



Lapidry Level-II

Based on January, 2014, Version 1 OS and April, 2021, V1 Curriculum



Module Title: Tumbling Gem Material

LG Code: MIN LAP1M06 LO(1-8)LG(22-28)

TTLM Code: MIN LAP1M06TTLM0421v1

April, 2021



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LG #22	LO #1- Prepare for Work
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Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Ensuring **occupational health and safety (OHS) requirements**
- planning task and sequencing in conjunction with tumbling processes
- selecting and checking tools and equipments for serviceability
- Acquiring tumbling material
- Selecting tumbling consumables based on appropriateness.
- cleaning equipment and work area

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Ensure **occupational health and safety (OHS) requirements**
- Plan task and sequence in conjunction with tumbling processes
- Select and check tools and equipments for serviceability
- Acquire tumbling material
- Select tumbling consumables based on appropriateness.
- Clean equipment and work area

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 20.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the [self-checks 1, 2,3,4,5, and 6 in pages 5,7,10,13,16, and18 respectively](#)
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if



your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.

7. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet 1- Ensuring *occupational health and safety* (OHS) requirements

1. Ensuring *occupational health and safety* (OHS) requirements

While operating with tumbling equipment, apply the following general occupational health and safety requirements.

- ❖ **Keep work area clean and uncluttered at all times.**
- ❖ **Never disconnect machine from power source with wet hands.**
- ❖ Make sure to keep all electrical connections dry.
- ❖ **Do not leave children unattended while using this machine.** Adult supervision is required at all times.
- ❖ **Do not operate this machine while under the influence of drugs, alcohol or any medication that causes drowsiness.**
- ❖ **Some rocks contain poisonous elements.** Avoid tumbling rocks that contain uranium, mercury, lead, arsenic, etc. Make sure you know the material you are polishing.
- ❖ **Do not overload the Tumble-Bee barrels.** This puts strain on the motor and won't give you the results you expect. Always use appropriate quantities that won't exceed the tumbler's capacity.
- ❖ **Never pour rock slurry down the drain.** When emptying and cleaning your barrels, never pour the slurry down the drain. Slurry hardens like a rock and can clog your drain.
- ❖ **Do not force the tool** to do a job it is not designed to do.

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- ❖ **Do not remove thermal overload protector from motor.**
- ❖ **Use only recommended accessories and parts.** The use of improper accessories or parts on this machine may cause risk of injury.
- ❖ **Know your power tool.** Read this instruction manual carefully. Learn the correct applications and limitations as well as specific warnings and hazards related to this machine.
- ❖ **Wear proper apparel.** Do not wear loose clothing, neckties or jewelry that can get caught in machine's moving parts. Secure long hair with rubber band or hair tie.
- ❖ **use eye, ear, and face protection.** Always wear ANSI-approved impact safety goggles. Wear a full face shield if you are producing metal flings or wood chips. Wear an ANSI approved dust mask or respirator when working around metal, wood, and chemical dusts and mists.
- ❖ **Do not overreach.** Keep proper footing and balance at all times. Do not reach over or across running machines.
- ❖ **maintain tools with care.** Keep tools clean for better and safer performance. Follow instructions for lubricating and changing accessories. Inspect tool cords periodically

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Self-Check -1	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. What do we mean by OHS?
2. Mention at least 10 occupational health safety procedures that should be applied while working with tumbling equipment.

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet 2 -Planning task and sequencing in conjunction with tumbling processes

2. Planning task and sequencing in conjunction with tumbling processes

The task at the first step of any project or product manufacturing is planning the project and sequencing the tasks as per the product requirement.

2.1 Planning end result of the process

Before going into any manufacturing process, it is better to plan the end product of the process.

2.2 Acquiring gemstone

The gemstone rough has to be acquired as per the end product of the process.

2.3 Preparing tools and equipment and other consumables

Tools, equipments, and other necessary consumables have to be made ready to start the process. Likewise, other all necessary inputs of the production process should be arranged sequentially and following the basic procedures of tumbling, generally categorized as coarse grinding, medium grinding, fine grinding, polishing, and cleaning, the task can be planned sequentially as per the requirements of the process. The processes are in effect correspondingly providing with the right abrasives and polishing compounds.

Examples abrasives include carbide grits, fillers like pellets, plastic etc. and polishing compounds including the following:

- Cerium oxide
- Tin oxide
- Aluminium oxide

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Carbid grits ranges from 60/90 upto 1000.As the number smaller ,the size of grit is larger and the the number is larger the size of the grit is smaller i.e the number/amunt of partcils on agiven surface is small for small number(60/90) and much more for(10000). If the number is small(60) the degree of cutting is higher and the number is more, degree of cutting become less but dgree of polish is higher.

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Self-Check -2	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answers for each.

- 1.what are the equipments that are used to tumble gemstones?
2. what are the consumable materials in tumbling process.
3. List the filler materials commonly used in tumbling.

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet 3 - Selecting and checking tools and equipments for serviceability

3. Selecting and checking tools and equipments for serviceability

3.1 Tumbling and tumbling equipment

3.1.1 Tumbling

Tumbling is the process of polishing gemstones by putting their rough in a revolving or vibrating barrel .

- It the simplest of way of fashioning gems, and that which serves as introduction to a lifelong hobby for many, is tumbling. The tumbler simulates, but speeds up many-fold, the natural events that make river stones smooth.
- It is accomplished by mixing the rough gems with water and a series of ever finer abrasives, and either tumbling them in a motorized, rotating rubber-lined barrel, or subjecting them to prolonged vibrations.
- **Tumbling is rough rocks transformed into smooth, shiny, colorful works of natural art!** Agate is a popular rock used to make tumbled stones. There are many different types of agate. In this photo you can see agate, apricot agate, carnelian agate, tree agate, blue lace agate, dendritic blue agate, green moss agate and others.



Figure 1 tumbled stones

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- Tumbled stones are small, rounded, brightly polished pieces of rocks and minerals. They are made by placing rough rocks in a machine known as a rock tumbler, which tumbles them until their edges and surfaces are smooth and polished. They are also known as "polished stones," "tumbled gems," "baroque gems," "polished rocks," and a variety of other names.
- Many people enjoy tumbled stones because they are beautiful natural materials that have been given a pleasing shape and a bright polish. They are popular in jewelry, craft, souvenir, awards, collectibles, and New Age markets. Tumbled stones can be purchased by the pound at prices that just about everyone can afford. Their colorful appearance and interesting shapes have inspired many people to learn more about rocks, minerals, and gems.
- The most popular materials used for making tumbled stones are attractive and colorful rocks and minerals that have a Mohs hardness between 5 and 8. These materials are generally durable and accept a good polish. Some of the most commonly tumbled materials are listed below
- Tumbled stones are made in a machine known as a rock tumbler. The most commonly used rock tumbler is a rotary machine that turns a barrel containing the stones, along with abrasive grit, and water, for days and weeks at a time. As the rocks tumble in the barrel, the grains of abrasive grit get caught between the rocks and abrade off sharp points and edges. This first step modifies the shape of the rocks and moves them towards a rounded shape. In two subsequent steps, smaller-size granules of silicon carbide are used to smooth the surfaces of the rocks in preparation for polishing. Then, in the final step, a rock polish such as micron-size aluminum oxide is used to produce a bright, lustrous, polished surface on the rocks. The tumbling process usually takes a few weeks to complete in a rotary tumbler

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As the stones hit each other, and the abrasive materials, sharp edges and corners become more rounded.

