Finishing Construction Work Level II

Learning Guide-103

Unit of Competence: Prepare & apply grout, Adhesive and sealant

Module Title: Preparing & applying grouting, Adhesive and sealant

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LO 4: Apply grout and sealant to floor and wall tiles on site

Instruction Sheet	Learning Guide # 103

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

- Applying Grout and sealant.
- Applying Safety 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:

- Apply Grout and sealant in accordance with specifications.
- Observe Safety procedures specified for type of grout and sealant.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheet
4. Accomplish the Self-check
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet
6. Do the “LAP test” (if you are ready).

Information Sheet-1	Applying Grout and sealant

4.1 Applying Grout and sealant

TYPES OF GROUT

Grout is the material that is used to fill the space between adjacent tiles and support the joints. It is visible and can be water-resistant. However, in most Portland cement based grouts, water or other liquids are likely to penetrate the joints. There are two major classifications of grout**:**

a. Cement based (CG) grout

They can be further classified as class 1 (CG1) for Normal Performance and class 2 (CG2) for Improved Performance).

In cementations grouts, there are two basic types: sanded and non-sanded. The general industrial practice for the application of cementations' grouts is as follows:

Sanded grouts	Formulated with Fine Silica Sand for Joint width of up to 6 mm
	Formulated with Coarse Silica Sand for Joint width between 4 mm to 15 mm
Non-Sanded grouts	Joint width of 4 mm or smaller

Sanded cementations grout

This grout consists of very fine graded aggregates, Portland cement, synthetic resins and colored pigments added with water retentive additive.

Fig.1 – Sanded cementations grout

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Non-sanded cementations' grout

This cement-based grout consists of fine fillers, synthetic resins, colored pigments and water-retentive additive. It is designed for use on tile surfaces that are dry when the grout is applied. The water retentive additive allows the grout to stay moist until the cement cures properly.

Fig. 2 – **Non-sanded cementations' grout**.

b. Epoxy based (RG) grout

The grout consists of epoxy resin, silica fillers, pigments and a hardener. They have very low water absorption, higher compressive strength, are resistant to staining and easy to maintain. Epoxy grout is a waterless mix formed by mixing a base material (part A) and a hardener (part B). These components are mixed on site just prior to grouting.

Generally, epoxy grouts require no additional sealer to protect the surface. However, epoxy grout is costly and the method of application is slightly more difficult compared to cement based grouts. Also, when resistance to chemical attack is important, prior testing of the grout ingredients against the chemical should be considered before use.

Adding liquid polymeric additive to cementitious grouts

Several latex additives are available that can be added to both sanded and no sanded grouts as a substitute for water.

These additives are blends of acrylics and latex. They will lower the water absorption, increase the strength and improve color retention of the grout.

Some cementations' grouts are premixed with dried latex powder at the factory and therefore do not require additional additives.

The following are some typical locations where grouts with latex additives are commonly used:

• Floors subject to heavy traffic

• Floors and walls on flexible substrates such as plywood, board partitions and others

• Floors subject to frequent cleaning and jet washing or exposed to weather

• Floors to be ground and polished after installation

• Swimming pool tile joints

Fig. 3 – Adding liquid polymeric additives to cement grout enhances its performance.

SPECIFICATION AND PERFORMANCE CRITERIA

FOR CEMENTITIOUS TILE GROUT (CG) BASED ON

ISO 13007-3

FUNDAMENTAL CHARACTERISTICS FOR CG1 (NORMAL PERFORMANCE)	REQUIREMENT
Abrasion resistance	< 2000 mm^3
Flexural strength under standard condition	> 2.5 N/mm^2
Compressive strength under standard condition	> 15 N/mm^2
Shrinkage	< 3 mm/m
Water absorption after 30 minutes	< 5 g
Water absorption after 4 hrs	< 10 g

FUNDAMENTAL CHARACTERISTICS FOR CG2 (IMPROVED GROUT)	REQUIREMENT
High abrasion resistance	< 1000 mm^3
Water absorption after 30 minutes	< 2 g
Water absorption after 4 hrs	< 5 g

