The Fourth Grade Tumblers' Manual

Written by Grade Four Students and Staff
Alice B. Beal Magnet School: An Expeditionary Learning School in Springfield, MA
Spring 2007

Grade Four Students and Teachers

Mr. Costello, Mrs. Mattoon, Mrs. Starzic, Ms. Russo and Mr. Lindsay

Juliette
Garhett
Chyhiem
Keesha
David
Dayquan
Angelia
Kathy
Veronica
Siannah
Joshua
Qiyam
Orlando
Anna
Serali
Ashley
Andrew
Raymond
Natalie
Matthew
James
Simone

Lyusi
Nathaniel
Bryanna
Abigail
Tajour
Ny'Asia
I'mani
Kira
Kayla
Olivia
Jahara
Shamsiddin
Michael
Isiah
Stephanie
Gabriella
Clarissa
Tyler
Deliani
Johnathan

To Our Readers

Each fourth grade student wrote to describe parts of our processes of tumbling. Although every fourth graders' words are not included in this manual, we are publishing their spirit and hard work. Every student worked to tumble our rocks. You'll be able to imagine, as you read our booklet, how much time, energy, cooperation, and hard work was required. We tumbled twice. That's about six weeks times two. Three months of work. But we admit, we love staring at, holding, and talking about our stones.

This manual was composed, as much as possible, with student words, sentences, and ideas. Orlando helped shape our manual with his deft remark that a lot of what we did to tumble rocks was repetitive. So, our manual tries to explain in sentences how to tumble. It is written with bulleted (•) sub-titles, which we hope can be used as check lists and organizers for future tumblers.

We want to dedicate our manual to Ms. Russo, our magnet technology teacher, who makes things work out beautifully for us all – students and teachers.

Introduction

The Beal School Fourth Graders tried tumbling rocks in the spring of 2007. The rocks came out beautifully. We think Beal students (or anyone) should try tumbling rocks. Because Beal is a magnet school it seems like we can do anything! How many other schools get to tumble rocks? There are really lots of reasons we think you too should try tumbling.

It's a great, fun project. At first you might think rocks are dumb. But when you get the hang of tumbling, you'll say, "Hey, rocks are pretty cool!" When you are finished with tumbling there are truckloads of things you can do with your beautiful, polished rocks. You can keep some of them and you can sell some of them. You can make jewelry with them. You can show them to your parents or you can show them off to anyone. You can add them to a collection. You can trade them or you can give them away. We didn't know how cool ordinary rocks are until we did this project.

Another thing that's fun about this project is that you get to pick out one rock to be yours from the rough rocks before they are tumbled. When you put it in the tumbler, you predict what your rock is going to look like when it is shiny and smooth. It is so fun to take the ugliest rock in the world and turn it into the prettiest. Some of the rocks change so much you can't find them. If that happens to you, you get to pick another finished rock to keep. And another good thing is when your rock is finished you learn more about it.

Beal students should study rocks because in science class students learn about how different kinds of erosion changes rocks. The tumbler is doing the same thing, but at a faster pace. In the real world it takes years to smooth rocks. In the tumbler it takes five weeks. You might think all we do is put water in the tumbler, but there is a different twist. Where the ocean comes up to the shore it might flip and twist and rub a rock until it's smooth. But we use different steps to flip and twist rocks with rough grit, fine grit, pre-polish, polish, and washing with soap. For some of us the best part is always changing and advancing to new steps. We also liked seeing how the rocks change bit by bit when we see them between the steps.

Beal students study rocks in fourth grade. When you tumble them you see in real life what rocks are like. Some of us got to take pictures. You do things you never did before. If you like to get a bit messy, this is a wonderful project for you.

Before You Begin

Before you begin you need to pick the right sizes of rocks. The largest a rock can be is 1½ inches. The smallest a rock can be is ¼ inches. A quarter of the rocks you put in should be small because the bigger rocks don't fit like a puzzle. Those small rocks are going to fill that gap between two larger rocks. When the rocks fit together they get to rub on each other and the grits more

When you tumble rocks you make this goo called slurry. Slurry is formed in the tumbler from the grits or polishes, rock dust, and water. Slurry isn't poisonous. It is very thick and sticky. Most of all, never, ever, ever pour it down the drain because if you do it will act like cement and stick to the drain and clog it up. Dump it outside on the ground where no one will walk in it.

