



FINISHING CONSTRUCTION

WORK Level-II

Learning Guide-64

Unit of Competence: Handle waterproofing materials

Module Title: Handling waterproofing materials

LG Code: EIS FCW2M15 L01-LG 64

MODULE Code: EIS FCW2M15 TTLM 0919v1

LO 1: Plan prepare

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Instruction Sheet	Learning Guide #64
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Obtaining and confirming preparing work instructions.
- Following Safety (OHS) requirements.
- Identifying and implementing Signage and barricade requirements.
- Selecting tools and equipment to carry out tasks.
- Calculating material quantity requirement.
- Preparing appropriate materials.
- Identifying Environmental requirements.

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:**

- Obtain work instructions and operational details using relevant information, confirm and apply for planning and preparation purposes.
- Follow Safety (OHS) requirements in accordance with safety plans and policies.
- Identify and implement Signage and barricade requirements.
- Select tools and equipment to carry out tasks.
- Calculate Material quantity requirements in accordance with plans and specifications and quality requirements.
- Identify, obtain, prepare, safely handle and locate Materials appropriate to the work application are ready for use.
- Identify environmental requirements for the project in accordance with environmental plans and apply regulatory obligations.



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. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet
5. Do the “LAP test”.

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Information Sheet-1	obtaining and confirming preparing work instructions
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1.1 work instructions

Work Instructions are instruction which is issued by authorized organizational or external personnel's .It includes the following items.

- Diagrams or sketches

A sketch is a very simple type of diagram. The elements in a sketch include shapes such as rectangles, circles, cylinders, stick figures that represent people, and text labels. Unlike other types of UML diagrams, sketches have only a few types of elements and only one type of relationship between elements.

- Plan

Plan is a set of drawings or two-dimensional diagrams used to describe a place or object, or to communicate building. Usually plans are drawn or printed on paper, but they can take the form of a digital file.

Construction drawings are necessary in most spheres of the building industry, as being the best means of conveying detailed and often complex information from the designer to all those concerned with the job.

Building trades people, especially carpenters and joiners, should be familiar with the basic principles involved in understanding and reading drawings correctly.

- Instructions issued by authorized organizational

Are used to submit a grant application, your organization must have at least one person registered in Grants.gov who has been given the Authorized Organization.

- Manufacturer specifications

Specifications refer to documented instructions (oral, written, graphic) and may include specifications from a supervisor or project specific drawings or Requirements.

- MSDS

Material Safety Data Sheet (MSDS) is a document that contains information on the potential hazards (health, fire, reactivity and environmental) and how to work safely

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Self-Check -1	Written Test
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Directions: I Multiple Choice Items

Instruction 1 Choose and write the letter of the best answer on the given answer sheet?

1. _____ is an easy and effective method of adding a durable, low maintenance and modern look to any home, new or existing. (2 point)

- A. Dressing
- B. Rendering
- C. paving
- D. Chiseling

2. Which of the following is not a type of document used to communicate with others in the same organization? (2 point)

- A. Call phone
- B. memo
- C. message
- D. none

3. Which of the following are a set of drawings or two-dimensional diagrams used to describe a place or object, or to communicate building? (2 point)

- A. plan
- B .drawing
- C .elevation
- D. isometric

Note: Satisfactory rating more than 3 points

Unsatisfactory - below 3 points

Answer Sheet

- 1. -----
- 2. -----
- 3. -----

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions



Information Sheet- 2	Following Safety (OHS) requirements
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1.2 Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) is the method of following the occupational standard which includes;

- **Safety Boots & Shoes:** Super range of work safety boots & shoes from Redwood, Capps Composite & Panoply. Redwood is the premier brand for comfortable and reliable safety boots. Capps is the premium brand for sports-style safety boots.
- **Hard Hats:** Safety hard hat are used to protect our head from accident during construction work.
- **Safety Glasses:** Safety glass and safety goggle used from eye protection. All safety glasses and goggles are close fitting and comfortable.
- **Dust Mask:** Mask reduces cost and optimizes comfort for mouse.

