in top condition, do this quick check before each ride. Timely bicycle maintenance can prevent crashes.

## A is for Air

Check your tire pressure with a gauge — tubes should be inflated to the air pressure noted on the tire sidewall. While checking the pressure, take a moment to look for damage to the sidewalls or tread of the tire. If you can see loose threads showing through the rubber, the tire should be replaced.

## B is for Brakes

Put your thumb between lever and the handle bar and squeeze the brake lever. You should not pinch your thumb. When you release the lever it should snap back into position. Visually check the brake pads for wear and the need for adjustment. If there is less than 1/8" of brake pads left at any point, they probably need replacing. Also squeeze the brakes to make certain that the pads are parallel to and aligned with the side of the rim when applied. How to adjust your brakes is found in the section on maintenance.

## C is for Cranks, Chain and Cassette

Check to see that the bottom bracket, crank arms and chainrings are tight. To check the crank, take the left and right crank arms in your hands and attempt to move them sideways, away from the bicycle frame. If both move, you may have a loose or worn bottom bracket. If only one moves, the individual crank arm bolt is loose and must be tightened. Never ride with a loose crank arm. Make sure the chain looks like metal, not rust or black gunk. Turn the pedals backwards to see if the chain travels smoothly. Check the cassette to make sure it is clean and moving freely.

## Q is for Quick Release

Your bike likely has quick release levers holding the wheels to the bicycle, on the brakes and maybe even on the seat post. Quick releases on the

hubs of your wheels feature a lever on one side and a nut on the other. Check to ensure that the wheels are clamped securely before each ride. To adjust the quick release, first pull the lever open. Make sure the wheel is firmly in place. Hold the quick release lever with one hand while gradually tightening the adjusting nut with the other hand in a clockwise direction. Tighten the nut until you feel resistance on the lever, then use the palm of your hand to close it.

## Check

Before you set out, take a brief, slow ride to check that your bicycle is working properly.

If, during your ABC Quick Check, you determine that adjustments are necessary and beyond your ability, enlist the help of a mechanic at your local bike shop.

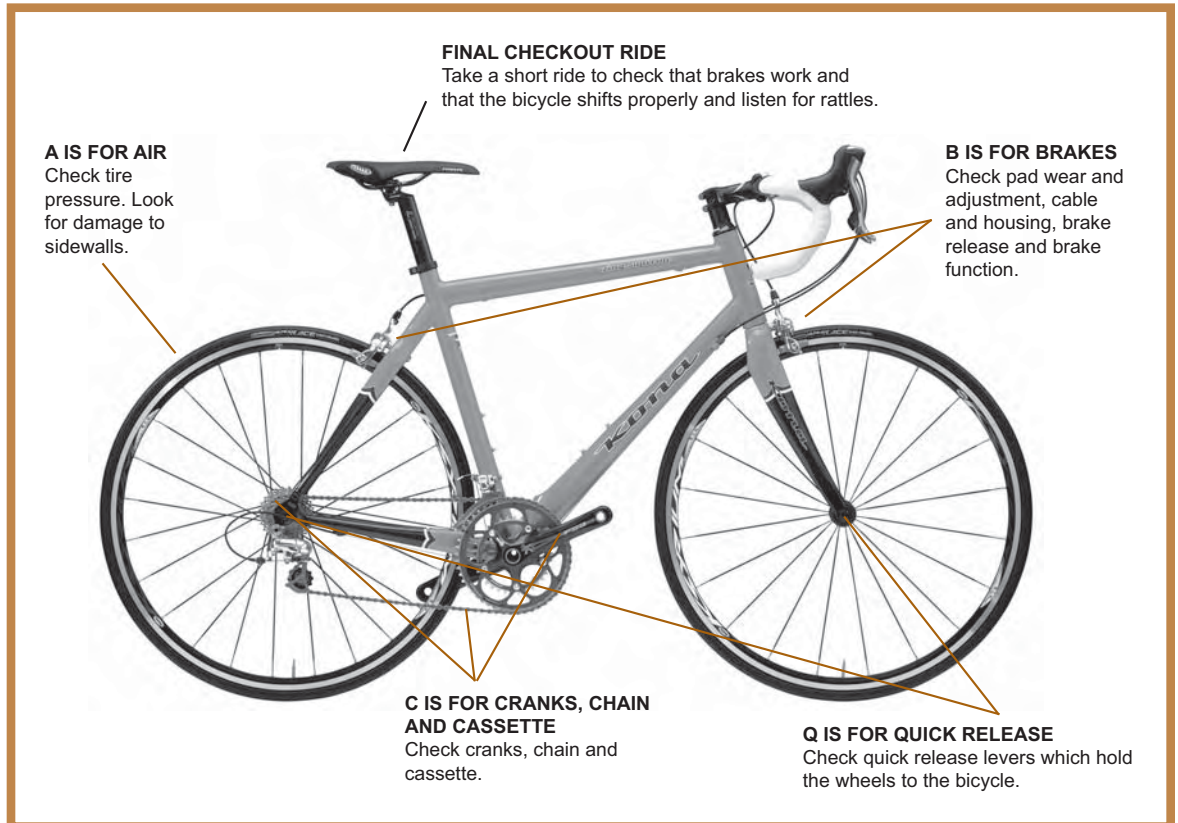


photo courtesy of Kona Bicycle Co.

# Tire Repair

## Fixing a flat

Flats happen to everyone sooner or later. A puncture is caused by something sharp, like a tack, a glass shard, or a thorn penetrating the tire and the tube.

A pinch flat or “snakebite” is caused by riding over an edge like a steel plate or a pothole. The tire is flattened against the rim and the tube is torn by the impact. The tube will show two parallel slits. Tires that are not inflated to the recommended pressure are especially prone to this kind of flat.

Flats can also be caused by improper remounting of the tire, worn out or damaged tires or rim tape failure which exposes sharp surfaces that can puncture the tube.

## Steps to fixing a flat tire

Fixing flat tires can be the most frequent maintenance you do on your bicycle. With practice, a flat can be fixed in less than 10 minutes. You will need to carry the appropriate equipment for the task: tire levers, spare tube, pump and patch kit. By being patient and following the procedure, you will find that the likelihood of follow-up flats will be reduced.

1. If the flat is on the rear wheel, shift to the smallest cog on the cassette.
2. Release the brakes to allow the tire to clear the brake pads.
3. Rotate the wheel slowly to check for any obvious causes for the flat and mark with a crayon or pen.
4. Release the quick release or nut and unscrew until the wheel is free.
5. Remove the wheel.
6. Deflate the tube completely. Push the valve pin in (schrader valve), or first unscrew the nut, then push the valve pin (presta valve).



SCHRADER VALVE



PRESTA VALVE



7. Push one bead of the tire towards the center of the rim around the entire wheel. Insert tire levers opposite the valve and pry the bead out of the rim. Two or three spokes further around, insert the second tire lever. If necessary, insert a third tire lever.
8. Pull one of the tire levers all the way around the rim removing one side of the tire. Do not remove both sides of the tire from the wheel rim.
9. Starting opposite the valve, pull the tube from the tire — keeping the relative positioning of the tire and tube intact.
10. Inflate the tube with enough air so you can find the hole by feeling or hearing the air escape. The location of the hole(s) in the tube will tell you where to look in the tire for the cause of the flat. Make sure the offending object, if any, is gone before you continue or you'll quickly get another flat. If the hole in the tire is larger than a pinhole, insert some form of boot to cover the space.
11. Inflate the good tube with just enough air to give it shape.
12. Insert the tube into the tire, starting at the valve stem then feeding it into the tire with both hands moving in opposite directions.
13. Beginning at the valve, seat the tube over the center of the rim.

## ROUTINE MAINTENANCE

There are bicycle maintenance issues that must be addressed on a weekly, monthly or annual basis to keep your bike in top fitness. It is also a good idea to become attuned to the way your bike sounds while you are riding, and notice any changes or mechanical abnormalities that may happen, such as rattles, soft tires or looseness in grips, pedals or bolts.

**Here is the maintenance we recommend you do on a routine basis.**

### Weekly

- Check tire pressure
- Wipe down and lube chain

### Monthly

- Check rim brake pads for wear (should be showing at least 1/8" for entire pad)
- Clean rims
- Inspect tires for wear
- Inspect frame for cracks
- True wheels (if wheels are wobbling)
- Inspect hubs — checking for looseness. Do this by moving the wheel side to side and making sure there is no play in the wheel.
- Ensure bolts are tight
  - crank bolts
  - stem bolts
  - seat post clamp
  - derailleur fixing bolts
  - shifter/brake lever fixing bolts
  - water bottle cage bolts

### Six Months

- Replace brake pads, if worn
- Check disc brake pads for wear

### Yearly

- Replace cables and housing, if worn or frayed
  - Brake cables and housing
  - Derailleur cables and housing

### Every 18 months

- Replace cassette and chain, if worn
- Check bottom bracket, headset and internal geared hubs for wear.

14. Work the bead of the tire back onto the rim. Use your hands to avoid pinching the new tube with a tire lever. If your thumbs aren't strong enough, use the palms of

your hand to roll the last part of the bead over the rim.