A typical application of non-sanded grout

In ceramic floor tiling in internal areas

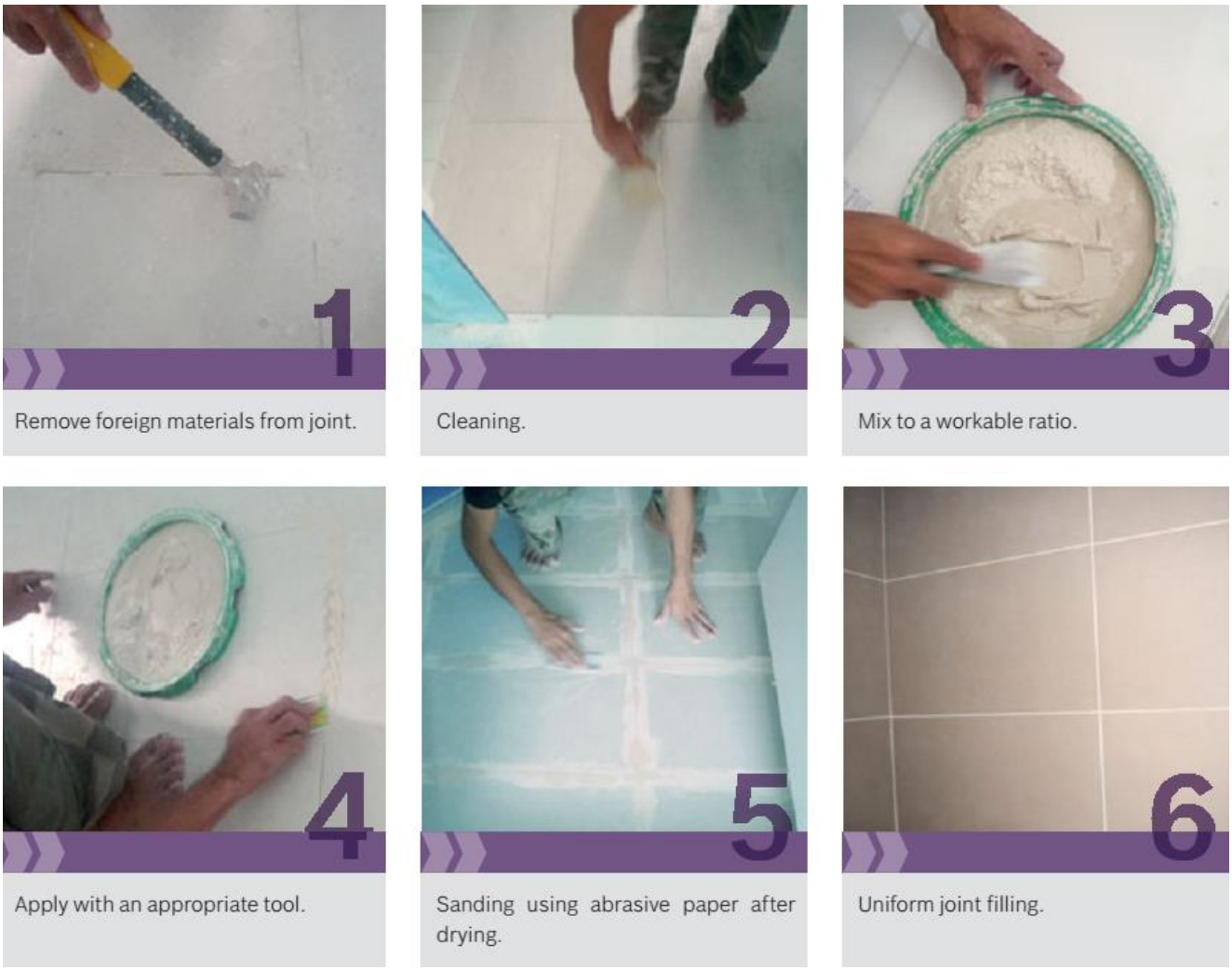

Fig. 4 – Application of grout in ceramic tiling.

Compatibility issues between grout and natural stones

Natural stones are prone to staining because of their porosity and absorption characteristics. In some circumstances, the grout's ingredients such as color pigments and additives can penetrate into the stone's microscopic pores where they are trapped and appear as stains in the stone. This can also be triggered during the wet polishing process.

The most vulnerable area in the natural stone is at "the edges". As the edges or side faces of the stones are often not of polished finish, this facilitates absorption leading to discoloration. Therefore it is strongly recommended to test the compatibility of the grout and stone

materials before installation. Where the porosity and absorption rate of the natural stone are high, use of penetrating sealers on the stones prior to the installation can be considered.

