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# JENN

Training and Consultancy

The path to enlightened education

**SUBJECT: MATHEMATICAL LITERACY**

**GRADE 12**

**2023 SPRING CLASSES**

**TEACHER AND LEARNER CONTENT MANUAL**

**Paper 2 Topics**

- 1. Plans**
- 2. Instructions and  
Assembly diagrams**
- 3. Models**

## MATHEMATICAL LITERACY PROGRAMME FOR 2023 Spring CLASSES

| TOPICS FOR PAPER 2   |   |              |             |
|--|---|--------------|-------------|
| Plans, Instructions and Assembly diagrams and Models                       | Plans (1 hour)                              | ± 48         | ± 45%       |
|  | Instructions and Assembly diagrams (1 hour) | ± 14         | ± 13%       |
|  | Models (2 hours)                            | ± 45         | ± 42%       |
| <b>TOTAL</b>   |   | <b>± 110</b> | <b>100%</b> |
| Pre-test and Post-test to be administered since it's a revision of Term 3. |   |              |             |

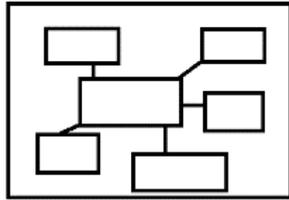
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| <b>TOPIC 4: Maps, Plans &amp; other representations of the physical world</b> |         |
| ○ Plans   | 08 – 16 |
| ○ Instructions and Assembly diagrams  | 17 – 21 |
| ○ Models  | 22 - 28 |



## ICON DESCRIPTION



**MIND MAP**



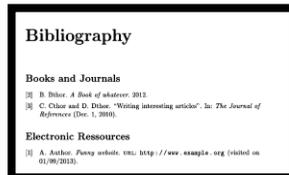
**EXAMINATION GUIDELINE**



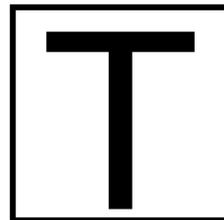
**CONTENTS**



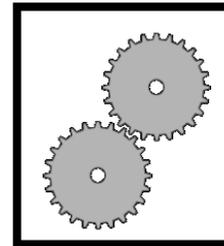
**ACTIVITIES**



**BIBLIOGRAPHY**



**TERMINOLOGY**



**WORKED EXAMPLES**



**STEPS**

## LESSON OBJECTIVES

### Plans

Learners must be able to:

|    |   |
|----|---|
| 1. | Different types of plans  |
| 2. | Understand the symbols and notations used on plans  |
| 3. | Describe what is being presented on the plans   |
| 4. | Analyse the layout of the structure shown on the plan.  |
| 5. | Determine actual length of a plan using measurements and a given scale.   |
| 6. | Determine the most appropriate scale in which a plan must be drawn  |
| 7. | Connect the features shown on elevation plans which features on perspectives shown on a floor of the same structure |

### Instructions and Assembly Diagrams

Learners must be able to:

|    |  |
|----|--|
| 1. | Use instruction/assembly diagrams, containing words and/or pictures.                                   |
| 2. | Complete the task given in the instructions and/or explain what the instructions mean and/or represent |
| 3. | Analyse the aspects of the design of a structure and make suggestions for alterations                  |

### Models

Learners must be able to:

|    |   |
|----|---|
| 1. | Determine the most appropriate way to package can/or optimum use of space                         |
| 2. | Determine the most cost-effective way to package a number of can and/or boxes                     |
| 3. | Investigate the best packaging shape for packaging a particular product                           |
| 4. | Investigate the best packaging shape to use for fragile and irregular shaped objects              |
| 5. | Investigate possible ways to stack/arrange boxes in a storeroom in order to maximise wasted space |

