MECHANIC SKILLS: Practice
MECHANIC SKILLS: PRACTICE

QUICK NOTES

These lessons are not meant to be used alone. Always pair with “mechanic skills explanations.”

We broke the lessons into two parts so that teachers could make classes as long or as short as they needed. While we never do this, some schedules may call for doing an Explanation one day and a Practice another day. Other classes may be able to combine two Explanation units and two Practice units into one session. The important thing is that youth are receiving some explanation and safety information before being handed tools and bikes.

As with our Explanation units, when teaching Practice units we follow these guidelines at Bike Works:

- Ask twice as many questions as you answer.
- Emphasize a hands-on approach to learning.
- Focus on “problem solving” and “troubleshooting.”
- Safety is part of every lesson.

It is particularly important to stress safety during Practice units. There are countless ways youth can bump, bang, hit, chip, scrape or otherwise dent themselves, each other, and/or the bikes. For this reason it is important to point out general safety guidelines such as, “Use tools for their intended use only,” as well as lesson-specific hints and tricks such as, “Be extremely careful of hitting your knuckles on the chain ring when you are removing crank arms.” We have done our best to include these reminders in “NOTES” boxes throughout the lessons.

Finally, be aware that some students may have never held a tool before. Start from the beginning and help students find a grip that is comfortable for them. Although it may seem like smaller people will have more trouble with loosening bolts or tightening a cable, most seasoned mechanics will tell you it’s all about leverage. Help students learn how to position themselves in order to put gravity on their side, and how to use the best tools (the longer combination wrench for example) to get the best leverage.
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BIKE BREAK DOWN

Get those hands on those bikes! This is a chance for youth to work with tools and get a feel for the bikes without previous experience.

LESSON

Preparation:
1. Prep your work area with bikes in stands that are ready to be stripped. Make sure the stands are secure. We suggest one bike per two students, if possible.
2. Lay out tools for youth to use. Make sure tools you want youth to use are accessible and those you don’t want them to use are out of sight/reach.

Activity:
1. Break up into pairs at each work station (use strategies on p. 157–161).
2. Discuss the importance of safety and using the right tool for the right job.
3. Go over how to use the repair stand, some of the basic tools you have laid out, the name of the tool, where on the bike it is used, and where it is stored.
4. Have the youth strip bikes in pairs starting with taking off the wheels. This an engaging way to get kids working with tools without really knowing anything yet. A good way to organize strip projects is to list an order on the board.
   1. Wheels: Remove wheels from bike. Remove tires and tubes from wheels.
   2. Pedals: When most people are done with wheels, have everyone put down their tools and regroup. Spend a minute explaining drive-side and non-drive-side and how non-drive-side pedals are reverse threaded.
   3. Cables: Cut all cables
   4. Brake Levers: Remove brake levers from bars. Do not take apart further!
   5. Handlebars and Stem: Remove bars and stem from bike.

Follow-up:
1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.
2. Take a “head count” of the tools and make sure they are all in the correct places.

MATERIALS
Whatever tools and bikes you have!

RESOURCES
Review Worksheet (p. 212)
LESSON

Preparation:
1. Review your notes and “Review Worksheet” from the previous class.
2. Print out blank BINGO cards and BINGO images—one set for each student (p. 216 and 217).
3. Print out labeled image of the bicycle (p. 239).
4. Put a variety of bikes in the stands—one for each pair if possible.
5. Make a space for cutting, gluing and playing BINGO!

Activity:
1. Pass out the labeled image of a bicycle.
2. Go over the parts of the bike using one of the bikes in the stand.
3. Explain the rules of BINGO and hint at some silly prizes.
4. Using the templates provided in the appendix, give everyone time to make their own BINGO card. There are several ways to do this:
   - Allow people to cut and chose the parts they want to put on their card.
   - If you have enough bikes, assign pairs or groups to partially assembled bikes. Tell them they can ONLY include parts on their card that are on their assigned bike.
   - Have participants make a card and then trade with another participant before playing.
   - Don’t forget to leave the “FREE” space open.

MATERIALS

Labeled image of the parts of the bicycle
BINGO cards—you can prepare these ahead of time or have students make them
BINGO markers
Glue
Bikes in stands in various states of completion
Scissors
Silly prizes like bike pins, candy, tattoos, etc.