Beal School has two tumblers. They both have two barrels that hold rocks. Each barrel holds 6 pounds of rocks. This next table tells you how much grit, polish, and soap to put in the tumbler for each step of tumbling. We used a coffee scoop to measure the grits and powders. One coffee scoop holds two tablespoons. So you use one coffee scoop to add two tablespoons. Do you see how many tablespoons of coarse grind (rough grit) to add to a 6 pound barrel?

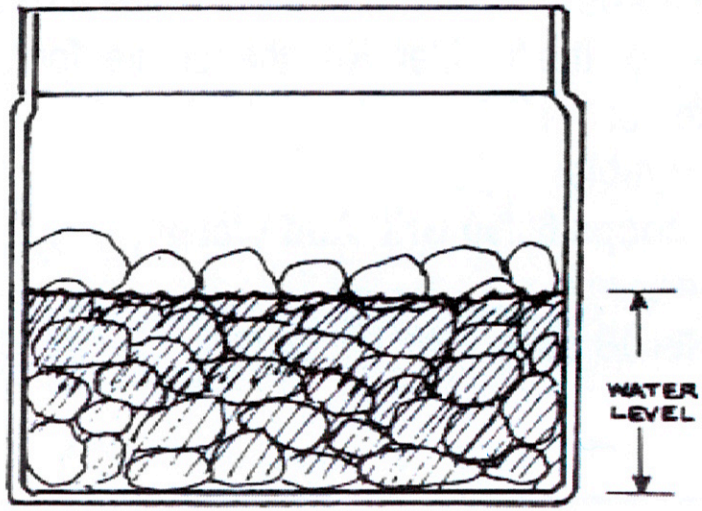
TUMBLING COMPOUND QUANTITIES

BARREL Barrel Size	STEP 1 Coarse Grind	STEP 2 Medium Grind	STEP 3 Pre-Polish	STEP 4 Polish	STEP 5 Burnish (Soap)
pounds	TABLESPOONS				
1.5	4	4	5	5	½
3.0	4	4	6	6	1
4.5	8	8	8	8	1½
6.0	10	10	12	12	3
12.0	20	20	24	24	4

Step One: Rough Grit

- **Loading The Tumbler**

The first thing you need to do is fill each tumbler 2/3 or up to ¾ full of rocks. Remember to put in different sizes of rocks. Then you add 5 coffee scoops of rough grit that is also called 60/90 sized grit. Do not to spill the grit on the top of the tumbler where the black cover fits. That part of the tumbler has to stay clean or the top might leak. Now, when you add the water, you don't need a whole lot all the way to the top. Add water till it gets up to the bottom or middle of the top layer of rocks. If you cut the side off the barrel, it would look like this.



Now it's time to put the covers on. You need to close the covers properly so there are no cracks for things to spill out. There are two covers. One cover is black and silver and the other is just silver. You put the black and silver one on first. Push one side of it down into the top edge of the tumbler. Then push it down all around till it fits. Now the all-metal silver cover goes on top. Push this top down hard till there is almost no crack on the edge. The bolt sticks up through the silver cover. Put the washer on the bolt. Screw the black nut down on the bolt. Make sure the side of the nut that has metal around the bolt is up. The side of the nut with a slot in it is also up near the top.

Put the barrels on the tumbler. Run the tumbler for 10 days. So, to repeat, for Step One, here's what to do:

- **Load The Tumbler**
- **Add Five Scoops 60/90 Grit, Add Water**
- **Close Covers**
- **Run Tumbler 10 days**

Step Two: Medium Grit

- **Fill Water buckets**

To clean the rocks you need a lot of water. Find a hose in our "mop sink closet" near the teachers' room. It's the door with no name on it. With the hose fill at least four medium size buckets and two large buckets half way to the top so that they are not too heavy to carry. If the buckets are too full, you might hit it with your leg and spill water in the hall. The water temperature doesn't matter (but don't make it too hot). Carry the buckets outside on the pavement just past the door to Room S – 6. When you use the hose do not turn on the water on high or the hose will get out of control. Hold the hose near the end where the water comes out or else it will splatter everywhere because it has a lot of pressure. If you spill water anywhere on the floor, you have to clean it up.

