

EC - LEARNER SUPPORT MATERIAL: CIVIL TECHNOLOGY: CIVIL SERVICES: GRADE 11

CONTENT TO BE COVERED:

TOPIC:

1. OCCUPATIONAL HEALTH AND SAFETY ACT 85 of 1993 (OHS) (Generic and specific)

Application of the OHS Act pertaining to: Personal safety:

Clothing:

- Head protection
- Eye and ear protection
- Footwear

General safety:

- Hand tools
- Power tools
- Small plant equipment
- Construction methods in the workplace

Safety and health aspects associated with storage of materials:

- On site
- In workshops
- Hazardous materials in the workplace. E.g. solids, liquids and gases
- HIV/Aids: preventative measures Awareness of substance abuse:
- Drugs
- Alcohol

Health risks associated with Infections and exposure to raw sewerage

General safety rules to be observed when soldering

2. EQUIPMENT AND TOOLS (Subject specific)

Identification, proper use and care of the following:

Cutting tools:

- Cold chisels
- Tin snips (Bent, straight & universal)
- Files (flat, round, square, triangular and half round)
- Pipe threader (stocks and dies)

Holding tools:

- Pliers
- Bench vice

Fastening tools:

- Spanners (ring, open ended and combination)
- Pop rivet apparatus
- Snapper or riveting tool
- Groover or seaming tool

Sheet metal work machines:

- Guillotine
- Sheet bending machine
- Pan and box bending machine
- Rolling machine

3. JOINING (Subject specific)

Explain the use of the following fixing agents:

- Chemical anchors
- Sleeve anchors
- Spring toggle fixing

Sheet metal:

Drawing and explanation of stages of obtaining:

- Grooved seamed joint
- Overlap joints
- Pop rivet joints
- Solder joints
- Calculating sheet metal allowance for joints taking into account preparation and where used

The student should be able to mark out and cut sheet metal.

EXAMPLE 1: QUESTION 1: SAFETY, MATERIAL, EQUIPMENT AND JOINING (SPECIFIC)

- 1.1 Name TWO causes of water pollution. (2 x 1) (2)
- 1.2 Briefly describe the safety risk of sewage. (2)
- 1.3 Briefly motivate why the working area where soldering work is done, must be well ventilated. (2)
- 1.4 Briefly describe the difference between the sizes of coarse aggregate and

fine aggregate. (2)

1.5 Various metals are listed to possibly fit the following properties. Choose the correct answer and write it next to the question number e.g. 1.5.4 Copper.

1.5.1 ... is suitable for producing sewerage pipes. (1)

- A Lead
- B Grey cast iron
- C Tin
- D Stainless steel

1.5.2 ... is ideal for producing hot-water pipes. (1)

- A Wrought iron
- B Aluminium
- C Copper
- D Tin

1.5.3 ... is suitable for external water taps. (1)

- A Brass
- B Stainless steel
- C Bronze
- D Copper

1.6 Name THREE properties of thermoplastic. (3 x 1) (3)

1.7 Which hand tool will be used for the following work?

1.7.1 To cut sheet metal (1)

1.7.2 To form rivet heads (1)

1.8 Identify the tools in **FIGURES 1.8.1** and **1.8.2** and name ONE use of each.

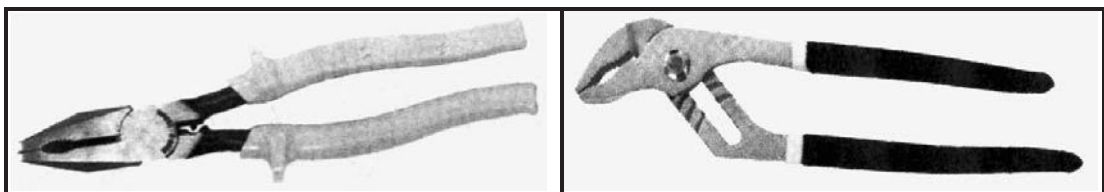


FIGURE 1.8.1

FIGURE 1.8.2

(4)

1.9 Indicate whether the following statements are **TRUE** or **FALSE**. Write only the word 'true' or 'false' next to the number