Each stage (usually 3 or 4) typically takes about two weeks so that from rough to polished gems takes considerable time. *Tumbling is not a craft for the impatient.* It can also be noisy and messy, but the product at the end is very pretty.

3.1.2 Types of tumbling equipment

There are two types of tumbling equipment:

- ❖ Vibratory tumbler
- ❖ Rotary tumbler

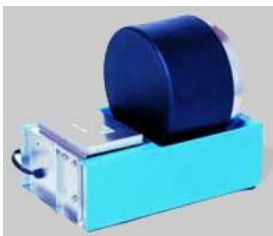


Fig -A vibratory tumbler

Vibratory tumbler works by shaking/vibrating 24hours for7days to accomplish one phase



Fig 2-A rotary tumbler

Rotary tumbler works by rolling 24hours

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for 7 days to accomplish one phase

of tumbled



Fig 3-An assortment of stones

The smooth, shiny tumbled stones can be used as accents in aquaria or as decorations in the garden or in the pots of houseplants. They can also be glued to "bell cap" findings, and made into pendants, charms or key chains. They are sometimes drilled to make baroque beads.

3.1.3 Checking up tools and equipment

Before operating machines to mass produce the tumbled products, the equipment has to be cross checked for its wellbeing. The tumbler should be clean unless it may be contaminated and its malfunctioning parts should be



reported for maintenance

Self-Check -3	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answers for each.

1. What is tumbling ?
2. What are the two types of tumbling equipment.
3. what do we mean by serviceability of machines?
4. What kind of material to be tumbled?

Note: Satisfactory rating - 4 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions



Information Sheet 4- Acquiring tumbling material

4. Acquiring tumbling material

4.1 Selecting Materials for Tumbling

Select your materials with care. The better the quality of the stones used, the better the final polish will be obtained. Do not expect poor or inferior materials to be transformed by some miracle into beautiful and precious gems. Most materials ranging in hardness of 5 on the Mohs scale up through 8, may be processed by the tumbling method. Extremely hard and extremely soft stones usually require special treatment, and should not be mixed with other materials. Beginners should start with agates, jaspers, and stones of similar hardness, about 6.5 to 7.5, as these stones are relatively easy to polish to a beautiful shine. To determine the approximate hardness of rocks collected in the field, refer to the Mohs scale and scratch test guide given below. Use of this guide allows one to make quick, relative determinations of a stone's hardness which is useful not only in

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selecting material suitable for tumbling, but also helps in identifying the particular rock or

Mohs Hardness Scale		
MINERAL	HARDNESS	COMMON TESTS
Talc	1	Scratched by fingernail
Gypsum	2	
Calcite	3	Scratched by copper coin
Fluorite	4	Scratched by a knife blade or window glass
Apatite	5	
Feldspar	6	Scratches a knife blade or window glass
Quartz	7	
Topaz	8	
Corundum	9	
Diamond	10	Scratches all common materials

mineral.

Table -MOH's hardness value

The size of the stones should be varied rather than similar. Generally, most of the load should measure from three quarters of an inch to one and one half inches, with a few stones up to two inches. The size variance prevents the stones from forming a relatively solid mass

which will not process properly.

4.2 Rocks/gemstones NOT to tumble

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As explained above, you want to pick gemstones/rocks based on their hardness according to the Moh's scale. The Moh's scale was formed in 1812 by Friedrich Mohs (a German geologist).

In a nutshell, it's a scale from 1-10 that measures a rock's scratch resistance (or hardness).

The lower the number, the softer the rock. For tumbling, it's best to stay in the seven range.

This is where quartz falls.

You can see that talc is so soft that it can be scratched with just a fingernail. Harder minerals require steel nails and masonry drill bits to leave a scratch.

Rocks that are too soft or too hard can be tough to polish and not recommended for a beginner.

Examples of rocks that are too soft would be soapstone and marble. Examples of rocks that would be considered too hard would be gem varieties of corundum like ruby and sapphire.

Diamonds would also be considered too hard.

Self-Check -4	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answers for each.

1. How can hardness of a material affect the end result of the tumbling?
2. List the gem materials that should not usually be tumbled.
3. How can size gem material determine the tumbling process.

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Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

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Information sheet-5	Selecting tumbling consumables based on appropriateness
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5. Selecting tumbling consumables based on appropriateness

5.1 Consumables of tumbling

There different consumables in tumbling process

5.1.1 Fillers

A filler or media of some type should be used to close airspaces between the rough stones. Fillers such as ceramic media, **plastic pellets**, ground corn cob and **walnut shells** are available. We recommend the use of ceramic media. Fillers help cushion the rocks and also distribute the abrasives more thoroughly through the load. In most cases the fillers may be re-used for subsequent loads. They will help prevent damage to the stones by absorbing some of the tumbling (banging) action. Add the filler material until the half-way mark is achieved. Add about one teaspoon of detergent soap.

5.1.2 The Abrasive Grits

The most common form of abrasive for use in tumblers is Silicon Carbide, a man made version of the mineral corundum (an impure form of sapphire and ruby).

This is a relatively inexpensive grit which comes in a lot of different forms. For our purposes the loose powder version is ideal. For most types of stones three grades of silicon carbide abrasives are used .

- ❖ 80 grit for the coarse first grind stage;
- ❖ 220 grit as a middle grind stage; and
- ❖ 400 grit for a final grinding stage.
- ❖ For some troublesome stones a further stage using 600 grit,1000 grit or sometimes pumice powder may be useful to get a quicker or higher polish.

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These grades of abrasive are chosen carefully. Each one is capable of removing the scratches left by the previous coarser grit - but don't expect them to do much more than that ! As a general rule marks that are still visible when leaving the 80 grit stage will still be visible in the finished gemstone.

5.1.3 Polishing compounds

For almost all stones **cerium oxide** will give a high finish at a reasonable cost. **Tin oxide** is also used but it is expensive. Aluminum oxide can be used for final polish. The polishing powder can be used over and over again (provided it doesn't get contaminated), so use the best you can afford.

Self-Check -5	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answers for each.

1. What do mean by tumbling grit size ?
2. How can we prevent the contamination of the abrasive grit?
3. What is the function of using fillers ?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-6

Cleaning equipment and work area

6. Cleaning equipment and work area

For safety of the operator and the machine, the machine and the work area has to be properly cleaned before starting the major operation. The advantage of cleaning is to prevent contamination of abrasives and polishing compounds with the dirty environment and thus neatness enhances polishing process.

The cleaning operation should be done by using different cleaning consumables including washing agents like soaps etc.

Cleaning of the equipment is important to early detect the worn out parts of the machine performing the next operation. The dirt to be cleaned here is usually the last used grit deposits, sands mud from abrasion and polishing of stones used water etc.

