# Rules of the Road: These six Rules of the Road will prepare you for safe and fun bicycling, no matter where or when you are riding. For more educational resources, sign up for a cycling class. Getting ready to ride is a matter of being responsible about preparation.

**1. Follow the law.** Your safety depends on it. Your actions reflect on you as well as other cyclists and influence how motorists perceive all cyclists. You have the same rights and duties as all drivers. Obey all traffic control devices such as stop signs, lights, and lane markings. Ride with traffic; use the rightmost lane headed in the direction you are traveling.
**2. Be predictable.** Make your intentions clear to motorists and other road users. Ride in a straight line and don’t swerve between parked cars. Do not ride on the sidewalk. Signal turns, and check behind you well before turning or changing lanes.
**3. Be conspicuous.** Ride where drivers can see you; wear brightly colored clothing at all times. Use a white front light, red rear blinking light and front, rear, and side reflectors at night or when visibility is poor. Wear reflective clothing and use reflective tape. Make eye contact with drivers. A friendly wave is a good way to verify recognition**.
4. Think ahead.** Be aware of traffic around you and be prepared to take evasive action. Anticipate what drivers, pedestrians, animals, and other bicyclists will do next. Watch for turning vehicles and ride outside the door zone of parked cars. Scan ahead for debris, potholes, utility covers, and grated drains. Cross railroad tracks at right angles as much as safely possible. In many crashes there is usually not a single cause. There is usually an interaction of factors. Crashes occur because factors interact and develop into a hazardous situation. “Accident” is not an appropriate term as most crashes are predictable and preventable. Remove just one factor, and a traffic conflict may not develop into a crash. Hazards are everywhere. Good cyclists are quick to notice what is going on all around them. Minimizing factors helps maintain a margin of safety. Continuously keeping the number of factors to a minimum is a good way to manage your risk. Safe riding requires a strategy, a way of thinking and planning to avoid trouble. **5. Ready to Ride.** Check that your tires are properly inflated, brakes are working, chain runs smoothly, and quick release wheel levers are closed. Carry repair and emergency supplies appropriate for your ride. Dress appropriately. Wear a helmet. Make sure that the helmet is secured and fits on top of your head, not tipped back or forward. After a crash or any impact that affects your helmet, visible or not, replace it immediately. Helmet effectiveness has been confirmed by research in the laboratory and by decades of crash analysis as well. There are four basic components of an approved helmet.
1) An outer shell designed to keep sharp or hard objects from penetrating into your head.
2) An impact, shock- absorbing dense liner that works with the outer shell to spread the force of impact throughout the helmet.
 3) Padding and cloth layer to provide comfort and fit.4) A retention system with a chin strap that must be secured to keep the helmet on your head if you crash. Getting ready to ride is a matter of being responsible about preparation.  **6. Keep your cool.** Anticipate conflicts. Learn braking and turning techniques to avoid crashes. Be extra alert at all intersections. Safe riding is a matter of attitude. Do not respond to aggressive drivers or abusive language. Road rage benefits no-one and always makes a bad situation worse. Safe riding is a matter of attitude.

**Develop a strategy to maintain a safety Margin:**

Most people involved in a crash can usually claim some measure of responsibility for what takes place. As a rider you cannot be sure other operators will see you or yield the right of way. The term “accident” implies an unforeseen event that occurs without anyone’s fault or negligence. Consider a situation where someone decides to squeeze through a yellow light turning red. Your light turns green and you pull into the intersection without checking for latecomers. It was the driver’s responsibility to stop and it was your responsibility to look before pulling out. Just because someone else is the first to start the chain of events leading to a crash, does not leave us free of responsibility.

1. **Stay within your personal skill level**
2. **Stay within your bicycle’s traction limits**
3. **Stay within the available time and space** to respond to traffic situations before having to react to an emergency.
4. **“SEE”:**

**Search** for factors and hazards that might lead to risky situations. Searching provides you with information to make decisions. Searching includes more than just what is in front of you. It includes areas behind and to both sides. Search in three categories:

* road and surface characteristics,
* traffic control markings and devices,
* other road users.

**Evaluate** how these factors might interact to create risk by playing the “What-if” game

**Execute** actions to maintain your margin of safety. Separate potential hazards before they develop into a dangerous situation. Safe riding requires a superior mental strategy to avoid the need for superior maneuvering skills. Adjust your speed and position and communicate your intentions.

**Braking:**

Both brakes should be applied at the same time when stopping. The front brakes provide 70% or more of your stopping power. It is important to develop the habit of using both brakes so your reflexes will be ready to respond quickly and properly when an emergency situation occurs. Develop your braking skills gradually. Learn to make smooth controlled stops before practicing quick stops. It is important to have a good sense of touch when using the brake levers. Too much pressure on the front may cause a forward tumble. Too much pressure on the rear can cause a skid. The best way to achieve maximum braking is to apply both brakes fully without locking either wheel. There are three components of total stopping distance:
1.) Perception distance: The distance traveled from the time danger is present till the time you see it.
2.) Reaction distance: The distance traveled from the time you see a hazard to when you actually apply the brakes.
3.) Braking distance: The distance traveled from the time the brakes are applied until you are stopped.

**Develop a “Rider Radar” system** by employing three lead times. Less than perfect conditions require increased time and space.(e.g. reduced traction, visibility, or fatigue)

1. **2-sec following time** minimum distance under ideal conditions.(pick out a fixed object and as a vehicle in front of you reaches it count, one-bicycle-one, two-bicycle-two; if the fixed object has not been reached, your following distance is at least 2-seconds.)
2. **4-sec immediate path**. (Anything within 4-sec is considered immediate because a quick response is required if something should go wrong. 4-sec provides enough time and space to swerve and/or brake for fixed hazards or for someone or something entering your path.)
3. **12-sec anticipated path**. Proper searching technique requires that you scan 12-sec ahead to provide time to prepare for a situation before it becomes immediate.

When changing lanes, check for traffic in your rearview mirror and use a head check to the side in the direction you are moving to see what may be in your blind spot area.

When passing a vehicle, keep an appropriate following distance and move to the left third of your lane. Check your mirror and perform a head check to be sure no one is attempting to pass you. When a safe gap appears, signal a lane change and accelerate around. Once past the vehicle, signal a lane change and return to a good lane position.

Riding downhill will increase your speed and your total stopping distance. Allow extra following distance. Also, your stopping distance should not exceed your sight distance.

One of the difficulties associated with riding at night is overriding your headlights. This is when your total stopping distance exceeds your sight distance.

**Potentially dangerous situations:**

* Most crashes occur on short trips (less than 5 miles long), just a few minutes after starting out. Never count on “eye contact” as a sign that a driver will yield to you.
* Remember that from ahead or behind, a bicycle’s outline is much smaller than a car. It is hard to see something that you are not looking for and most drivers are not looking for bicycles. Smaller vehicles appear farther away and seem to be traveling slower than they actually are.
* Intersections have a great potential for conflict between you and other traffic. Be especially alert at intersections with limited visibility or that have congested surroundings that might camouflage you. Driveways and alleys should also be considered as intersections. Check for traffic in all four directions before reaching any intersection.
* When preparing to stop at a traffic light or stop sign shift into a lower gear to be ready to start off again. When stopped, waiting to turn or for a light to change, check behind you occasionally for approaching vehicles and have an escape plan in mind. If drivers are not paying attention, they could be on top of you before they see you. Wait a couple of seconds before pulling out into an intersection in case someone crosses after their light changes to red. To ensure the best chance of being detected at traffic-actuated signal lights, stop where the sensors are located.
* If you have a stop sign or stop line, stop there first. Then edge forward just short of where the cross traffic lane meets your lane.
* When riding in city traffic watch for vehicles pulling away from a parked position and for pedestrians stepping into your path.
* Avoid riding in a driver’s blind spot.
* Do not let a tailgating driver distract you from SEEing ahead, use hand signals and turn into a street or parking lot to allow the tailgater to pass by.

**Negotiating curves** is fun, but requires a special skill set. When approaching a curve:

1. **Search** for information about the curve. What is its radius and slope? What is the surface composition and condition? What other traffic is involved? Is the entire curve visible? What happens beyond the curve?
2. **Evaluate** the situation. Plan an appropriate path and entry speed, maintain a good lane position while holding a steady speed, and be ready for any problems.
3. **Execute** by looking in the direction you want to go. In normal turns the rider and bicycle should lean together at the same angle. In slow, tight turns, counterbalance by leaning the bicycle only and keeping your body straight.
4. **When braking in a curve** the amount of traction is reduced. The key to stopping quickly in a curve is to get the bicycle straight up as quickly as possible so the maximum amount of traction is available for braking. As the lean angle is reduced, more braking pressure may be applied. If road and traffic conditions permit, straighten up the bicycle first and square the handlebar before the brakes are applied for a straight-line stop.
5. **Skids:** If a front-tire skid occurs, immediately release the front brake to allow the front wheel to resume rolling, and then reapply the front brake properly. Front-tire skids could result in a “low-side” fall. If a rear-tire skid occurs, the ability to turn is lost. Do not release the rear brake while the rear wheel is out of alignment with the front wheel. If the rear wheel stops skidding and resumes rolling when it is out of alignment with the direction of travel, the bicycle will immediately straighten, resulting in a loss of control. You could be thrown off in a “high-side” fall which is likely to produce serious injury. You can prevent a “high-side by intentionally keeping the rear brake locked and skidding to a stop. If a fall does occur it will be on the “low-side” with only a short distance to fall.

**Obstacles** such as potholes, speed bumps, road debris, gravel, or solid objects may be avoided by effective searching and evaluating. If an object cannot be avoided, rise off the seat and use your legs as shock absorbers.

* Slow as much as traffic permits.
* Approach at a 90 degree angle if possible.
* Grip the handlebars firmly without covering the brakes and rise slightly off the seat, keeping your knees bent.
* Shift your weight to the rear to take the weight off the front wheel as it contacts the object.
* Do not sit down until the bicycle has stabilized. Continue to SEE ahead.

**Swerving** to avoid a crash or an obstacle may be appropriate if stopping is not a potential solution. A fast moving bicycle can swerve to avoid a car-sized obstacle in less distance than it takes to stop.