RESOURCES

Parts of the Bike—English/Spanish (p. 239)
Blank BINGO Cards (p. 216)
BINGO Card Images (p. 217)
Review Worksheet (p. 212)

SOURCE

WE Bike NYC
LESSON (CONTINUED FROM P. 116)

5. Play BINGO! You can do four rounds of BINGO depending on time:
   
   Round 1: Say the name of a part and point to it on the bicycle. Also point to the image that will be on the cards.
   
   Round 2: Say the name of a part and point to it on the display bicycle.
   
   Round 3: Say the name of a part and have a volunteer point to the part on the bicycle.
   
   Round 4: Only point to a part on the bicycle and have the group come up with the name of the part.
   
6. When someone wins, you can have them come up and identify all 5 parts they covered on the display bicycle before claiming their prize.

Follow-up:

1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.

2. Take a “head count” of the tools and make sure they are all in the correct places.
Fix a Flat Practice 1 of 2

Learn how to fix a flat tire!
Gain a sense of accomplishment in a mechanic setting.

Lesson

Preparation:
1. Review your notes and “Review Worksheet” from the previous class.
2. Just before class take a tack and pop at least one tube on each bike.
3. Write the steps to fixing a flat on the board:
   - Remove the Wheel
   - Remove the Tire
   - Patch the Tube
     1. Find and mark the hole with an “X”
     2. Sand area
     3. Apply Vulcanizing fluid and let DRY
     4. Apply the patch
   - Test for leaks
   - Reinstall tire and tube—NO TOOLS!
   - Reinstall wheel and inflate to proper pressure

Materials

- Repair stands
- 13, 14, 15mm wrenches
- Ballpoint pens
- Sandpaper
- Vulcanizing fluid
- Bulk patches
- Rags
- Floor pumps
- Holey tubes
- BMX bikes with flats & worn out tires and/or wheels
- Replacement tires and wheels as necessary

Resources

Review Worksheet (p. 212)

CONTINUED ON P. 119
LESSON (CONTINUED FROM P. 118)

Activity:
1. After you have done the demonstration you can divide kids into pairs (use strategies on p. 157–161).
2. Let pairs get to work fixing those flats! Make sure youth do the whole process—from taking the wheel off, to tightening it back onto the bike and inflating the tire to proper pressure!
3. When they are done, have them bring it to an instructor for a final check.
4. After they have completed the entire process as a duo, give them each a popped inner tube for them to repair on their own.
5. Be sure to leave 15 minutes at the end of class for clean-up and “Final Checks” of each bike.

Follow-up:
1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.
2. Take a “head count” of the tools and make sure they are all in the correct places.
FRONT HUB PRACTICE 1 OF 2

Practice overhauling front hubs.

LESSON

Preparation:
1. Review your notes and “Review Worksheet” from the previous class.
2. Make sure you have enough front wheels for one per pair of students.
3. Write the 5½ steps of an overhaul on the board or wall.
   ½. Get a rag
   1. Disassemble
   2. Clean
   3. Inspect
   4. Grease and Reassemble
   5. Adjust

Activity:
1. Review the 5½ steps of an overhaul with the students, having them explain each step to each other.
2. Pair up students, two to a bike (use strategies on p. 157–161).
3. Have students work together to overhaul the front hub.

NOTE
Remind students to use particular care with the dust caps (if they have them) and that this is the make or break portion of the repair if they approach it without caution.

CONTINUED ON P. 121

MATERIALS
Repair stands
Cone wrenches
Combination wrenches
12” adj. wrench
Simple green
Rags
Grease
Bearings
Drop gauge tool
BMX bikes and/or wheels

RESOURCES
Review Worksheet (p. 212)
Front Hub—Exploded (p. 246)
LESSON (CONTINUED FROM P. 120)

4. When students are done, have them bring their wheel to an instructor for a “Final Check.”

5. Be sure to leave 15 minutes at the end of class for clean-up!

NOTE
Make sure to monitor that a “stronger” student in the pair isn’t doing all the work.

Follow-up:

1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.

2. Take a “head count” of the tools and make sure they are all in the correct places.

MATERIALS & RESOURCES
See p. 120
LESSON

Preparation:
1. Review your notes and “Review Worksheet” from the previous class.
2. Prepare enough bikes in stands for students to work in groups of two.
3. Write the agenda and the 5½ steps of an overhaul on the board or wall.
   - Get a rag
   - Disassemble
   - Clean
   - Inspect
   - Grease and Reassemble
   - Adjust

Activity:
1. Have students explain the 5½ steps of an overhaul. You can have it already written on the board, or have the students fill in the steps.
2. Pair up students, two to a bike (use strategies on p. 157–161).
3. Work slowly showing everyone how to remove the handlebars from the bike. Make sure everyone has removed their handlebars before continuing with the overhaul.
4. Overhaul that headset! Follow the 5½ steps and be sure to keep the pieces in order on your rag.
5. When students are done, have them bring their headset to an instructor for a “Final Check.”
6. Be sure to leave 15 minutes at the end of class for clean-up!