Dust masks by Venire. For respiratory protection against non-toxic fine particles and fumes. Supplied in great value multi-packs!

- **Ear Defenders:** Venire Ear Defenders -news! Radio electronic ear defenders, adjustable ear muffs, noise reducing foam ear plugs and reusable silicone earplugs. Compliant with the hearing protection standard. We supply the full Venire ear protection range. Please contact us if you can't find what you're looking for!
- **Gloves;** Protective glove from Venire range includes cotton/polyester gloves, polyamide gloves and thermal polyester/acrylic gloves. With coated palm and fingers for exceptional grip. These protective gloves comply with the standard for hand protection.

Fall Arrest Equipment; Excellent selection of quality fall arrest equipment (PPE) from Panoply (previously branded Formant). The range includes: fall arrest kits (suitable for safflowers), full body fall arrest harnesses, energy (shock) absorbing lanyards, retractable fall arrest blocks, ladder fall arrest system, rope & webbing fall restraint lanyards (not for fall arrest), karabiners and safety scaffold hooks. All Panoply fall protection equipment is compliant with the relevant safety standards.



- Emergency procedures; Emergency plan is a written set of instructions that outlines what workers and others at the workplace should do in an emergency. An emergency plan must provide for the following: emergency procedures, including: an effective response to an emergency.
- Extinguishing fires; Carbon Dioxide fire extinguishers extinguish fire by taking away the oxygen element of the fire triangle and also are removing the heat with a very cold discharge. Carbon dioxide can be used on Class B & C fires.
- First aid Hazard control; Refers to workplace procedures adopted to minimize injury, reduce adverse health effects and control damage to plant or equipment. Hazard control practices are often standardized and taught to managers and safety personnel in a given industry.
- First aid is medical attention that is typically administered immediately after an injury or illness occurs. It usually consists of one-time, short-term treatment, such as cleaning minor cuts, treating minor burns, applying bandages.



fig 1 first aid kit

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Self-Check -2	Written Test
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Directions: 1 Multiple Choice Items

Instruction 1 Choose and write the letter of the best answer on the given answer sheet? :

1. _____ is medical attention that is typically administered immediately after an injury or illness occurs. (3 points)
A. Injury
B. emergency
C. First aid
D. Accident
2. Which of the following are used to keep our eye from accident? (2 point).
A. Helmet
B. Goggle
C .Glove
D .Apron

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

1. -----
2. -----

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions



Information Sheet-3	Identifying and implementing Signage and barricade requirements.
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1.3 Identifying and implementing Signage and barricade requirements

- Barricades and signage

Barricades and signage that are no longer required are removed as soon as practicable.

Barricading controls shall be implemented and authorized as part of barricaded area it shall have its own barricading and label to identify the hazard. Installation and dismantling for edges other than roof edges.

Signage and barricade solid plastering material and components are sorted to suit material barricade and size, stacked for ease of identification, retrieval for task sequence and job location.

Signage implementation is no exception. Setting up a digital signage system can be a complex undertaking. It involves expert knowledge of web-based infrastructures, and multiple vendors and service providers such as: Hardware (digital signage media players, displays, mounts)

- Barricade

A barricade is anything that prevents people or vehicles from getting through. Construction workers often barricade a street to block traffic. This can also be a verb, like when parents barricade part of their house to keep toddlers from getting into trouble.



Fig 1.1 stop sign



Fig1. 2 open sign

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Implement of barricade is the smart traffic barricade system for the purpose of reducing accidents and smooth moving of traffic. Implementation of the smart traffic barricade system will ensure that driver will have to compulsorily follow traffic signals and violation of traffic signals will not be possible.



Fig1.3 direction indicator

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Self-Check -3	Written Test
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Directions: I Multiple Choice Items

Instruction II Choose and write the letter of the best answer on the given answer sheet?