* Keep the upper torso straight while the bicycle leans.
* Apply forward pressure to the appropriate handgrip. Press right-go right, press left-go left.
* Look toward the clear path you are trying to reach to avoid target fixation.
* Do not brake while swerving.

**Carrying cargo** changes some dynamics. There are three points to consider:

* **Weight:** Type of bicycle frame and your physical ability dictate the limit of how much cargo your bike can safely carry. Do not overload your frame, racks, panniers, or trailers.
* **Location:** Keep the weight low and evenly distributed from side to side. Be aware of the “Load Triangle”, the space formed by the top of your head and the two axles. Luggage racks and top trunks are convenient, but carrying weight high and to the rear of the bicycle may lighten the front wheel and cause a degree of handling instability. Do not overload handlebar bags and front panniers.
* **Security:** Be sure your cargo is secure. Use racks and luggage designed for bicycles. Loose items may be secured with web straps to keep them away from the wheels or blocking lights.

**Tire failure:** May have several causes. Check the condition of both tires before every ride. Low tire pressure can increase your chances of experiencing a flat or sidewall failure. Properly inflated tires are more resistant to punctures. Over-inflated tires may blow-out. Check tire pressure and inflate to specifications listed on the sidewall every day. If a tire failure or flat should occur, maintain a firm grip on the handlebar, but do not fight any wobble (shaking of the handlebars) or weave (slow oscillation of the rear) that can develop. Allow the bike to slow on its own as much as possible Avoid braking or downshifting until speed is low and under control. If braking is necessary, use the brake on the wheel with the good tire.

**Traffic Lights:**

1. **Obey, obey, obey**
	* Cyclists, just like motorists, must obey all traffic control devices
	* It takes longer to travel through an intersection by bike; plan to stop for yellow lights
	* Avoid cars that run red lights wait for the signal to turn green, confirm traffic has cleared.
2. **Detection**
	* Bicycles must activate a vehicle detector just like a motor vehicle
	* Detectors are embedded in the roadway; look for squares cut into the roadway
	* Detectors use magnetic forces to pick up vehicles, not weight
3. **Unresponsive signals**
	* In most states, after three minutes, you can treat a red light as a stop sign
	* Pass through a red light only as a last resort
	* Yield to other vehicles while crossing the roadway
4. **Ride on the right**
	* Always ride with the flow of traffic
	* Do not ride on the sidewalk
	* Allow yourself room to maneuver around roadway hazards
5. **Yield to traffic in busier lanes**
	* Roads with higher traffic volumes should be given right-of-way
	* Always use signals to indicate your intentions to switch lanes
	* Look behind you to indicate your desire to move and to make sure that you can
6. **Yield to traffic in destination lane**
	* Traffic in your destination lane has the right-of-way
	* Making eye contact with drivers lets them know that you see them
	* Signal and make your lane change early, before you need to
7. **Directional Positioning**
	* Position yourself in the right-most lane that goes in the direction of your destination
	* Ride in the right third of the lane
	* Avoid being overtaken in narrow-lane situations by riding in the right third of the lane
8. **Speed Positioning**
	* Position yourself relative to the speed of other traffic
	* Left-most lane is for fastest moving traffic, right-most for slower traffic
	* Yield to faster moving vehicles by staying to the right in the lane

**Traffic Principles:**

1. **Ride on the right**
	* Always ride with the flow of traffic
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2. **Yield to traffic in busier lanes**
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**How Far Right?**

1. **Laws**
	* Most bicycle laws use the same language regarding where cyclists should drive
	* Directions to ride "as far to the right as practicable" appears in most laws
	* No clear definition of practicable has been identified
2. **Safety**
	* Do not ride where you are subject to poor road conditions or constant hazards
	* Give yourself ample room to your right to maneuver in an emergency
	* Ride in the right third of the lane if there is not sufficient room for lane sharing
3. **Traffic rules**
	* Slower moving vehicles travel to the right of faster moving ones
	* Motorists are looking for other vehicles in or near the travel lanes, not against curbs
	* Follow the same rules as motorists including yielding right-of-way and signaling
4. **Wide lanes**
	* Ride just to the right of the travel lane to remain visible to other motorists
	* Allow enough room when passing parked cars to avoid a suddenly opened door
	* Always ride in a straight line; do not swerve between parked cars
5. **Hazards**
	* If a lane narrows ahead or is blocked by a bus, establish your position in traffic early
	* Avoid riding where glass and other trash accumulates on the right side of roadways
	* Grates and gutter-pans should be avoided by positioning yourself away from them

**Lane Positioning**

1. **Ride on the right**
	* Ride in the same direction as traffic; stay far enough away from curb to avoid hazards
	* Ride in the right third of the right-most lane that goes in the direction you are going
	* Take the entire lane if traveling the same speed as traffic or in a narrow lane
2. **Visibility**
	* Always ride in or near a travel lane; stay visible by riding where drivers are looking
	* Wear bright clothing at night as well as during the day
	* Do not pass on the right; motorists are not looking for other vehicles there
3. **Parked cars**
	* Ride in a straight line, not in and out of parked cars on the side of the road
	* Beware of cars merging into the roadway from a parallel parking position
	* Allow enough room when passing parked cars to avoid a suddenly opened door
4. **Take the lane**
	* If there is insufficient road width for cyclists and cars
	* If traveling the same speed as other traffic or if hazards narrow the usable width
	* Before intersections and turns to assert your position on the roadway
5. **Extra wide lanes**
	* Do not ride completely to the right; you will be more visible 3-4 feet away from traffic
	* Right turning cars and cars entering will be more likely to see you before they turn
	* Be careful of motorists passing on the right around left-turning vehicles

**Turns and Turn Lanes**

1. **Positioning for turns**
	* Before a turn: scan, signal and move into the lane that leads to your destination
	* Ride in the right third or middle of the lane, as lane width dictates
	* To traverse multiple lanes, move one at a time, scanning and signaling each move
2. **Avoiding turn lanes**
	* If your lane turns into a right turn only lane, change lanes before the intersection
	* Changing lanes too late could result in an overtaking motorist turning in front of you
	* Maintain a constant position relative to the curb or shoulder during a turn
3. **Beware of blind spots**
	* Most drivers do not always expect to see cyclists on the roadway
	* Do not ride next to another vehicle unless you are in a different lane or passing
	* If you can't see bus, truck or car mirrors, drivers can't see you
4. **Signaling**
	* Signal well before the intersection; make sure you are in proper lane position
	* Left arm out and down with palm to the rear to indicate stopping
	* Left or right arm straight out to indicate left or right turn
5. **Scan**
	* Constant identification of potential hazards in front and behind as well as to each side
	* Scanning allows you to avoid dangerous situations before they happen
	* Scan for motorists, road conditions, pedestrians, animals, traffic signals

**Lane Changing in Traffic**

1. **Plan ahead**
	* If you are familiar with the traffic patterns, be sure to get in the correct position early
	* Keep in mind the relative speed between you and other traffic; plan accordingly
	* Be aware of road conditions that would impede your progress across lanes
2. **Scan**
	* Look for traffic, pedestrians and hazards in front of you and behind
	* Identify lane markings and traffic control devices affecting next intersection
	* Note bus stops, driveways, crosswalks and other special traffic zones
3. **Signal**
	* Signal your intention to turn or change lanes if your speed is near other traffic
	* Signaling may not be necessary if overtaking traffic speeds won't allow time to see it
	* Signal only if you think that oncoming traffic can react safely
4. **Act**
	* Relative speed may require you to move quickly and decisively when it is safe to do so
	* In high speed overtaking traffic situations, cross all lanes at once when safe
	* Move after signaling in low- and same-speed traffic situations
5. **Improvise**
	* If you get caught between lanes while crossing traffic, ride the white line until clear
	* Your safety is paramount while changing lanes; if traffic is too heavy, use crosswalks
	* Ride to red light then move to left turn lane if volume and speed do not allow crossing

**How to Avoid Getting Doored**

1. **Lane positioning**
	* Allow enough room when passing parked cars to avoid a suddenly opened door
	* Never swerve between parked cars; use the outside of the next car as your guide
	* Avoid riding on the right side of any stopped car, especially if it is near the curb
2. **Speed positioning**
	* As you begin to overtake cars in urban settings, always pass them on your right
	* If you are traveling at the same speed as traffic, ride in the center of your lane
	* As traffic begins to speed up, signal and begin moving to a lane on your right
3. **Sudden stops**
	* If a car stops in front of you suddenly, stop, look for exiting passengers, then pass on left
	* Make sure that you stop safely before you release the handlebar to signal and pass
	* Maintaining control of your bicycle is the most important task
4. **Intersections**
	* Before turning, look for cars double-parked in your destination lane
	* When turning, take the lane so you don't get forced to the right of a stopped car
	* Plan your turn so that you remain at least three feet to the left of any stopped cars
5. **Bike lanes**
	* You do not have to ride within a bike lane if you are avoiding a hazard
	* Cars must not drive in bike lanes but bikes may leave bike lanes at any time
	* Stay out of the door zone, even if this means riding on the edge or outside a striped bike lane

**How to Ride in Bike Lanes**

1. **Safety considerations**
	* Bikes are not required to travel in bike lanes when preparing for turns
	* Always allow enough room when passing parked cars to avoid a suddenly opened door
	* Avoid bike lanes that you think are poorly designed or unsafe; alert your local government
2. **Intersections**
	* Avoid riding in lanes that position you on the right side of a right turn lane
	* Bike lanes should stop before an intersection to allow for bikes to make left turns
	* Always signal as you move out of a bike lane into another traffic lane
3. **Debris**
	* Report obstructions and poor maintenance to your local government
	* Avoid riding immediately adjacent to curbs where trash collects
	* If debris forces you out of the bike lane, signal your move out into traffic
4. **Parked cars**
	* Stay out of the door zone, even if this means riding on the edge or outside a striped bike lane
	* Watch for brake lights, front wheels, signals and driver movements
	* Position yourself in the field of vision of a motorist pulling out of a parking space
5. **Right turns**
	* Avoid riding in lanes that position you on the right side of a right turning motorist
	* Move out of the right turn lane if you are not turning right
	* Ride in the rightmost lane that goes in the direction that you are travelling
6. **Left turns**
	* Move out of the bike lane well in advance of the intersection; signal every move
	* Position yourself in the rightmost left-turning lane
	* Reposition yourself after executing the turn; remain clear of parked cars