1.9.1 Copper pipe is heated with a torch to bend it. (1)

1.9.2 Galvanised steel pipe is bent by means of a pipe bending spring. (1)

1.9.3 Polythene pipes are joined with PVC glue and joints. (1)

1.10 Answer the following questions with regard to the joining component in **FIGURE 1.10**.

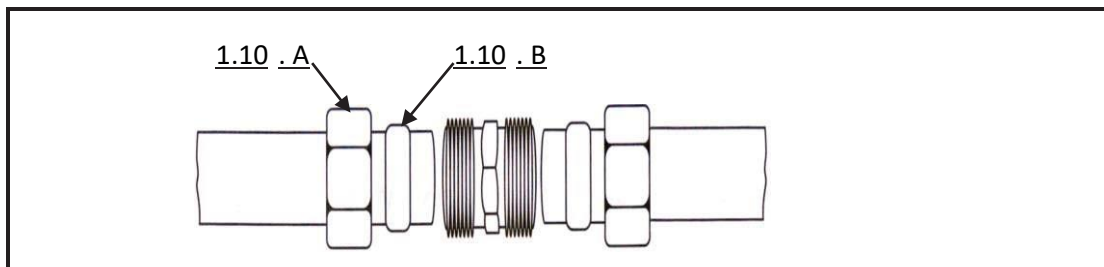


FIGURE 1.10

1.10.1 What is this type of pipe joint called? (1)

1.10.2 Name the parts 1.10.A and 1.10.B. (2)

1.10.3 Which type of pipe is joined by this type of joint? (1)

1.11 Make a neat sketch of a grooved-seamed joint for sheet metal. (2)

1.12 What is the purpose of the flux when soldering work is done? (1)

[30]

ANSWER 1: QUESTION 1: SAFETY, MATERIAL, EQUIPMENT AND JOINING (SPECIFIC)

1.1 Any TWO causes of water pollution / similar answers.

- Leaking sewer systems
- Factory waste
- Dumping of sewer near rivers

- Sewage seeping into ground water (2 x 1) (2)

1.2 Similar answer:

- (1) Sewage contains harmful micro-organisms / bacteria / viruses / parasites
- (2) which are harmful / unhealthy for people (2)

1.3 Similar answer:

- (1) To prevent (2) breathing in poisonous fumes (2)

1.4 Coarse aggregate – Stone / Rock

fine aggregate – Sand (2)

1.5 1.5.1 ... is suitable for use as sewerage pipes.

B Grey cast iron (1)

... is ideal for use as hot-water pipes.

1.5.2 C Copper (1)

1.5.3 ... is suitable for external water taps.

A Brass or

D Copper (1)

1.6 Any THREE properties of thermoplastic.

- Can be reshaped
- Easy to handle
- Lightweight
- Does not break easily
- Available in variety of colours or transparent
- Maintenance is low
- Easy to cut, file, drill
- Joints are firm
- Resistant to shrinking and expansion
- Poor conductor of heat
- Low heat resistance (3 x 1) (3)

1.7 1.7.1 Cut sheet metal – Tin snips (1)

1.7.2 To form rivet heads – Ball-peen hammer (1)

1.8 Identify the tools in **FIGURES 1.8.1 and 1.8.2** and name ONE use of each.

1.8.1 Universal pliers

- Gripping
- Cutting
- Bending
- Pulling wires

1.8.2 Water pump pliers

- Clamping of plumbing pipes (2)

1.9 1.9.1 True (1)

1.9.2 False (1)

1.9.3 True (1)

1.10 1.10.1 Compression joint (1)

1.10.2 1.10. A – Compression nut

1.10.B – Ferrule (2)

1.10.3 Copper pipe (1)

1.11 Grooved seamed joint for sheet metal



(2)

1.12 Any ONE similar answer.

- Prevents oxidation
- Promotes flow of solder
- Assists in cleaning of solder material

(1)

[30]

EXAMPLE 2: QUESTION 2: SAFETY, MATERIAL, EQUIPMENT AND JOINING (SPECIFIC)

2.1 Plumbers may come into contact with harmful sewage. Name THREE steps that can be taken to prevent infections involving sewerage. (3 x 1) (3)

2.2 Name TWO safety measures which must be applied to avoid breathing in of soldering fumes. (2 x 1) (2)

2.3 Choose a term in **COLUMN B** that matches the description in **COLUMN A**. Write only the letter (A–E) next to the question number (2.3.1–2.3.3) for example 2.3.4 F.