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Self-Check -6	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. How can cleaning of machinery and work area increase safety of operators and machinery?
2. What are the cleaning consumables?
3. What are the probable wastes that should be cleaned?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____



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TTLM Code MIN LAP1TTLM0421v1

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LG #23	LO #2- Prepare, select and weigh rough material
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Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Loading the barrel or bowl to $\frac{1}{2}$ - $\frac{3}{4}$ full rough
- Adding a required amount of 60/80 grit.
- Adding Fillers to allow coverage of space
- Filling Water (if required) is to cover remaining space.
- Closing and tightening barrels / bowls.
- Tagging machine with starting day and grit size.
- Starting machine and running for a week (24 hours) of rough grind..
- Unloading the mix.
- Separating stone, filler and grit.
- Cleaning/washing stone.

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, **you will be able to –**

- Load the barrel or bowl to $\frac{1}{2}$ - $\frac{3}{4}$ full rough
- Add a required amount of 60/80 grit.
- Add Fillers to allow coverage of space
- Fill Water (if required) is to cover remaining space.
- Close and tighten barrels / bowls.
- Tag machine with starting day and grit size.
- Start machine and run for a week (24 hours) of rough grind..
- Unload the mix.
- Separate stone, filler and grit.
- Clean/wash stone.



Learning Instructions:

8. Read the specific objectives of this Learning Guide.
9. Follow the instructions described in number 3 to 7.
10. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
11. Accomplish the [self-checks 1, 2,3 and4](#) in [pages 4,6,8, and 10](#) respectively
12. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
13. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
14. Submit your accomplished Self-check. This will form part of your training portfolio

Information Sheet 1- Loading the barrel or bowl to $\frac{1}{2}$ - $\frac{3}{4}$ full rough

1. Loading the barrel or bowl to $\frac{1}{2}$ - $\frac{3}{4}$ full rough

1.1 Introduction to tumble

Before loading gemstone rough, it is important to perform the following preparatory tasks

- Wash the stones thoroughly. Be sure there is no debris attached to the stones. Use a brush and soapy water if necessary.

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Sort your stones by size and hardness into groups or batches. Soft stones will grind away before hard stones are ready for the next step. Stones of nearly the same size will have more points of contact and therefore will produce a more thorough and faster grinding action. If certain shapes or sizes are desired, you may want to preform your stones by grinding them on a lap first.

1.2 - Loading the barrel

The amount of stones put in a tumbler barrel depends on the size of the barrel and the stones themselves. The best tumbling action occurs when the barrel is filled $\frac{1}{2}$ - $\frac{3}{4}$ of its capacity. Fill the barrel with your stones to $\frac{1}{2}$ " above the halfway mark. Remove the stones and weight them. This weight will help you to determine how much grit is needed. Record this weight for future reference. Use the following ratio to determine the amount of silicon carbide grit needed for your batch:



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One pound of grit per eight to ten pounds of rock



Self-Check -1	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. How much is the amount of abrasive grit to be added in rough grinding?
2. What do we mean by tumbling mix?
3. How much is the volume of the barrel to be filled with the tumbling mix? why?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions



Information Sheet-2

Adding a required amount of 60/80 grit

2. Adding a required amount of 60/80 grit (coarse grinding)

Following the steps in the information sheet-1, Put your batch of rocks back into the barrel and add grit accordingly. If the rocks are chips or have rough crude surfaces, start with a **coarse grit (60/80 mesh)**. If the rocks are water worn from tumbling in stream beds or already tumbled by ocean waves, start with a medium grit.

- If baking soda is available, add about a tablespoonful to the mix. The soda will help neutralize the gases that might be formed. Add water into the barrel so it is either just touching the bottom of the top layer of rocks or until it covers the rock by no more than 1/16 of an inch. Put the cover on and secure it. Place the barrel into position on the tumbler.

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Self-Check -2	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. What is the amount of adding grit to the mix?
2. What do we mean by **60/80 mesh** grit?
3. What will happen if we fill the barrel 100%

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-3	Adding Fillers and water to allow coverage of space and tightening the barrel
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3. Adding Fillers and water to allow coverage of space and tightening the barrel

3.1 Adding Fillers to allow coverage of space

Add fillers into the barrel to fill the gap and prevent unnecessary collisions between the stones, If they do not fill the barrel to the half-way mark. The filler material is available from lapidary supply stores. Inexpensive marbles, plastic pellets, or crushed walnut shells make good substitutes. Add the filler material until the half-way mark is reached.

3.2 Adding water

In addition to the fillers ,water should be added to fill the remaining space so it is either just touching the bottom of the top layer of rocks or until it covers the rock by no more than 1/16 of an inch.

3.3 Tightening the barrel

After filling the tumbling mix, the barrel should be properly covered tightened by wing nuts.

3.4 Tagging machine with starting day and grit size

Tagging is a technique of writing a note on a tumbling machine about starting date, the type of material, and the grit or polishing compound on use. The note can be wider than mentioned here. It is used as a reference for decision making.

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Self-Check -3	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. What is tagging?
2. List all the information that should be written on the tag?
3. How much should the level of water above the gem material.?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions



Information Sheet-4	Starting machine and run for a week (24 hours) of rough grind
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4. Starting machine and run for a week (24 hours) of rough grind

After adding, filling, tightening and tagging the machine, now it is time to start the machine by placing the barrel into position on the machine. Here below are the operations to be performed till the change of the next grit.

- Put the tumbler into operation and observe its action for a few minutes. Check for loose or slipping belts or pulleys. Listen to the sounds coming from within the barrel. Is there sufficient amount of action taking place? If there isn't, shut down the operation, open the barrel and inspect the consistency of the mixture. If the mixture is too dry, add a little water. Put the cover back on and continue as before. If everything appears to be functioning properly, you can leave and come back periodically to check the operation.
- It will take an average of four to six days of coarse grinding. Sharp-edged or broken pieces of agate may require as much as 360 hours of coarse grind operation. After each 24 hours of operation, shut down the operation. Remove some stones from the barrel and examine them. You can add or decrease the grinding time according to how much more rough grinding you want performed. If you want to continue with the coarse grit, inspect the grit and the consistency of the mixture. If the grit no longer has sharp edges, you may want to add more coarse grit. If the mixture is too dry, you may want to add a little more water. Place the stones back into the container, seal the barrel, place it into position, and start up the operation. Observe and listen to see if the operation is functioning properly. You can leave and check back periodically. When the coarse grinding phase is finished to your satisfaction, you can

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proceed to the next step. If a few stones need more coarse grinding, you can remove them from this batch and re-tumble them later in another batch.

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Self-Check -4	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. What is the importance of listening the sounds coming from within the barrel?
2. How much time is usually required to accomplish rough grinding?
3. How can we grind gemstones which are not found with satisfactory results while tumbling in previous step?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions



Information Sheet-5

Unloading the mix, Separating stone, filler and grit and cleaning

5. Unloading the mix, Separating stone, filler and grit and cleaning

When the coarse grinding phase is finished to your satisfaction, you can proceed to the next step.

- Remove all of the material and stones from the barrel and place in a pan. DO NOT use an aluminum pan. It may discolor your stones. Plastic is preferred. DO NOT wash the waste material down your drains. It may harden in the traps or pipes and require major plumbing repairs to clear the pipes.
- Clean the stones, the barrel, the lid, the pan and any other part that has made contact with the grit mixture. Wash everything and your hands thoroughly. You do not want any previous grit particle left to contaminate the next mixture. It may produce scratches.