**Why Commute by Bike**

1. **Fight pollution**
	* Automobiles produce toxic substances that pollute the ground, air and water
	* Burning fossil fuels creates CO2 that contributes to global warming
	* Automobiles also produce noise pollution
2. **Stay fit**
	* Bicycle commuting allows you to include your workout in your daily schedule
	* Riding a bike instead of your car sitting in traffic is less stressful
	* Staying in better shape will decrease your chances of getting sick
3. **Avoid traffic delays**
	* Off-road trails, bike lanes and wide curb lanes allow you to ride past traffic
	* Bike commuting takes less time when you account for car parking and traffic
	* Longer rides can result in less traffic and more enjoyment of your commute
4. **Save money**
	* Maintenance costs for your automobile will decrease, as will your gas bill
	* You will save money on parking (and tickets)
	* You won't have to have a membership to a gym to workout
5. **Enjoy your commute**
	* Arrive at work refreshed and full of energy; ride off stress after work
	* Commuting under your own power gives you a sense of accomplishment
	* Take the long way home and ride through a park or along a local river

**Why Support Bicycle Commuters?**

1. **Individuals**
	* Bike commuting cuts down on automobile traffic; less stress, congestion and pollution
	* Bicycles put less wear on the roadways, decreasing taxes used for road repair
	* More car parking; you can park a dozen bikes in one car parking space
2. **Businesses**
	* More parking spaces for your car-driving customers
	* A cleaner environment is a cheaper place to do business
	* Supporting bike commuters will earn you a loyal, healthy clientele
3. **Communities**
	* Fewer cars mean safer communities with lower speed limits and less congestion
	* Noise, air, water and ground pollution would be decreased
	* More walk-able and bike-able communities increase home values
4. **Governments**
	* Car accidents involve far more fatalities per incident than bicycle accidents
	* Savings can be realized from highway, emissions and environmental expenditures
	* Bicycle infrastructure is inexpensive to build and maintain
5. **Police**
	* Bikes are involved in less severe accidents and fewer accidents per mile than cars
	* Motor vehicle crashes are the leading cause of death for people aged 1 to 24
	* Bike-mounted police need bicycle-friendly infrastructure to patrol

**Rain Riding:**

1. **Cornering**
	* Make your turns slowly and consistently; no jerky movements
	* Keep your weight on the outside pedal in the 6 o'clock position
	* If you need to brake in a turn, apply the brakes slowly
2. **Braking**
	* Water on the rims will lubricate your brake system making it hard to stop
	* Apply the brakes lightly to clean off the rims before you need to stop
	* Reduce speed to create a margin of safety. Allow a greater distance for stopping
3. **Hazards**
	* Bridges, metal grates, crack sealant, tar strips, and painted lines and crosswalks can be very slick. Most Painted surfaces are slick when wet.
	* Avoid puddles as they may conceal deep potholes or road debris.
	* During the first few minutes of rain, oil seeps from the roadway making it very slick. Use the tire tracks left by other vehicles.
	* Ice/snow patches, mud, moss, and algae can be very slippery. Keep the bicycle perpendicular to the surface.
	* Bridge gratings may make the bicycle feel “loose” and to wander. Keep steering relaxed and avoid abrupt maneuvers.
4. **Protect yourself**
	* Visibility can be limited during a storm; wear bright clothing
	* Keep your eyes free of debris with yellow or clear lenses in your glasses
	* Wear waterproof clothing that is breathable with layers underneath. Protective gear can help you avoid being distracted by adverse environmental elements.
5. **Protect your bike**
	* Front and rear fenders will keep you and your bike dry
	* Lube your chain before and/or after a wet ride to replace the lube that washed off
	* Drip chain lube down into your brake and shifter cables to avoid rust

**Rain Riding Gear**

1. **Bike**
	* Keep the water from your tires out of your face with full-length fenders
	* A rear rack can shield you from water from your back tire
	* Fenders are available in quick-release versions for easy on and off
2. **Jacket**
	* A waterproof and breathable jacket with hood is the best for rain riding
	* Underarm pit zippers allow you to ventilate your body without letting water in
	* Hoods should not obstruct vision.
	* Helmet covers work well in several weather conditions.
	* Cycling jackets provide a longer back panel and shield tire spray.
3. **Pants**
	* Waterproof and breathable material is the best for rain pants
	* A Velcro/zippered cuff will help you get them on and off over shoes
	* Use a rubber band or ankle strap to keep rain pants out of chain gears.
	* Waterproof and neoprene socks are available at most outdoor stores
	* Booties will cover shoes and prevent water from entering
	* Sandwich bags inside of shoes, over socks can help keep your feet dry
4. **Hands**
	* Waterproof and neoprene gloves are available from most manufacturers
	* Gloves should provide wind protection and access to shifters

**Proper Lock-Up Tips for Bicycles**

1. Always lock your bike at home, even in the garage, apartment building or college dorm.
2. Lock to a fixed, immovable object like a railing or permanent bike rack. Be careful not to lock to items that can be easily cut, broken or removed. Be careful that your bike cannot be lifted over the top of the object to which it is locked.
3. Lock in a visible and well-lit area.
4. Lock in a location where there are other bikes. The chances are better that there will be a bike with a less secure lock than yours. Thieves will usually go for the easiest target.
5. When using a U-lock, position your bike frame and wheels so that you fill or take up as much of the open space within the U-portion of the lock as possible. The tighter the lock up, the harder it is for a thief to use tools to attack your lock.
6. Always position a U-lock so that the keyway is facing down towards the ground. Don't position the lock close to the ground. This makes it more difficult for a thief to attack it.
7. Always secure your components and accessories, especially quick-release components, with a secondary cable lock. Or, take them with you.
8. Don't lock your bike with a wheel locked to the frame. It can be easily lifted and carried away.
9. Don't lock in the same location all the time. A thief may notice the pattern and target your bike.
10. Don't lock to anything posted illegal. Check with area law enforcement agencies for local bike parking regulations.
11. Always check your lock before leaving your bike to be sure you have secured it properly.
12. For the greatest theft deterrence, use two locks such as a U-lock and a locking cable. The longer it takes a thief to get through your bike security, the less likely your bike will be stolen.

**How to Commute by Bicycle**

1. **Sharing the road**
	* Bicycles are vehicles and should act and be treated as such on the roadways
	* Laws that apply to motorists apply to cyclists as well; ride on the right, with traffic
	* Ride in the right-most lane that goes in the direction that you are travelling
2. **Signals and signs**
	* Obey all stop signs, traffic lights and lane markings
	* Look before you change lanes or signal a turn; indicate your intention, then act
	* Identify hazards and adjust your position on the roadway accordingly
3. **Safety**
	* If the lane is too narrow or you are going the same speed as traffic, take the lane
	* Be visible and predictable at all times; wear bright clothing and signal turns
	* Always wear a helmet to protect your head in the event of a crash
4. **Route choice**
	* Consider distance, traffic volume, road width and condition, and terrain
	* Some routes may be a bit longer but much more pleasant; carry a map for detours
	* Allow extra time for a new route; try riding different routes on the weekend
5. **Bike parking**
	* Try to find an indoor parking area in your office or building in which to keep your bike
	* Lock your bike to an immovable object in a highly visible area out of the elements
	* Ask your employer or building owner to provide safe, covered parking
6. **Clothing optional**
	* If you have a short commute, ride in your work clothes at a relaxed pace
	* Cycling specific clothing is an option for longer, more strenuous rides
	* Use waterproof and breathable fabrics to stay comfortable and dry
7. **Showering**
	* Showering should not be necessary in the morning when it is cool outside
	* Many workplaces have showers located in the building; inquire about access
	* Some health clubs offer shower-only memberships for a few dollars a month
8. **The bike**
	* Any bike that you feel comfortable on will work; make sure it is in good working order
	* Consider weather protection such as fenders and a rack for carrying capacity
	* Invest in a rechargeable headlight; helmet and handlebar mounts are available
9. **Maintenance**
	* Have your bike checked over by your local bike shop
	* Learn how to repair a flat, fix a chain and inspect your brake pads for wear
	* Replace tires when they are worn out; use tire liners if you experience excessive flats
10. **Weather**
	* Heat, cold and precipitation require special preparation for you and your bike
	* Fenders and rain gear keep out the rain; use layers and wind proofing for cold days
	* Some cycling-specific gear can provide relief on hot days; it keeps you cool and dry

**Overcoming Bike Commuting Excuses**

1. **I'm out of shape**
	* Ride at an easy pace; In a few months you will be in great shape
	* Ride your route on a weekend to find the easiest way to work
	* You will improve your fitness level when you become a regular bike commuter
2. **It takes too long**
	* The average commuter travels at 10 mph; the more you ride, the faster you will get
	* Trips of less than three miles will be quicker by bike
	* Trips of five to seven miles in urban areas may take the same time or less as by car
3. **It's too far**
	* Try riding to work and taking mass transit home, then alternating the next day
	* Combine riding and mass transit to shorten your commute
	* Ride to a coworker's house and carpool to work
4. **No bike parking**
	* Look around for a storage area in your building or office
	* Stash your bike in a covered, secure place such as a closet or even your office
	* Formally request that your employer provide bike parking or lock it up outside
5. **My bike is beat up**
	* Tell a reputable bike shop that you are commuting and have them tune up your bike
	* If you can't maintain your bike yourself, identify bike shops near your route
	* Make sure that your bike is reliable and in good working order before you start riding
6. **No showers**
	* Most commuters don't shower at work; ride at an easy pace to stay cool and dry
	* Ride home at a fast pace if you want a workout; shower when you get there
	* Health clubs offer showers; get a discounted membership for showers only
7. **I have to dress up**
	* Keep multiple sets of clothing at work; rotate them on days you drive
	* Have work clothes cleaned at nearby laundromats or dry cleaners
	* Pack clothes with you and change at work; try rolling clothes instead of folding
8. **It's raining**
	* Fenders for your bike and raingear for your body will keep you dry
	* If you are at work, take transit or carpool to get home; ride home the next day
	* Take transit or drive if you don't have the gear to ride comfortably in the rain
9. **The roads aren't safe**
	* Obey traffic signs, ride on the right, signal turns, stop at lights, wear bright clothing
	* You are at no greater risk than driving a car
	* Wear a helmet every time you ride
10. **I have to run errands**
	* Bolt a rack to the back of your bike to add carrying capacity
	* Make sure that you have a lock to secure your bike while you are in a building
	* Allow yourself extra time to get to scheduled appointments and find parking