## PLANS, ASSEMBLY DIAGRAMS AND MODELS: EXAMINATION GUIDELINE



| Section       | Level 1: Knowing   | Level 2: Applying routine procedures in familiar contexts   | Level 3: Applying multi-step procedures in a variety of contexts  | Level 4: Reasoning and reflecting   |
|---------------|--|---|---|---|
| <b>Plans</b>  | <ul style="list-style-type: none"> <li>Identify the scale of a plan.</li> <li>Define terms (e.g. floor plan; elevation plan; layout plan; etc.).</li> <li>Read off the value(s) of given dimensions on the plan (e.g. the length of the wall is 4 m).</li> </ul> | <ul style="list-style-type: none"> <li>Use a given key to identify the number of windows/doors/rooms shown on a plan for a building.</li> <li>Identify on which plan a particular structure is shown (e.g. the door is shown on the North elevation plan).</li> </ul> | <ul style="list-style-type: none"> <li>Measure dimensions on a plan and use a given scale to determine actual dimensions.</li> <li>Use plans in conjunction with other content, skills or applications to complete a project (e.g. interpret plans to determine the dimensions of a room in order to establish the amount of carpet needed for the floor of the room).</li> </ul> | <ul style="list-style-type: none"> <li>Describe an item represented in a plan.</li> <li>Critique the design of a structure shown on a plan.</li> <li>Decide on an appropriate scale in which to draw a plan and then draw the plan.</li> <li>Make connections between plans showing different views of the same structure (e.g. explain which wall shown on a floor plan is represented on a particular side view plan).</li> </ul> |
| <b>Models</b> | <ul style="list-style-type: none"> <li>Measure the dimensions of a structure for which a model or 2D drawing will be constructed.</li> </ul>   | <ul style="list-style-type: none"> <li>Build a model using a given table of dimensions or a given net/cut-out.</li> </ul>   | <ul style="list-style-type: none"> <li>Use a given scale to determine the dimensions in which to build a model or make a 2D drawing and complete the project.</li> <li>Build a model and use the model in conjunction with other content, skills, or applications to solve a</li> </ul>   | <ul style="list-style-type: none"> <li>Decide on an appropriate scale in which to build a model or make a 2D drawing, use the scale to determine dimensions, and complete the project. Construct and compare two models in terms of storage space and materials used</li> </ul>   |

|  |  |  |   |  |
|--|--|--|---|--|
|  |  |  | <p>problem (e.g., build a model of a container and use the model to investigate different types of packaging arrangements; or build a model of a container and determine the surface area and volume of the model to investigate the amount of storage space available in the container).</p> | <p>and make a decision about which model will be the better choice for packaging an item.</p> <ul style="list-style-type: none"><li>• Analyse a model and critique the layout of the structure shown in the model.</li></ul> |
|--|--|--|---|--|



## IMPORTANT TERMINOLOGY

| <b>Plans, Assembly Diagrams and Models</b> |  |
|--|--|
| <b>Plan</b>                                | A more detailed representation of a smaller area, often showing landmarks or objects. E.g., layout plan of a school hall.  |
| <b>Floor Plan</b>                          | A two-dimensional view of a building/ structure from above, excluding the roof of a building and provides information regarding the size and shape of each room, together with positions of exterior and interior walls, doors, windows. |
| <b>Layout Plan</b>                         | A layout plan is a top view that shows the arrangement of features/A layout plan is the structural arrangement of items within a certain space.  |
| <b>Elevation Plan</b>                      | A two-dimensional picture of the outside of a building/structure and provides information regarding the height of the building/structure and external features.  |
| <b>North Elevation</b>                     | The side view of the building from the northern side   |
| <b>South Elevation</b>                     | The side view of the building from the southern side   |
| <b>Design Plan</b>                         | A drawing which shows how a building/structure is made and how it functions or looks and provides manufacturing and or assembly details such as measurements and points of attachment for individual components.                         |
| <b>Assembly diagram</b>                    | A set of instructions, which can be in the form of diagrams, pictures, words or a combination thereof, which is used in the assembly or construction of a product.   |
| <b>Model</b>                               | A three-dimensional representation of an object/structure, which is made to scale of the original or proposed object/structure.  |

## Plans

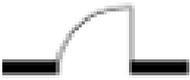
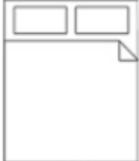
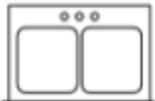
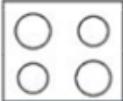
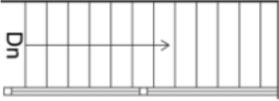
### What is a Floor Plan?