Fig. 5 – Wet polishing on a marble floor.

The use of sanded grout with a polished marble installation presents another difficulty. Marble has smooth and soft surface. The fine sand in the grout may scratch the polished surfaces during or after installation. Hence, it is advisable to use non-sanded grout for polished marble surfaces.

In some cases, the grout may tend to emerge from marble joints because of its weak bonding or insufficient grout depth.

This can occur after grinding and polishing or after certain period of regular mopping.

This can be reduced by using some latex additives in the grout to improve the bonding property. Alternatively, where budget permits, epoxy grouting can be considered which will give better bonding and aesthetics.

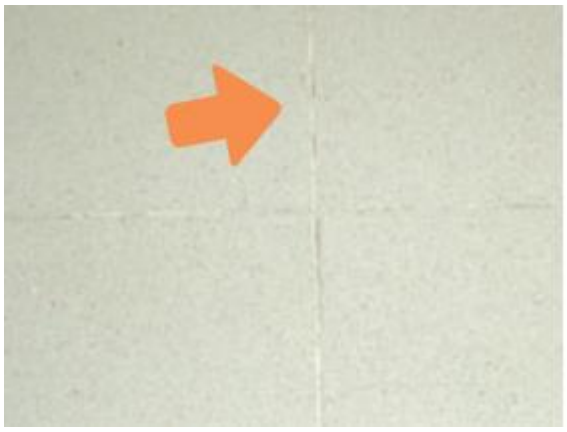

Fig. 6 – Discoloration of grout and edge **Fig**. 7 – Emerging grouts from marble joints.

Staining after polishing.