**Commuting and Public Health**

1. **American epidemic**
	* In 1991, 4 states reported obesity rates of over 15%; in 1997, it rose to 37 states
	* Over 50% of the adult US population is overweight; 25% of the US is obese
	* The result of this condition is over $22 billion in health care and living costs
2. **Risks**
	* 29% of Americans are sedentary which causes an increase in disease and death
	* 80% do not get the recommended 30 minutes of moderate activity 5 days a week
	* Inactivity is a factor in 10% of total deaths and 25% of chronic disease related deaths
3. **Recommendations**
	* Bike commuting is moderate physical activity 5 times a week
	* Recreational bike riding is a safe, low-impact, aerobic activity for Americans of all ages
	* 25% of all trips are within a mile of home; ride your bike for your health
4. **Communities**
	* Residents of pre-1960's communities are more likely to walk, bike and use transit
	* Typical infrastructure in American cities is designed for efficient auto use
	* Americans spend 75 minutes a day in their car; 89% of all trips are by car
5. **Challenge**
	* 60% of Americans want bikeways between home and stores
	* 55% want more bike paths and improved road conditions for cycling
	* Sustainable transport is the future; support cycling as transportation and recreation

**Commuter Gear Basics**

1. **Picking a bike**
	* You can commute on any bike as long as it is good working order
	* Road bikes, mountain bikes, hybrids, cross bikes, touring bikes all work great
	* The bike should reflect your riding style; relax on a 3 speed or hammer a road bike
2. **Carrying capacity**
	* A rear rack and panniers, a basket on the front or a backpack all work well
	* Panniers are most expensive and are usually waterproof; use them if you have them
	* Baskets don't carry much and backpacks can make you sweat through your clothing
3. **Fenders**
	* Full fenders are recommended; use quick release or standard bolt-on style
	* The roadways can be wet from other things besides rain
	* Fenders also keep dirt and mud off of your clothes
4. **Lights**
	* Headlights are mandatory at night; white in front with a rear reflector in back
	* A red light on the rear of the bike increases visibility at night
	* Check batteries and replace them as soon as the light begins to dim
5. **Safety**
	* Always wear a helmet while riding your bike no matter what
	* A helmet is your last line of defense against injury in an accident
	* Prevent injury by knowing the rules of the road and acting predictably
	* Indiana law requires bicycles to have an audible device effective to 500 feet.
6. **Tools**
	* Bring only tools that you know how to use; a pump is a necessity
	* Prepare for breakdowns with regular inspections of your bike
	* Carry a multi-tool with allen wrenches, screwdriver, chain tool; know how to use them
7. **Spare parts**
	* Carry a spare tube and patch kit at all times; keep another spare at work
	* Know the condition of your bike and its parts by inspecting it regularly
	* Keep a few spare parts that need regular replacement at work
8. **Lock**
	* Use a high-security U-lock; don't wait until your bike is stolen to invest in a good lock
	* Lock your bike to an immovable object in a highly visible area
	* Secure both wheels and other components if they can be easily removed
9. **Flat prevention**
	* Tire liners and flat resistant tires go a long way to help decrease flat tire occurrence
	* Replace tires when they are worn out; check pressure with a gauge
	* Familiarize yourself with how much air your tires lose each week
10. **Reflection**
	* Make sure that motorists, cyclists and pedestrians can see you at night
	* Wear bright or reflective clothing; apply reflective tape to helmet and bike
	* Ankle straps keep pant legs out of the chain and usually have a reflective strip

**Clothing Materials**

1. **Lycra/spandex**
	* Shorts and tights are usually made of this combination of materials
	* Stretches with your body and supports muscle groups
	* Smooth material prevents chafing from saddle
2. **Coolmax**
	* Wicks moisture away from skin to surface where it evaporates
	* Great for warm riding or as a first layer for cold days; light and compressible
	* Usually used in jerseys, headbands and hats
3. **Wool**
	* Merino wool is soft but expensive; natural anti-bacterial properties
	* Wool is great for socks, jerseys, leg and arm warmers, shorts and tights
	* Wool keeps you warm even when wet; tends to get heavy when full of moisture
4. **Gore-tex**
	* Waterproof, windproof and breathable material used in a lot of raingear
	* Socks, hats, jackets, rain pants, shoes; almost everything can be made with it
	* Expensive; ventilation and layering are still important in cold, wet conditions
5. **Nylon**
	* Used in shell of most baggy-style shorts; durable, lightweight and dries quickly
	* Can be soft and flexible or rugged and durable; used for panniers and seat bags
	* Used in shoes for ventilation and hydration packs for durability; many uses

**Carrying Cargo**

1. **Rear rack**
	* Your first and primary rack should load cargo on the rear of your bike
	* Carry the majority of your weight in panniers and trunk packs here
	* Attach reflectors and lights to rack so bags don't obscure them
2. **Front rack**
	* Your secondary rack that should be used only when rear rack is also loaded
	* Low rider or standard racks are available; use what suits your preference and pannier
	* More weight in the front panniers will make your bike less stable
3. **Panniers**
	* All different sizes and features to fit any budget and use
	* Some are waterproof but you can always buy a waterproof cover
	* Make sure that your ankles don't hit panniers when attached to your bike
4. **Packing panniers**
	* Load specific-use items in same pannier; one for food, clothing, tools, etc.
	* Pack high-use items, such as raingear and socks, close to the top of each pannier
	* Avoid packing pointed items directly against pannier that could tear them
5. **Trailer**
	* Trailers allow you the quickest easy-on, easy-off carrying system
	* Remember to carry trailer-specific tubes, tools and repair parts
	* Trailers have less overall cargo capacity than racks and panniers
6. **Packing your Trailer**
	* Use a trailer-specific bag with sectioned compartments that will aid organizing
	* Rain gear and other quick-need items can be lashed to the top of the bag
	* In waterproof bags, pack heavy items towards the front of the trailer
7. **Rain**
	* Avoid wet gear by packing things in plastic bags inside panniers
	* Every stitch hole offers water a possible entrance into your panniers and bags
	* Rain covers minimize the weight that can be added by wet packs

**Bike Security**

1. **Visibility**
	* Lock your bike in a highly visible area close to pedestrian traffic
	* Streetlights provide additional security at night
	* Avoid locking your bike behind large objects that obscure visibility
2. **Securing you bike**
	* Lock your frame, wheels, seat-post and anything else easily removed
	* Seat/seat-post locks are one-time installations and are available at your local bike shop
	* Lock your bike to a large metal immovable object
3. **U-locks**
	* Rigid and U shaped with a cylindrical lock core that is impossible to pick
	* Made of heavy tempered steel that is very hard to break
	* Most secure, most expensive, hardest to use locks; considered the standard in cities
4. **Cable locks**
	* Great for short time periods where your bike is highly visible and a low chance of theft
	* Manufacturers are combining security of U locks with ease of use of cable locks
	* Smaller, lighter, less expensive, easier to use but less secure than a U lock
5. **Carrying a lock**
	* Most locks come with a mount for your bike to keep the lock out of the way
	* Backpacks, panniers or any other bag is a quick, easy place to stow a lock
	* Be sure that the lock does not interfere with safe operation of the bike
6. **Time factor**
	* Short periods away from your bike require a less secure lock; try a cable lock
	* The longer you will be away from your bike, the more secure it should be
	* Use the combination of a U lock and a cable lock for overnight parking
7. **Extras**
	* Register your bike with local and national registration service
	* Register your key numbers with the company that made your lock
	* Mark your bike in an identifiable way to aid in its recovery if stolen

**Bicycle Parking and Storage**

1. **Long term**
	* Daily/nightly parking at transit stations and large residential buildings
	* Storage space and facilities should be close by
	* Security is crucial; lockers, bike rooms and cages provide the best protection
2. **Short term**
	* Simple inverted 'U' or continuous curve racks are versatile and easily manufactured
	* Provide enough space for cyclists to maneuver bike into and around racks
	* Racks can be custom designed to double as urban landscape artwork
3. **Visibility**
	* Bike parking should be obvious and near the main entrance of the building
	* From the street, the bike parking area should be in plain view
	* High visibility discourages theft and vandalism
4. **Access**
	* Convenient to street and building entrances; easy to find on ground level of building
	* Separated from normal pedestrian and motorist traffic
	* Avoid stairways between the street and bike parking
5. **Security**
	* Surveillance is essential to reduce theft and vandalism
	* Bike parking should be within site of pedestrian traffic or office windows
	* Avoid hiding bike parking by placing it in low traffic alleys or parking areas
6. **Lighting**
	* Well-lit areas deter theft and discourage vandalism
	* Personal security is an issue for bike commuters as well as motorists
	* Prevent accidents by highlighting bike parking with a floodlight
7. **Weather protection**
	* Whenever possible, bike parking should be protected from precipitation and wind
	* Use existing overhangs or covered walkways; parking garages may provide protection
	* Construction of a freestanding shelter adjacent to the building may be necessary
8. **Avoid pedestrian conflict**
	* Bike racks should not block normal pedestrian traffic
	* Cyclists should not have to ride on heavily traveled sidewalks to access bike parking
	* Place racks near street and building access
9. **Avoid motorist conflict**
	* Bicycle and motorist parking should be separated by a barrier
	* Physical barriers protect racks as well as bikes from damage
	* Allow maneuvering room for bikes between barriers and bike racks
10. **Promote bike parking**
	* Paint bike racks bright colors so pedestrians, motorists and cyclists can see them
	* Use signs to direct cyclists toward parking; paint a bicycle logo on the rack or ground
	* Use marketing, advertising and informational materials to publicize availability

### Ten Commandments of Bicycling

**I**. Wear a helmet for every ride and use lights at night

**II.** Conduct an ABC Quick Check before every ride should be as routine and automatic as checking the weather forecast.