Choose the best answer for the following questions

1. _____ is the process safety sign implementation during construction.

(3 points)

A .Barricading

C. Signage

B. Interpreting

D. sign

2 _____ solid plastering material and components are sorted to suit material type and size.

(3 points)

A. Signage

C .A & D

B .Tying

D. Barricade

Note: Satisfactory rating – 3 points

Unsatisfactory - below 3 points

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

Answer Sheet

1. -----

2. -----

Score = _____

Rating: _____

Name: _____

Date: _____



Operation Sheet -3	Identifying and implementing Signage and barricade
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3.1. Identifying signage and barricade

Steps 1- Review preliminary safety sign?

Step 2- select the right signs for the right place?

Step 3- Implement the sign based on their place?



Information Sheet-4	selecting tools and equipment
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1.4 Selecting Tools and Equipment

- Angle grinders

Angle grinders are versatile tools that can grind metal and cut tile, stucco and pavers, rout out mortar, plus they can sand, polish and sharpen.



Fig 1. 4 angle grinder

- Brooms and Brush

Buckets Used for cleaning the joints of the tiles and to clean the tools. A bucket is used to serve small amount of water or material and to take the tools after work.

- Caulking guns

Caulking guns are the types of tools which are used to apply caulk or filing paint.

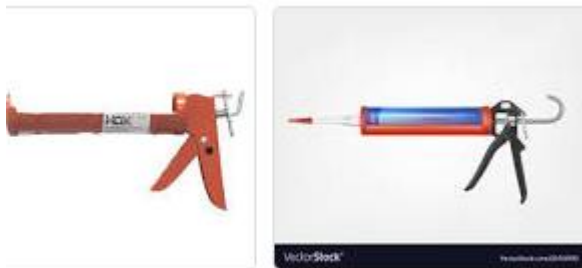


Fig 1.5 Caulking guns

- Chisels

It is used to cut and shape red-hot steel pieces. Since heated steel is many times softer than cold steel, these chisels are not typically hardened or tempered. The blade of the hot chisel is ground on one face, so that the bottom face of the blade can ride flush against the surface of the anvil. The portion of a tool or machine with an edge that is designed to puncture, chop scrape surfaces.

Blade are typically made from materials that are harder than those they are to be used on blade



work by concentrating force on the



cutting edge. **Fig1. 6 blades**

- Water levels

It is a transparent PVC hose. It is used to transfer or mark vertical levels on surface of wall when it is filled with water, but without any air bubbles. The water level in each end of the hose is equal. It is an instrument to mark equal levels on site. It is very accurate but not easy to handle



Fig 1.7 water level

- Electric drills

An electric drill is a drill which is driven by an electric motor which is used for making hole.

- Electric hammers

Electric hammers are hammers driven by electric motor. Electric motor converts electricity to mechanical work.

- Extension leads

An extension cord, power extender, drop cord, or extension lead is a length of flexible electrical power cable with a plug on one end and one or more sockets on the other end.



Fig1.8 extension cable



- Fusion rollers

Fusion mineral Paint is dry to the touch after two hours and can accept a re-coat of paint after 4 hours. We recommend that cure time with all acrylic paints is 21 days; however, painted surfaces can be gently used after 24-48 hours of drying time

- Hammers

Hammer tool for cutting and trimming bricks and blocks and removing debris.

- Mixers

Mixers are used to mix an ingredient by the standard ratio. Such as mortar and concrete



Fig1.9 Mixers

- Meters

Measuring tape is used to measure dimensions of building parts and distances in site. It is manufactured from steel, plastic or fiber in lengths of 1m, 2m, 3m, 5m, 30m, etc. and 50m. In using tapes for measurements, the two points should be aligned perfectly. In addition, when long horizontal measurements are needed, care should be taken to avoid sag on the tape meters.