A Floor Plans is a diagram which shows a two-dimensional view of a building from above excluding the roof of a building.

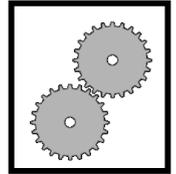
The following information may be obtained from the floor plan:

- The size and shape of a building/house including all the dimensions of each room.
- The position of all the features of the building, the doors, windows, basins, toilets cupboards, showers etc.

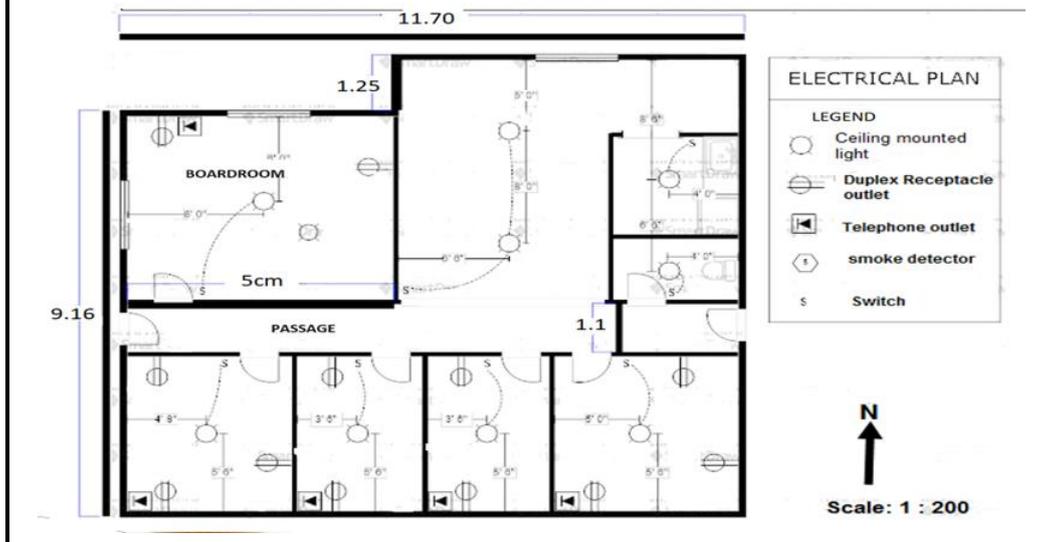
### Symbols that are used for floor plans:

|  |   |   |
|--|---|---|
| Door<br>           | Window<br>        | Sliding door<br> |
| Toilet<br>        | Bed<br>          | Bathtub<br>     |
| Bathroom sink<br> | Kitchen sink<br> | Stove<br>       |
| Stairs<br>        | Shower<br>       | Wall<br>        |

## Worked Example



1. A floor plan for offices is given below. The length of the building on the plan is 11.70 cm and the width is 10.40 cm. An electrical plan is also attached to the floor plan. Use the information on the floor plan to answer the following questions.



- 1.1 Determine the number of telephone outlets in the building. (2)

**Possible answer: 05**

- 1.2 Write down the ratio of the outside doors to the inside doors in simplest form. (3)

**Possible answer:**

**2 : 6**

**1 : 3**

- 1.3 Explain the meaning of the scale 1:200 on the plan. (2)

**Possible answer**

**One cm on the map equals 200 cm in reality**

- 1.4 Use the given scale to determine the actual dimensions of the building. (3)

**Possible answer:**

**Length = 11,7 x 200**  
**= 2 340 cm**  
**= 23,4 m**

**Width = 10,4 x 200**  
**= 2 080 cm**  
**= 20,8 m**

- 1.5 Determine the probability of finding a window on the eastern wall of the offices. (2)

**Possible answer: 0%**

## Elevation Plans

### What are Elevation plans?

- They are 2-dimensional pictures of the outside of the building.