15. As you refill the tube, check that the tire does not bulge off of the rim. Pump the tire up to the rec-

ommended pressure shown on the tire sidewall.

16. Install the wheel on the bike. Adjust any brakes you released.

# Adjusting Brakes

There are three major types of bicycle brakes: rim, coaster and disc.

Coaster brakes use a mechanism inside the rear hub to stop the wheel from turning and require you to push backwards on the pedals to stop. Coaster brakes should be taken to a shop for repair or adjustment.

Rim brakes apply force to the wheel rims to stop them from turning and are available in a variety of types including cantilever, linear pull, and sidepull.

Disc brakes apply force to metal discs, called rotors, attached to the wheels to stop. Like rim brakes, disc brakes are activated by hand levers.

Take disc or coaster brakes to your mechanic unless you are confident you can correctly adjust them.

## Rim Brake Inspection

Check to make sure the wheel rim and brake pads are clean. If not, wipe rim clean and lightly sand the surface of the brake pad with sandpaper.

Squeeze the brake and let go quickly to ensure the cables aren't sticking within the housing. Enlist the assistance of a bicycle mechanic if you find difficulties with the cables or housings.

Push on the brake hood sideways to be sure it is firmly clamped to the handlebar. Then place your thumb between the lever and the handlebar. When the brake is fully applied, the lever should not pinch your thumb.

Make sure the brake arms move freely when the lever is squeezed and return quickly with the lever is released. The brake pads or arms should not rub the rim or tire when the lever is released.

## Rim Brake Pad Adjustment

Proper brake pad adjustment reduces squealing and improves braking performance. As a brake pad wears, its alignment relative to the rim changes. You should regularly check the alignment of brake pads where they contact the rim and adjust them if they don't align properly.

It is preferable to adjust the front end of each brake pad so that it contacts the wheel rim before the rear of the pad — this is called a “toe-in.” You'll need a 5 or 10 mm Allen wrench.

Loosen the nut or bolt that holds the brake pad to the brake arm by one turn.

Wrap a thick rubber band around the back end of the brake shoe and pad.

While applying the corresponding brake lever with modest hand force, move the brake pads into position against the rim and increase lever force. You may have to twist the brake pad and the underlying washers to achieve this position.

While holding the pad in position with one hand, tighten the bolt to secure the pad.

Remove the rubber band.

Check to make sure the brake works correctly and fine tune the adjustment if necessary.

## Brake Movement Adjustment

The most common type of brake adjustment involves compensating for brake pad wear by tightening the cables. First, make brake pad adjustments. If the brake still does not grip well or the lever travels too far,



RIM BRAKES



DISC BRAKES



COASTER BRAKES

a cable that is slightly too long is the most likely cause. Adjust initially by loosening the barrel adjuster counter-clockwise on your brake lever or brake until the brake engages when 3/4" clearance remains between lever and handlebars.

If the correct adjustment cannot be obtained, you should enlist the assistance of a bike mechanic to adjust the length of the cable using the binding bolt on the brakes.

# Adjusting Derailleurs

## Rear Derailleur Adjustment

Many problems with shifting the rear derailleur are a result of the cable having stretched. If your cable tension is too loose, your shifting will not be smooth. Taking up cable tension can be done on the road by turning the barrel adjusters, if your bike has them. If you are unable to fix the problem by turning the barrel adjuster at the shifter or derailleur, you might need to do a minor operation to take up the cable tension. This operation is best left to a mechanic unless you are confident you can handle it.

You'll need a few simple tools, such as a small screwdriver and Allen wrenches. It's best to put the bike in a bicycle workstand. Consult a qualified mechanic if you don't have the tools or are unclear about how to do the following:

- Shift the chain onto the smallest rear cog. Screw the barrel adjuster in all the way and loosen the anchor bolt just enough to release the derailleur cable.
- By sighting down from the rear of the bike, use the 'H' set screw to line up the upper pulley on the derailleur with the smallest cassette cog. Turning the screw clockwise moves the pulley toward the frame and counter-clockwise moves it away.
- Remove slack from the cable and tighten the cable anchor bolt.
- Shift down one gear while rotating the pedals. If shift is precise and quick, go to step 6.
- Unscrew adjuster barrel in half-turn increments until shifting is precise.
- Shift to largest cog. Loosen the 'L' set screw if chain does not reach largest cog. Be careful not to loosen the setscrew too far, which will make the chain drop into the spokes of your wheel.
- Tighten the 'L' set screw while in largest cog. This will limit the travel of the rear derailleur. Turning the screw clockwise moves the pulley to the right and counter clockwise moves it to the left.
- Check all gears. Repeat steps as necessary until shifting is smooth. Make fine adjustments by loosening or tightening barrel adjuster at the derailleur.

## Front Derailleur Adjustment

Adjustment to the front derailleur is necessary when shifting drops the chain off of the inside or outside of the chainrings or the chain rubs the derailleur cage in your smallest or largest gear combination. Unless you're confident that you know what you are doing, take front derailleur adjustments to your local bicycle mechanic — the front is trickier than the back.

- Release the cable from the anchor bolt.
- It is crucial that the derailleur cage remain perfectly parallel to the chainrings and 1 to 2 mm above the largest chainring when shifted to that position. If you can't get this correctly parallel, stop and take your bike to a shop.
- With the chain on the lowest gear combination (smallest ring in front, largest cog in back), tighten the 'L' set screw until the inside plate of the derailleur is 1 to 2 mm away from the chain. Remove slack from cable and tighten the anchor bolt.
- While turning the cranks by hand, shift the front derailleur to the largest chainring and smallest cassette cog.
- Tighten the 'H' set screw if the chain jumps off the large chainring and falls to the outside. Loosen 'H' set screw if the derailleur cannot reach the large chainring from the smaller one.
- Check all gears. Repeat as necessary until shifting is smooth. Loosen 'L' set screw one half turn to improve shifting to small chainring. Make fine adjustments by loosening or tightening the barrel adjuster at the shifter.



## TOOLS for the ROAD

There are a few tools bicyclists should carry on every bike ride. To determine what tools are right for you, ask yourself this question:

### What do I know how to fix?

Only carry tools for work that you know how to do. Carrying tools that you don't know how to use will help only if someone who knows about bikes happens along.

### MUST HAVES

Some items should always be carried for safety's sake:

- Identification — A copy of your driver's license and medical insurance card should be the minimum.
- Money or cell phone for phone call.
- Tools for fixing a flat tire.

If you only ride close to home, these should be enough. For longer rides, you'll probably want to carry more tools and a few spare parts. For most bikes, the following tools will handle the majority of on-road repairs and adjustments:

- Tire levers
- Patch kit and spare tube
- Tire pump or other device to inflate tires — there are two different kinds of valves on tubes, so make sure the pump fits the ones you have.
- Allen wrenches of 4, 5 and 6 mm

Multi-tools made specifically for bicycles have many of the tools you need for simple, on-the-road repairs.

If you know how to adjust other parts of your bike, be sure to carry the tools you need to make those adjustments.

# Clothing & Accessories

## Helmet

A bicycle helmet, like any piece of protective equipment, is designed to be worn a certain way. When it is used correctly, it will do what it's supposed to do: protect your head.

Follow the instructions below to make sure you are wearing the right size helmet and that you are wearing it correctly. If you already own a helmet and it won't adjust properly after following these steps, you may need to try another size or brand.

If your helmet hits the ground during a crash, you need to replace it. Even a minor crack or a small crushed spot in the foam can reduce the protection it offers.

## Bicycling gloves

Gloves are important for two reasons: they help distribute handlebar pressure across your palms, preventing blisters and nerve compression, and they may protect your hands in a fall. There are fingerless styles and full-finger gloves for when it gets colder. Be sure to get a pair that fit your hands snugly.

## Cycling shoes

Cycling shoes help you transmit power to the pedals efficiently and may allow you to use clipless pedals. They generally have a stiff sole that resists bending. They allow you to ride longer and stronger, while preventing

foot fatigue and soreness. They may not be the best choice if you are going short distances with lots of walking in between riding.

## Cycling shorts

By cushioning your sit bones and reducing chafing in sensitive areas, cycling shorts add comfort to your ride. Choose traditional tight shorts with a padded insert, or find a pair of casual, loose-fitting cycling shorts with padding on the inside. It is best not to wear underwear under your cycling shorts, as the seams are in all the wrong places and the material may chafe.



## HELMET FIT & ADJUSTMENT

A helmet should be level on the head (not tilted up, back, or sideways), with the side and chin straps properly adjusted and fastened securely. If you wear a helmet every time you ride, you're taking great strides in safeguarding that brain of yours.

1. Start out with the smallest size helmet that fits your head. Try on different sizes and brands of helmets until you find one that fits. It should cover the majority of your forehead so you can see the front edge. Even without the straps fastened or the pads in place, there should be little movement when you move your head from side to side.
2. If you need a snugger fit, put in the foam pads that come with the helmet or adjust the strap at the back of the helmet. Your goal is to have the helmet snug enough that it will not fall off when you bend over.
3. When adjusted correctly, each ear strap should meet at a point directly below your ear lobe, with no loose play in the straps. Make sure you base your adjustment decisions on a properly positioned helmet worn level on your head! Only after these straps are adjusted should you try adjusting the chin strap. The chin strap should be tight enough so the helmet moves when you open your mouth widely.