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Self-Check -5	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. Why do not we use aluminum pans for placing unloaded stones?
2. What is the negative effect of washing the waste in to water drains?
3. Can we recycle grits? How ?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Operation Sheet-1	Smooth grinding the tumbled stone with 200 grit
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Procedures to smooth grind the material with 220 grit

- Step1:** Load the barrel or bowl to $\frac{1}{2}$ - $\frac{3}{4}$ full rough
- Step 2** Add a required amount of 60/80 grit.
- Step 3** Add Fillers to allow coverage of space
- Step 4** Fill Water (if required) is to cover remaining space.
- Step 5** Close and tighten barrels / bowls.
- Step 6** Tag machine with starting day and grit size.
- Step 7** Start machine and run for a week (24 hours) of rough grind..
- Step 8** Unload the mix.
- Step 9** Separate stone, filler and grit.
- Step 10** Clean/wash stone.

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LAP Test 1	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Use all necessary tools, equipment and materials that you require to perform the following tasks.

Task 1:smooth grind the rough tumbled stone using 220 grit



LG Code:MIN LAP1M06LO4-LG-25

TTLM Code MIN LAP1TTLM0421v1

LG #24	LO #3- Start rough grind with 60 or 80 grit
Instruction sheet	
<p>This learning guide is developed to provide you the necessary information regarding the following content coverage and topics – Loading barrel or bowl with the rough tumbled material</p> <ul style="list-style-type: none"> ▪ Adding a 1½ tablespoon of 220 grit to the mix • Adding fillers to allow coverage of space between the individual tumbling material • Filling Water to cover remaining space • Closing barrels / bowls and tightening lid • Tagging machine with starting day and grit size • Starting machine and running for a week of smooth grind ▪ Checking tumbling mix for appropriate grinding. If unsatisfactory is rerun • unloading mix if ground material is as desired • Separating Stone from filler and grit ▪ Cleaning / washing off Stone from grit and dirt ▪ Doing Steps from 1 to10 with 400 grits <p>This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –</p> <ul style="list-style-type: none"> ▪ Load barrel or bowl with the rough tumbled material ▪ Add a 1½ tablespoon of 220 grit to the mix • Add fillers to allow coverage of space between the individual tumbling material • Fill Water to cover remaining space • Close barrels / bowls and tightening lid • Tag machine with starting day and grit size • Start machine and running for a week of smooth grind ▪ Check tumbling mix for appropriate grinding. If satisfactory retrun • unload mix if ground material is as desired • Separate Stone from filler and grit ▪ Clean / wash off Stone from grit and dirt ▪ Do Steps from 1 to10 with 400 grits 	
Learning Instructions:	

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15. Read the specific objectives of this Learning Guide.
16. Follow the instructions described in number 3 to 20.
17. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask your teacher for assistance if you have hard time understanding them.
18. Accomplish the [self-checks 1,2, and3](#) in [pages 4,7 and 9](#) respectively
19. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
20. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
21. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet 1- Loading barrel or bowl with the rough tumbled material

1. Loading barrel or bowl with the rough tumbled material

After removing and cleaning all the unnecessary parts which are produced used in the previous step, place the stones back into the barrel. If they do not fill the barrel to the half-way mark, you may need some filler material. The filler material is available from lapidary supply stores. In expensive marbles, plastic pellets, or crushed walnut shells make good substitutes. Add the filler material until the half-way mark is reached. Add about one tablespoonful of baking soda.

Tumbling mix- is the mixture of gemstones, the filler and water

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Self-Check -1	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. Mention the fillers used for tumbling .
2. What are the constituents of the smooth tumbling mix?
3. What is the function of adding baking soda?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-2

Adding a 1½ tablespoon of 220 grit to the mix

2. Adding a 1½ tablespoon of 220 grit to the mix(smooth grinding)

Procedures to follow

2.1 Adding fillers to allow coverage of space between the individual tumbling material

If the tumbled stones do not fill the barrel to the half-way mark, you may need some filler material. The filler material is available from lapidary supply stores. Inexpensive marbles, plastic pellets, or crushed walnut shells make good substitutes. Add the filler material until the half-way mark is reached. Add about one tablespoonful of baking soda.

2.2 Filling Water to cover remaining space

After loading the semi-processed, gem material and the filler, fill the remaining space up to a reasonable depth with water.

2.3 Closing barrels / bowls and tightening lid

After filling the tumbling mix, the barrel should be properly covered tightened by wing nuts.

2.4 Tagging machine with starting day and grit size

As it has been defined in the previous guides, **Tagging** is a technique of writing a note on a tumbling machine about starting date, the type of material, and the grit or polishing compound on use. The note can be wider than mentioned here. It is used as a reference for decision making.

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2.5 Starting machine and running for a week of smooth grind

- Put the tumbler into operation and observe its action for a few minutes. Check for loose or slipping belts or pulleys. Listen to the sounds coming from within the barrel. Is there sufficient amount of action taking place? If there isn't, shut down the operation, open the barrel and inspect the consistency of the mixture. If the mixture is too dry, add a little water. Put the cover back on and continue as before. If everything appears to be functioning properly, you can leave and come back periodically to check the operation.
- It will take an average one week. After each 24 hours of operation, shut down the operation. Remove some stones from the barrel and examine them. You can add or decrease the grinding time according to how much more grinding you want performed. If you want to continue, inspect the grit and the consistency of the mixture. If the grit no longer has sharp edges, you may want to add more grit. If the mixture is too dry, you may want to add a little more water.
Place the stones back into the container, seal the barrel, place it into position, and start up the operation. Observe and listen to see if the operation is functioning properly. You can leave and check back periodically. When this grinding phase is finished to your satisfaction, you can proceed to the next step. If a few stones need more grinding, you can remove them from this batch and re-tumble them later in another batch.

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Self-Check -2	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. What are fastening materials which are used to tighten the cover of the barrel?
2. How much time is usually required to smooth grind the stone by 220 grit?
3. What is the mechanism of grinding stones with unsatisfactory results at this step?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-3

Unloading the mix, Separating stone, filler and grit and cleaning

3. Checking tumbling mix for appropriate grinding. If satisfactory is rerun

Unloading the mix, Separating stone, filler and grit and cleaning

When the smooth grinding phase is finished to your satisfaction, you can proceed to the next step.

- Remove all of the material and stones from the barrel and place in a pan. **DO NOT** use an aluminum pan. It may discolor your stones. Plastic is preferred. **DO NOT** wash the waste material down your drains. It may harden in the traps or pipes and require major plumbing repairs to clear the pipes.
- Clean the stones, the barrel, the lid, the pan and any other part that has made contact with the grit mixture. Wash everything and your hands thoroughly. You do not want any previous grit particle left to contaminate the next mixture. It may produce scratches

❖ **Do Steps from the start to the end in this guide with 400 grits for smooth grinding**

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Self-Check -3	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. What do we mean by grit contamination?
2. What is the mechanism to check whether the material is well ground or not?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Operation Sheet-1

Smooth grinding the tumbled stone with 200 grit
--

Procedures to smooth grind the material with 220 grit

Step1 : Loading barrel or bowl with the rough tumbled material

Step 2: Adding a 1½ tablespoon of 220 grit to the mix

Step 3: Adding fillers to allow coverage of space between the individual tumbling material