**III.** Obey traffic laws: ride on the right, slowest traffic farthest to right

**IV.** Ride predictably and be visible at all times

**V.** At intersections, ride in the right-most lane that goes in your direction

**VI.** Scan for traffic and signal lane changes and turns

**VII.** Be prepared for mechanical emergencies with tools and know-how

**VIII.** Control your bike by practicing bike handling skills

**IX.** Drink before you are thirsty and eat before you are hungry

**X.** Have fun

**ABC Quick Check**

1. **A is for air**
	* Inflate tires to rated pressure as listed on the sidewall of the tire
	* Use a pressure gauge to insure proper pressure
	* Check for damage to tire tread and sidewall; replace if damaged
2. **B is for brakes**
	* Inspect pads for wear; replace is there is less than ¼" of pad left
	* Check pad adjustment; make sure they do not rub tire or dive into spokes
	* Check brake level travel; at least 1" between bar and lever when applied
3. **C is for cranks, chain and cassette**
	* Make sure that your crank bolts are tight; lube the threads only, nothing else
	* Check your chain for wear; 12 links should measure no more than 12 1/8 inches
	* If your chain skips on your cassette, you might need a new one or just an adjustment
4. **Quick is for quick releases**
	* Hubs need to be tight in the frame; your quick release should engage at 90°
	* Your hub quick release should point back to insure that nothing catches on it
	* Inspect brake quick releases to insure that they have been re-engaged
5. **Check is for check it over**
	* Take a quick ride to check if derailleur and brakes are working properly
	* Inspect the bike for loose or broken parts; tighten, replace or fix them
	* Pay extra attention to your bike during the first few miles of the ride

**Bicycle Clothing Basics**

1. **Always wear a properly fitting helmet**
	* Make sure that the helmet fits on top of the head, not tipped back
	* Always wear a helmet while riding a bike, no matter how short the trip
	* After a crash or impact on your helmet, replace it immediately

1. **Shorts**
	* Bike shorts include a pad to increase comfort while in the saddle
	* Tight, close fit keeps fabrics from rubbing your skin and causing irritation
	* Bike shorts should be worn alone or under another pair of lightweight shorts
2. **Jerseys**
	* Technical fabric of jerseys pulls moisture off of your skin to keep you dry
	* Jerseys do not absorb moisture; they do not get heavy with perspiration
	* On cold days, cotton will absorb water and hold it next to your skin, chilling you
3. **Shoes**
	* Stiff soles of cycling shoes allow better power transmission to pedals
	* Mesh vents allow air to circulate around feet keeping them dry
	* Shoes are usually designed to accept cleats for clipless pedals
4. **Glasses**
	* Protect your eyes from wind, dirt, debris and the sun while riding
	* Your front wheel or someone else's rear wheel can shoot glass or dirt at your face
	* Keep perspiration out of your glasses with a thin headband around your forehead
5. **Gloves**
	* Provide padding to help increase comfort and relieve numbness while riding
	* Protect your hands in the event of a fall with cycling specific gloves
	* Experienced cyclists can clean glass and debris off of tires with gloves while riding
6. **Tights**
	* Keep your legs warm and out of the wind with full-length tights when it's cold
	* Muscles function better when they are warm and protected from the elements
	* Full-length leg warmers which can be removed during a ride are also a good idea

**Bike Comfort**

1. **Frame size**
	* Frame size is the most important component of comfort; it cannot be changed
	* You should have 1" to 2" of stand-over on road bikes; 3" to 4" on mountain/hybrid
	* Your local bike shop will be able to help with frame fit determination
2. **Saddle Height**
	* While seated, you should have a slight bend in your knee with your feet on the pedals
	* Wear your cycling shoes to insure proper seat height
	* Beginners may want their seat a bit lower for comfort and security
3. **Seat Angle**
	* From the side of the saddle, the nose and back of the saddle should be horizontal
	* The middle of the saddle should create a dip from front to back
	* The saddle should be tilted no more than five degrees up or down from level
4. **Handlebars**
	* Handlebar setup is a personal preference; higher for comfort, lower for performance
	* Drop bars: lowest flat part of bars should be horizontal
	* Mountain: bend should sweep horizontally
5. **Saddle Design**
	* Saddles come in gender specific as well as comfort and performance models
	* If you hurt after you and your bike shop adjust it a few times, try a new one
	* Explore your choices; your saddle should not hurt you or cause numbness

**Bike Education and Helmets**

1. **Bicycle driver's education**
	* Education is essential for the proper operation of a bicycle on roadways
	* Bicyclists are drivers of vehicles and the law treats them as such
	* A majority of bicycle-related deaths are caused by mistakes made by the operator
2. **Motorist driver's education**
	* States require driver's education before they will license you drive a motor vehicle
	* Motorists do not learn how to properly deal with bicycles on the roadway
	* Commercial drivers are not trained to understand cyclists rights
3. **Helmets**
	* Many states require riders under 16 to wear helmets while on a bike
	* Helmets decrease severity of head injuries in bike crashes by 85%
	* Education encourages safe riding
4. **Why education?**
	* Cyclists who have received education are less likely to be involved in a crash
	* Helmets do not decrease crash frequency, only severity
	* Education decreases crash frequency and severity
5. **Mandatory helmet laws**
	* Educate motorists about bicyclists' rights
	* Supporters point to deaths as the only measure of bicycle safety
	* Crash avoidance will decrease injuries and fatalities more than just wearing a helmet

**Bike Selection**

1. **Comfort**
	* Mountain and hybrid bikes usually have the most upright riding position
	* Road bikes tend to have a lower riding position for aerodynamics
	* Wider mountain and hybrid tires provide a smoother ride than skinny tires
2. **Distance**
	* Skinny, high-pressure road tires are good for long distance riding
	* Road style mountain bike tires are more comfortable but might slow you down
	* Touring bikes offer a more comfortable, wider tire and upright riding position
3. **Touring**
	* On-road touring bikes have low gears and sturdy frame construction to carry gear
	* Racks can be fitted to any mountain bike, full suspension included
	* Any bike can be used for touring with the addition of an easy-to-attach trailer
4. **Off-road**
	* For off-road and trail riding, suspension and fat tires with large knobs for traction
	* Full suspension bikes allow longer rides with less fatigue for a small weight penalty
	* Hybrids and mountain bikes work on dirt and gravel roads

**Efficiency on the Bike**

1. **Use lower gears**
	* Most beginning cyclists push too big a gear; down shift and spin a smaller gear
	* Low cadence will cause you to fatigue faster and might cause knee pain
	* Try to spin about 90 rpms; you'll have more energy and get a better workout
2. **No bull**
	* When stopped, don't push off the ground to get started
	* Leave one pedal in the two o'clock position; push down when you are ready to go
	* You will have enough momentum to balance and put your other foot on the pedal
3. **Relax**
	* You should be comfortable while you ride
	* Relax while you ride; it takes energy to grip the handlebar in fear
	* Change hand positions often, slightly bend your elbows, stretch your neck while riding
4. **Don't rock the boat**
	* Make sure that your saddle height is adjusted properly
	* Too high and your hips rock; too low causes knee pain
	* You should have a slight bend in your knee at the bottom of the pedal stroke
5. **Skip the soft shoes**
	* Soft-soled shoes absorb pedaling energy and slow you down
	* Stiff-soled cycling shoes help you transfer more energy to forward motion
	* Toe clips and clipless pedals attach your foot to the pedal which increases efficiency
6. **Red light, green light**
	* Restarting from a stop uses more energy than a slowing and not stopping
	* Time it so that you hit the intersection on green so you don't have to stop
	* Make sure that you are aware of how your actions affect other vehicles around you
7. **Avoid the wall**
	* Listen to your body while you ride to avoid hitting the wall of exhaustion
	* Eat before you are hungry and drink before you are thirsty to avoid fatigue
	* If you experience a lightheaded feeling, get off the bike and get some fluids

**Helmet Fit**

1. **Wear a helmet**
	* A helmet is your last line of defense in an accident; never ride without one
	* Helmets can reduce serious head injuries by 85% in a crash
	* A helmet will not protect your head if it is not properly fit
2. **Helmet Fit**
	* Make sure that the helmet fits on top of the head, not tipped back
	* Always wear a helmet while riding a bike, no matter how short the trip
	* After a crash or any impact that affects your helmet, replace it immediately
3. **Shell and pads**
	* Find the smallest helmet shell size that fits over your head
	* Helmet pads should not be used to make a helmet that is too big fit your head
	* Leave about two-fingers width between your eyebrows and the front of the helmet
4. **Straps**
	* The straps should be joined just under each ear at the jawbone
	* The buckle should be snug with your mouth completely open
	* Periodically check your strap adjustment; improper fit can render helmet useless
5. **Ventilation**
	* In general, the more vents the better; improper ventilation can cause overheating
	* Helmets with good ventilation can actually be cooler than riding with no helmet at all
	* More vents usually mean a higher priced helmet; buy one that you are proud to wear
6. **Colors**
	* Helmets come in all different colors in different models; buy a highly visible color
	* Shell color does not affect the temperature of the helmet against your head
	* Pick a color that encourages you or your kids to wear it

**Sharing the Path**

1. **Courtesy**
	* Respect other trail users; joggers, walkers, bladers, wheelchairs all have trail rights
	* Respect slower cyclists; yield to slower users
	* Obey speed limits; they are posted for your safety
2. **Announce when passing**
	* Use a bell, horn or voice to indicate your intention to pass
	* Warn other well in advance so you do not startle them
	* Clearly announce "On your left" when passing
3. **Yield when entering and crossing**
	* Yield to traffic at places where the trail crosses the road
	* Yield to other users at trail intersections
	* Slow down before intersections and when entering the trail from the road
4. **Keep right**
	* Stay as close to the right as possible, except when passing
	* Give yourself enough room to maneuver around any hazards
	* Ride single file to avoid possible collisions with other trail users
5. **Pass on left**
	* Scan ahead and behind before announcing your intention to pass another user
	* Pull out only when you are sure the lane is clear
	* Allow plenty of room, about two bike lengths, before moving back to the right
6. **Be predictable**
	* Travel in a straight line unless you are avoiding hazards or passing
	* Indicate your intention to turn or pass
	* Warn other users of your intentions
7. **Use lights at night**
	* Most trail users will not have lights at night; use a white front and red rear light
	* Watch for walkers as you will overtake them the fastest
	* Reflective clothing does not help in the absence of light
8. **Do not block the trail**
	* For group rides, use no more than half the trail; don't hog the trail
	* During heavy use periods (holidays and weekends) stay single file
	* Stop and regroup completely off of the trail
9. **Clean up litter**
	* Pack out more than you pack in
	* Encourage others to respect the path
	* Place all litter in its proper receptacle
10. **Limitations for transportation**
	* Most paths were not designed for high-speed, high volume traffic
	* Use paths keeping in mind their recreational nature
	* It might be faster to use roads and avoid the traffic on the paths during heavy use