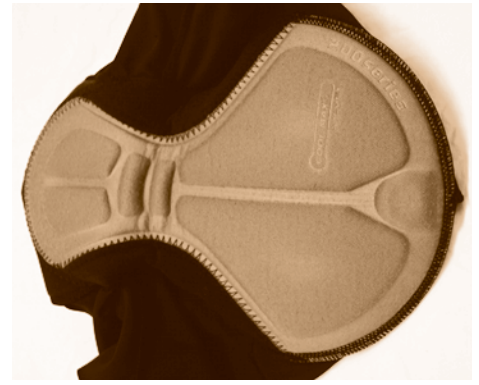




BICYCLING GLOVES



CYCLING SHOES



CYCLING SHORTS

### Cycling jerseys

Many jerseys are made of technical fabrics that pull moisture away from your skin. Depending on what fabric you choose, it can either help keep you warm or cool. Jerseys usually have pockets on the back to carry food, tools, money or other items you want to keep accessible. Be sure to buy jerseys that are light colored to improve rider visibility on the road.

CYCLING JERSEY



### Rainwear

Important considerations when purchasing rainwear include breathability and coverage. Florescent yellow-green (Hi-Vis), yellow or orange are the most visible colors in rainy conditions. If the temperature is below 50 degrees, your rainwear should be waterproof to keep cold water off of your skin.

### Cold weather wear

Cold weather clothing should be made of fabrics that wick moisture away from your body, insulate you, and screen you from the wind. The weather conditions you elect to ride in will determine how many layers of clothing you put on. An extra layer of socks or shoe covers, as well as thick gloves or mittens, are vital for keeping your extremities warm while riding in cold weather. Arm and leg warmers are also widely available and easy to carry.

### Glasses

Sunglasses offer protection from wind, grit, and ultraviolet light. Look for glasses that wrap around your field of vision, permitting a good peripheral view. Lenses should be distortion-free and made of a high-impact, shatter-proof material. Clear or amber lenses are recommended for cloudy, gloomy or rainy weather.



### Water

You need to carry water if your ride is longer than one hour. Your bike should have cages to carry water bottles. Hydration packs allow you to carry more water and drink hands-free while riding. Be sure to carry enough water for your ride.



### Bike Lock

If you leave your bike unattended for even short periods of time, your standard equipment should include a good lock. Do not carry a lock slung over the handlebars, as it could impede your steering. Racks, brackets or backpacks are better options for

### HELMET FIT – REMEMBER THESE THREE TIPS



**EYES:** You should be able to see the front edge.



**EARS:** the straps should meet in a "Y" just below the lobe of your ear.



**MOUTH:** the chin strap should be tight enough so the helmet moves when you open your mouth wide.

carrying locks while riding. For the best level of security, use two different kinds of locks connected together.



BIKE LOCK

### Lights and Reflective Materials

Riding in the dark or in the rain requires that you be properly equipped to see and be seen. The safest thing to do is always use front and rear lights if you ride at night. At the very least, all state laws require a front light and rear reflector. Lights range widely in their brightness and effectiveness. Some use batteries; others use generators that allow the bike and rider to generate power. Rear reflectors may be all that is legally required, but they are not enough for your safety.

In addition to using reflectors on your bike, consider wearing reflective clothing. At a distance, your lights show up first. As a motorist gets



LIGHTS

closer, small LED lights will get overpowered by automobile headlights, and reflective tape won't. Most cycling-specific jackets have some reflectivity built-in, and adding a reflective vest or reflective tape on your bike will help make you very visible.

# Bicycle Handling Basics

## Gears and Gear Selection

Whether you use them all or not, you likely have many gears on your bike so that you can exert nearly the same amount of pedaling effort whether you're riding up a hill, down a hill, or on level ground at a wide range of speeds.

For good efficiency and low impact on your knees, most people find a pedaling cadence of 75-95 revolutions per minute (rpm) to work for them. You can determine your cadence by manually counting how many times one pedal goes around in a minute.

When you are maintaining a steady cadence, the bike will travel different distances depending on the gear you select. For example, when a bike is in high gear, each revolution of the pedals propels it a long distance — perhaps 25 feet or so — but pedaling effort is very high. When the bike is in low gear, each revolution propels it only a short distance — perhaps as little as five feet — but the pedals are easier to turn.



CASSETTE WITH NINE COGS

If your bike has three chainrings, you will do much of your riding in the middle one. Most of your shifting will be done with your right hand to use the rear derailleur to find a comfortable gear. Remember to shift with derailleurs only when pedaling.

If the change in terrain is pronounced, you will need to shift the front derailleur as well. Move it onto a smaller chainring (toward the bike) for a lower gear, and onto a larger chainring (away from the bike) for a higher gear. Use the shifter at your left

hand to move the chain while pedaling. Remember, moving the chain towards the bike makes it easier to pedal and moving the chain away from the bike makes it harder to pedal.

CHAIN IN LOW GEAR  
(BIG COG)



CHAIN IN HIGH GEAR  
(SMALL COG)





## Starting/Stopping

Riding confidently and competently in traffic sends the message that you belong in the roadway. One of the best ways to do this is to start quickly and confidently. You do this by starting with one pedal in an up position, then putting all your weight on the pedal to launch you and your bike across the intersection. As you are pushing on the pedal, ease back onto the saddle.

To stop smoothly and evenly, use both brakes with more pressure on the front one. Just as you come to a complete stop, turn the handlebars a little bit away from the side you want to step down on. The bike will lean to that side so you can step down.

## Steering a Straight Line

If started in motion carefully, a bicycle without a rider can coast all the way across a parking lot before it eventually falls down. Your job is to use small motions to steer the front wheel as little as possible so as to keep the bike directly under your center of gravity. So look up and let the bicycle work for you.

If the bike leans to the right, the front wheel will tend to steer itself to the right, and if the bike leans to the left, the wheel will steer to the left, assuming no force is applied to the handlebar.

On a bike that is moving and upright, the caster effect keeps the wheel lined up in the direction of motion.

## Scanning

When riding in traffic, you need to be predictable and communicate with drivers when you are going to change your speed or roadway position. You can do this by looking around, or scanning, and when it is safe, signaling your intentions.

Scanning is the act of looking over your shoulder. You do it to check for overtaking traffic or to see that you are clear before merging or changing lanes. This is a skill that you'll need to be proficient at so you can keep the bicycle moving in a straight line while you are looking back. Practice looking over each shoulder until it becomes

second nature and you are able to maintain a straight line of travel while looking back.

## Signaling

A large part of being predictable in your actions on the road is letting others know what you plan to do before you do it — hand signals are a vital communication tool. Scanning behind you while riding in traffic may act as a secondary signal to motorists that you plan to change your position on the roadway.

The right-turn signal has historically been the left arm outstretched and bent upward at the elbow. When used by a cyclist, this signal may be difficult for motorists to see. Some states now allow the outstretched right arm to indicate a right turn. Always use hand signals when turning, changing lanes and even when changing position in a given lane. Motorists will appreciate the courtesy and respond in kind.

Be sure to stop signaling well before entering the intersection. At this point, it is more important for you to have both hands on the handlebar for maximum control and maneuverability.



**HAND SIGNALS** are a vital communication tool. Let other motorists know what you plan to do before you do it.



# PART II

## BICYCLING IN TRAFFIC



# Principles of Traffic Law

Understanding the basic principles of traffic law will help you understand how to ride your bicycle in any traffic situation. All road users expect each other to act in accordance with these principles to avoid conflicts and collisions. Complying with traffic laws will decrease the likelihood of a crash by making your actions predictable, and make your ride more enjoyable. As a bicycle rider, in all states, you are accorded all the rights and assume all the duties of a vehicle driver. Therefore, drive your bicycle as you would any vehicle. Although a bicycle is very maneuverable, this does not mean that cyclists should violate traffic laws.

## First Come, First Served

Operators of vehicles, including cyclists, are entitled to the lane width they need, with reasonable clearance behind and to each side, and reasonable stopping distance in front of them. Drivers must yield before moving into space occupied by vehicles that are there first.

## Drive on the Right-Hand Side of the Road

Drivers of vehicles, including bicyclists, must drive on the right-hand side of the roadway. Traveling against traffic puts you in positions on the road where other drivers do not expect you, and makes it impossible for you to read signs and signals. To be predictable to motorists and other road users, never be a wrong-way rider. Many common crash types result from going against the flow.

## Yielding to Crossing Traffic

Drivers on minor roads, including driveways and alleys, yield to traffic on more major roads. Yielding means proceeding onto a roadway only when it is safe to do so and obeying all traffic control devices (e.g. signs, signals and markings).

## Yielding when Changing Lanes

Drivers who want to move into a new lane on the road must yield to traffic in their new lane of travel. Yielding means moving only after looking behind you to see that no traffic is coming and looking in front to see that the way ahead is clear. This is a special case of first come, first served.