MATERIALS
- Repair stands
- Allen keys
- Combination wrenches
- 30, 32, 36, 40mm headset wrenches
- Channel locks
- Large adjustable wrench
- Simple green
- Rags
- Grease
- Bearings
- Drop gauges
- BMX bikes
- Threadless stem for demo

RESOURCES
- Review Worksheet (p. 212)

CONTINUED ON P. 123
LESSON (CONTINUED FROM P. 122)

Follow-up:
1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.
2. Take a “head count” of the tools and make sure they are all in the correct places.
1-PIECE BOTTOM BRACKET PRACTICE 1 OF 2

Practice overhauling 1-piece bottom brackets.

LESSON

Preparation:
1. Review your notes and “Review Worksheet” from the previous class.
2. Prepare enough bikes in stands for students to work in groups of two. Try to choose bikes without chain guards.
3. Write the agenda and the 5½ steps of an overhaul on the board or wall.
   ½. Get a rag
   1. Disassemble
   2. Clean
   3. Inspect
   4. Grease and Reassemble
   5. Adjust

Activity:
1. Have students explain the 5½ steps of an overhaul in a creative way.
2. Pair up students, two to a bike (use strategies on p. 157–161).
3. Have students put their bikes in the stand non-drive-side facing the class.
4. Overhaul! Make sure to lay all the pieces out on the rag in order. Remind students about parts of the bottom bracket that are reverse threaded! The non-drive-side of the bike is “Backward Land” where everything is reverse threaded.
5. When students are done, have them bring their bottom bracket to an instructor for a “Final Check.”

MATERIALS

Repair stands
Bottom bracket wrenches
Large and small adjustable wrench
Simple green
Rags
Grease
Spanner wrenches
Pedal wrench
Screwdriver
BMX bikes

RESOURCES

Review Worksheet (p. 212)

CONTINUED ON P. 125
6. If students finish early, have them check all the other things on the bike that you have learned so far—headset, flat tires, front hubs. They can also lubricate the chain and clean the bike.

7. Be sure to leave 15 minutes at the end of class for clean-up and “Final Checks” of each bike.

Follow-up:
1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.
2. Take a “head count” of the tools and make sure they are all in the correct places.
LESSON

NOTE Depending on what skill level you are teaching, youth can work on BMX (Beginner) or MTB (Intermediate) bikes.

Preparation:

1. Review your notes and “Review Worksheet” from the previous class.
2. Prepare enough bikes in stands for students to work in groups of two on each bike. If supplies are limited, two groups can work on each bike given it has both a front and rear brake.
3. If possible, have an extra volunteer for this lesson. Brakes are tricky and can get frustrating fast!
4. Write the agenda and the steps to a brake adjustment on the board.
   1. Wheels centered
   2. “Troubleshooting”—Look at every part of the system and replace parts as necessary.
   3. Pad alignments
   4. Cable tension—Remember your barrel adjuster!

MATERIALS

Repair stands
Examples of housing and cables
Cable and housing cutters
Tri-flow or other chain lube
Spares for project
Cables
Offset brake tools
3rd & 4th hand tools (optional)
Housing
Cable ends
Ferrules
Brake pads
Y-socket (8,9,10)
Needle nose pliers
BMX bikes

RESOURCES

Review Worksheet (p. 212)
Brake Types (p. 248)

CONTINUED ON P. 127
Activity:

1. Begin by talking about the difference between “troubleshooting” and an “overhaul.” For this lesson we don’t need to take apart every part of the brake, like we would in an overhaul, we only need to look at each part of the system and fix the parts that aren’t working well. This is called “troubleshooting.”

2. Pair up students and assign bikes (use strategies on p. 157–161).

3. Give students enough time for everyone to replace, lube and adjust a cable. Remind students to follow this order:
   1. Center wheel.
   2. “Troubleshooting:” Inspect entire system—replace parts if necessary.
   3. Adjust pad alignment.
   4. Adjust cable tension.