A typical application of epoxy-based grout on a marble floor

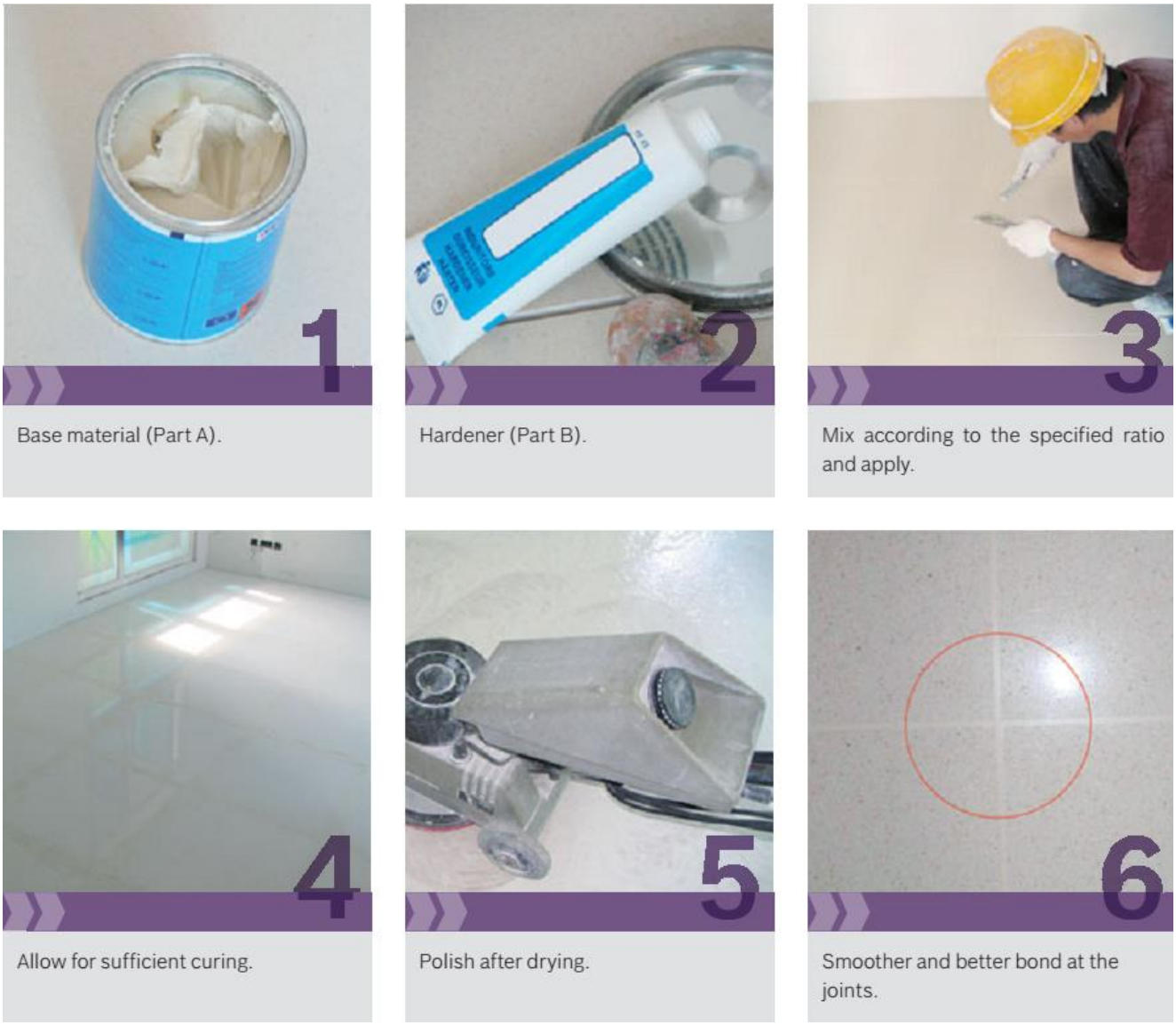

Fig. 8– Application of epoxy grout in compressed marble flooring.

Fig. 9 – Better aesthetics and smoother joints on a marble floor using epoxy grout after polishing.

SUMMARY

Selecting the right grout is as important as selecting the right stone or tile. The manufacturer's instructions on product suitability, mixing, curing and applying the grout should be followed closely for optimum performance. Before proceeding, it is advisable to test its compatibility with the stone. More care should be taken for moisture sensitive and light-colored natural stones to avoid stain ingress. It should be noted that expansion joints on walls and floors must never be filled with grouting material as they are not designed for this purpose.

How to Grout a Tile Floor &wall

After tile is installed, the next step is grouting the gaps between tiles. This task is less time-consuming and labor intensive than installing tile, but it's even more important than making sure all your tiles are straight and look nice. Doing a proper grout job will ensure that the floor under the tile stays safe from moisture. You will still be working on your knees for an extended period of time, so it's not a job to take lightly.

1. Remove the old grout. If you're re-grouting an old tile surface, remove the old grout. You can remove the old grouting compound with a grout saw or a grout removal bit in a rotary tool. Make sure this is fully removed before proceeding.

- Make sure that the joints are free of any dirt, dust, or debris before you start as well.

2. Pick a color of grout. The color of the grout will affect whether people notice the beauty of the individual tiles, or the overall pattern of the tiles. Light grout tends to accentuate the individual tiles by blending in, becoming "invisible," while dark grout tends to accentuate the pattern of the tiles, their overall structure on the floor.

- Choose a color that matches the tile if you want the floor to have a continuous appearance. If you installed the tile yourself and the grout lines aren't perfectly straight, a matching color of grout can help conceal these imperfections.
- Choose a color of grout that contrasts the tile color if you want the individual tiles to stand out. If you installed tiles with an irregular edge, a contrasting color of grout will enhance this feature of the tile.
- Choose a dark color for high traffic areas. White or light-colored grout will be difficult to keep clean.

3. Choose between sanded or un sanded grout. Sanded grout is stronger than un sanded grout. Sanded grout is needed when the grout lines are greater than 1/8-inch (3-mm) wide to add strength. Un sanded grout is liable to crack on wider joints.

4. Wait for the thinnest mortar to cure. Thinnest is used to adhere the tiles to the floor during installation. The exact drying time varies by brand, so read and follow the thinnest packaging carefully. You usually have to wait at least a day to grout a tile floor.

5. Mix the grout according to the package directions. You only want to mix as much as you can apply in about a half hour, as it will begin to dry out.

- Dump the powder into a large bucket, and add only 3/4 of the recommended water, mixing thoroughly with a trowel. Afterwards, mix in the remaining 1/4 of water and mix again. It should be the consistency of thick batter or slightly looser than smooth peanut butter; too much water will prevent it from spreading and hardening properly.

Grouting tile is not difficult to do well, but unfortunately, it is even easier to do poorly. The following instructions will show you how to do it well, and also give you some tips and tricks to get great results very easily.

When grouting tile it's important to remember you are working with a construction material that has a limited workable life and loves nothing more than drying. If you try to grout an area too large, the grout will become difficult to work and will dry on the tile, becoming difficult to remove. The trick is to work in small areas of 5 to 10 square feet or less. That gives you time to adequately work an area before you move on to the next section.