## Speed Positioning

In general, stopped or parked vehicles are next to the curb, slower moving vehicles are to the left of them, and faster moving vehicles are closest to the centerline. Overtaking on the right violates this principle and there-

fore is more risky than overtaking on the left.

## Lane Position Rules

Ride three feet to the right of the motorized traffic when the lane is wide enough (about 14 feet) to share safely. When lanes are too narrow to share safely, control the lane by riding in the center of the lane or just to the right of the center in the right hand tire track. This is legal in all states.

If traveling at the speed of traffic, a bicyclist should control the lane unless it is a very wide lane. If traveling faster than other traffic, overtake on the left, keeping a safe distance from slower traffic.

## Intersection Positioning

At intersections, drivers position their vehicles so as to avoid conflicts with the movement of other drivers. Right turners are to the right of center, left turners are to the left of center and straight-through cyclists are between these positions.



# Changing Lanes Safely

## Intersections — Turn Lane Rule

Ride in the rightmost lane that leads to your destination. In single-destination lanes, ride on the right-hand side of the lane. In multiple-destination lanes, ride in the side of the lane appropriate for your destination and current traffic conditions.

Riding in traffic requires knowledge, skill and confidence. You must be confident and assertive, but not reckless. In order to successfully change lanes in traffic the cyclist must:

- Plan ahead
- Look behind, perhaps several times
- Signal your intention
- Act carefully, smoothly and deliberately
- Negotiate as necessary
- Never move in front of another vehicle so close as to constitute a hazard.

When you need to change multiple lanes and traffic is heavy and moving at about your speed, negotiate with

overtaking motorists and make two moves per lane, one to change lanes and one to move close to the far edge of the lane.

## Lane/Intersection Positioning

Most motor-vehicle/bicycle crashes occur during turns, but most such crashes can be avoided. When you approach a multi-lane intersection, think about where you would position yourself if you were driving a car. You wouldn't be in the right-turn-only lane if you were continuing straight. You wouldn't attempt a left turn from the right lane on a multi-lane one way road.

Generally speaking, as a bicyclist, you should be in the right-most lane that goes in the direction you are traveling. But, as a bicyclist you are driving a narrow vehicle, so you also can choose which part of the lane is the best position. The specific portion of the lane depends on the distinct characteristics of the intersection. The diagrams below and on the following

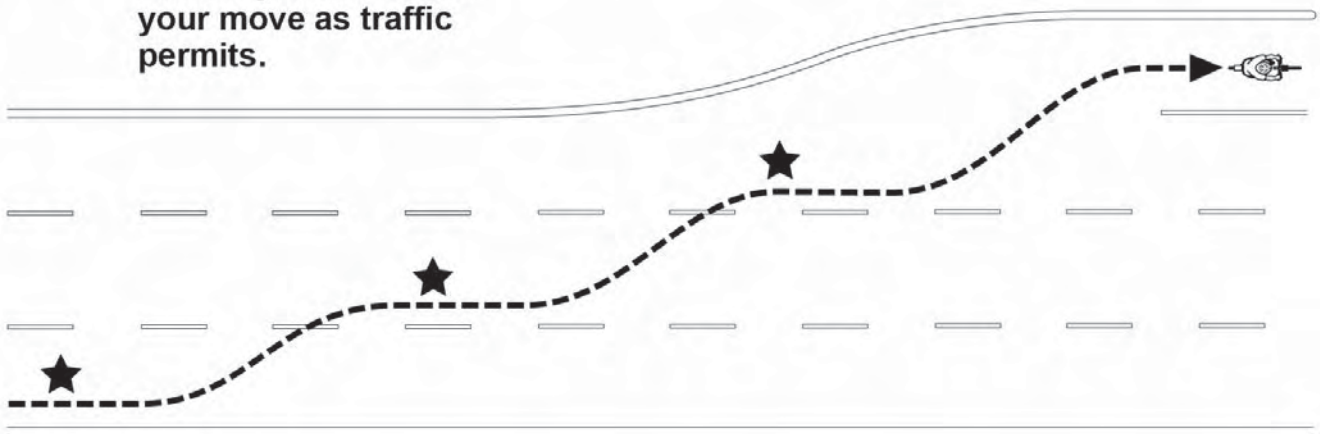
pages show correct lane positioning for a variety of different scenarios.

## BIKE LANES

More and more communities are striping bike lanes on their streets. Well designed and maintained bike lanes should enable you to follow the same principles of traffic law — they are simply travel lanes for preferential and exclusive use by bicyclists. You should be prepared to merge into the regular travel lane to make left turns and to avoid debris or illegally parked cars. Pay special attention in bike lanes that are adjacent to parked cars and always ride outside the door zone.

## LEFT TURN ACROSS MULTIPLE LANES

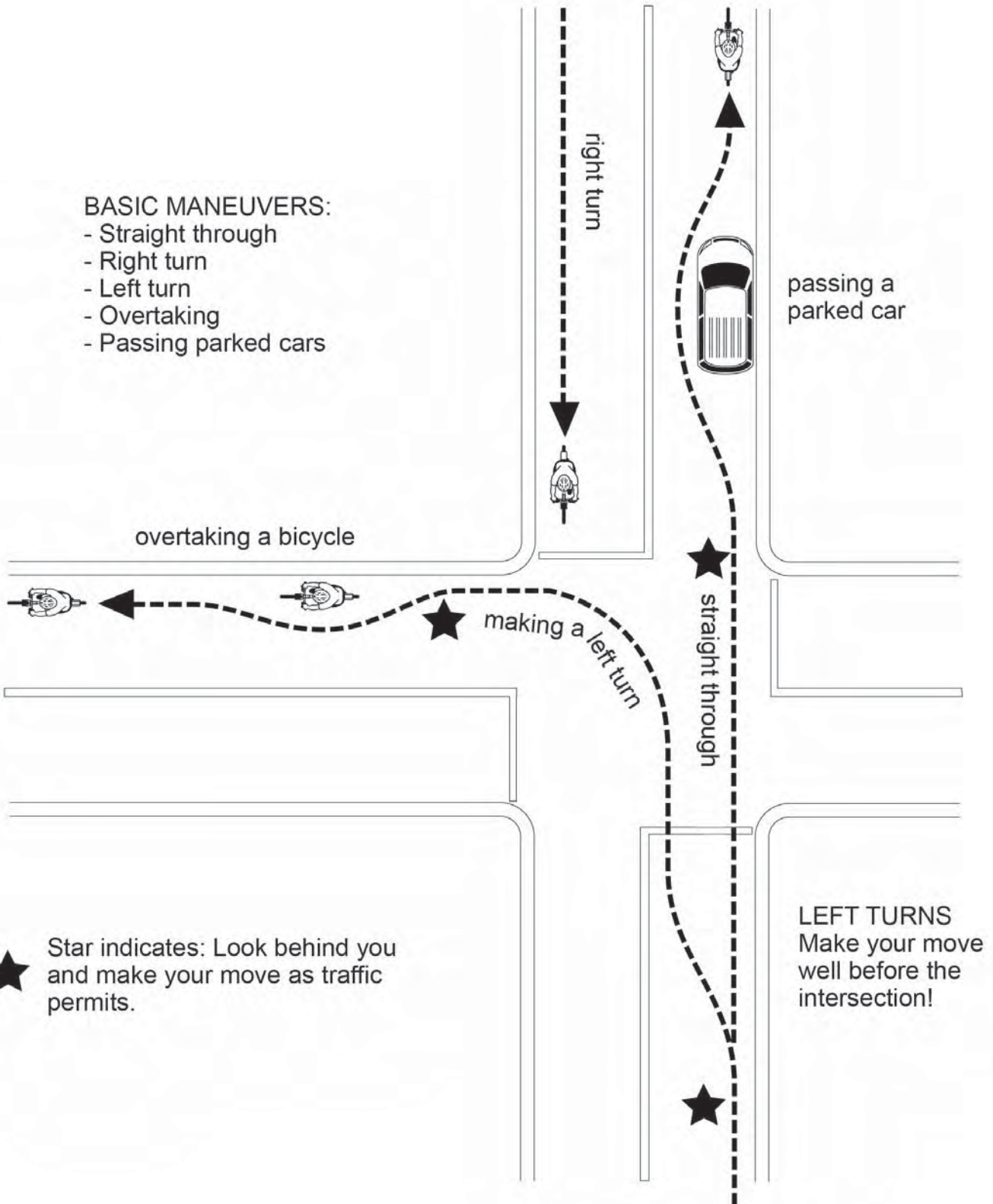
★ Star indicates: Look behind you and make your move as traffic permits.



## LANE POSITIONING

## BASIC MANEUVERS:

- Straight through
- Right turn
- Left turn
- Overtaking
- Passing parked cars

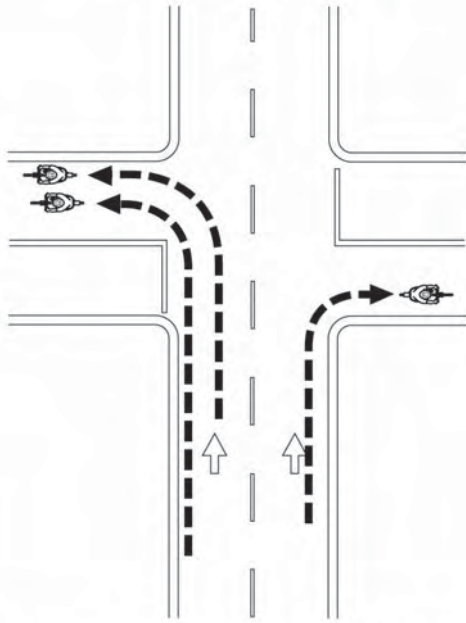


Star indicates: Look behind you and make your move as traffic permits.