4. When students are done, have them bring their bike to an instructor for a “Final Check.”

5. If students finish early, have them check all the other things on the bike that you have learned so far—headset, flat tires, front hubs, bottom bracket. They can also lubricate the chain and clean the bike.

6. Be sure to leave 15 minutes at the end of class for clean–up and “Final Checks” of each bike.

Follow-up:

1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.

2. Take a “head count” of the tools and make sure they are all in the correct places.
Understanding components and adjustment of the rear derailleur.
Understand the concept of “troubleshooting” and problem solving.

**LESSON**

**Preparation:**
1. Review your notes and “Review Worksheet” from the previous class.
2. Prepare enough bikes in stands for students to work in groups of two.
3. You may want to go around and re-set some of the limit screws or change the cable tension on the bikes so that they are ready for repair.
4. Beware of grip shifts! Try not to replace the cable if you can!
5. This is another good lesson for an extra volunteer in the classroom!
6. Write the agenda and the steps to adjustment on the board.
   1. “Troubleshoot;” Inspect entire system—replace parts if necessary.
   2. Adjust alignment.
   3. Adjust limit screws.
   4. Adjust cable tension—Remember your barrel adjuster!

**MATERIALS**
- Repair stands
- Examples of housing and cables for all systems
- Cable and housing cutters
- Tri-flow or other chain lube
- Screwdrivers
- Spares for project
- Cables
- Housing
- Cable ends
- Ferrules
- Y-socket (8, 9, 10)
- Allen wrenches (4, 5, 6)
- Mountain bikes

**RESOURCES**
- Review Worksheet (p. 212)

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CONTINUED ON P. 129
LESSON (CONTINUED FROM P. 128)

Activity:

1. Have students tell stories or imagine what might happen if the gears weren’t working properly.
2. Pair up students, two to a bike (use strategies on p. 157–161).
3. Give students enough time for everyone to replace, lube and adjust a cable. Remind students to follow the adjustment steps on the board. Be sure to stress “TROUBLESHOOTING FIRST!” Many times youth will struggle with adjusting a rear derailleur for an hour only to realize they need to replace a rusty cable or their housing is frayed. Those are the things “troubleshooting” should find first!
4. When students are done, have them bring their bike to an instructor for a “Final Check.”
5. If students finish early, have them check all the other things on the bike that you have learned so far—headset, flat tires, front hubs, bottom bracket. They can also lubricate the chain and clean the bike.
6. Be sure to leave 15 minutes at the end of class for clean–up and “Final Checks” of each bike.

Follow-up:

1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.
2. Take a “head count” of the tools and make sure they are all in the correct places.

NOTE
This lesson has the most potential for the glazed over student factor. Make sure you keep them engaged and talking. Be wary of overwhelming them with unnecessary information by keeping your lesson short and to the point.
LESSON

Preparation:
1. Review your notes and “Review Worksheet” from the previous class.
2. Prepare enough bikes in stands for students to work in groups of two.
3. You may want to go around and re-set some of the limit screws or change the cable tension on the bikes so that they are ready for repair.
4. This is another good lesson for an extra volunteer in the classroom!
5. Beware of grip shifts! Try not to replace the cable if you can!
6. Write the agenda and the steps to adjustment on the board.
   1. “Troubleshoot;” Inspect entire system—replace parts if necessary.
   2. Adjust height.
   3. Adjust alignment.
   4. Adjust limit screws.
   5. Adjust cable tension—remember your barrel adjuster!

MATERIALS
Repair stands
Examples of housing and cables for all systems
Cable and housing cutters
Tri-flow or other chain lube
Screwdrivers
Spares for project
Cables
Housing
Cable ends
Ferrules
Y-socket (8, 9, 10)
Allen wrenches (4, 5, 6)
Mountain bikes

RESOURCES
Review Worksheet (p. 212)

NOTE
This lesson can be combined with “Rear Derailleurs.”

CONTINUED ON P. 131
LESSON (CONTINUED FROM P. 130)

Activity:
1. Have students tell stories or imagine what might happen if the gears weren’t working properly.
2. Pair up students, two to a bike (use strategies on p. 157–161).
3. Give students enough time for everyone to replace, lube and adjust a cable. Follow the steps on the board. Remind students to “TROUBLESHOOT FIRST!” Cable tension won’t fix a problem if the housing is blown.
4. When students are done, have them bring their bike to an instructor for a “Final Check.”
5. If students finish early, have them walk around the shop and “tour” different kinds of shifting systems. Can they find a grip shift, downtube shifter, trigger shifter, bar end shifter, and an STI shifter?
6. If students still have time, have them check all the other things on the bike that you have learned so far—headset, flat tires, front hubs, bottom bracket, front derailleur and brakes. They can also lubricate the chain and clean the bike.
7. Be sure to leave 15 minutes at the end of class for clean-up and “Final Checks” of each bike.