Step 4: Filling Water to cover remaining space

Step 6: Closing barrels / bowls and tightening lid

Step 7: Tagging machine with starting day and grit size

Step 8: Starting machine and running for a week of smooth grind

Step 9 : Checking tumbling mix for appropriate grinding. If unsatisfactory is return occurs

- ❖ unloading mix if ground material is as desired
- ❖ Separating Stone from filler and grit

Step : 10 Cleaning / washing off Stone from grit and dirt

LAP Test 1

Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Use all necessary tools, equipment and materials that you require to perform the following tasks within **20 hours**

Task 1:smooth grind the rough tumbled stone using 220 grit



LG Code:MIN LAP1M06LO4-LG-25

TTLM Code MIN LAP1TTLM0421v1

LG #25	LO #4- Start smooth grind with 220and400 grits
Instruction sheet	
<p>This learning guide is developed to provide you the necessary information regarding the following content coverage and topics – Loading barrel or bowl with the rough tumbled material</p> <ul style="list-style-type: none"> ▪ Adding a 1½ tablespoon of 220 grit to the mix • Adding fillers to allow coverage of space between the individual tumbling material • Filling Water to cover remaining space • Closing barrels / bowls and tightening lid • Tagging machine with starting day and grit size • Starting machine and running for a week of smooth grind ▪ Checking tumbling mix for appropriate grinding. If unsatisfactory is rerun • unloading mix if ground material is as desired • Separating Stone from filler and grit ▪ Cleaning / washing off Stone from grit and dirt ▪ Doing Steps from 1 to10 with 400 grits <p>This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –</p> <ul style="list-style-type: none"> ▪ Load barrel or bowl with the rough tumbled material ▪ Add a 1½ tablespoon of 220 grit to the mix • Add fillers to allow coverage of space between the individual tumbling material • Fill Water to cover remaining space • Close barrels / bowls and tightening lid • Tag machine with starting day and grit size • Start machine and running for a week of smooth grind ▪ Check tumbling mix for appropriate grinding. If satisfactory retrun • unload mix if ground material is as desired • Separate Stone from filler and grit ▪ Clean / wash off Stone from grit and dirt ▪ Do Steps from 1 to10 with 400 grits 	

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Learning Instructions:

22. Read the specific objectives of this Learning Guide.
23. Follow the instructions described in number 3 to 20.
24. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask your teacher for assistance if you have hard time understanding them.
25. Accomplish the [self-checks 1,2, and3](#) in [pages 4,7 and 9](#) respectively
26. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
27. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
28. Submit your accomplished Self-check. This will form part of your training portfolio.



Information Sheet 1- Loading barrel or bowl with the rough tumbled material

4. Loading barrel or bowl with the rough tumbled material

After removing and cleaning all the unnecessary parts which are produced used in the previous step, place the stones back into the barrel. If they do not fill the barrel to the half-way mark, you may need some filler material. The filler material is available from lapidary supply stores. In expensive marbles, plastic pellets, or crushed walnut shells make good substitutes. Add the filler material until the half-way mark is reached. Add about one tablespoonful of baking soda.

Tumbling mix- is the mixture of gemstones, the filler and water

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Self-Check -1	Written Test
----------------------	---------------------

Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

4. Mention the fillers used for tumbling .
5. What are the constituents of the smooth tumbling mix?
6. What is the function of adding baking soda?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-2	Adding a 1½ tablespoon of 220 grit to the mix
----------------------------	--

5. Adding a 1½ tablespoon of 220 grit to the mix(smooth grinding)

Procedures to follow

2.6 Adding fillers to allow coverage of space between the individual tumbling material

If the tumbled stones do not fill the barrel to the half-way mark, you may need some filler material. The filler material is available from lapidary supply stores. Inexpensive marbles, plastic pellets, or crushed walnut shells make good substitutes. Add the filler material until the half-way mark is reached. Add about one tablespoonful of baking soda.

2.7 Filling Water to cover remaining space

After loading the semi-processed, gem material and the filler, fill the remaining space up to a reasonable depth with water.

2.8 Closing barrels / bowls and tightening lid

After filling the tumbling mix, the barrel should be properly covered tightened by wing nuts.

2.9 Tagging machine with starting day and grit size

As it has been defined in the previous guides, **Tagging** is a technique of writing a note on a tumbling machine about starting date, the type of material, and the grit or polishing compound on use. The note can be wider than mentioned here. It is used as a reference for decision making.

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2.10 Starting machine and running for a week of smooth grind

- Put the tumbler into operation and observe its action for a few minutes. Check for loose or slipping belts or pulleys. Listen to the sounds coming from within the barrel. Is there sufficient amount of action taking place? If there isn't, shut down the operation, open the barrel and inspect the consistency of the mixture. If the mixture is too dry, add a little water. Put the cover back on and continue as before. If everything appears to be functioning properly, you can leave and come back periodically to check the operation.
- It will take an average one week. After each 24 hours of operation, shut down the operation. Remove some stones from the barrel and examine them. You can add or decrease the grinding time according to how much more grinding you want performed. If you want to continue, inspect the grit and the consistency of the mixture. If the grit no longer has sharp edges, you may want to add more grit. If the mixture is too dry, you may want to add a little more water.

Place the stones back into the container, seal the barrel, place it into position, and start up the operation. Observe and listen to see if the operation is functioning properly. You can leave and check back periodically. When this grinding phase is finished to your satisfaction, you can proceed to the next step. If a few stones need more grinding, you can remove them from this batch and re-tumble them later in another batch.

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Self-Check -2	Written Test
----------------------	---------------------

Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

4. What are fastening materials which are used to tighten the cover of the barrel?
5. How much time is usually required to smooth grind the stone by 220 grit?
6. What is the mechanism of grinding stones with unsatisfactory results at this step?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-3	Unloading the mix, Separating stone, filler and grit and cleaning
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6. Checking tumbling mix for appropriate grinding. If satisfactory is rerun

Unloading the mix, Separating stone, filler and grit and cleaning

When the smooth grinding phase is finished to your satisfaction, you can proceed to the next step.

- Remove all of the material and stones from the barrel and place in a pan. DO NOT use an aluminum pan. It may discolor your stones. Plastic is preferred. DO NOT wash the waste material down your drains. It may harden in the traps or pipes and require major plumbing repairs to clear the pipes.
- Clean the stones, the barrel, the lid, the pan and any other part that has made contact with the grit mixture. Wash everything and your hands thoroughly. You do not want any previous grit particle left to contaminate the next mixture. It may produce scratches

❖ **Do Steps from the start to the end in this guide with 400 grits for smooth grinding**

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Self-Check -3	Written Test
----------------------	---------------------

Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

3. What do we mean by grit contamination?
4. What is the mechanism to check whether the material is well ground or not?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

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**Operation Sheet-1****Smooth grinding the tumbled stone with 200 grit****Procedures to smooth grind the material with 220 grit**

Step1 : Loading barrel or bowl with the rough tumbled material

Step 2: Adding a 1½ tablespoon of 220 grit to the mix

Step 3: Adding fillers to allow coverage of space between the individual tumbling material

Step 4: Filling Water to cover remaining space

Step 6: Closing barrels / bowls and tightening lid

Step 7: Tagging machine with starting day and grit size

Step 8: Starting machine and running for a week of smooth grind

Step 9 : Checking tumbling mix for appropriate grinding. If unsatisfactory is return occurs