**LEFT TURNS**  
Make your move well before the intersection!

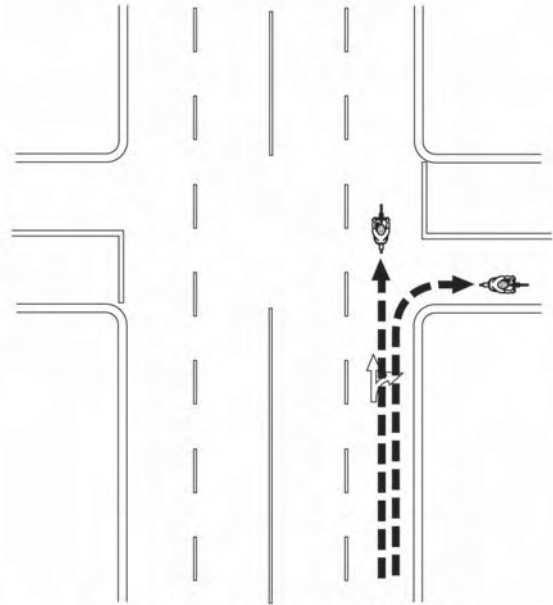
## BICYCLING IN TRAFFIC

### ONE-WAY STREET



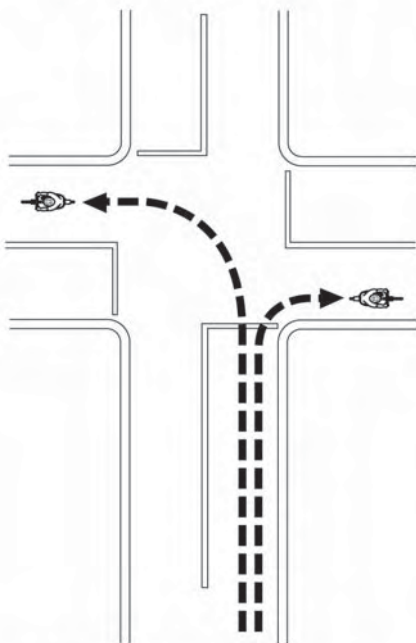
Left turn from left side of lane if there is little turning traffic, from center or right side of lane if left and straight traffic is heavy.

### DUAL DESTINATION RIGHT-TURN LANE



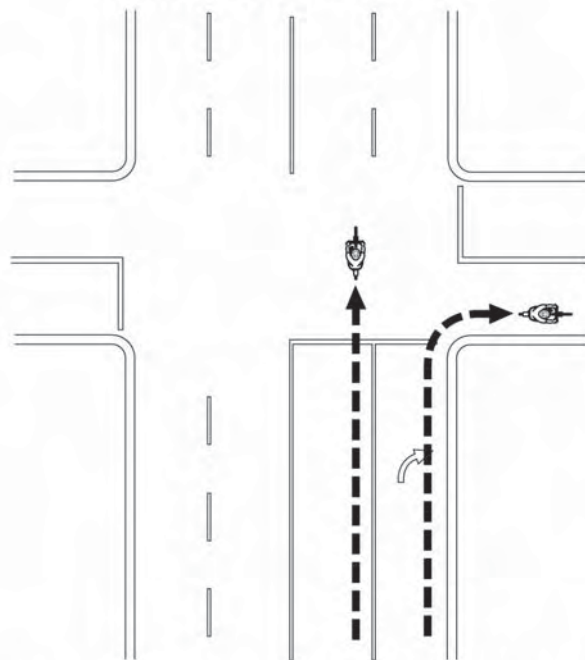
Right turn from right side of lane. Straight from center of lane.

### TWO-WAY STREETS



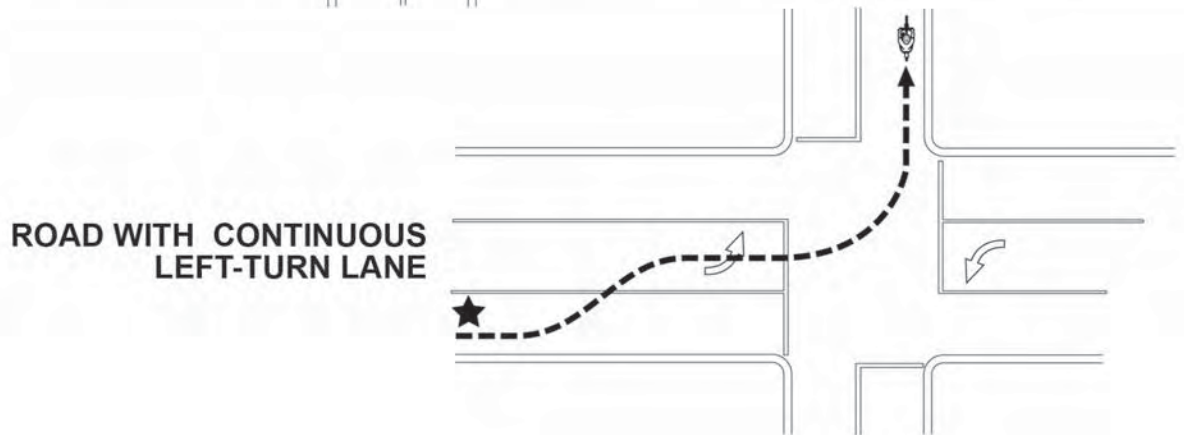
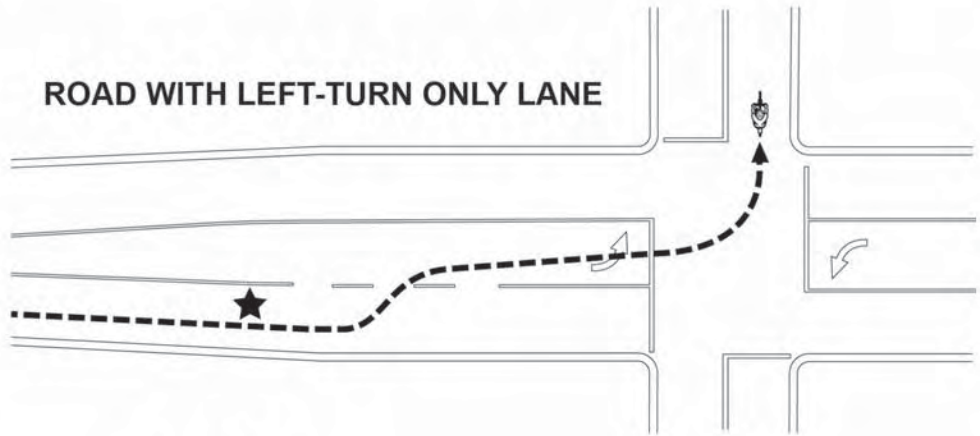
Left turn from left side of lane. Right turn from right side of lane.

### RIGHT-TURN ONLY LANE



Right turn from right side of right-turn only lane. Straight from right side of through lane.

## MAKING LEFT TURNS



# Why Crashes Happen

## Why Crashes Happen: Statistics

Approximately 50 percent of all bicycle crashes are falls. They are often caused by road surface hazards — impact with potholes, storm grates, skidding on wet manhole covers, loose gravel or dirt — or by the front wheel being diverted by railroad tracks, expansion joints or other cracks in the pavement. To avoid these, be alert to the hazards. Be careful turning, braking, or accelerating on a slippery surface. Steer around hazards if you can; the rock dodge technique allows you to do this quickly, as necessary.

## Breaking Down Crash Statistics

Most motorist/cyclist collisions involving child cyclists are caused by the child. The causes of motorist/cyclist collisions involving adult cyclists are about evenly distributed between motorists and cyclists.

Research into bicycle crashes has shown that bicyclist crash rates decrease with experience measured by miles or years of cycling. Bicyclists

| Who is at fault?       | Action                                      | %          |
|------------------------|---|------------|
| Bicyclist              | Wrong-way riding facing traffic             | 14%        |
| Bicyclist              | Left turn from the right side of the road   | 11%        |
| Bicyclist              | Failure to yield from driveway              | 9%         |
| Bicyclist              | Running a stop sign or signal               | 8%         |
| Bicyclist              | Swerving in front of car                    | 5%         |
| <b>Total Bicyclist</b> |   | <b>47%</b> |
| Motorist               | Left turn in front of the bicyclist         | 13%        |
| Motorist               | Right turn in front of the bicyclist        | 11%        |
| Motorist               | Running a stop sign or signal               | 8%         |
| Motorist               | Opening car door into path of the bicyclist | 7%         |
| Motorist               | Failure to yield from driveway              | 6%         |
| Motorist               | Didn't see the cyclist                      | 3%         |
| <b>Total Motorist</b>  |   | <b>48%</b> |
| <b>Undetermined</b>    |   | <b>5%</b>  |

Jerrold Kaplan, 1974, William E. Moritz 1996.  
The highlighted lines are the only crashes that involve cyclists hit from behind.

who ride regularly under adverse conditions (rain, darkness, in the mountains, etc.) tend to be more experienced and have lower crash rates than fair-weather riders.