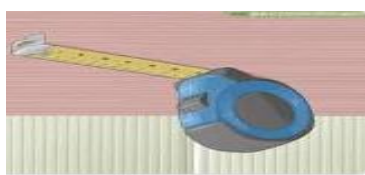


Fig1. 10 meter

- Hot air welders

Hot gas welding, also known as hot air welding, is a plastic welding technique using heat. A specially designed heat gun, called a hot air welder, produces a jet of hot air that softens both the parts to be joined and a plastic filler rod, all of which must be of the same or a very similar plastic.

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Fig 1.11 hot air welder

- Knife

Are used to apply heat to the waterproofing ply and unroll the Flam line into it. Press the Flam line into the hot waterproofing with a blunt putty knife.



Fig 1.12 knife

- Compressors

Sometimes the words "pump" and "compressor" are used interchangeably, but there is a difference: A pump is a machine that moves a fluid (either liquid or gas) from one place to another. A compressor is a machine that squeezes a gas into a smaller volume and (often) pumps it somewhere else at the same time.



Fig 1.13 compressor



- Vacuum pumps

Its main function is to remove gas molecules from a sealed volume and leave a partial vacuum behind.



Fig 1.14 Vacuum pump

- Scissors

Scissors are used to cut paper for waterproofing work.



Fig 1.15 scissors

- Solvent applicators

System is used for precise placement of solvent when joining the fabricator who likes the precision of a calibrated solvent application.

- Spirit levels

Spirit level is used to control the horizontal and vertical alignment of wall surface. The length is at least 40, 80 to 120cm long. It is made of metal, synthetic material or wood. It has two measuring bubbles: one is located at mid length is used to check horizontal positions.

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Fig 1.16 spirit level

- Straight edge/Level/; is a perfectly straight metal/aluminum/ with all long and short edges parallel to its center line. It is employed to check straight alignments of walls. Its length ranges from 2m up to 4m. Together with the spirit level, it can be used to bridge over the point to be checked. A straight edge/Level/ can also be made from a wooden plank with perfectly parallel edges.



Fig1. 17 straight edges

- Trowels

Trowel used for picking up mortar out of the barrel, spreading mortar on the tile.

The handle is used to knock the tile gently into place and compact the mortar.



Fig 1.18 trowel

- Vacuum cleaners

A vacuum cleaner' also known simply as a vacuum or a device that causes suction in order to remove debris from floors draperies and other surfaces. It is generally electrically driven.



→ [More images for Vacuum cleaners](#)

Fig 1.19 vacuum cleaner

- Wood floats

Wood float; are used for scoring the plastered surface in the last coat.



Self-Check -4	Written Test
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Directions: I Multiple Choice Items

Instruction 1 Choose and write the letter of the best answer on the given answer sheet?

1 . _____ used for picking up mortar out of the barrel, spreading mortar on the tile. (3 points)

- A. Straight edge
- B. hose level
- C. trowel
- D. plum bob

2 . _____ is used to control the horizontal and vertical alignment of wall.(2 point)