- ❖ unloading mix if ground material is as desired
- ❖ Separating Stone from filler and grit

Step : 10 Cleaning / washing off Stone from grit and dirt

LAP Test 1**Practical Demonstration**

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Use all necessary tools, equipment and materials that you require to perform the following tasks within **20 hours**

Task 1: smooth grind the rough tumbled stone using 220 grit



LG Code:MIN LAP1M06LO5-LG-26

TTLM Code MIN LAP1TTLM0421v1

LG #26	LO #5- Start smooth grind with 600and1000 grits
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Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Loading barrel or bowl with the smooth tumbled gem material
- Adding a 1½ tablespoon of 600 grit to the mix
 - Adding fillers to allow coverage of space between the individual tumbling material
 - Filling Water to cover remaining space
 - Closing barrels / bowls and tightening lid
 - Tagging machine with starting day and grit size
 - Starting machine and running for a week of 24 hrs smooth grind
- Checking tumbling mix for appropriate grinding. If unsatisfactory is rerun
 - unloading mix if ground material is as desired
 - Separating Stone from filler and grit
- Cleaning / washing off Stone from grit and dirt
- Doing Steps from 1 to10 with 400 grits

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, **you will be able to –**

- Load barrel or bowl with the smooth tumbled gemmaterial
- Add a 1½ tablespoon of 600 grit to the mix
 - Add fillers to allow coverage of space between the individual

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tumbling material

- Fill Water to cover remaining space
- Close barrels / bowls and tightening lid
- Tag machine with starting day and grit size
- Start machine and running for a week of 24 hrs smooth grind
- Check tumbling mix for appropriate grinding. If satisfactory return
 - unload mix if ground material is as desired
 - Separate Stone from filler and grit
- Clean / wash off Stone from grit and dirt
- Do Steps from 1 to10 with 1000 grits

Learning Instructions:

29. Read the specific objectives of this Learning Guide.
30. Follow the instructions described in number 3 to 7.
31. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
32. Accomplish the [self-checks 1,2 and 3 in pages 4,7 and 9 respectively](#)
33. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
34. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
35. Submit your accomplished Self-check. This will form part of your training portfolio.



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Ministry of Mines and Petroleum



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Information Sheet 1- Loading barrel or bowl with the smooth tumbled material

7. Loading barrel or bowl with the smooth tumbled material

After removing and cleaning all the unnecessary parts which are produced used in the previous step, place the stones back into the barrel. If they do not fill the barrel to the half-way mark, you may need some filler material. The filler material is available from lapidary supply stores. Inexpensive marbles, plastic pellets, or crushed walnut shells make good substitutes. Add the filler material until the half-way mark is reached. Add about one tablespoonful of baking soda.

Tumbling mix- is the mixture of gemstones, the filler and water

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Self-Check-1	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

7. What are the constituents of the smooth tumbling mix as per information sheet one?
8. What is the function of adding baking soda?
9. Mention the fillers used for tumbling .

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____



Information Sheet-2	Adding a 1½ tablespoon of 600 grit to the mix
----------------------------	--

8. Adding a 1½ tablespoon of 600 grit to the mix(smooth grinding)

Procedures to follow

2.11 Adding fillers to allow coverage of space between the individual tumbling material

If the smooth tumbled stones do not fill the barrel to the half-way mark, you may need some filler material. The filler material is available from lapidary supply stores. Inexpensive marbles, plastic pellets, or crushed walnut shells make good substitutes. Add the filler material until the half-way mark is reached. Add about one tablespoonful of baking soda.

2.12 Filling Water to cover remaining space

After loading the smooth tumbled gem material and the filler, fill the remaining space up to a reasonable depth with water.

2.13 Closing barrels / bowls and tightening lid

After filling the tumbling mix, the barrel should be properly covered tightened by wing nuts.

2.14 Tagging machine with starting day and grit size

As it has been defined in the previous guides, **Tagging** is a technique of writing a note on a tumbling machine about starting date, the type of material, and the grit or polishing compound on use. The note can be wider than mentioned here. It is used as a reference for decision making.

Tagging (The note on the tag is only used for demonstration)

2.15 Starting machine and running for a week of smooth grind

- Place the barrel into position on the tumbler.

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- Put the tumbler into operation and observe its action for a few minutes. Check for loose or slipping belts or pulleys. Listen to the sounds coming from within the barrel. If there isn't sufficient action taking place, shut down the operation, open the barrel and inspect the consistency of the mixture. If the mixture is too dry, add a little water. Put the cover back on and continue as before. If everything appears to be functioning properly, you can leave and come back periodically to check the operation.
- It will take about 72 to 150 hours for the stones to be ready for the polish phase. After each 24 hours of operation, shut down the operation. Remove some stones from the barrel and examine them. You can add or decrease the grinding time according to how much more grinding you want performed. If you want to continue, inspect the consistency of the mixture. If the mixture is too dry, you may want to add a little more water. DO NOT add more grit. Place the stones back into the container, seal the barrel, place it into position, and start up the operation. Observe and listen to see if the operation is functioning properly. You can leave and check back periodically. When this grinding phase is finished to your satisfaction, you can proceed to the next step
- Continue to take extreme care not to damage the stones. Remove all of the material and stones from the barrel and repeat the cleaning procedures used after the coarse grit operation. Clean the stones, the barrel, the lid, the pan, the sink faucets, etc. Wash everything and your hands thoroughly. You do not want any previous grit particle left to contaminate the next mixture. It may produce scratches.

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Self-Check -2	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

7. Why the care given here in this step is greater than the previous?
8. How much time is usually required to smooth grind the stone by 600 grit?
9. What is the mechanism of grinding stones with unsatisfactory results at this step?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

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Information Sheet-3	Unloading the mix, Separating stone, filler and grit and cleaning
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9. . **Checking tumbling mix for appropriate grinding.** If satisfactory is rerun

Unloading the mix, Separating stone, filler and grit and cleaning

When the smooth grinding phase is finished to your satisfaction, you can proceed to the next step.

- Remove all of the material and stones from the barrel and place in a pan. **DO NOT** use an aluminum pan. It may discolor your stones. Plastic is preferred. **DO NOT** wash the waste material down your drains. It may harden in the traps or pipes and require major plumbing repairs to clear the pipes.
- Clean the stones, the barrel, the lid, the pan and any other part that has made contact with the grit mixture. Wash everything and your hands thoroughly. You do not want any previous grit particle left to contaminate the next mixture. It may produce scratches
- ❖ **Do Steps from the start to the end in this guide with 1000 grits for smooth grinding**

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Self-Check -3	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

5. What do we mean by grit contamination?
6. What is the mechanism to check whether the material is well ground or not?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Operation Sheet-1	Smooth grinding the tumbled stone with 600grit
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Procedures to smooth grind the material with 600 grit

Step1 : Loading barrel or bowl with the rough tumbled material

Step 2: Adding a 1½ tablespoon of 600 grit to the mix

Step 3: Adding fillers to allow coverage of space between the individual tumbling material

Step 4: Filling Water to cover remaining space

Step 6: Closing barrels / bowls and tightening lid

Step 7: Tagging machine with starting day and grit size

Step 8: Starting machine and running for a week of smooth grind

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Step 9 : Checking tumbling mix for appropriate grinding. If unsatisfactory is return occurs