You can ride safely in traffic. There are preventive measures that you can take to reduce the likelihood of a crash and avoidance techniques to learn and use if a crash is imminent.

# Avoiding Crashes

## Sudden Stops

The most serious type of fall is the one caused by a sudden stop that vaults you headfirst over the handlebars. When pedestrians and animals appear quickly in your line of travel, you must make a quick decision on how to deal with the situation. Always maintain control of your bike. When riding in urban settings, keep both hands on the handlebars in the braking position for best control.

## Dogs

When a dog is chasing you, the most serious risk is a collision with the animal. Speak in a loud voice and continue to move away from the dog's territory. Keep riding and talk to the dog to let him know you are human or dismount and put the bicycle between yourself and the dog. You should always report dog attacks or chases.

## Wind Blasts

Gusting wind and gusts caused by vehicles can affect cyclists. Large

trucks can blast you away in the front and suck you in at the back. You need to correct the lean caused by a wind blast, so maintain sufficient space between yourself and other vehicles, claiming the lane if necessary. Hold the handlebars firmly and lean slightly to compensate for the effect of any gust. Practice and experi-





ence will help you gain confidence in dealing with wind blasts.

### Sidewalks

Riding on the sidewalk is a significant cause of car/bike crashes — especially if you are also riding against traffic. At every driveway and intersection you can surprise turning motorists who are simply not looking for you (they are also poor judges of speed). If you must ride on the sidewalk, ride at walking pace and stop or yield at every intersection.

### Surface Defects and Other Hazards

Stay alert to the road surface and hazards that may be present. Extra caution needs to be taken when riding over metal obstacles, as they can be very slippery. Proceed slowly and do not brake or turn quickly on metal grates, plates or slats. Water over the road can cause dangerous conditions. Wider tires on your bike are one way to improve stability.

### Railroad Tracks

Be conscious of the angle of railroad tracks as you approach them. You need to cross tracks with your bicycle perpendicular to the rails. It is also a good idea to stand up and let your legs and arms act as shock absorbers.

### Steel Plates

Steel plates are used by construction crews to cover work in progress. They can have sharp edges running parallel to your travel that will steer your bike out from under you or sharp edges facing you that you have to roll over. If this obstacle cannot be safely avoided, sit back and take the weight off of your front wheel while being careful to keep it straight. These obstacles can also cause a snakebite tube puncture.

### Storm Grates

Storm grates and sewer drains are slippery when wet. Some designs

may offer slots that can trap your front wheel. Exercise caution when riding over grates. If at all possible, avoid them.

### Surface Cracks

A long, narrow pavement crack running parallel to your path of travel can cause a crash. In order to avoid this type of hole or crack, change your path of travel to cross the crack at a right angle. Be sure not to move suddenly into the path of another vehicle — scan behind you before moving left into traffic if you need to do so in order to avoid a surface crack.

### Uneven Road Surfaces

Uneven road surface needs to be addressed just as a railroad track or pavement crack. Turn your wheel to cross onto a different level of pavement at a right angle.

## CRASH PREVENTION

### STEP 1: Control Your Bike:

#### Don't fall or collide with others

About half of cyclist crashes are single rider falls. If you can skillfully control your bike, by starting, stopping, signaling and turning smoothly, you will not fall down all by yourself or run into other cyclists, dogs and pedestrians.

### STEP 2: Obey the Rules:

#### Don't cause traffic crashes

For adult cyclists, about half of the car/bike crashes are caused by cyclists who make unsafe decisions. Follow traffic laws, obey signs and signals and use correct lanes for turns and through movements, so you don't cause a collision.

### STEP 3: Choose the Right Position in the Lane: Discourage other driver's mistakes

Unsafe decisions by motorists cause about half of the car/bike crashes for adult cyclists. Know when to con-

trol the lane or when to share a lane. Use your lane position to tell drivers what you are doing and discourage them from making right hooks, left crosses or other unsafe movements. More than 90 percent of crashes can be avoided with the first three steps in crash prevention.

### STEP 4: Learn Hazard Avoidance Skills: Avoid other driver's mistakes

When all else fails and you are faced with a critical situation, understand how to maneuver your bicycle to avoid crashing or at least limit the consequences of a crash.

### STEP 5: Wear a Helmet: Protection to survive a crash

When all your skill and techniques fail and you are involved in a crash, you need to be wearing a helmet. Gloves and sunglasses are also helpful. Think of these as the seat belt and air bags in your car.

# Hazard Avoidance Maneuvers

Riding safely on the road requires knowledge and understanding of traffic laws and the principles that determine and govern these laws. However, even when you ride predictably and occupy your proper place on the roadway, situations may arise that necessitate maneuvering to avoid hazards or collisions. The ability to execute an evasive maneuver could mean the difference between a close call and a crash. Be sure to practice these often: For any of these maneuvers to work when you need them, they must come naturally.

## Quick Stop

When you are riding in traffic and something stops suddenly in front of you, you need to bring your bicycle to a Quick Stop, under control and in a short distance.

There is an art to stopping a bicycle in an emergency. When you apply the front or rear brake, the bicycle begins to slow down and your weight transfers forward. **The more weight on a wheel, the more effective the braking and the less likely it is to skid.**

**If you are like many people, you instinctively grab both brakes in an emergency and apply them equally until the bike begins to skid. You have no control and a wheel that is skidding offers you virtually no stopping power. So the logic for effective braking is:**

- Braking with the rear brake alone will help prevent pitch-over, but it is not very effective.
- In theory, you can stop fastest with the front brake, but an error will pitch you over.
- **For a fast, safe stop, use both brakes. This produces the optimum deceleration. If the rear wheel starts to skid, ease up slightly on the front brake. With practice, you will use the front brake harder (up to three times**



ABOVE: Quick stop

harder) and the rear brake more lightly to decrease your stopping distance.

- **When braking hard, slide your body back on the saddle as far as possible. You can transfer even more weight to the rear wheel by moving your rear end straight back and placing your stomach on the seat.**
- **When carrying a heavy load on the rear of your bike, you will be able to brake harder with less danger.**

## Rock Dodge

Rock Dodge is a maneuver to avoid any small object in the road. It is an essential skill for any cyclist to master.

**To execute a Rock Dodge, keep riding straight until you are very close to the object. Just before you reach the object, turn the handlebars suddenly to the left — without leaning — so the front wheel goes around the object. Immediately straighten out and keep riding.**

When you steer to the left of the rock, you automatically lean right. When you straighten up, you bring the bike back under you. Your front wheel snakes around the rock, your back wheel passes on the other side, but your body and handlebars have barely moved. The motion is subtle and the entire action happens in a split second.

This technique will feel unnatural at first and will take practice before

you can do it smoothly. Once you master the Rock Dodge, practice it regularly.

### Avoidance Weave

The Avoidance Weave is used when you suddenly encounter a series of hazards like potholes or rocks that could cause a crash.

The Avoidance Weave is a set of swooping turns. To avoid a series of hazards successfully, look ahead past the hazards and begin a turn before you reach each hazard. Continue to look ahead and turn sharply until you are through the hazards. It's important to lean your bicycle and get into a rhythm.

### Instant Turn

The Instant Turn is used to avoid an unexpected vehicle passing directly in front of you. In these instances, you won't have the time or space to do a Quick Stop. An Instant Turn allows you to avoid the crash and go in the direction of the vehicle. Even if you do crash, it will be at an angle and the consequences will be less than crashing head on.

Many people think that a turn is produced simply by turning the front wheel, but you actually lean first and turn second. Because they happen so fast, the two moves appear simultaneous. To force the lean quickly you have to perform a maneuver that

feels unnatural and sounds even more unlikely. Turn your front wheel left — the wrong way, toward the car. By doing this you're forcing a right lean. The moment you have a lean started, turn your front wheel sharply right and you'll find yourself in a tight right turn.

This doesn't ever feel natural, and you must train yourself to do it. The quick twitch in the wrong direction at the start of the instant turn is the most important and least intuitive part of the turn. You are deliberately unbalancing yourself by steering the whole bike out from under you.



LEFT: Teaching the rock dodge

ABOVE: Demonstrating the instant turn

# PART III

## ENJOYING THE RIDE



# Riding Enjoyment

When you start riding, your technique is much more important than your speed. Maintaining a steady cadence, shifting smoothly and keeping a consistent pace are the building blocks to becoming a fast and safe cyclist. Be sure to fuel up before you go on a ride: eating and drinking lots of water are vital.

## Cadence

Cadence is your pedaling rate in revolutions per minute (rpm). Higher rpm produce the same power with less force, though this may feel strange at first. For most, the best cadence for riding is 75 to 95 rpm. Practice riding with that cadence and you will be able to go longer distances with ease. Pedaling at a lower rpm increases fatigue in your thigh muscles. If your bicycle has more than one gear, continually shift to a gear that enables you to easily spin the pedals at a cadence of 75 to 95 rpm on whatever terrain you are riding.