- A. Float
- B. Trowel
- C .Scissors
- D. Spirit level

Note: Satisfactory rating – 3 points

Unsatisfactory - below 3 and points

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

Answer Sheet

- 1. _____
- 2. _____

Score = _____
Rating: _____

Name: _____

Date: _____



With 5% wastage =0.42kgs/m²

ii. One coat of bitumen emulsion

With 5% wastage =0.79kgs/m²

b. Ditto but two coats

i. bitumen emulsion for primer coat

With 5% wastage =0.42kgs/m²

ii. Two coat of bitumen emulsion

With 5% wastage =1.58kgs/m²

C. Roof dump proofing

a. One coat of bitumen for roofing

i. Bitumen emulsion for primer coat

With 5% wastage =0.32kgs/m²

ii. One ply of glass fiber

With 10% wastage & overlap =1.20m²/m²

iii. One coat of bitumen emulsion

With 5% wastage =2.5kgs/m²

b. Ditto but two coats

a. Bitumen emulsion for primer

Coat with 5% wastage =0.32kgs/m²

b. Two plies of glass fiber

With 10% wastage & overlap =2.41m²/m²

c. Two coat of bitumen emulsion

With 5% wastage =4.5kgs/m²

d. Two coat of reflecting

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Finish with 5% wastage

=0.32kgs/m²

- Specification

Specifications should describe fabrication, and application, through installation, finishing and adjustment. Specifications should include any necessary codes and standards applicable to the project. The specifications should also include descriptions and procedures for alternate materials, products or services if necessary. Quality specifications are detailed requirements that define the quality of a product, service or process. Quality includes tangible elements such as measurements and intangible elements such as smell and taste.

Specifications can be broadly classified into four categories as follows:

1. Manufacturer's specification
2. Guide Specification
3. Standard Specification
4. Contract (Project) Specification

1. Manufacturer's specification: Manufacturers prepare specification of their product for the guidance of their users, which may include property description and installation guide lines.

2. Guide Specification : Specifications prepared by an individual or group of individuals based on manufacturer's specifications, established trends of workmanship, service and laboratory tests and research findings to be used as guide lines for preparation of contract specifications

3. Standard Specification: Specifications which are intended to be used as a reference standard in the construction of a project. The guide specification which has been standardized by a recognized authority is considered as standard specification.

4. Contract (Project) Specification: the specification prepared for a particular project to accompany the drawings and other contract documents. The specifications described above can be prepared following the format which has general and specific parts (general specification and specific specification).

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Self-Check-5	Written Tests
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Directions: Multiple Choice Items.

Instruction 1 Choose and write the letter of the best answer on the given answer sheet? .

1. _____ describe fabrication, application, through installation, finishing and adjustment. (3 points)

- A. Specification
B. bill of quantity
C. bar schedule
D. take off sheet

2----- Specifications which are intended to be used as a reference standard in the construction of a project. (2 point).

- A. Manufacturing
B. Standard
C. Contract
D. Guide

Note: **Satisfactory rating** – 3 points

Unsatisfactory - below 3 and points

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

Answer Sheet

1. -----
2. -----

Name: _____

Date: _____

Short Answer Questions



Information Sheet-6	Preparing appropriate Materials
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1.6 Identifying appropriate Materials

There are different types of materials used for waterproofing described below;

1. Cementations waterproofing

Cementations waterproofing is often used in the internal wet areas such as toilets. Most of the time the type of cementations waterproofing is semi-flexible, some even toward rigid type. It is still good to use because internal toilets are not exposed to sunlight and weathering and so it do not go through the contraction and expansion process continuously.

2. Liquid waterproofing membrane

Liquid membrane is a thin coating which consists of usually a primer coat and two coats of top coats.

3. Bituminous membrane is bituminous waterproofing coating made up of bitumen based materials and it is not suitable for expose to sunlight. It became very brittle and fragile when long exposure to the sunlight unless it is modified with more flexible material such as polyurethane or acrylic based polymers. The flexibility of the finished products always depends on the solid content of the polymer added to the bitumen.

4. Bituminous membrane

Bituminous waterproofing membrane has Torch (welding light) on membrane and self-adhesive membrane. Torch on membrane is the more preferred one use because of its shelf life and ease of use during application. The self-adhesive type must be use fast as the bonding properties of the membrane is reducing through time. Very often applicators find the self-adhesion membrane already lose its bonding properties when they want to apply. Therefore, they have to use one additional primer to prevent the deboning problem in the near future.

- Torch on membrane have exposed and covered types. Exposed membrane often has mineral granular aggregate to withstand the wear and tear of the weathering and the other types of membrane, contractor need to apply one protective screed to prevent the puncture of the membrane.

But one has to be very careful when applying the protective screed which is often cement mortar.

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- **Betonies**

Betonies is a popular waterproofing system for earth sheltered structure principally because it is relatively easy to apply at a modest cost. Betonies are natural clay that will swell up to sixteen times its original volume when it comes in contact with water. As the swelling occurs, the betonies become impervious to the penetration of additional water.