**Shifting and Gears**

1. **Front derailleur**
	* Left shifter controls the front derailleur and which chainring your chain is on
	* Used less frequently than rear derailleur
	* Shifting requires more attention than the rear derailleur but is done less frequently
2. **Rear derailleur**
	* Right shifter controls the rear derailleur; this is the fine tuning of the gear range
	* Used most frequently to account for minor changes in terrain
	* Two or three shifts down is equal to one shift down on the front derailleur
3. **Chain rings up front**
	* Bikes come with two or three chainrings; three is for mountain biking and touring
	* These are low, medium and high range or low and high for road bikes with two
	* Small ring is low gear for climbs, middle ring for flats, big ring for descents
4. **Cassette in the rear**
	* The smaller the cog on the cassette, the harder the gear is to push
	* Most bikes have 8, 9, or 10 cogs; rear derailleur moves the chain from one to another
	* Many front and rear gear combinations overlap
5. **Pedaling**
	* Pedal at about 90 rpms both climbing or descending; it's faster than you think
	* Shift into an easier gear before you need it; before a climb instead of during one
	* You should be using the same pedal force and cadence to climb as you do to descend

**Buying Your Child a Bike**

1. **Sizing**
	* Your child should be able to straddle the top tube with both feet on the ground
	* Adjust the reach of the handlebars so the child is comfortable and sitting upright
	* Bikes should not be 'grown into'; buy a bike that safely fits your child
2. **Hand vs. pedal brakes**
	* Pedal brakes should be the child's first brakes; teach them to stop at a fixed point
	* Small children may not be able to use hand brakes due to lack of strength and reach
	* Use lever 'reach adjusters' to bring brake levers closer for smaller hands
3. **Training wheels**
	* Start with both training wheels on the ground; gradually move them up every week
	* Children should use training wheels to learn to balance
	* If a child is unwilling to take them off, raise them so they don't touch the ground
4. **BMX**
	* Dirt jumping requires safety gear including full-face helmet, shin pads and gloves
	* Beginners should also consider elbow pads, knee pads and wrist guards
	* Not all bikes are strong enough to jump; check with your local bike shop
5. **Freestyle**
	* Flatland trick riding requires safety gear; helmet, glove and shin pads are important
	* Freestyle bikes have 'pegs' on front and rear axles that allow standing
	* Never allow your child to transport other children on their bike
6. **Mountain**
	* Children should wear a helmet and gloves when mountain biking
	* Ride or walk with your child so you know the trails that they will be riding
	* Set specific boundaries for where your child can and cannot ride
7. **Growing into a bike**
	* Don't buy a bike that does not fit your child; too small later is better than too big now
	* Quality bikes will be easier to resell; they last longer as hand-me-downs also
	* Make sure that your child's bike fits them by checking with your local bike shop

**Kids and Bikes**

1. **When**
	* Once a child can hold their head up and fit a helmet, they can be a passenger
	* Until about age five, kids should ride in a child seat, or better yet, a trailer
	* Kids need basic motor skills to operate a bike
2. **Traffic**
	* Explain to kids how traffic works; they have only been passengers
	* Teach them about yielding, passing, predicting and traffic law
	* Bicycle riders have to obey the same rules as cars and buses
3. **Helmets**
	* Let them pick out their helmet and they will want to wear it; wear yours also
	* Make sure that the helmet fits the child properly; level on the head and snug
	* Replace the helmet after a crash
4. **Training wheels**
	* Training wheels help the child develop a sense of balance
	* Start with the training wheels solidly on the ground; they will hold the bike upright
	* Gradually raise the training wheels; remove them when they start to get in the way
5. **Balance**
	* Practice balancing in an open field or vacant parking lot
	* Have the child practice riding in circles as well as in a straight line
	* Show them how to use the brakes; get them to skid the rear wheel
6. **Starting and stopping**
	* Children should learn to stop before entering the roadway
	* Look left, then right, then left again before proceeding
	* Driveways, sidewalks and crosswalks are potential danger zones
7. **Riding straight**
	* Use a painted line in a parking lot
	* Straight-line riding will allow drivers to predict what the child will do
	* Predictability is important in any traffic situation; kids don't know this
8. **Scanning and signaling**
	* Have the child ride straight and look back at you without swerving
	* Children must scan for traffic in front of them as well as behind before signaling
	* Teach them how to signal right, left and stop and when to do it
9. **Neighborhood ride**
	* Plan a ride with your child around you neighborhood and discuss possible dangers
	* Allow your child to lead
	* Include them in the planning of the ride
10. **Transportation choices**
	* Bikes are vehicles; this is their introduction to driver's training
	* Plan a route with your child to get them to a friend's house or school by bike
	* At about 10, kids are ready for longer trips; make sure they make safe decisions

**Reacting to Dogs**

* **Priorities** (You are just riding and he is just being a dog. Remember that most dogs bark and chase for fun with no intention of attacking)

1.) Avoid striking the dog, you might fall and you might injure the dog.

2.) Stay in control of your bike. Do not panic, remain calm.

3.) Do not kick at the dog.

* **Non-aggressive approach:**

 Once an approaching dog is spotted, a good response is to slow, including a downshift, then accelerating past the point of interception. Continue pedaling and ride past the dog; he will probably stop at the end of his territory.
 b.) If the dog is faster than you, stop and place your bike between you and the dog

* **Aggressive approach:** a.)Yelling at the dog may startle the dog enough to get him to disengage
b.) Spray water from your water bottle into his face
c.) Pepper spray should only be used in extreme cases
* **Larger animals** such as deer or elk present a different problem. These animals are unpredictable. Allow more time and space in areas where they are likely to be encountered. If they are on the roadway, pass them at a walking speed.
	+ - **Small animals** are also unpredictable. Even a squirrel can bring you down if you strike them a glancing blow with the front wheel. Allow plenty of time and space for them to clear your path.

**Crash Types**

**Motorist at Fault**

|  |  |
| --- | --- |
| **Crash Type** | **Frequency** |
| Motorist turn/merge into cyclist's path | 34%  |
| Motorist driving out from a stop sign | 16% |
| Motorist exiting driveway/alley | 10% |

**Adult Cyclist at Fault**

|  |  |
| --- | --- |
| **Crash Type** | **Frequency** |
| Cyclist turn/merge into motorist path | 6% |
| Cyclist overtaking motorist | 6% |
| Cyclist non-compliant at traffic signal | 5% |

**Children at fault**

|  |  |  |
| --- | --- | --- |
| **Crash Type** | **Nonfatal** | **Fatal** |
| Cyclist stop sign violation | 17% | 12% |
| Cyclist unexpected turn/swerve | 14% | 16% |
| Cyclist ride into traffic | 14% | 15% |
| Motorist overtaking | 10% | 38% |

**Road Biking Lingo**

|  |  |
| --- | --- |
| **Attack** | Accelerating away from the pack of other riders in order to break away off the front.  |
| **Bonk** | Running out of energy during a ride; avoid this by eating and drinking often  |
| **Cadence** | Your leg speed or crank speed, measured in revolutions per minute (rpms)  |
| **Century** | A one day ride of 100 miles  |
| **Criterium** | Also known as a 'crit,' this is a multi-lap race on a course less than 2 miles around  |
| **Draft**  | Following closely behind another rider to reduce wind resistance and save energy  |
| **Dropped** | Getting left behind by a group of riders Coming off the back. |
| **Drops** | The lowest and most aerodynamic position on road bike handlebars  |
| **Replacement aids** | Any performance enhancing substance such as gels or power drinks  |
| **Hoods** | The soft rubber covers over brake lever mounts  |
| **Metric Century** | A one day 100 kilometer or 62 mile ride   |
| **Off the Back** | Riders who have not been able to keep up with the lead group, loosing contact.  |
| **Road Rash** | Any skin abrasion resulting from a brief or extended slide across pavement  |
| **SAG Wagon**  | Vehicle used to transport cyclists who have difficulties or gear during a ride (Support and Gear) |
| **Riding a Wheel** | Drafting someone while waiting for them to make a move so you can follow  |
| **Spin**  | Concentrating on smoothly pedaling at a high cadence  |
| **Sprint** | Riding as fast and hard as possible to make it to a fixed point |

**Anticipating Motorist Errors**

1. **Left turn**
	* Motorists often misjudge the speed of oncoming cyclists and turn into them
	* Make eye contact when approaching a motorist positioned for a left turn ahead of you
	* Maintain a straight line unless you need to execute a defensive maneuver.
2. **Right turn**
	* Right turning motorists may turn just after overtaking a cyclist; avoid blind spots
	* Be aware of overtaking motorists in high traffic situations with constant scanning
	* Motorists in front of you may change speed and turn right without signaling.
3. **Crossing**
	* Motorists may not recognize a cyclist's right to the road and pull out in front of them
	* Do not ride so far to the right that you are not in the motorist's line of vision.
	* Use audible signals to get a motorist's attention before they proceed.
4. **Prevention**
	* Always wear bright clothing to make yourself more visible day and night
	* Learn to recognize when motorists will turn and when they will wait
	* Ride predictably, assume appropriate lane position, and always wear a helmet.
5. **Assert yourself**
	* Plan to take your right of way but be prepared to act to avoid collision
	* Use hand signals, a bell, your voice, lights, anything to get the attention of motorists
	* Always be aware of a safe way out whether you expect to use it or not

**Emergency: Instant Turn**

1. **Emergency**
	* If a car turns while you are next to it, you will have to stop or turn defensively.
	* The Instant Turn is faster than a normal turn but requires practice
2. **Handlebar jerk**
	* The first move is to quickly jerk your handlebar for a split second
	* This sudden move will make the bike lean and set up your turn
	* It's important that you do not turn into traffic.
3. **Turn**
	* After your bike is leaning, you must continue the direction and complete the turn
	* Remember that there might be an obstruction around the turn. Be ready to respond further
	* Coming close to the car might result in a glancing blow which is better than a direct hit.
4. **Pedal position**
	* Your right foot should be positioned to avoid catching a pedal on the turn side.
	* Leaning hard on the outside pedal will help you maintain traction in the turn
5. **Avoidance**
	* Avoiding this circumstance is the best way to ride safely
	* Remember to take the lane if it is too narrow to share safely; your safety is up to you
	* Every cyclist should learn and practice the instant turn, rock dodge and quick stop