We have two elevations:

|  |  |
|--|--|
| <b>North Elevation</b><br>The side view of the building from the northern side | <b>South Elevation</b><br>The side view of the building from the southern side |
| <b>East Elevation</b><br>The side view of the building from the east side      | <b>West Elevation</b><br>The side view of the building from the west side.     |

**North Elevation**

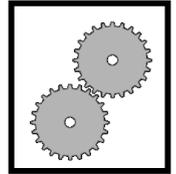
**West Elevation**

**East Elevation**

**South Elevation**

- Elevation plans shows the information about the height of the building and the external features.
- These plans are named using the compass directions.
- The information about the dimensions of the rooms are not shown.

## Worked Example



1. Jane and Tom are the newly-weds. They plan to build a house using the floorplan and elevations shown in ANNEXURE A in the addendum.

Use the information above and ANNEXURE A to answer the questions that follow.

- 1.1 How many bedrooms are shown on the floorplan? (2)

**Possible answer: 03**

- 1.2 The elevations are numbered from 1 to 4. Match the elevation with the correct number e.g., West elevation 3.

- (a) North elevation
  - (b) South elevation
  - (c) West elevation
  - (d) East elevation
- (4)

**Possible answer:**  
**North Elevation – 2**  
**South Elevation – 1**  
**West Elevation – 4**  
**East Elevation - 3**

- 1.3 Is this plan for a single or double storey house? (2)

**Possible answer:**  
**Double storey**

- 1.4 The actual length of the northern wall is 20 metres. Calculate the length on the floorplan. (3)

**Possible answer:**  
**length on the floorplan**  
**1 : 250**  
**1 cm : 250 cm**  
**20 m × 100**  
**= 2 000 cm**  
**length =  $\frac{2\,000}{250}$**   
**= 8 cm**

**OR**  
**length on the floorplan**  
**1 : 250**  
**1 mm : 250 mm**  
**20 m × 1 000**  
**= 20 000 mm**  
**length =  $\frac{20\,000}{250}$**   
**= 80 mm**

- 1.5 How many doors are found on the first floor? (2)

**Possible answer:**  
**5 doors**

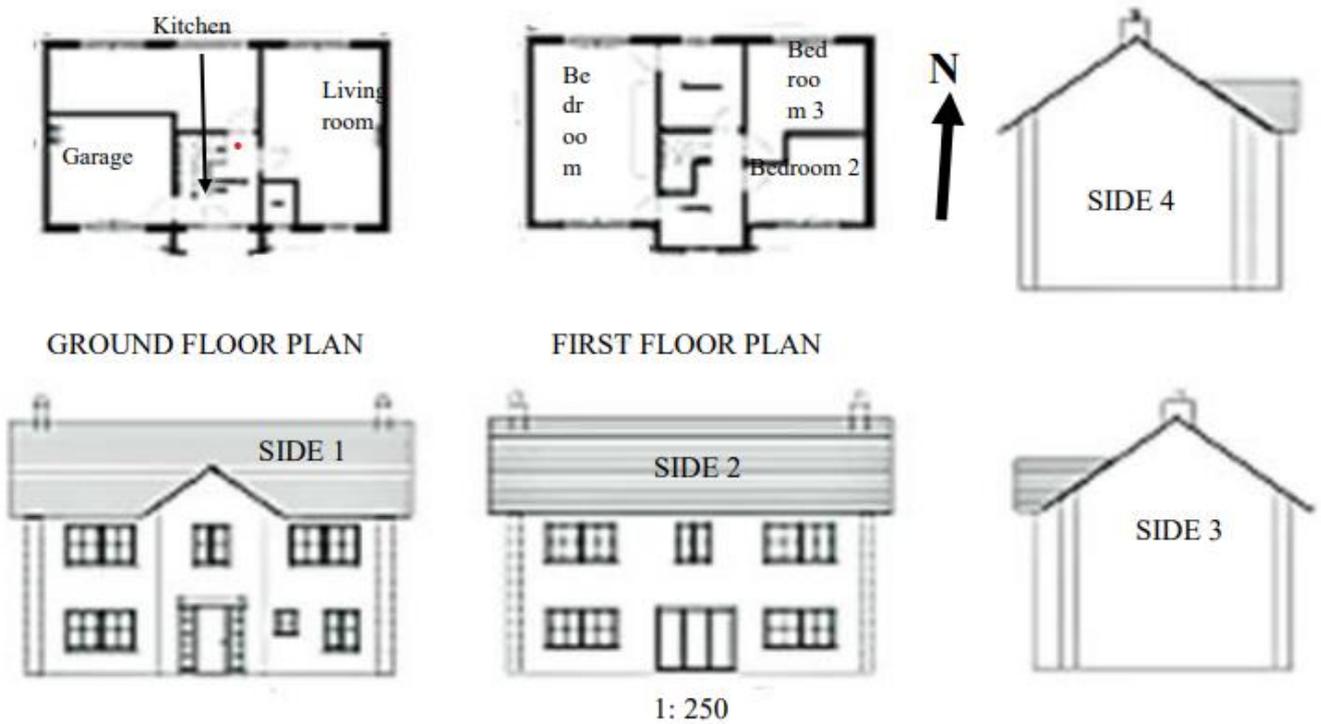
1.6 Give the compass direction of the kitchen from the garage. (2)