COLUMN A	COLUMN B
2.3.1 Where concrete structures are not subjected to tensile and bending stress	A Cement
2.3.2 To bind masonry	B Screed
2.3.3 Smoothing of concrete floors	C Mortar
	D Unreinforced concrete
	E Coarse aggregates

(3 x 1) (3)

2.4 Which type of board product will be used as formwork when a smooth finish for concrete is required? (1)

2.5 Briefly motivate why meranti wood will not be used for the manufacturing of roof trusses. (1)

2.6 Explain the difference in use of filler bricks and face bricks. (2)

2.7 Briefly motivate why copper is more suitable than malleable iron for the use of hot water supply. (1)

2.8 Which metal is used for the galvanising of iron? (1)

2.9 Which factor determines the thickness of the glass in window frames? (1)

2.10 Name THREE properties of polypropylene which make it ideal for sewer pipes. (3 x 1) (3)

2.11 Answer the following questions with regard to the tools in **FIGURES 2.11.A and 2.11.B.**

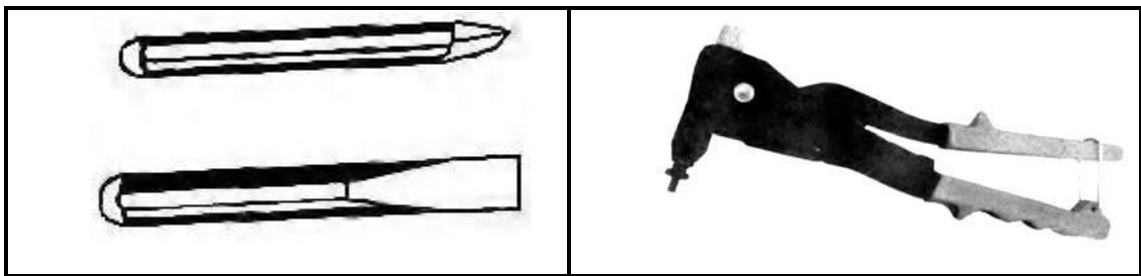


FIGURE 2.11.A

FIGURE 2.11.B

2.11.1 Identify the tools in **FIGURES 2.11.A and 2.11.B.** (2)

2.11.2 Name TWO maintenance measures which must be applied to tool 2.11.A. (2 x 1) (2)

2.11.3 Describe the use of tool 2.11.B. (2)

2.12 Briefly describe the preparation of the pipes which must be joined by heat fusion. (2)

2.13 Indicate whether the following statements are **TRUE or FALSE.** Write only the word 'true' or 'false' next to the question number (2.13.1–2.13.4)

2.13.1 Galvanised pipes are bent with a pipe bending spring. (1)

2.13.2 Polythene pipes are joined with thread connections. (1)

2.13.3 Lead solder must never be used for connecting drink-water pipes. (1)

2.13.4 Sleeve anchors are used when pipework is anchored to wood. (1)

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ANSWER 2: QUESTION 2: SAFETY, MATERIAL, EQUIPMENT AND JOINING (SPECIFIC)

- 2.1 Any THREE steps to prevent infections by sewerage:
- Wear suitable personal protective equipment
 - Avoid hand-to-face contact
 - Cover open wounds
 - Wash hands
 - Remove protective equipment upon leaving the area
 - Place protective gear in a plastic bag
 - First-aid equipment should be available
 - Clean equipment thoroughly
 - Immunisations must be up to date
- (3 x 1) (3)
- 2.2 Any TWO safety measures which must be applied to avoid breathing in of soldering fumes:
- Extractor fan
 - Keeping head not directly above the work
 - Mask can be used
- (2 x 1) (2)
- 2.3 2.3.1 D – Unreinforced concrete
- 2.3.2 C – Mortar
- 2.3.3 B – Screed
- (3 x 1) (3)
- 2.4 Plywood (1)
- 2.5 Meranti is more expensive / Pine is cheaper (1)
- 2.6 Explain the difference in use of filler bricks and face bricks
- (1) Filler bricks are used where it is not visible/is plastered
- (2) Face bricks are used for facing purposes/not to be plastered/esthetical display (2)
- 2.7 Copper does not rust / Keeps heat longer (1)
- 2.8 Zink (1)
- 2.9 Area of the window (1)

2.10 Any THREE properties of polypropylene which make it ideal for the use as sewer pipes.

- Flexible
- Light
- Strong
- Resistance to chemicals
- Durable

(3 x 1) (3)

2.11 2.11.1 A – Cold chisel

B – Pop rivet gun

(2)

2.11.2 Any TWO maintenance measures which must be applied to tool

2.11.A.

- Sharpen regularly
- Grind down mushroom heads

(2 x 1) (2)

2.11.3 (1) Securing rivet pins (2) in tin sheets /sheet metal

(2)

2.12 (1) Clean ends (2) Ends must be square

(2)

2.13 2.13.1 False (1)

2.13.2 False (1)

2.13.3 True (1)

2.13.4 False (1)

[30]