## Shifting smoothly

Using the gears on your bike will enable you to ride more comfortably for longer distances and periods of time. You want to match the effort your legs are capable of to the terrain and wind in which you're riding. Shifting gears helps accomplish this goal. Muscles get tired when you push hard; shifting to an appropriate gear will reduce the need to use as much force. Riding into the wind can be more difficult than pedaling up a steep hill



— and may require shifting to lower gears.

## How to Shift

Today, indexed shifters and derailleurs are more precise than ever. Even though your rear derailleurs are designed to shift while under full pedaling power, a slight reduction of force helps to complete each shift smoothly. Shift while pedaling, but not while pushing hard on the pedals. Reducing power before shifting is most important when shifting your front derailleur.

## Pace

The pace you choose to ride is dependent upon your fitness level, your cadence and the group you are riding with. A steady pace makes you



Cadence is the rate of rotation of the pedals.

predictable when riding in traffic. Realize that you will climb hills slower and go down hills faster.

### Drafting or Pacelining

Drafting is riding within 3 feet or closer behind another cyclist to take advantage of lower wind resistance. It is an important skill for you to know. Practice with someone you ride with regularly — never draft off of someone you don't know. Be careful, as drafting can be dangerous, but it really comes in handy on windy days.



**DRAFTING** is riding within 3 feet or closer behind another cyclist to take advantage of lower wind resistance.

# Nutrition & Hydration

The body gets energy from carbohydrates, fats, and protein. Carbohydrates are the primary energy source for bicycling. Fats, which also serve as an energy source, are important for longer endurance rides. Proteins are used to maintain and repair muscles.

### Carbohydrates: Simple and Complex

Simple carbs, also called sugars, are found in fruits and vegetables. They provide quick energy and are in many of the gel-type products cyclists use. Plan to carry some source of simple carbs on a ride longer than one hour.

Complex carbs, also called starches, are found in pasta, grains, breads, potatoes, and cereals. Complex carbs provide long-term energy to adequately fuel you through a long ride. Consume a carbohydrate-rich meal the day before a long ride. A pre-ride meal of complex carbs (cereal and a bagel) will provide a good energy foundation.

### Fats Should Be Avoided on a Ride

Fats are difficult for the body to digest and will rob you of needed energy. Eating a hamburger and fries, for example, will overload your body with fat. This will force your body to

use energy for digestion instead of for cycling. But fats are an important part of your energy stores for longer rides, so don't avoid them altogether.

### Proteins are Important

Proteins, which are found in meats, peanut butter, and beans should be consumed moderately on the day of a ride. After a long ride, make sure you get some of these muscle builders in your diet to help you recover.

### Eating Ahead

Eating spaghetti, salad and bread the night before a long ride is good preparation. Figs, granola bars, and dried fruits are excellent natural sources of simple carbohydrates that will help you maintain energy during your ride. Bananas are a bicyclist's mainstay. They provide necessary carbs as well as potassium and other vitamins that your body uses in large amounts while bicycling. Plan to snack a little every 20 minutes.

### Hydration

You will perspire more heavily than normal while bicycling. Dehydration, or loss of body fluid, is a serious condition and should be avoided. Try to consume more water than normal

the day before your ride. This will super-hydrate your body in preparation for the ride. During your ride, drink the equivalent of one water bottle (20 oz.) in small amounts each hour or every 12 to 14 miles. Electrolyte (sport) drinks can greatly improve your riding enjoyment. If the weather is exceptionally hot and humid, increase the amount you drink and drink more often, alternating water and sports drinks.

If you find yourself feeling light-headed and ill on a very hot day, if you have ridden for a couple of hours and have not urinated, or if your skin feels cold and you get goose bumps, you may be experiencing dehydration. Get off your bike in some shade and re-hydrate before continuing your ride.

The best option for an enjoyable ride is to eat and drink at a slow, steady pace. Plan when and what you will consume and you will find that your muscles will enjoy the ride as much as you will.

**THE BASIC RULE OF BICYCLING IS:  
Eat before you are hungry  
and drink before you are  
thirsty.**

# Sharing Paths and Trails



Recreational paths and trails can be very congested — safety is an issue. Whether bicycling, walking, or jogging, following the same rules as everyone else will help you have a safer, more enjoyable time.

Trails have engineering and design limitations that require you to ride differently than you would on the road. If your preferred speed or style of cycling is inappropriate for trails, look for better-suited alternative routes. Riding trails with friends or family can be quite enjoyable if you obey the rules of the trail.

## Be Courteous

All trail users should be respectful of other users, regardless of their mode of travel, speed, or skill level.

## Right of Way

Know the Right of Way rules on the trail you're using. Trails may have local variations of the standard roadway rules. If you don't know your local rules, a good rule of thumb is that cyclists should yield to all other trail users.

## Give an Audible Signal when Passing

Give a clear signal when passing. This signal may be a bell, horn, or voice. Warn in advance so that you have time to maneuver if necessary. Loudly and clearly saying, "Passing on your left," is the most common signal used to alert other users of your approach.

## Pass on Left

Pass others who are going in your direction on their left. Look ahead and behind to make sure the lane is clear before pulling out. Do not move back to the right until safely past. Fast-moving users, like cyclists, are responsible for yielding to slower-moving users.

## Yield when Entering and Crossing other Trails

When entering or crossing a trail at trail intersections, yield to traffic on the cross trail or road. This is often the most dangerous point on a trail.

## Be Predictable

Ride in a straight line. Warn other trail users of your intentions by indicating when you are turning, slowing or stopping.

## Use Lights at Night

If the trail is open and you are using it between dusk and dawn, you must be equipped with lights. Bikes need a white front light and a red rear light or reflector. Reflectors and reflective clothing are no help if there is no source of light.

## Do not Block the Trail

When riding in a group, use no more than half the width of the trail. On many heavy-use trails, this means that all users will need to stay single file. If you stop to regroup, always do it off the trail.

## Clean up litter

Do not leave any debris along the trail. If you have trash, carry it until you find a trash can. Go the extra mile — pack out more trash than you bring in.

# Riding with a Group

If you are riding in a group, there are some group riding rules to follow. You are responsible for your own safety when riding in a group. If you are planning on riding in a major ride with more than 100 riders, be sure to take the League's Group Riding Skills Course.

## Be Predictable

Group riding requires even more attention to predictability than riding alone. Other riders expect you to continue riding at a constant speed and lane position, following the road or trail, unless you indicate differently.

## Use Signals

Use hand and verbal signals to communicate with others in the group and with motorists. Hand signals, except for the standard hand signals, may vary by region so make sure you know and agree to the same set of signals.

## Give Warnings

Warn cyclists behind you of changes in direction or speed. The lead rider should call out "left" or "right" in addition to a hand signal. The lead rider should announce the turn well in advance of the intersection, so members of the group have time to position themselves and can turn without conflict.

## Change Positions Correctly

You should pass others on their left. Say "on your left" to warn others that you are passing. If you need to pass someone on the right, say "on your right" clearly and be careful since this is an unusual maneuver.

## Announce Hazards

Most of the cyclists riding in a group will not have a good view of the road surface ahead, so it is important to announce hazards. Indicate hazards by pointing down to the left or right and shouting, "hole" or "bump."

Everyone should be made aware of hazards, however, everyone does not need to announce them.

## Watch for Traffic Coming from the Rear

Even when you are occupying the proper lane position, it often helps to know when a car is coming. Since those in front cannot see traffic approaching from the rear, it is the responsibility of the riders in back to inform the others by saying "car back." Around curves, on narrow roads, or when riding double, it is also helpful to warn of traffic approaching from ahead with "car up."

## Be Careful at Intersections

When approaching intersections requiring vehicles to yield or stop, the lead rider should say "slowing" or "stopping" to alert those behind them. When passing through an intersection, some bicyclists say "clear" if there is no cross traffic. This is a dangerous practice and should not be followed. It encourages riders to let others do their thinking for them. Each bicyclist is responsible for his or her own safety.

## Leave a Gap for Cars

When riding up hills or on narrow roads, leave a gap between every three or four bicyclists so motorists can pass smaller groups.

## Move Off the Road to Stop

When the group stops, move well off the road so you do not interfere with traffic. When you start again, each bicyclist should look for, and yield to, traffic.

## Ride Single File or Two Abreast

Ride single-file or two abreast as appropriate to the roadway, traffic conditions, and where allowed by law. Most state vehicle codes permit narrow vehicles such as bicycles and motorcycles to ride two abreast within the lane. Even where riding double is legal, courtesy dictates that you ride single file when cars are trying to pass you if the lane is wide enough for them to safely do so. Riding more than two abreast is almost always illegal unless the road is closed to motor-vehicle traffic.





# How to Drive Around Cyclists

About 98 million people in the United States own a bicycle. About 700 bicyclists are killed each year in the U.S. Around 96 percent of these deaths result from crashes with motor vehicles. In all 50 states, bicyclists are accorded the same rights and expected to obey the same laws as drivers of motor vehicles.