**Possible answer**  
**East**

1.7 Which symbol represents a door on the floorplan? (2)

**Possible answer:**  
**Quarter circle OR Drawing symbol of a quarter circle**

### ANNEXURE A



Source: [www.floorplans.com](http://www.floorplans.com)

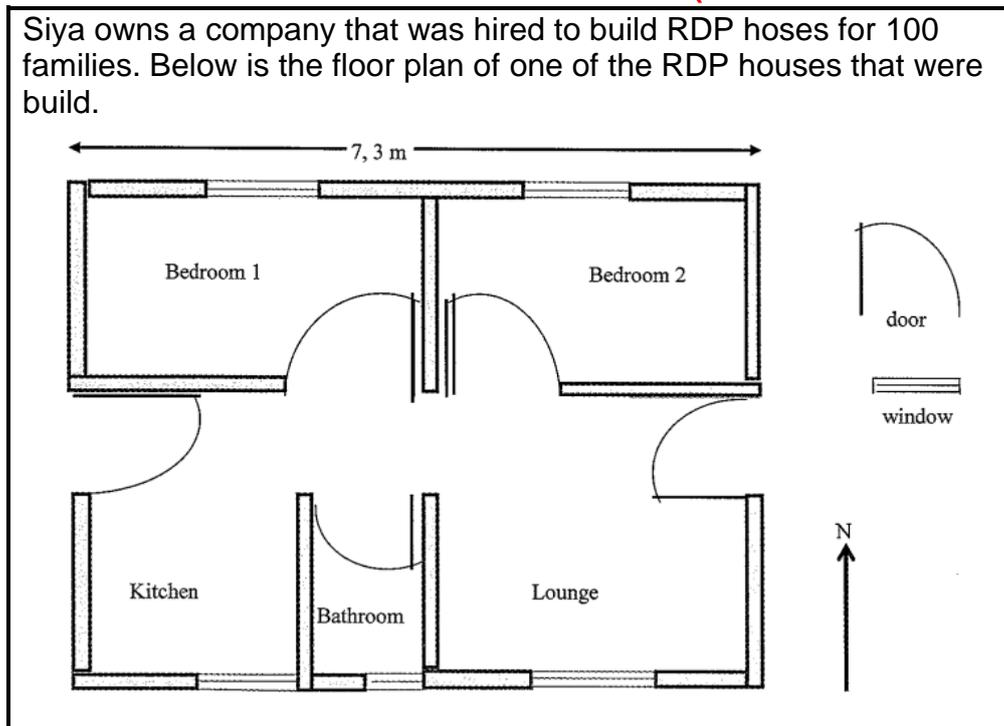
## ACTIVITY 1: Floor and Elevation Plans



(28 marks: 25 minutes)

1.1

Siya owns a company that was hired to build RDP houses for 100 families. Below is the floor plan of one of the RDP houses that were build.