- **Open The Tumbler**

To open the tumblers, you twist the black knob (or nut) to take off the silver top. Don't use a tool when you close the top. Because if you close the top too tight it won't come off again. If the black knob is on too tight to take off, ask an adult to open or ask them to get a wrench or pliers and unscrew it. After you twist the black knob off, take the silver washer off. Use this washer to get the silver top off. Find a crack between the silver top and the black side of the barrel. Push the washer in the crack and twist it to get the silver top off. Then screw the knob on the bolt again. The knob will help you pull the second top off. Before you pull on the knob find the crack between the side of the barrel and the black and silver cover. Push the side of the tumbler away from the black top for about three inches along one curving side. Now, when you pull up on the knob, it should pop the top off! The tumbler is open. What color is the slurry?

• Wash The Rocks, Tops, and Barrels

Take a colander (a strainer) and put it in a container. Put the barrel in the colander. Pour water into the barrel. Turn the barrel sideways and gently pour or push the rocks into the colander. Wash the slurry and little rocks out of the barrel and into the colander. When you pour rocks into the colander, you have to make certain they do not crack. So we pour the rocks into our hands before spilling them gently into the colander.

Now the slurry and the wash water are in the container. Lift the colander out of the container. Put it into a new, empty container. Pour the slurry water into two empty buckets. Carry the slurry to a spot your teacher says is a good place to dump it on the ground.

You need to wash the rocks, tops, and barrels until they are clean. Pour water onto and off the rocks until the water stays clean. Rubbing the sides of the tops and the corners inside the barrels with water and paper towels works to clean them. The rest of the wash water from the rocks can be dumped near the school building.

• Load The Tumbler, Check for Clunkers

This time when you load the tumbler, you have to look for clunkers. Look at each rock as you put the clean rocks into the barrel. Feel the rocks. If any rocks have rough, scratchy spots that could scratch other rocks, take them out and save them. If any rocks have cracks that the Step One grit might be stuck in, add them to the clunkers. Save the clunkers. The clunkers can be put back into Step One and tumbled again some other time.

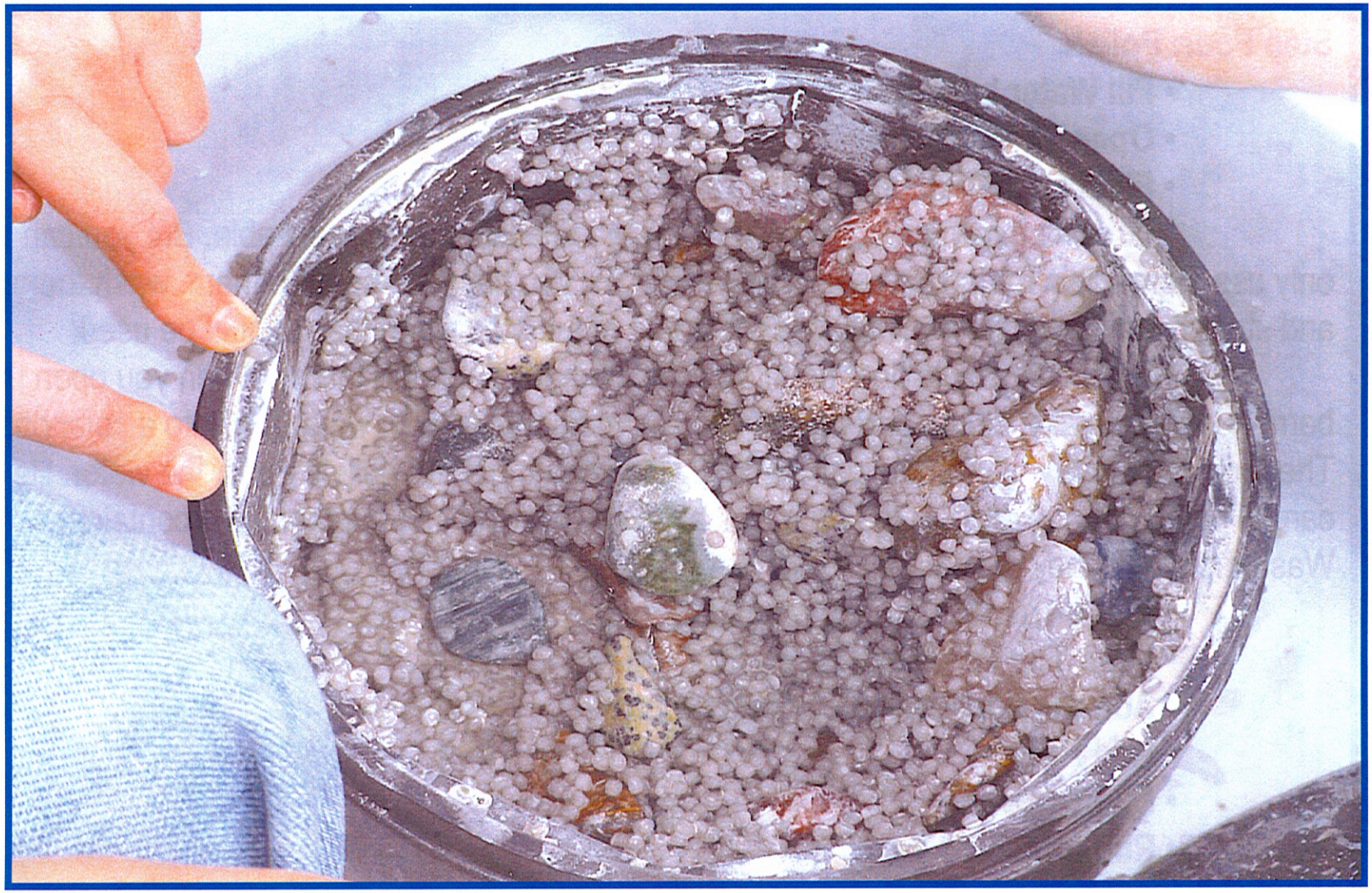
- **Add Five Scoops 120/220 Grit, Add Water**
- **Close Covers**
- **Run Tumbler 7 days**