The tools involved in grouting tile are few and not very specialized. The only real special tool you'll need is called a rubber grout float. For a successful grout job, be prepared to spend time cleaning your float and grout sponge often! Have a nearby location to dump dirty water from your bucket and replace it with clean warm/hot water frequently. You need to be speedy about this to avoid grout that hardens before you're ready.

Let's take a look at what you need to grout ceramic wall tile:

Tools and Materials

- Rubber grout float
- 1-gallon plastic bucket (filled halfway with clean warm/hot water)
- Grout sponge
- Grout (premixed or a batch made from powder)
- Grouting tool (you can use your finger for small joints less than 1/8", such as when installing 2" x 4" subway tile)
- Microfiber towel
- Rosin paper and a plastic grocery bag (for countertop /sink protection)
- Painter's tape

SETTING YOUR TILE IN 3 EASY STEPS

Step 1 – Spread Mortar:

- Using a notched trowel, spread mortar while holding the trowel at a 45° angle to the floor or wall surface.

- First, use the straight edge of the trowel to apply a thin, even coat to the surface.
- Follow immediately with more mortar and “comb” the mortar in one direction, using the notched side of the trowel to achieve an even-setting bed.
- Only spread as much material as can be covered with tiles before mortar dries or loses tackiness to the touch.

Step 2 – Setting Tile:

- Place the first tile at the intersection of the horizontal and vertical control lines, making sure the tile is properly aligned with both chalk lines.
- You need to apply adhesive to the back of the tile (back-buttering) when installing 30 x 30
- cm (12 x 12 in.) or larger tiles, when the tile is concave underneath or if the tile is wet from using a wet saw.
- Place tiles in position and firmly apply pressure to the face of the tile while moving the tile back and forth perpendicular to the trowel ridges. This helps to ensure that the mortar transfers to the back of the tile and that the tile is in an even plane with adjacent tiles.
- Check several of the set tiles for adequate mortar coverage by lifting them up. Make sure that at least 80% of the back is covered with adhesive for interior applications and 95% for exterior applications.
- Tile spacers, which can ensure straight and even grout lines, should be placed vertically against the face of the tile and not laid flat in the grout joint at the corners.
- Keep a damp cloth or sponge nearby for quick cleanup in case you drop mortar or adhesive on the tiles or any other surfaces.

Step 3 – As Work Progresses:

- Keep the grout joints clear of any setting material.
- Grout joints should have at least two-thirds of the tile thickness clear for application of the grouting material.

- Avoid disturbing or walking on tiles.
- Follow the setting material manufacturer's directions on curing time before grouting.
- Curing or drying times will vary due to temperature, humidity and porosity of tile and substrate, in addition to the tile size and the setting material used.

Steps of tiling

Cement grouting in 3 easy steps

Step 1 – Prepping the Area:

- Wipe, brush and vacuum the grout joints to ensure that the area is free from standing water, dirt, dust and foreign debris.
- Remove the spacers and excess mortar to ensure even tile joints.
- Certain types of tiles – such as heavily pitted tiles, unglazed tiles, and tiles that have grooved, rough or indented surfaces – require special preparation before grouting.
- (The application of a protective coating may be necessary to prevent entrapment of cement particles and permanent staining from color pigments.)

Step 2 – Mixing and Applying Grout:

- Before applying the grout, moisten the tile surface with a damp cloth or sponge, using a minimal amount of water so that the grout joints remain dry.
- Next, holding the float at a 45° angle, force grout into the joints to completely fill the joints with no voids.
- Remove excess grout from the tile surface by holding the rubber float at a 90°angle (perpendicular to the tile surface) while moving it across the tile in a diagonal direction.

Step 3 – Cleaning Up:

- •Begin to clean up as soon as the grout begins to firm up and there is no longer a transfer of grout to your finger (usually between 10 to 30 minutes).
- Never allow the grout to remain on the tile surface for an extended length of time before completing the initial cleaning.
- Use as little water as possible when cleaning grout off the tile surface. Excess water will discolor the grout joints.
- When grouting a large area, grout and clean one section at a time rather than applying grout over the entire area.