Use the plan above to answer the questions that follow:

- 1.1.1 Explain the term floor plan. (2)
- 1.1.2 Determine the number of windows on the above plan. (2)
- 1.1.3 Give the general direction of bedroom 1 from the lounge (2)
- 1.1.4 The actual length of the house is 7,3 m and, on the plan, it is 133 mm. Determine the scale used the form 1 : ... . (4)
- 1.1.5 If the width of the house is 7,1 m. Calculate the area covered by the house.
- You may use the following formula:
- Area of a rectangle = length x width** (2)
- 1.1.6 Does the door leading to the bathroom open to the right or the left? (2)

1.2 The layout and elevation plans of a clinic is shown on ANNEXURE A.

Use the following information:

1 foot = 0,3048 m

1 inch = 2,54 cm

50' represents 50 feet

10" represents 10 inches.

Study ANNEXURE A and answer the questions that follow.

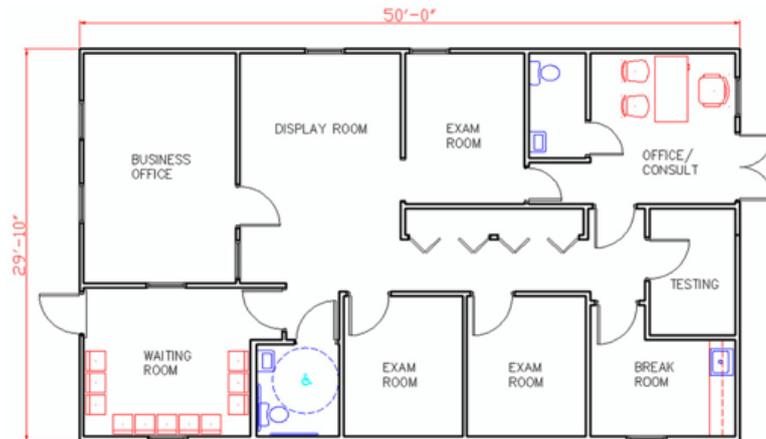
1.2.1 If the outer door of the waiting room is facing north, determine the direction the window of the break room is facing. (2)

1.2.2 The width of the clinic is 29 feet and 10 inches. Convert the width to metres. (4)

1.2.3 Calculate the scale of the plan if the length of the clinic is 50 feet as indicated on the plan and the measurement on the plan is 135 mm.  
Express your answer in the form 1 : ... (5)

1.2.4 Which one of the elevation plans is incorrect? Justify your answer. (3)

## ANNEXURE A



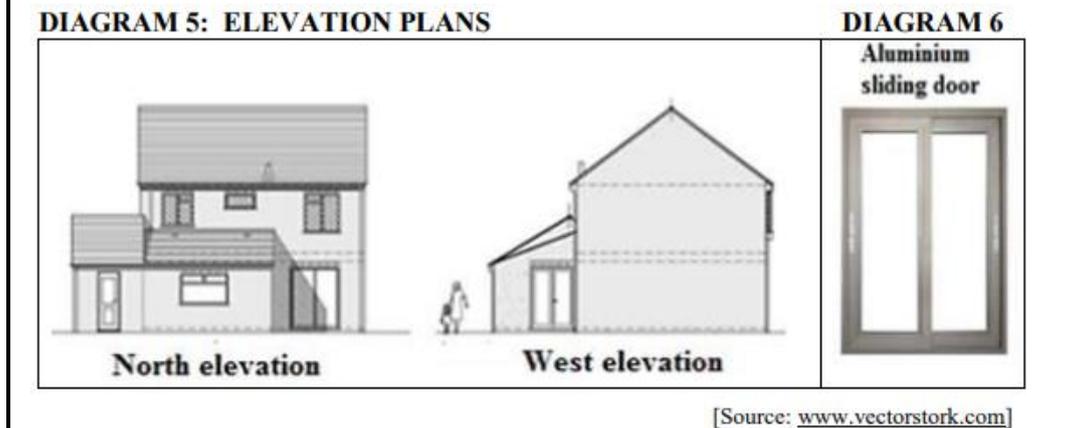
|                         |                         |
|-------------------------|-------------------------|
| <p>Elevation View A</p> | <p>Elevation View B</p> |
| <p>Elevation View C</p> | <p>Elevation View D</p> |