Follow-up:
1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.
2. Take a “head count” of the tools and make sure they are all in the correct places.
Review the 5½ steps to an overhaul.
Practice overhauling a threadless headset.

**Lesson**

**Preparation:**
1. Review your notes and “Review Worksheet” from the previous class.
2. Prepare enough bikes in stands for students to work in groups of two. If you
don’t have enough threadless headset bikes, have students work on what you have.
3. This is the portion of the class where students may be falling behind on their
bike projects if they had harder bikes to work on or any unforeseen problems—
make sure that they get ample time to do their work and catch up if they can.
4. Write the agenda and the 5½ steps of an overhaul on the board or wall.
   ⅓. Get a rag
   1. Disassemble
   2. Clean
   3. Inspect
   4. Grease and Reassemble
   5. Adjust

**Materials**
- Repair stands
- Allen keys
- Combination wrenches
- Simple green
- Rags
- Grease
- Bearings
- Drop gauges
- Mountain bikes w threadless
  headsets

**Resources**
- Review Worksheet (p. 212)
- Threadless Headset—Exploded
  (p. 247)

Continued on p. 133
LESSON (CONTINUED FROM P. 132)

Activity:

1. Review the 5½ steps of an overhaul. Be creative! Have students do the majority of the talking during the review.

2. Remind students that the cable routing of bikes with gears will be much more complex than the bikes they have worked on in the earlier classes, have them take a mental picture of the front of the bike before starting their work.

3. Pair up students, two to a bike (use strategies on p. 157–161).

4. Overhaul! Remind students to share the work.

5. When students are done, have them bring their headset to an instructor for a “Final Check.”

6. If students finish early, have them check all the other things on the bike that you have learned so far—headset, flat tires, front hubs. They can also lubricate the chain and clean the bike.

7. Make sure to leave 15 minutes for clean up! If a student pair is really struggling with an adjustment feel free to fix it for them at this point so that it gets back together.

Follow-up:

1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.

2. Take a “head count” of the tools and make sure they are all in the correct places.

MATERIALS & RESOURCES

See p. 132
LESSON
Preparation:
1. Review your notes and “Review Worksheet” from the previous class.
   If possible, remove crank arms and re-assemble before class to avoid a seized crank arm situation.
2. Prepare enough bikes in stands for students to work in groups of two.
3. Challenge the students’ sense of vocabulary by using bicycle language yourself and encouraging them to use precision in their speech.
4. This is a great lesson for extra volunteers!
5. Write the agenda and the 5½ steps of an overhaul on the board or wall.
   ½. Get a rag
   1. Disassemble
   2. Clean
   3. Inspect
   4. Grease and Reassemble
   5. Adjust

NOTE: It is very important during disassembly that you have all instructor hands on-deck to ensure that there is no cross-threading happening when removing crank arms.

MATERIALS
- Repair stands
- Bottom bracket sockets
- Large and small adjustable wrench
- Allen keys
- Simple green Lockring wrench
- Spanner wrenches
- Rags
- Grease
- Crank pullers
- Screwdriver
- Pedal wrench
- Mountain bikes
- Bottom Bracket chart

RESOURCES
- Review Worksheet (p. 212)
- Bottom Brackets (p. 250)

CONTINUED ON P. 135
LESSON (CONTINUED FROM P. 134)

Activity:

1. Have students explain the $5\frac{1}{2}$ steps of an overhaul. Get creative! Assign each person one step in the overhaul process. Have them act out their step without making any words. Have the rest of the students put the 6 actors in order without talking or making any noise!

2. There may be several different types of bottom brackets on the class bikes. Take some time to tour the classroom and look at the different systems. Display the Bottom Bracket chart (p. 250) to show students the various ways to take on and off a 3–piece bottom bracket based on the country of origin for the part/bike.

3. Remind students to look for washers when they remove the cranks/crank bolts!

4. Pair up students, two to a bike (use strategies on p. 157–161).

5. Overhaul! Make sure to remind students to tighten the crank puller in the crank with the adjustable wrench before extracting the cranks.

