WHEN TO TRUE - CHECKING FOR SYMPTOMS

- Your wheel must be trued if there is visible wobbling in the rim as it spins.
- Even if the wobbling is not noticeable while riding, it is best to keep the rim true as a true wheel is also a strong one (if you keep riding a wheel that is slightly out of true, chances are good that it will get worse).
- Check overall quality of wheel: squeeze parallel sets of spokes, while looking for bent, broken, or brittle spokes, or spokes that are overly tight or loose.
- Examine rim and hub for damages such as cracks and bulges – depending on damage, rim or entire wheel will need to be replaced.
- Hubs can be re-used once, whereas rims should always be replaced.
  * If re-using a hub, change direction of spokes so that grooves in spoke holes will go in opposite direction of those already made.

HOW TO TRUE

- Truing a wheel is not a quick process! relax, go slowly, and be patient. Expect to spend at least half an hour the first few times you do it.
- Truing a wheel is a process of tightening or loosening spokes, which has the effect of effectively shortening or lengthening spokes respectively.
- Determine where the wobble is by spinning wheel and examining rim relative to brake pads or calipers.

Lateral Truing (side to side)

- Determine which spokes correspond with the bend, (if it helps, mark these with electrical tape).
- If the rim wobbles to the right, tighten spokes on the left in ¼ turn increments (and vice-versa if wobble is on the left).
- If any spoke is looser than the others, tighten it a bit more than the others.
- Spin rim and check wobble. If bend is still there, loosen spokes on that side a ¼ turn. Repeat process of tightening and loosening as necessary.
- If truing requires so much loosening and tightening of spokes that tension on one side is much higher than the other, the rim is probably damaged. In this case, even spoke tension will be impossible, making the wheel weak and possibly dangerous.

Radial Truing (up and down)

- Spin wheel and see if wheel moves up or down relative to calipers or brake pads.
- If rim has a high spot, it must be pulled down.
- Locate the centre of this high spot, and tighten the two closest nipples ¼ turn. Radiating outward, tighten one nipple on each side of the two centre nipples 1/8 turn, and if necessary, one nipple on each side of those nipples, 1/8 or 1/16 turn. Spin, check progress, and repeat if necessary.
- If rim has a low spot, it must be pushed down.
- Locate the centre of this low spot, and loosen the two closest nipples ¼ turn. Loosen one nipple on each side of the two centre nipples 1/8 turn, and if necessary, one nipple on each side of those nipples, 1/8 or 1/16 turn.
- These corrections may have affected lateral trueness; check and fix as necessary.

Prestressing the Wheel

- If wheel is not prestressed before being ridden, any spoke wind-up may become undone.
- To prestress wheel, tightly squeeze parallel spokes all the way around the wheel.
- This may cause wheel to come out of true; check and re-true as needed.
DO I NEED A TRUING STAND?

- No. a truing stand is nice... but not necessary. Just flip your bike upside down so that it rests on its handlebars and seat, and examine trueness by examining rim relative to brake pads as the wheel spins.
  *If you have a hard time seeing wobbles in the rim, put a piece of white paper behind the wheel/brake pads.

WHAT IS DISHING?

- This term applies to rear wheel only.
- ‘Dish’ refers to the shape of a rear wheel when viewed from behind, in particular, that the spokes on the drive side are flat while those on the non-drive side are conical.
- A wheel is dished when the rim is centered in respect to the axle ends on the hub and within the frame.
- ‘Dishing’ refers to the process of shortening and lengthening spokes to center the rim within the frame.
- The process of dishing is a more advanced technique. For this reason, it is best to know the principles and techniques of wheelbuilding before attempting to redish a wheel.
- However, for minor adjustments (or if you are adventurous) (re)dishing a wheel is accomplished by shortening all spokes on one side and lengthening all spokes on the other. To do this, start with a spoke beside the valve, and tighten (or loosen) every spoke until you come back to the valve.
Remember to turn each spoke an equal amount; turning spokes in small increments (ie. A half-turn) repeatedly is safer than turning spokes in large increments all at once.
- After dishing, always check for lateral and vertical trueness as well as correct tension

REPLACING SPOKES

- To determine the correct length of a spoke for a given hub and rim, several measurements need to be taken. The process of taking measurements, for the hub at least, is difficult. Consult the website below for instructions.
- Once measurements have been taken with a caliper, they must be entered into a program to calculate spoke length.
- A particularly good one is Spocalc, available on Sheldon brown’s website; this is an excel document with the dimensions for hundreds of rims and hubs (still, chances will be good that you will have to take measurements yourself; this is safest)
- Once you have found the dimensions for your hub and rim as well as other inputs, enter them into the software to generate the spoke length.
- This program is pretty accurate since it uses pure 3d trigonometry but it’s a good idea to cross check measurements with other programs available online  http://www.sheldonbrown.com/rinard/spocalc.htm
- Spokes are available in 1mm increments; round up if necessary

TENSIONING SPOKES

- Uniform spoke tension is important for a strong wheel.
- Front wheel should have uniform tension on both sides
- Rear wheel should have uniform tension per side (drive side will have higher tension than non-drive side due to dishing)
- Spoke tension can be checked in three ways:
  - squeezing spokes with hands and comparing tension
  - with a tension meter
  - by plucking individual spokes and listening to the musical pitch that they make; different spoke lengths have different musical tones corresponding to ideal their ideal tension: http://www.bikexptr.com/bicycle/tension.htm
Although many modern bicycles have non-adjustable, wheel hubs, many still require adjustment. If your bike has "cartridge" or non-adjustable hubs, you can skip this section. "Sealed" only means that your hubs have seals to help keep dirt and water out, but does not identify whether your hubs are adjustable. Your bike shop can help you figure out what you have.

If the hubs are too tight or too loose, you will soon damage the parts.

By setting the hub cones close together, the adjustment becomes tight. Screwing them farther apart causes looseness. When a wheel is off the bike, set the adjustment to very slight wiggliness, because clamping the wheel into the bike compresses the hubs slightly. Once installed, there should be just barely detectable looseness at the rim, or none at all.

On many American bikes, you simply turn one of the cones before tightening the axle nuts that hold the wheel on the bike.

Most others have thin locknuts that are jammed against the cones to keep the adjustment from drifting. To operate on this type, loosen the locknut on one side, use thin "cone wrenches" to change the adjustment, then retighten the locknut.

If it is impossible to adjust the wheel so that the hubs are not too tight and not too loose at the same time, or if the hubs feel gravelly when turned, an overhaul is recommended to examine the parts for wear, and replace whatever is needed.

If the side of the wheel hub looks particularly dirty, and if the hubs are not sealed, then overhaul is a good idea to clean out the old, dirty grease, and replace it with fresh grease.

To overhaul the hubs, unscrew one locknut and hub cone from the axle over a cloth. In most hubs, the balls will fall out. Clean everything as much as you can, using a non-flammable, safe-to-breathe solvent. Examine everything for wear, especially the hub cones, the cups (inner surfaces of the hub) and the balls. The bearing balls should be shiny, not dull. Although rare, you should check for cracking of the hub body itself, especially around the outsides of the cups. Put fresh grease in the cups, stick the hubs into the grease, put the cones and locknuts back on the axle, and adjust properly.

If your hub has cages that hold the balls in groups, note which way they fall out, and put them back the same way. Almost always, the balls face each other, and the backs of the cages face toward the outside.