Step Three: Pre-Polish

- **Fill Water buckets**
- **Open The Tumbler**
- **Wash The Rocks, Tops, and Barrels**
- **Load The Tumbler, Check for Clunkers**
- **Add Six Scoops Pre-Polish, Add Water**
- **Add Pellets**

Rocks get smaller when they tumble. Add plastic pellets if you have less than 2/3 of a barrelful when you load it. Use pellets to get the barrel 2/3 to ¾ full, just like in Step One when you loaded it the first time. The pellets keep the rocks from falling too far inside the tumbler. They might crack or chip if they fall too far.

- **Close Covers**
- **Run Tumbler 7 days**



Step Four: Polish

- **Fill Water buckets**
- **Open The Tumbler**
- **Float Off, Wash, and Store The Pellets**

You don't throw the plastic pellets away because they are reusable. But you can only use them again for the same tumbling step. So, you have to separate them, wash them, and store them in a container that says the name of the step when they should be used.

Here's one way to float them off (which means separate them). When you open the barrel, pour the rocks, slurry, and pellets into a container filled with water (not into a colander). The rocks go to the bottom. The pellets float. Use nets to get the pellets out of the water. Be careful not to get any rocks in the nets. Get all the pellets out and put them in a container. Wash them until they are clean. Store them.

- **Wash The Rocks, Tops, and Barrels**
- **Load The Tumbler, Check for Clunkers**
- **Add Six Scoops Polish, Add Water**
- **Add Pellets**
- **Close Covers**
- **Run tumbler 7 days**

Step Five: Wash

- Fill Water buckets
- Open The Tumbler
- Float Off, Wash, and Store The Pellets
- Wash The Rocks, Tops, and Barrels
- Load The Tumbler, Check for Clunkers
- Add One and One Half Scoops Soap, Add Water
- Add Pellets
- Close Covers
- Run Tumbler 2 days

And after two days you can…

- Fill Water buckets
- Open The Tumbler
- Float Off, Wash, and Store The Pellets
- Wash The Rocks, Tops, and Barrels

Now enjoy your beautiful rocks!

Here's How Our Rocks Came Out

We were all amazed at how the rocks were transformed. When we went to find our rock, we wanted to take all of them. They were so magnificent. All the rocks had their own special color and shape. Everybody was very happy about how our hard work paid off. The patterns are as elegant as the rock itself. The patterns can have rings like opal, stripes like corundum (ruby or sapphire), spots like Dalmatian, or your stone might even be clear. Tigereye changed a lot. It looks holographic now. When I move it, it changes from light to dark. It feels as smooth as glass. Ocean jasper used to be blue when it was not polished, but not now. It is now green. All the rocks came out filled with color. Well, they were all more beautiful than the sun shining on the ocean. One rock looks like the waves of the ocean.