6. When students are done, have them bring their bike to an instructor for a “Final Check.”

7. If students finish early, have them check all the other things on the bike that you have learned so far, lubricate the chain and clean the bike.

8. Be sure to leave 15 minutes at the end of class for clean-up and “Final Checks” of additional work on each bike.

Follow-up:

1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.

2. Take a “head count” of the tools and make sure they are all in the correct places.
LESSON

Preparation:
1. Review your notes and “Review Worksheet” from the previous class.
2. Prepare enough bikes in stands for students to work in groups of two. Try to get as many different kinds of brake systems in the stands as possible. Try to group similar types of systems together in the classroom so that students can help each other, and you don’t have to move around as much.
3. Prep the bikes by making subtle or not-so-subtle changes in the brakes that need to be fixed.
4. Write the agenda and the steps to brake adjustments on the board.
   1. “Troubleshoot”
   2. Cables and Housing
   3. Canti-Hangers and Straddle Cables
   4. Ferrules and End Caps
   5. Cable Tension
   6. Centering and Springs
   7. Brake Pads

NOTE
In the advanced classes, try to challenge the students’ sense of vocabulary by using bicycle language yourself and encouraging them to use precision in their speech.

MATERIALS
Repair stands
Bikes
Rags
Simple green
Sandpaper
Tri-flow or other lube
Cable cutters
Offset brake tools
3rd & 4th hand tools
Housing
Cable ends
Ferrules
Brake pads
Y-socket (8/9/10) wrench
Hex wrenches
9/11 & 8/10 brake wrenches
Screwdrivers
Examples of cables
Examples of brakes and pads

RESOURCES
Review Worksheet (p. 212)
Brake Types (p. 248)
Brake Type Flow Chart (p. 249)

CONTINUED ON P. 137
LESSON (CONTINUED FROM P. 136)

Activity:
1. Pair up students, two to a bike (use strategies on p. 157–161).
2. Review the steps on the board having youth explain each part.
3. Have at it! Remind students to “TROUBLESHOOT FIRST!”
4. Have all adjustment brought to an instructor for a “Final Check” before moving on.
5. If students finish early, have them check all the other things on the bike that they have learned so far, lubricate the chain and clean the bike.
6. Give students a chance to work on more than one type of brake. After they have adjusted their bike, have them “prep” it for the next group by making changes that need to be adjusted by the next mechanics.
7. Have a more in-depth discussion about disk brakes, hydraulic brakes and specific tips for “squealy brakes” if you have time.
8. Be sure to leave 15 minutes at the end of class for clean-up and “Final Checks” of each bike.

Follow-up:
1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.
2. Take a “head count” of the tools and make sure they are all in the correct places.

MATERIALS & RESOURCES
See p. 136
LESSON

Preparation:
1. Review your notes and “Review Worksheet” from the previous class.
2. Prepare enough bikes in stands for students to work in groups of two.
3. Make sure to have a bike manual (or several) to use for reference if students start getting frustrated.
4. Prep the bikes by making subtle or not-so-subtle changes in the gears that need to be fixed.
5. Have some extra chain available for trying out the chain tool.
6. Write the agenda and steps to adjustment on the board.

Rear:
1) “TROUBLESHOOT”
2) Alignment
3) Limit screws
4) Cable Tension

Front:
1) “TROUBLESHOOT”
2) Height
3) Alignment
4) Limit screws
5) Cable tension

MATERIALS
Repair stands
Bikes
Examples of housing and cables for all systems
Cable and housing cutters
Tri-flow
Screwdrivers
Cables
Cable ends
Ferrules
Rags
Simple green
Chain checker
Chain removal tool
Allen keys
Y-socket wrench
9/11 & 8/10 wrenches
Freewheel example (off a bike)
Cassette example (off a bike)

RESOURCES
Review Worksheet (p. 212)

CONTINUED ON P. 139
LESSON (CONTINUED FROM P. 138)

Activity:
1. Pair up students, two to a bike (use strategies on p. 157–161).
2. Have at it! Remind students to start by “troubleshooting” the whole system.
3. If students finish early, have them check all the other things on the bike that they have learned so far, lubricate the chain and clean the bike. They can also practice breaking and re-connecting a chain with the chain tool.
4. When students are done, have them bring their bike to an instructor for a “Final Check.”
5. Be sure to leave 15 minutes at the end of the lesson to clean up!