- ❖ unloading mix if ground material is as desired
- ❖ Separating Stone from filler and grit

Step : 10 Cleaning / washing off Stone from grit and dirt

LAP Test 1	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Use all necessary tools, equipment and materials that you require to perform the following tasks within 25 hours

Task 1:smooth grind the pre-rough tumbled stone using 600 grit

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LG Code:MIN LAP1M06LO7-LG-28

TTLM Code MIN LAP1TTLM0421v1

LG #28	LO #7- Start machine to clean polished material
Instruction sheet	
<p>This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –</p> <ul style="list-style-type: none">• Loading the barrel or bowl with smooth tumbled material gem.• Adding a required amount of polishing detergent.• Filling Water (if required) is to cover remaining space.• Closing and tightening barrels / bowls.• Starting machine for few minutes.• Unloading mix.• Separating stone from other contents.• Sorting stone by size, pattern, etc.• Storing the product. <p>This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –</p> <ul style="list-style-type: none">• Load the barrel or bowl with smooth tumbled material gem• Add a required amount of polishing detergent• Fill water (if required) is to cover remaining space• Close and tighten barrels / bowls• Start machine for few minutes• Unload mix• Separate stone from other contents• Sort stone by size, pattern, etc• Store the product	
Learning Instructions:	

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36. Read the specific objectives of this Learning Guide.
 37. Follow the instructions described in number 3 to 20.
 38. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
 39. Accomplish the “Self-check 1” **in page 4**
 40. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
 41. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
- Submit your accomplished Self-check. This will form part of your training portfolio

Information Sheet 1- Starting machine to clean polished material

1. Starting machine to clean polished material

Steps to start tumbling machine to clean polished material

1.1 Loading the barrel or bowl with smooth tumbled gem material.

After cleaning the stones, the barrel, the lid, the pan, the sink faucets, etc. Wash everything and your hands thoroughly. Carefully place the stones back into the barrel

1.2 Adding a required amount of polishing detergent.

Add enough detergent soap powder and water to make a thick soapy solution

1.3 Filling water (if required) is to cover remaining space.

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1.4 Closing and tightening barrels / bowls.

Properly close the mix and tag the machine.

1.5 Starting machine for few minutes.

Tumble the stones for 6 to 12 hours

1.6 Unloading mix, Separating stone from other contents.

Remove the stones from the barrel carefully and place them in a plastic colander
Wash them thoroughly. Spread them on a cloth or towel to dry.

1.7 Sorting stone by size, pattern, etc.

The stones should be sorted by size, pattern and even by level of finish/quality. Those that are properly polished will have the same appearance as when they were wet. If some stones are not satisfactory, you can rerun them later with another batch as fillers

1.8 Storing the product.

The final product should be properly stored in suitable place to prevent any scratches and breakdowns. Usually it is put on the clothes prepared for this purpose.

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Self-Check -1	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. How much time of machine run is required to clean polished stone.
2. Write all the procedures to be followed while cleaning polished stone till storing.
3. What are characteristics of tumbled products which are used to sort them?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____



Operation Sheet-1

Cleaning and storing polished gem material

Procedures to clean and store polished gem material

Step1 : Loading the barrel or bowl with smooth tumbled material gem.

Step2 : Adding a required amount of polishing detergent.

Step3 : Filling Water (if required) is to cover remaining space.

Step4: Closing and tightening barrels / bowls.

Step5 : Starting machine for few minutes(**6-12hrs**).

Step6 : Unloading mix.

Step7 : separating stone from other contents.

Step8 : Sorting stone by size, pattern, etc.

Step9 : Storing the product.



LAP Test 1	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Use all necessary tools, equipment and materials that you require to perform the following tasks.

Task 1: Cleaning and storing polished gem material



LG Code:MIN LAP1M06LO8-LG-29

TTLM Code MIN LAP1TTLM0421v1

LG #29	LO #8- clean up
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Instruction sheet

- This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –
 - Clearing , mopping, cleaning, checking work area, equipment and tools
 - Disposing the waste
 - Recycling the grit
 - Trading procedures

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Clear , mop, clean, check work area, equipment and tools
- Dispose the waste
- Recycle the grit

Learning Instructions:

42. Read the specific objectives of this Learning Guide.
43. Follow the instructions described in number 3 to 7.
44. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
45. Accomplish the [self-checks 1,2,3 and 4 in pages 6,8,11 and 13 respectively](#)

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46. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
47. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
48. Submit your accomplished Self-check. This will form part of your training portfolio your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.

Submit your accomplished Self-check. This will form part of your training portfolio

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Information Sheet 1- Clearing , mopping, cleaning, checking work area, equipment and tools

1. Clearing ,mopping, cleaning, checking work area, equipment and tools

1.1 Clearing ,mopping, cleaning, work area, equipment and tools

After completion of the project, the facility of the project should be cleared, mopped, cleaned. Here, by facility we mean lapidary workshop, the tools and equipments and so much so. If there are a malfunctioning parts of a facility exists, immediate measures should be taken to erect the tool or equipment prior to the next application.

The major advantages of cleaning equipment, and tools include:

- It improves safety of operators
- It improves safety of tools, machines and the workshop too.
- It enhances morale of the operators
- It is used to reduce contamination of abrasive grits and polishing compounds

Tumbler Barrel Contamination & Tumbler Tarnish

Have you opened your rotary tumbler barrel expecting sparkling, shiny jewelry and instead found your silver covered in either a black sludge, a yellowish, bronzy or black film? For those of you with a magnetic tumbler, has it ever served you up dark grey water and dull, greyish silver? It can be quite a shock and very puzzling when it happens, but there is a logical explanation, cure and treatment for this tumbler affliction.

Rubber Barrel Breakdown: What causes it

If your pieces come out of the tumbler covered or splotched in a sticky yellow, bronze, or black sludge your tumbler barrel is breaking down. The type of rubber used to manufacture the barrels is called SBR (Styrene Butadiene). SBR is a man-made rubber- the same type that automobile tires are made from. In order for a rubber to be called SBR it must contain certain components. The raw materials for making the SBR compound come from several sources around the world and are not always the same

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quality. SBR rubbers can be the same compound technically from batch to batch, but because the raw materials vary somewhat, the finished product may have more or less resistance to chemicals.

All SBR rubbers are susceptible to attack and breakdown in the presence of certain harsh chemicals and can even be attacked by a mild soap and water if the quality of the rubber is poor. Chemicals known to attack SBR rubber that should not be used in a rubber barrel:

- Ammonia
- High alkaline solutions (such as borax)
- Solvent based solutions (such as acetone, citrus cleaner)
- . Bleach
- Mild chemicals in high concentration (such as soaps)

People have reported yellow, bronze or black contamination while running distilled water and various soaps, tap water and various soaps, and Rio's Super Sunsheen Burnishing Compound with either tap or distilled water. While the breakdown is most common when a tumbler is new, there have been many reports of the contamination after many uses. If you experience the barrel breakdown after many uses, something has changed in what you are doing. Even mild soaps used in high concentration can kick off a tumbler meltdown where there has never been one before. When the tumbler barrel first starts to break down, the

pieces will come out covered in a yellow film. As it breaks down further, the film will become bronze and continue darkening until it becomes a black sludge. What you are seeing is how much carbon black and oil is being leached from the rubber. You may not notice the stages of the breakdown since it can happen within a few hours. Some people leave their work running overnight and open the container to find the dreaded black contamination. If you touch the inside of the tumbler barrel that has begun to break down, it will feel anything from tacky to downright sticky.