## How to Drive Around Cyclists

Leave at least three feet of passing space between the right side of your vehicle and a bicyclist.

Be aware that when a road is too narrow for cars and bikes to ride safely side by side, it is safest for bicyclists to take the travel lane, which means riding in or near the center of the lane. This is allowed in the laws of all 50 states.

Reduce your speed when passing a cyclist, especially if the roadway is narrow.

When turning left at an intersection, yield to an oncoming bicyclist just as you would yield to an oncoming motorist.

After passing a cyclist on your right, check over your shoulder to make sure you have allowed adequate distance before merging back in.

Don't honk your horn when approaching bicyclists.

In inclement weather, give cyclists extra room, just as you would other motorists.

Look for approaching situations and obstacles that may be hazardous to cyclists, such as potholes, debris, and glass, and then give them adequate space to maneuver.

Look for bicyclists before opening your car door on the traffic side.

Children on bicycles often act unpredictably. Expect the unexpected.



## Common Cyclist Errors

**Unfortunately, not everyone who rides a bike understands or obeys the rules of the road. Some of the common cyclist errors you may encounter as a motorist are:**

- **Wrong-way riding.** Cyclists riding on the left (wrong) side of the road, facing traffic, cause 14 percent of all car/ bike crashes. Look both ways before turning.
- **Mid-block ride-outs.** This is the most frequent crash type for young riders and occurs when the bicyclist enters the roadway from a driveway, alley, or curb without slowing, stopping, or looking for traffic.
- **Cyclist failure to yield when changing lanes** (11 percent of car/bike collisions).
- **Cyclist failure to yield to crossing traffic** (9 percent of car/bike collisions).

# Glossary

**1,000 Yard Look:** When you are riding, a general rule of thumb for where you should be looking is 1,000 yards ahead. This helps you keep a straight line and see the big picture.

**Bar Tape:** Foam tape used for comfort that is wrapped around handlebars on road bikes.

**Barrel adjuster:** Small mechanism used for making minor adjustments on brake or shifter cables.

**Bonk:** When you run out of energy, usually caused by not drinking or eating enough while riding.

**Boot:** A large patch placed inside a tire that is split or torn. Typically this is a piece of an old tire, but anything flat and non-porous (including a dollar bill) will work.

**Brake pad:** The rubber part of the brake that contacts the rim of the wheel and provides stopping power.

**Brake hoods:** Covering for the brake lever mechanism where you can rest your hands.

**Bunny hop:** A way to jump over hazards by jumping up and pulling your bike with you.

**Cable Housing:** The tube that encloses brake and shifter cables and allows minor adjustments.

**Cadence:** The rate of rotation of the pedals.



**Century:** a ride of one hundred miles normally done in a day.

**Clipless Pedals:** A type of pedal that requires a shoe with a cleat, locking your shoe to the pedal and providing better pedaling efficiency.



**Door, dooring:** A crash caused by a motorist opening a car door into traffic in front of a cyclist who is riding too close to parked cars.

**Drafting:** Riding behind another cyclist to take advantage of reduced wind resistance.

**Drop Bars:** Curved handlebar normally found on road bikes.

**Left Cross:** a motorist turning left in front of a cyclist.

**Pannier:** Bags mounted on a rack on your bike to carry gear.

**Pinch flat:** Tube damage characterized by two small slits. This is usually caused by hitting a sharp edge such as a construction plate or pothole on under-inflated tubes and pinching the tube against the rim. (see also: Snakebite flat).

**Power Pedal Position:** Position of the pedal (about 2 o'clock) for a strong, confident start.

**Presta:** One of two types of valves that are commonly found on bicycle tubes (see also, Schrader).

**Right hook:** A motorist turning right in front of a cyclist.

**Rim strip:** A tape-like material placed in the rim to protect the tube from spokes.

**RPM:** Revolutions per minute.

**Schrader:** One of two types of valves that are commonly found on bicycle tubes (see also, Presta).



SCHRADER VALVE

**Snakebite flat:** Tube damage characterized by two small slits. This is usually caused by hitting a sharp edge such as a construction plate or pothole on under-inflated tubes and pinching the tube against the rim. (see also: Pinch flat).



PRESTA VALVE

**Spoke wrench:** Tool used to adjust the tightness of the spokes and keep the wheel true.

**Tire lever:** Tool used to remove the tire bead from the rim.

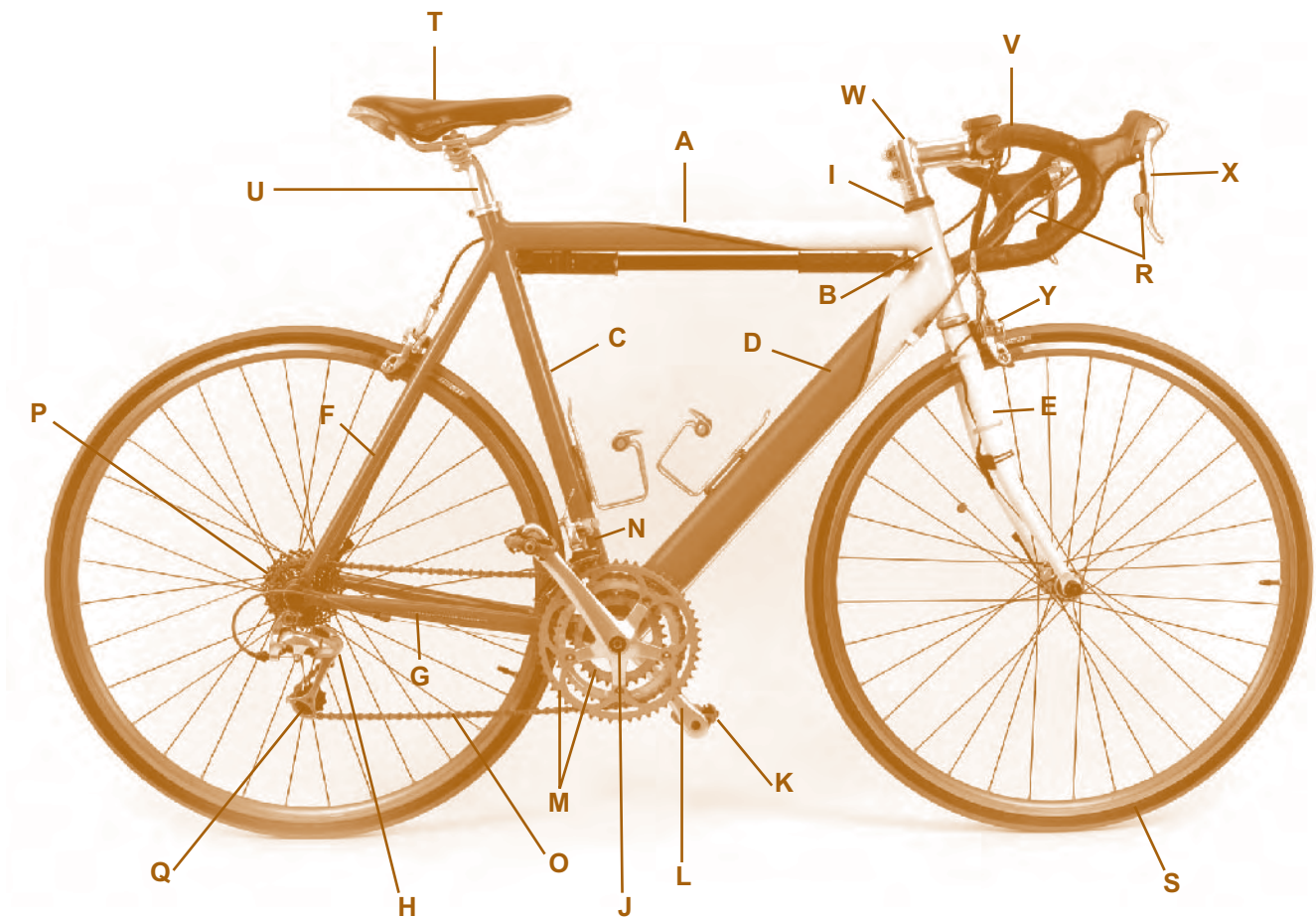
**Toe Clips:** A type of pedal with a strap on it to strap your shoe to the pedal, providing better pedaling efficiency.

**Toe In:** Brakes are adjusted so the front of the brake pad touches the rim first to reduce squealing.

**True:** A wheel that doesn't wobble is a wheel that is 'true.'



DROP BARS



## Parts of the Bike (Answer Key)

### Frame

- A. Top tube
- B. Head tube
- C. Seat tube
- D. Down tube
- E. Fork
- F. Seat stays
- G. Chain stays
- H. Dropouts
- I. Headset
- J. Bottom Bracket

### Drive train

- K. Pedal
- L. Cranks
- M. Chainrings
- N. Front derailleur
- O. Chain
- P. Cassette
- Q. Rear derailleur
- R. Shifters and cables
- S. Wheel - hub, spokes, rim, tire, rim strip, tube, valve

### Other components

- T. Saddle
- U. Seat post
- V. Handlebar
- W. Handlebar stem
- X. Brake lever and cables
- Y. Brakes

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