Follow-up:
1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.
2. Take a “head count” of the tools and make sure they are all in the correct places.

NOTE
This class has the potential to get very frustrating for some as derailleurs can be particularly challenging. Help the students with techniques on how to work through their feelings [like Scenic Turnout (p. 175)] and remind why they are doing it in the first place.

Materials & Resources
See p. 138
REAR HUB PRACTICE 1 OF 2

Practice overhauling a rear hub.

LESSON

Preparation:
1. Review your notes and “Review Worksheet” from the previous class.
2. Prepare enough bikes in stands for students to work in groups of two.
3. Make sure to have a bike manual (or several) to use for reference if students start getting frustrated.
4. Challenge the students’ sense of vocabulary by using bicycle language yourself and encouraging them to use precision in their speech.
5. Write the agenda and the 5½ steps of an overhaul on the board or wall.

½. Get a rag
1. Disassemble
2. Clean
3. Inspect
4. Grease and Reassemble
5. Adjust

MATERIALS
- Repair stands
- Bikes
- Cone wrenches
- Combination wrenches
- Bench vice
- Axle vice
- Freewheel remover
- Chain whip
- Giant adjustable wrench
- Cassette lockring tools
- Grease
- Rags
- Simple green
- Cleaning brushes
- Torque wrench (optional)

RESOURCES
- Review Worksheet (p. 212)
- Rear Freewheel Hub—Exploded (p. 246)

CONTINUED ON P. 141
LESSON (CONTINUED FROM P. 140)

Activity:

1. Review the 5½ steps of an overhaul. Get creative! If students are mature enough to stay positive and not get mean, have them explain the steps while imitating the teaching style of one of their teachers. Have students (and staff) guess which teacher it is!

2. Get to it! Remind students to take extra care when working with freewheels and cassettes.

3. Make sure the students know that they need to get their adjustment checked by an instructor EVERY TIME before fully reassembling their bike. They also need to sign off on each job as they finish—this is an important habit for working in a shop.

4. If students finish early, have them check all the other things on the bike that they have learned so far, lubricate the chain and clean the bike.

5. When students are done, have them bring their wheel to an instructor for a “Final Check” before putting it back in the bike.

6. Be sure to leave 15 minutes at the end of class for clean-up!

Follow-up:

1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.

2. Take a “head count” of the tools and make sure they are all in the correct places.

NOTE: Make sure students use caution when threading freewheels back onto the wheel as they could turn disastrous if improperly threaded.
WHEEL TRUING PRACTICE 1 OF 2

Practice concepts of wheel building and truing.

LESSON

Preparation:
1. Review your notes and “Review Worksheet” from the previous class.
2. Prepare one bike for each student. They will true both the front and rear wheels.
3. This class requires special preparation to round up enough truing stands. Plan in advance!
4. Have additional practice wheels on hand for students who move fast or whose wheels don’t need much truing.
5. Have an example of a bent (versus out of true) rim.
6. Write the steps to truing a wheel on the board along with the agenda.
   1. Remove the wheel
   2. Put the wheel in the stand
   3. True laterally with the tire on
   4. True radially with the tire off
   5. Check spoke tension with a tensiometer
   6. Check wheel dish with a dishing tool
   7. Clean the wheel

MATERIALS

Truing stands
Spoke wrenches
Dishing tool
Tensiometer
Tri-Flow
Rags
Demo wheels, rims, hubs, spokes

RESOURCES

Review Worksheet (p. 212)
Parts of the Wheel (p. 245)

CONTINUED ON P. 143
LESSON (CONTINUED FROM P. 142)

This class has the potential to get very frustrating. Help the students with techniques on how to work through their feelings [like Scenic Turnout (p. 175)] and remind why they are doing it in the first place.

Activity:
1. Remind students to work in SMALL increments. A quarter turn at a time is enough. In addition, they’ll have to go back and forth between radial and lateral truing a few times.
2. If students finish early, have other wheels they can work on. Throw a bent rim in the mix and talk about why it can’t be trued. What can you do in this instance?
3. When students are done, have them bring their wheels to an instructor for a “Final Check.”
4. Be sure to leave at least 15 minutes at the end of class for clean-up and any additional adjustments.

Follow-up:
1. Fill out the “Review Worksheet” (p. 212). This will help you plan the next class, and the next year.
2. Take a “head count” of the tools and make sure they are all in the correct places.