**Emergency: Quick Stop**

1. **Emergency**
	* A quick stop may allow you to safely stop your bike to avoid an obstacle
	* You do not want to lose control of your bicycle in an emergency situation
2. **Brake application**
	* Front brakes have the most power but can cause a crash if misused
	* Either brake causes weight to shift forward, increasing the power of the front brake
	* Brakes need to be adjusted properly for maximum braking control
3. **Weight transfer**
	* Shift weight back over the rear wheel by sliding behind the saddle
	* Use your arms to push the bike out in front of you
	* Keep the handlebars straight; do not try to turn
4. **Front brake**
	* Practice using your front brake to avoid going over the bars
	* Braking hard with the front brake causes weight to shift forward
	* Apply more front brake than rear; release the brake a bit if the rear wheel skids
5. **Rear brake**
	* The rear brake has less stopping power than the front brake
	* Too little weight on the rear wheel will cause it to skid
	* Not enough weight on the rear wheel will cause the rider to go over the bars

**Emergency: Rock Dodge**

1. **Emergency**
	* Designed to allow you to avoid a hazard and not change road position
	* Vital if you are pinned by a gutter on one side and a car on the other
	* Your body will travel straight; your bike will avoid the hazard
2. **Front wheel**
	* Your front wheel is more important than your rear; you steer with the front wheel
	* Just before the hazard, jerk your front wheel around it then back
	* Your front wheel should avoid the rock, pothole or trash
3. **Looking ahead**
	* Identify hazard, note its distance, keep it in your periphery and look ahead
	* Other hazards may be ahead that you will need to prepare for
	* Concentrate on riding a straight line while moving the bike around the hazard
4. **Your body**
	* Your body should continue straight over the hazard while your bike moves around it
	* Standing up with your pedals level will help you maneuver your bike beneath you
	* Un-weight the rear wheel in case you hit the hazard with your rear wheel
5. **Rear wheel**
	* Ideally you should not hit the hazard with either wheel; practicing will help
	* Lift up off of the saddle in case your rear wheel hits the hazard
	* Try to lean forward just a bit to get the rear wheel over or around the obstacle

Bicycle Maintenance

1. **Know your ability**
	* Take tools for work that you can perform
	* Try to fix things if you are sure that you can improve how they work
	* Do not depend on others for your mechanical needs
2. **Know your bike**
	* Maintain your bike or let a bike shop do it for you; twice a year for heavy use
	* Catch problems before they happen on the road with regular inspections
	* If you have hard to find items on your bike, stock up when you can
3. **Know your ride**
	* If you are going to be far from civilization, prepare with extra tools or parts
	* For short rides, you might not carry any tools if you don't mind walking
	* Urban areas may have more glass in the roadway; bring patches and a tube
4. **Know your tools**
	* Tire levers, tube, pump and patch kit for flats
	* Allen wrenches, chain tool and screwdriver for mechanicals
	* Understand which tools are needed for your bike; tools don't fix things, people do
5. **Know your options**
	* If you carry a phone for emergencies, make sure you have reception on your ride
	* First aid can be an important part of a tool kit; know how to use it
	* Stop to help others but only attempt to fix what you know you can

**Tire Pressure**

1. **Maintenance**
	* Tires naturally lose air over time; if you don't pump them up, they will go flat
	* Floor pumps work best at home; they move the most air and are easy to use
	* Skinny tires need air almost daily; fat tires need air weekly
2. **Emergency**
	* Hand pumps work well in emergency situations; convenience over performance
	* CO2 is fast and easy but can be tricky; carry a pump as backup
	* Long skinny pumps for high-pressure skinny tires; short fat pumps for fat tires
3. **Valves**
	* Know your valves, presta or Schrader; carry an adapter just in case
	* Both types of valves can be damaged; some tire sealants can clog valves
	* Presta valves tend to hold air better than Schrader valves
4. **Personal preference**
	* Recommended pressure is printed on tires; be careful if you go higher or lower
	* Mountain bike commuters frequently inflate tires to 80 psi for faster going
	* Tandem riders can inflate hybrid tires to 90 psi or more
5. **Tips**
	* Use the largest tube that fits your tire; it will hold air longer and resist flats better
	* Check your tire pressure with a gauge before every ride
	* Find a favorite pressure for your tires and stick to it; it may change with different tires

**General Mechanic Skills**

1. **Threads**
	* Pedals, stem bolts or water bottle bolts, grease everything before installing
	* Boat trailer bearing grease is inexpensive and waterproof
	* Grease all flats on bolt heads that will be up against other metal pieces
2. **Bearings**
	* Bearings should be repacked (cleaned and re-greased) about yearly
	* Races are smooth, precision surfaces on which bearings roll; clean then re-grease
	* Bearings are easily destroyed if you don't understand how to adjust them properly
3. **Cranks**
	* Grease crank bolts, never grease bottom bracket tapers; you may damage crankarms
	* Grease chainring bolts and surfaces where chainrings attach to crankarm
	* Clean out pedal threads with a rag, bristle brush or degreaser
4. **Derailleur**
	* Take care not to lay bike down on its derailleurs; you might damage them
	* Remove dirt or lube related buildup with a rag and flathead screwdriver
	* Inspect derailleur cables and housing for cracking and fraying; replace if necessary
5. **Headset**
	* Bearings in your headset need annual re-packing; more often if you ride in the rain
	* Clean bearing surfaces, re-grease and replace bearings; use grease to hold them in
	* Clean old grease out with rag, inspect bearing for wear and replace if necessary
6. **Seat-post**
	* Use sand paper to smooth out inside of seat tube to avoid scratching seatpost
	* Apply liberal coating of grease to top three inches inside seat tube
	* Grease help keep water out of frame tubes and allow easy removal of seatpost
7. **Hubs**
	* Hubs roll on bearings like your headset; regular service is necessary
	* Turn axle by hand to check hub status; if it feels loose and gritty, clean and re-grease
	* Riding on hubs with no grease can destroy bearings and races
8. **Noises**
	* Creaks are usually caused by metal shifting on metal under stress, like pedaling
	* Every place two pieces of metal are touching, there should be grease between them
	* Locate noise and silence by re-assembling with a liberal coating of grease
9. **How tight is tight?**
	* Most parts on a bike do not need to be as tight as humanly possible, just snug
	* Turn bolt until threads are buried then a quarter turn to tight
	* Grease on threads helps to overcome friction and allows proper fastening

**Fix a Flat**

1. **Remove wheel**
	* Front: undo brake then wheel quick release and remove
	* Rear: shift into smallest cog in rear, undo brake then hub quick release; remove
	* Rear: set bike upside down on handlebars and seat before opening hub quick release
2. **Deflate tire**
	* Remove remaining air by depressing valve
	* Schrader is larger, spring loaded valve and must be depressed; car style valve
	* Presta is all-metal, air sprung narrow valve; unscrew then press
3. **Remove one side of tire from rim**
	* Using tire levers, unseat one side of tire; start away from valve stem
	* For tight rim/tire combinations, multiple tire levers are needed; do not use metal levers
	* Many mountain and hybrid bikes tires will come off by hand; practice at home
4. **Remove tube**
	* Remove tube from tire; avoid valve damage by starting away from valve
	* Keep tube and tire in same relative position to each other to aid in finding puncture
	* Inspect tube for hole; mark for patching or use your spare tube for replacement
5. **Inspect inside of tire**
	* Feel inside of tire for cause of flat; use caution as cause may puncture your finger
	* Remove thorn, glass, staple, nail or whatever caused your flat
	* Inspect tire for damage caused by flat
6. **Install new or patched tube**
	* After repairing damaged tube or retrieving spare, inflate tube to give it round shape
	* Fold back tire to allow access to valve hole; insert valve first then tube into tire
	* For presta valve, screw valve closed and install valve nut loosly against rim
7. **Reseat tire bead**
	* Start reseating tire by hand at valve hole; work in both directions
	* Push valve partially back through rim to insure proper seating of tire bead
	* Visually inspect tire bead to insure proper tire seating on rim
8. **Inflate tire**
	* Inflate tire slowly, check for bulges which might indicate improper bead seating on rim
	* Deflate if bulge occurs; carefully re-inspect and reseat bead on rim
	* Inflate to desired pressure
9. **Install on bike**
	* Front: install wheel; tighten hub quick release and attach brakes; make sure it is straight
	* Rear: install wheel by placing chain on top and bottom of small cog
	* Rear: push pulley closest to you forward; drop hub down into frame and tighten
10. **Ride away**
	* Check brake and hub quick releases; make sure that tire does not rub brakes or frame
	* Check rear derailleur to make sure that shifting is still smooth
	* If anything is wrong, the wheel is probably crooked; make sure wheels are in straight

**Patching Tubes**

1. **Find the hole**
	* Pump tube with air; listen and feel around the tube for the leak
	* Mark hole with chalk or hold under your thumb
	* Use the sandpaper or another abrasive to rough up tube around hole
2. **Apply glue**
	* Apply glue to the size of a quarter, centered around the hole
	* Allow two to three minutes for glue to set; glue will turn cloudy
	* Make sure that the glue area is slightly larger than the patch
3. **Apply patch**
	* Remove patch with plastic still attached; do not peel plastic off of patch
	* Place sticky, non-plastic side down, centered over hole
	* Slide it around in a small circle to ensure even distribution of glue
4. **Wait and hold**
	* Hold patch firmly between thumb and forefinger for about three minutes
	* Time taken now will ensure that your patch will hold later down the road
	* If at home, place tube flat between two books and place heavy object on top
5. **Check it**
	* Inspect to make sure that the patch bonded to tube all the way around
	* Plastic will keep glue from sticking to inside of tire; wipe off excess
	* Patches can last forever if properly applied