- After each wipe-down, rinse and wring out the sponge so that no excess water stays on the tile surface or grout joint.
- Change the rinse water frequently. (Having multiple buckets of clean water at hand will simplify this process.)
- Make sure that all tiles are thoroughly cleaned before grout dries.
- About an hour later, come back and buff the tiles with a soft clean rag, terry-cloth towel or cheesecloth to remove any remaining haze.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1/ write five basic steps for proper joint preparation and sealant application*? (5points)*

Note: **Satisfactory rating - 3 and 5 points** **Unsatisfactory - below 3**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet 1	Apply Cement grouting

Procedures for seal & smooth floors & wall

Step 1**-** prepare the area

Step 2- Prepare & adjust available material.

Step 3- Mix the grout material within the given ratio.

Step 4- Applying Grout

Step 5: clean up

Information Sheet-2	Applying Safety procedures

4.2. Applying Safety procedures

To start applying grout to the tiles proceed as follows:

1. Scoop up a load of grout onto the rubber float sufficient to covers a diagonal area of the front corner of the float and about 20% of its entire area. You do not want to cover the entire float with grout.
2. Apply the grout working from the bottom of the tile job upwards, and holding the float at an approximately 45-degree angle, forcing the grout into the tile joints. You may also find it easier to first work the grout fully into the joints working parallel to the joints, then reloading the float and working in a diagonal direction across the face of the tiles.

   Continue to apply grout to the tile joints working your way up the wall in sections no larger than 5 to 10 square feet in area. This will give you time to apply grout and fully work the joints before the grout hardens too much.

1. Apply the grout diagonally to the wall holding the float at an angle (ideally at about to 45 degrees to the tile face). Several passes may be needed to fully force grout into the joints. You may also find you need to reload the float more than once to achieve the required fill.
2. Once you have the joints filled in one small area, hold the float at a steeper 70- to 90- degree angle (almost perpendicular) to the wall and scrape off any grout residue from the face of the tiles.
3. Periodically rinse the float in warm/ hot water, and then clean the bucket and refill with warm / hot water.
4. Clean the rubber float often! You may find the grout collecting on the bottom of the float and around the edges. Get in the habit of cleaning it often, scraping off grout with a putty knife or something similar.
5. After fully grouting the initial 5- to 10-square-ft. area, pause to clean up this section.

Once you have cleaned most of the leftover grout from the face of the tiles, you'll be left with a hazy residue. After about 20 minutes, you will clean this residue off with a special grout sponge. Do not use a kitchen sponge!

Using the grouting sponge seems easy but it actually takes some technique to get right. The key is to make sure it is well wrung until it almost seems dry. The hydrophilic sponge is designed capability to wick and hold high amounts of water.

There are five basic steps for proper joint preparation and sealant application:

1. Clean -Joint surfaces must be clean, dry, dust free, and frost free.

2. Prime - If required, primer is applied to the clean surface(s).

3. Pack - Backer rod or bond breaker is applied as required.

4. Seal - Sealant is applied by "pushing the bead" into the joint cavity.

5. Tool-Dry tooling techniques are used to create a flush joint and make certain the sealant has the proper configuration and fully contacts the joint walls

CUTTING YOUR TILE

• When cutting tile, always wear protective eyewear.

• Remember to cut all tiles before you begin to apply the mortar.

• Try to avoid cuts that result in a tile less than half its original size.

• To make straight cuts, score the tile surface with a tile cutter and snap the pieces apart.

• For curved or rounded cuts, use tile nippers, a grinder with a diamond blade, or mechanical cutting tools with recommended bits or cut-off wheels.

• For circular holes, use a carbide-tipped hole saw or mechanical cutting tools.

• When you are finished cutting the tiles, smooth the rough edges with a rubbing stone.

(When using mechanical cutting tools, follow recommended safety precautions).

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1) During cleaning time why no use kitchen sponge*? (5points)*

Note: **Satisfactory rating - 3 and 5 points** **Unsatisfactory - below 3**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Answer keys for learning guide -104

Self check 1

1/

1. Clean -Joint surfaces must be clean, dry, dust free, and frost free.
2. Prime - If required, primer is applied to the clean surface(s).
3. Pack - Backer rod or bond breaker is applied as required.
4. Seal - Sealant is applied by "pushing the bead" into the joint cavity.
5. Tool-Dry tooling techniques are used to create a flush joint and make certain the sealant has the proper configuration and fully contacts the joint walls

Self check 2

1. because it may absorb some bad wastes & damages our good color