

(1) Title of Elective: BASIC PLUMBING SKILLS

(2) Overview: Water is essential for life. Water supply is important for drinking, cooking, washing, personal hygiene, irrigation and cleaning. Plumbing involves the installation and maintenance of piping system to ensure the efficient delivery and control of water for those in need. A plumber is a professional who installs, connects, repairs and fixes pipes and control systems. This elective provides students with basic knowledge and skills for a domestic water supply system. Through this elective student will develop competencies to safely manipulate basic plumbing tools and equipment to realise a project work on a simple residential pipe work.

(3) Level: This elective will be offered over 2 terms in **Grade 8**

(4) Aim: To provide students with a foundational understanding of plumbing principles and practices related to for domestic water supply systems.

Objectives of the elective:

By the end of this elective students should be able to:

- recognise the importance of plumbing in our daily life.
- understand and apply safety and health protocols for plumbing work.
- identify basic plumbing tools and equipment, including their functions and safe practices.
- recognise basic plumbing pipes, fittings, materials and control systems of a domestic water supply.
- distinguish various components of polythene or polypipe fitting.
- manipulate safely basic plumbing tools and equipment.
- develop competencies to measure, cut and connect polythene or polypipes.
- understand potential career opportunities in the plumbing trade.
- design and realise a prototype for part of a domestic piping system.

(5) Competencies

	Competencies	Content
1.	Understanding the importance of plumbing in our everyday life	Plumbing systems around us. Plumbing used in residential, public infrastructures, commercial, industrial buildings and leisure activities.
2.	Understanding and applying safety and health protocols for plumbing work.	Use of Personal Protective Equipment (PPE): Overall, safety shoes cotton gloves with grip. Emphasis on behaviour and attitudes in a working environment.
3.	Identifying basic plumbing tools/equipment	This includes: <ul style="list-style-type: none"> • Measuring tape, steel rule (300mm long) • Permanent markers/pencils • Quick release pipe cutter. • Hacksaw • Screwdrivers (Phillips and flat types) • File • Self grip plier
4.	Recognising basic plumbing pipes, fittings, materials and control systems of a domestic water supply	<p>Plumbing Pipe: Common Polypipe or polythene (dia.1/2 inch)</p> <p>Materials: PTFE seal tape, self-tapping screws</p> <p>Fittings:</p> <ul style="list-style-type: none"> • Straight double septor for joining two lengths of polypipe. • Male septor . • Female septor • Equal T septor • Elbow septor. • Female T- septor to connect taps/valves and cocks. <p>Control systems:</p> <ul style="list-style-type: none"> • Tap (dia ½ inch)

		<ul style="list-style-type: none"> • Angle valve (dia ½ inch) • Air valve (dia ½ inch) • Stop cock (dia ½ inch)
5.	Distinguishing various components of polythene or polypipe fitting	The different parts of a straight double septor fitting
6.	Manipulating basic plumbing tools and equipment	<p>This includes proper use of a hacksaw, pipe cutters, and other tools, as well as adherence to safety practices.</p> <p>Use proper personal protective equipment (PPE): This includes wearing an overall while manipulating tools and equipment.</p> <p>Maintains a clean and organized work area: This demonstrates responsibility and preventing risks of accidents and injuries.</p>
7.	Demonstrating competencies to measure and mark out polypipes/polythene pipes	This will include avoiding minor and major errors in measurement. Use confidently a steel rule and measuring tape. Use of markers and appropriate marking out tools
8.	Demonstrating skills for cutting polypipes safely and confidently	Procedure to safely cut polypipes to exact length and to remove any burrs from cutting edge. Cleaning of pipe edges by using a file or sandpaper if needed.
9.	Demonstrating skills for winding PTFE seal tape onto threaded parts.	Techniques for winding PTFE seal tape to threaded part of a male fitting or control systems.
10.	Demonstrating competencies for connecting polypipes using different types of fittings	Techniques for connecting polypipes securely using different types of fittings so as to prevent leakage.
13.	Demonstrating skills to connect control systems.	Techniques to connect securely various control systems (taps, angle valve, air-valve, and stop cocks).
14.	Designing and realising a functional model for part of a domestic piping system	Present a functional model of a domestic plumbing system.