**Causes of Flats**

1. **Punctures**
	* Glass, thorns, nails, staples, screws; anything sharp can cause a flat
	* These result in slow leaks that can take up to 48 hours to go completely flat
	* Usually easily repaired with patch kit; not normally associated with severe tire damage
2. **Pinch flats**
	* Compression of the tube between your rim and a hard surface
	* Known as 'snakebites,' these are dramatic, audible flats that deflate quickly
	* Hard to repair with patches; replace tube or use oval **patches**; rim damage possible
3. **Tire damage**
	* Improperly adjusted brakes can rub through tire and cause tube to blow out of tire
	* Maintaining proper tire pressure helps prevent flats and maximizes rolling efficiency
	* Worn tires leave less rubber between the tube and the road, decreasing flat protection
4. **Rims**
	* Spokes and sharp spots on the inside wall of the rim can cause flats
	* Recurring flats are usually caused by sharp metal on the rim or part of a spoke
	* Use a file or sandpaper to buff off the sharp spot and remove any burrs
5. **Flat forensics**
	* Carefully studying where the hole in the tube will allow you to find its cause
	* Make sure that you keep the wheel, tube and tire in the same orientation
	* Flats may be caused by imperfections in the tube; these may be impossible to detect

**Brake Basics**

1. **Brake types**
	* Road bikes have center-mount, side pull brakes
	* Mountain, touring, cyclocross and hybrid bikes have cantilever mount brakes
	* Linear, side pull cantilevers or vee brakes are the most common on new bikes
2. **Noises**
	* Squeals and scrapes are the most common noises which can be fixed
	* Brakes squeal from pads hitting the rim flat; toe in brake pads to stop noises
	* Scraping means you need to either sand the metal out of the pads or replace them
3. **Pad wear**
	* Brake pads should be replaced when you get down to about ¼" of pad left
	* Properly toed in brakes wear at a slight angle; too much and they will wear faster
	* Front brake pads last longer because the front brake is stronger
4. **Lever adjustment**
	* Your brakes will hit sooner if you unscrew the barrel adjusters around the housing
	* You can shorten the reach with a screw that points toward the other brake lever
	* Your first lever adjustment should start with the barrel adjusters all the way in
5. **Maintenance**
	* Find out how to use the brake cable quick release at the lever; this will aid in cleaning
	* Inspect brake pads for wear or metal shards; sand pads to remove metal
	* Sand pads to improve braking; heat from braking will glaze pads and reduce power

### Drive-train and Chain Maintenance

The Bicycle is one of the most efficient vehicles ever built. It will take an individual farther for a given amount of energy than any other form of transportation. One reason for this is the chain drive.

Basically unchanged for one hundred years, the chain drive allows only two percent of energy to be lost between the chain rings and the cassette. By comparison, even the most fuel efficient car loses about 80 percent of the engine's energy before it moves the car. Complementing its ability to conserve power, a bicycle is one of the most frugal forms of transportation, requiring less than two cents per mile to operate.

**Chain Replacement**
The modern bicycle chain has a half inch pitch, meaning it is one half inch, pin to pin. One link consists of two inner plates, two outer plates, two pins and two rollers. While the pins fit tightly into the outer plates, both the inner plates and the rollers pivot freely on the pins.

As a chain wears out, so do the chain rings on your cranks and the cogs on your rear wheel. How do you prevent such damage? Well, there are a few theories about how to keep the drive train of your bike in good working order without spending too much money.

One is the "replace your chain before it wears out" theory. Keeping constant vigil over your chain by checking it monthly and replacing it as soon as it wears out will make your other parts last much longer. If you ride regularly, you may require as many as three to four chains each year. Estimated cost: $30 to $150, depending on quality of chain and labor costs.

The other is the "lazy person's wait until its finished" theory. This follows the idea that your bike will tell you when it's ready to have its chain replaced. As chains stretch, cog sets wear out and so do small chain rings. When you pedal under load, (uphill, for example) and your chain 'skips,' you are seeing the end of the road for most of your drive-train. At this point, you need a new chain, cassette and quite possibly a new small chainring. Under normal road conditions, you might realistically expect to get two years out of these parts. The estimated cost: $70 to $200 every two to three years, again, depending on quality of parts and labor costs.

**Chain Care**
In order to get the maximum life from your chain, you should consider three things:

**Quality of the Chain:** The differences between less expensive and more expensive chains are the shape of the plates, quality of materials and the riveting of the pins. Chain side plates are designed to help the chain shift better, so better quality equals smoother shifts. Higher quality materials are used on more expensive chains increase chain life. In addition, pins are 'mushroomed' in the higher quality chains after they are pushed into the plates at the factory. This process increases the tolerances of the chain plates and makes for a stronger, longer lasting chain.

**Maintaining Your Chain:** Regular maintenance of your chain need not be a lengthy or messy process. Simply put: If you can see dirt on the outside of your chain you should to wipe it down with a clean rag. If your chain squeaks or is excessively noisy, it needs lubrication. Remember-- if you can see the lube on the chain, there is too much. Wipe it down with a clean rag. Only the inside of the chain needs to be lubricated. There are many types of lubricants out there for bike chains-- dry, wet, self-cleaning, etc. Find one that works for you and learn how to use it properly. Telling someone what type of lube to use is like telling them what kind of underwear to buy. As a general rule, if you ride where it's wet, use a wet lube. If you ride where it's dry, use a dry lube. You should avoid spray applicators as they tend to be very messy. To apply lube to your chain, pedal the cranks backwards about four times and drip the lube onto the chain. It helps to rest your hand with the lube on your chain-stay and contact the lube applicator to the chain, squeezing as you backpedal. After you are finished applying the lube, back pedal about six more times, then wipe off the excess using a clean rag. If your chain is dirty, the rag will soak up dirt and excess lube. Use a cleaner side of the rag and continue wiping excess lube and dirt off the chain by pedaling backwards with one hand, holding the chain with the rag in the other.

**Riding on the Chain:** Your riding style will affect how long your chain will last. If you ride in a high gear, the lower cadence loads the chain more than if you spin in a lower gear. The less the chain is loaded, the longer it will last. Reducing the amount of cross gearing (large chainring and large cog in the rear or small chainring and small cog in the rear) will also help improve the life of your chain. If you ride a tandem, your chain will most definitely wear faster.

**Buying a Replacement Chain**
It is important to remember that your new chain be compatible with the drivetrain on your bike. There are multi-speed and single-speed chains. Check with your local bike shop about which chains they carry and which one will work with your bike. With bikes from a single gear all the way to 30 gears, getting the right chain is very important as one might not work with the other.

**Install it yourself**
Replacing your chain need not be a mandatory trip to the local bike shop although you will need tools. First, measure the new chain by wrapping it around your large chainring, through the front derailleur, then around the largest cog in the rear, bypassing the rear derailleur. Then, from the point where the chain comes together, add two links and cut the chain using your chain tool. Do not push the pin all the way out of the other side of the link-plate. Push it far enough that you can break the chain by bending it laterally. If you are unsure of how far to push the pin out, it is best to remove the chain from your chain tool and try before you push the pin all the way out. Most new chains do not require that you use the original pin to rejoin the links. Some chains now come with a special master link for multi-speed chains, much like those for one speed chains. You still need a chain tool to cut the chain, but reattach it using the supplied master link.

Understanding your drive-train is valuable knowledge for all cyclists. Taking a little extra time to understand how it works will make you a more confident and knowledgeable cyclist and an asset to your riding partners.

**Front Derailleur Adjustment**

1. **Set screws**
	* Set limits of how far the derailleur travels; turns clockwise decrease range
	* 'H' screw limits how far derailleur can travel away from bike; 'L' towards bike
	* Road and mountain front set screws are on different parts of the derailleur
2. **Cage alignment**
	* Looking down on derailleur, outside cage should be parallel with the chainrings
	* Replace derailleur’s with bent cages as shifting performance will be decreased
	* Cage should line up about 3 mm above biggest chainring with derailleur extended
3. **Triple vs. Double**
	* Triple chainring derailleur’s allow chain to drop lower for the smallest chainring
	* Double chainring derailleur’s have narrower cages and cannot be used on triples
	* Triple derailleur’s have special areas that help shift chain off of smallest chainring
4. **Derailleur types**
	* Based on cable routing on the bike, derailleur’s are either top or bottom pull
	* Derailleur’s also have different clamp diameters for different frame tube sizes
	* Top or bottom swing derailleur’s are also available; check with a bike shop
5. **Mountain vs. road**
	* Mountain derailleur’s have a different arc along the cage for smaller chain rings
	* Road derailleur’s have a wider arc to accommodate larger chain rings
	* Mountain derailleur’s have a wider margin of error to account for mud and dirt

**Rear Derailleur Adjustment**

1. **Set screws**
	* Set limits of how far the derailleur travels; turns clockwise decrease range
	* 'H' screw (lower) sets how far the derailleur travels away from wheel; for small cog
	* 'L' screw (upper) sets how far the derailleur travels towards wheel; for big cog
2. **Barrel adjuster**
	* Where the housing and cable enter derailleur, plastic piece is threaded for adjustment
	* Can be screwed by hand for quick adjustments; affects cable tension for shifting
	* If installing new cable, start with barrel adjuster all the way clockwise
3. **Derailleur housing**
	* Black plastic housing protects cable and allows it to turn corners
	* Too little will affect shifting adversely; leave enough for a gradual sweeping bend
	* Inspect regularly for cracks and other damage; replace yearly with cables
4. **Derailleur hanger**
	* Part of frame that derailleur threads into; replaceable derailleur hangers are common
	* Hanger must be vertical and parallel to frame to allow proper derailleur alignment
	* Bike shops have a tool that can straighten derailleur hangers unless it's replaceable
5. **Time for a new derailleur**
	* Grab lower cage and gently move side to side; replace if there is excessive play
	* Main cause of worn derailleur is main pivot that bolts to frame
	* Derailleur Linkage may also weaken or loosen adversely affecting shifting accuracy
6. **Throwing a chain**
	* If chain shifts into spokes, turn 'L' set screw in half turn increments until fixed
	* If chain shifts onto frame, turn 'H' set screw in half turn increments until fixed
	* A broken chain can tear the derailleur off the bike and destroy wheel or frame
7. **Diagnosis**
	* Can't shift to easier gears: screw barrel adjuster counterclockwise (increase tension)
	* Can't shift to harder gears: screw barrel adjuster clockwise (decrease tension)
	* Only adjust barrel a half-turn at a time, checking adjustment the bike after each