- **Injected materials; Injection molding** is a manufacturing process for producing parts by injecting molten material into a mould. Injection molding.

Process characteristics · History · Equipment · Process troubleshooting

Liquid sealants or sealant devices Coats seals protect. Water tight and flexible. easy to use rubberized coating. This product sprays out as a liquid, seeps into cracks and holes and dries to a watertight, flexible coating that is virtually invisible. It seals out water, air and moisture and helps prevent rust and corrosion.

Sheet and sprayed material membranes sheet based waterproofing membranes. The most common type of sheet based membrane is a bituminous waterproofing membrane. This type of membrane is stuck to the substrate with a hot tar based adhesive using blowtorches. Joints between adjacent membranes are also made with the same hot adhesive.

Self-Check -6	Written Test
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Directions: Multiple Choice Items.

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Instruction 1 Choose and write the letter of the best answer on the given answer sheet? :

1. _____ is a thin coating which consists of usually a primer coat and two coats of top coats. (3 points)

- A .Liquid waterproofing membrane C. Cementations waterproofing
B. Bituminous membrane D. Bituminous membrane

2. Which of the following are used for binding material? (3 point).

- A .Cement C. Lime
B. Gypsum D. All are the answer

Note: **Satisfactory rating – 3 points**

Unsatisfactory - below 3 points

Answer Sheet

1. -----
2. -----

Name: _____

Date: _____

Short Answer Questions



InformationSheet.7	Handing waterproofing materials
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1.7 Identifying Environmental requirements

- Clean up management cleaning: - Ensure all surfaces to be coated are sound, clean, dry, and free from dust, oil, release agents, loose material, efflorescence and/or other contaminants. Remove all mortar digs and protrusions and either brush down with a stiff broom or wash/pressure clean substrate as required, prior to the application of any products.

Cleaning during application should any render get onto surfaces that are not to be coated, clean the surface immediately with clean water.

- storm water management: groundwater recharge is an important part of storm water management as it helps maintain the base flow in nearby stream and wetlands, replenishing drinking water supplies and reducing the overall volume of runoff helping to reduce or eliminate erosion
- Vibration is mechanical phenomenon whereby oscillations occur about an equilibrium point.
- waste management

Waste management is the precise name for the collection, transportation, disposal or recycling and monitoring of waste. This term is assigned to the material, waste material that is produced through human being activity.

Self-Check -	Written Tests
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Directions; Multiple Choice Items.

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Instruction 1 Choose and write the letter of the best answer on the given answer sheet?

1. _____ is a mechanical phenomenon whereby oscillations occur about an equilibrium point. (3 points)

A. demolition C. compaction

B. expansion D. vibration

2. _____ is the precise name for the collection, transportation, disposal or recycling and monitoring of waste. (2 point)

A. Waste management B. Disposing

B. Removing D. None

Note: Satisfactory rating – 3 points Unsatisfactory - below 3 points

Answer Sheet

1. -----

2. -----

Name: _____

Date: _____

Reference

1. <https://www.youtube.com/watch>.

2. <https://www.youtube.com>

Key Answer

1. LO1 Information sheet one, Self-check answer one 1. C 2. B

2. LO1 Information sheet two, self-check answers two 1. C 2. B

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3. LO1 Information sheet three self-check answers three 1. C 2. C

4. LO1 Information sheet four self-check answers four 1. C 2. D

5. LO1 Information sheet five self-check answer five 1. A 2. B

6. LO1 Information sheet six self-check answers six 1. A 2. D

7. LO1 Information sheet seven self-check answers seven 1. C 2. A

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5	Shukri Tahir	BSC in Building Construction Technology	Somalie	Shikuretahir09@gmail.com
6	Tenagnetwork Kebede	BSC in Building Construction technology	Amhara	tenagnk16@gmail.com
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