15.	Test and evaluate final design.	Carry out a presentation to explain the functionality of the prototype of the plumbing system.
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(6) Key Focus Areas

- Safe use of basic plumbing tools and equipment
- Working with polypipes (dia ½ inch), fittings and control systems.
- Design part of a domestic piping system.

(7) Duration

25 hours per school term, i.e., a total duration of 25 x 2 = 50 hours over **two** terms

(8) Implementation guidelines

Pre-requisites

Students should possess a positive attitude towards working collaboratively and safely in a workshop environment.

Resource requirements

- workshop with good lighting and non-slippery floor, good water supply, work bench, storage facilities for plumbing tools, equipment, materials and fittings.
- 5m of polypipe ½ inch in diameter and different types of fittings
- Straight double septor for joining two lengths of polypipe.
- Male septor .
- Female septor
- Equal T septor
- Elbow septor.
- Female T- septor to connect taps/valves and cocks.

Control systems:

- Tap (dia ½ inch)
- Angle valve (dia ½ inch)
- Air valve (dia ½ inch)
- Stop cock (dia ½ inch)

Tools such as: Hacksaw, pipe cutter, file, self-grip plier

Consumables such as:

- Thread seal tape (Teflon tape).
- Sandpaper grit 80 and 100

Procedure

- Activity sheet for each learning outcomes will be developed and used.
- Main concepts and key words in KRM would be provided in the workbook and activity sheet.
- Learners will use the basic plumbing tools and equipment.

Teacher and student tasks

- Demonstration will be carried out prior to any hands-on practice for students.
- Safety and health protocols to be carefully explained and applied.
- Sufficient time and proper planning needed for students to develop the basic competencies in using basic plumbing tools and equipment confidently.
- Viewing of appropriate videos related to the skills needed for this elective, it is proposed that MITD training officers who are specialist in plumbing to visit secondary schools where this elective is being taught.
- A project work to be carried out either in pair or in groups of 3-5 about Designing and realising a functional model for part of a domestic piping system

(9) Training requirements for teachers

- It is proposed that Design and Technology Educators be empowered to teach this elective as they are aware about the safety and health protocols while working in a lab environment.
- Training to be carried out by MITD training officers who are specialist in the field of plumbing.

(10) Events accompanying the implementation of the elective

- Visits to MITD centres where plumbing is offered at vocational level.
- Talks by plumbing companies in schools where this elective is offered.
- Plan a visit of a residential building where plumbing work is being carried out

(11) Organisations that may be involved (Ministry and NGOs); sponsored projects

- MITD centres where plumbing is offered
- Private plumbing companies

(12) Safety measures

- 1) Adherence to health and safety protocols within a lab setting.
- 2) Wearing of personal protective equipment, e.g. wearing of overall.
- 3) Safe practices to be observed while working with basic plumbing tools and equipment.
- 4) Non-slippery shoes to be worn
- 5) Proper housekeeping while working in the laboratory.
- 6) All wastes to be properly disposed.

(13) Cross-curricular elements

- Sustainability concerns about saving water and avoid wasting water
- Safety and health within laboratory settings.

(14) Evaluation

- Continuous practical assessment along the implementation of the elective
 - Carrying out proper and exact measurement using the correct tools.
 - Marking out of polypipes accurately.
 - Holding and cutting safely polypipes.
 - Connecting controls systems using thread seal tape (Teflon tape).
- Elements of oral, written assessment
 - Labelling different parts of a 'septor'
 - A poster (A3 in size) to show plumbing around us
 - Presentation of project work on plumbing installation for domestic water supply system.

Student Progress Card for the elective

		Superficially Attained	Partially Attained	Fully Attained
Competency 1	Carrying out proper and exact measurement using the correct tools	2	3	5

Competency 2	Marking out of polypipes accurately.	2	3	5
Competency 3	Holding and cutting safely polypipes	1	3	5
Competency 4	Fixing different types of fittings to polypipes	1	2	5
Competency 5	Connecting controls systems using seal tape (Teflon tape).	1	3	5
Competency 6	Design and realise a functional model for part of a domestic water supply	5	10	15
Competency 7	Oral presentation of project work to an audience	3	7	10
TOTAL				50

15. Other elements