Avoiding Barrel Breakdown in New Tumblers

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If you have just purchased a new tumbler with a rubber barrel and new shot, you need to run the shot in vinegar and water (50/50) for at least three 20 minute cycles, and then a 20 minute rinse cycle with water and about 2T baking soda. If you have one of the Harbor Freight Chicago brand tumblers, you are probably afest running just plain water with 1 drop of castile, pH neutral or ivory soap. Super Sunsheen may be too caustic, so should be diluted to 50% of recommended strength for good measure. If you have a Lortone or

Thumlers model tumblers, they are much more stable, but be careful not to make your burnishing compounds too concentrated or cut back to 50% strength to be on the safe side.

Run short cycles and check the water frequently. If you find a batch that is beginning to yellow, this is the first sign of breakdown. Run a cleaning cycle and stop using whatever burnishing compound you were using or dilute it 50% of the strength you were using. If it continues to happen, then the barrel is not going to give you good service and it should be replaced.

Tarnishing in the Tumbler: What causes it

If your pieces come out of the tumbler covered in a gray film and the burnishing solution is also gray, your pieces are tarnishing (oxidizing) during tumbling. This is caused by a highly alkaline solution. The pH in the water can be raised by too much soap, too strong a burnishing solution, shot that is already dirty, new shot that has not been cleaned, or the water itself may be already elevated in pH due to local conditions. If you experience oxidized silver after tumbling and you are using only a drop of soap or burnishing solution diluted according to directions, rinse the shot and tumbler barrel well. Run water only and 2T baking soda in the tumbler for 20 minutes. Then run only plain water for 1 hour with a piece of silver. If the water looks gray and/or the silver looks tarnished, you should switch to distilled water.

Pieces that have been tumble tarnished are very difficult to clean. The longer the pieces tumble in an alkaline environment where oxides have formed, the harder it will be to remove them. A quick dip in silver dip solution or an extended pickle bath should

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dissolve the oxides, but some pieces that have tumbled for several hours have basically had the oxides hammered into the metal and may never look bright and shiny.

Manufacturers Recommendations

It is recommended to run cycles of no more than ½ hour before changing your burnishing compound and not to re-use it. If your pieces are taking overnight to tumble, then your shot to barrel size ratio and/or water to shot ratio is off and you should adjust the mix to achieve faster/better results. Always clean your pieces before introducing them into the tumbler

Note: A good cleaner/degreaser solution is 1 cup warm water with about 1/2 tsp dish soap and about 1 tsp ammonia. Use a toothbrush to clean the piece and then rinse in clear water. A dip in a solution of water and baking soda can be used to guarantee neutralization of the ammonia. Shot should be cleaned before using for the first time to remove oils and manufacturing residues from it. Tumble your shot with 50/50 vinegar and water for 3 cycles of 20 minutes each, rinsing well between each cycle. Then run a final rinse cycle of 20 minutes with 2T baking soda and rinse well. Then you can make your burnishing solution and tumble as usual. Maintain separate barrels for different metals or media to avoid contamination. If you want to make beach glass (as somebody recently mentioned), then you should use a different barrel for this process since you will be using sand as the media which will contaminate the barrel. Do not leave burnishing compounds sitting in the tumbler when not in use. The correct ratio of water/shot and work in a 3lb tumbler is 2lbs shot just barely covered with water, 1 drop of a neutral pH soap and about 1 cup of work maximum. A 3lb tumbler is designed to hold NO MORE than 3 pounds of total weight, which means the total weight of the barrel with the shot and the water and the workpieces placed on a scale should not exceed 3lbs.

1.2 checking work area, equipment and tools

The work area, the tools and equipments of department should periodically be checked for their proper wellbeing. This is very important to take measures of maintenance initiatives.

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Self-Check -1	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. What are the advantages cleaning tools and equipment?
2. What is the cause for oxidization of the tumbler?
3. Mention the chemicals that are known to attack the rubber of the barrel?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-2	Disposing the waste
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1. Disposing the waste

Means for disposal of slurry

You need a means for disposing or storing the slurry that results from tumbling. This slurry consists of water and broken down grit and tiny rock fragments (it would be a fine dust if it was not wet). This slurry should never be put down a household drain as it will settle into traps, turn into concrete and ruin the plumbing.. A fine sediment builds up a number of layers after a number of slurries are poured into the bucket. The sediment can be disposed of in a hole dug outside, or in the household rubbish collection etc.. (It's also a good idea to avoid getting any slurry or grit, which is silicon carbide, onto clothes or towels etc. which are then washed in a washing machine as the slurry and grit can damage the machine and drains.)

When the slurry hardens, it acts as cement and is very hard to break up.

Sometimes, dumping slurry on grass can make a dead spot because it suffocates the grass roots from light and water.

If you live in an area where you do not have a yard, dump the slurry in a container and let it dry out. You can then dispose of it in your trash can.

- Run your tumbler in 20 minute cycles with your cleaner and your shot, rinsing well between each cycle until your shot is shiny and clean. Once your tumbler and shot is clean, run only very mild soap and water. A pH neutral or slightly alkaline soap would be best, such as castile or ivory soap. Be sure to clean your items well before tumbling so you do not introduce foreign substances into the barrel that might induce the contamination. To clean the sludge from silver, you can use a toothbrush and any of the low pH substances assuming you do not have chemically sensitive stones embedded. You could also run the dirty pieces in one or more of the cleaning cycles for a hands-off approach. This low pH cleaning method does not always work because some rubber

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barrels were made with unstable rubber or have been so damaged that they are beyond repair.

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Self-Check -2	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. What type of soap is used to clean the barrel?
2. What are the constituents of waste slurry?
3. Describe the tumbling waste disposal techniques and state where to dispose it.

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-3	Recycling the grit
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2. Recycling the grit

3.1 Recycling the grit

Because grit gradually breaks down as you're tumbling, you cannot reuse it.

However, the slurry that your tumbler creates can be used from the previous stage to help the grinding action. For the polish stage, you do not want any slurry or grit in the barrel from your prior stage. It is recommend that you thoroughly wash your rocks before putting them in polish - you also need to wash the barrel. Failing to do so will hinder your final polish results.

- **Unlike grit, polishing compound can be reused several times, but eventually, it will need to be changed.**

But recycling is possible by selecting the unbroken grit from the finer chipped of grit.

The unbroken grit can be reused for the process at the same step. The smaller chips of it can be used for the next finer steps adding with new grits with small grit sizes.

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Self-Check -3	Written Test
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Direction 1: Short answer items

Instruction1- Read the following questions and give answer for each.

1. Describe the techniques used to recycle tumbling grits. ?
2. Why recycling of polishing compounds is usually impossible?
3. Why we dipose wastes?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Score = _____

Rating: _____

Name: _____

Date: _____

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

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Reference Materials

Guidelines for Polishing Rocks & Minerals

Web Address

- <https://geology.com/rock-tumblers/tumbled-stones/>
- [Ad. www.alibaba.com/wholesale/marketplace](https://www.alibaba.com/wholesale/marketplace)

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