## ACTIVITY 2: Floor and Elevation Plans

(20 marks: 15 minutes)



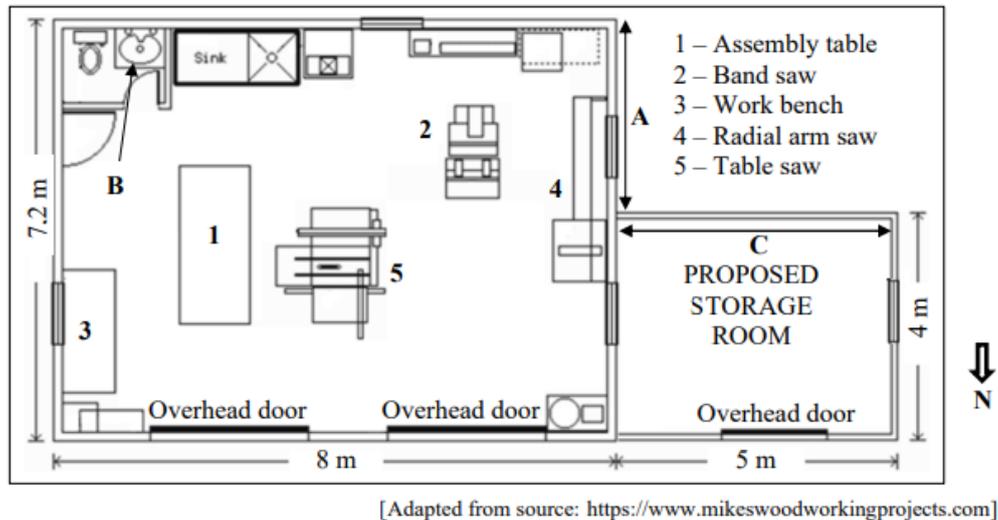
- 1.1 DIAGRAM 5 below shows Miss Ndoe's family home in Witbank, Mpumalanga. The house has one aluminium sliding door on the North elevation and one aluminium door on the West elevation. Each door is fitted with two panels of safety glass. The aluminium sliding door (DIAGRAM 6) is shown alongside the elevation plans.



Use the elevation plans and information above to answer the questions that follow.

- 1.1.1 Define the term "elevation plan". (2)
- 1.1.2 Measure the height (in cm) of the safety glass of the aluminium sliding door in DIAGRAM 6. (2)
- 1.1.3 Describe the term used for the space within the perimeter of a two-dimensional flat surface. (2)
- 1.1.4 How many windows are shown on the plan's West elevation? (2)

- 1.2 The plan below shows the workshop of Loyiso with a key that shows some of his machinery, tools, work surfaces and its location within the



workshop.

Study the plan above and answer the questions that follow.

- 1.2.1 Write down the number of windows found on the western wall of the workshop. (2)
- 1.2.2 Determine the length of the outer wall, marked A. (2)
- 1.2.3 Name the feature that is indicated by the letter B on the plan. (2)
- 1.2.4 Give ONE change to the plan that you would suggest to the draftsman in terms of accessibility for the proposed storage room. (2)
- 1.2.5 The length of C is 4,77 m. If the thickness of the wall is 0,23 m, determine the perimeter of the inner walls of the proposed storage room. (4)

## INSTRUCTIONS AND ASSEMBLY DIAGRAMS

- When we buy goods such as furniture (TV stands, chairs, etc) or electronic equipment (cell phones, computers, printers, etc), they sometimes comes in pieces, and we need to follow instructions provided in manuals to assemble them.
- It is therefore important to make sense of the instructions if you want the optimal use from the item that you have bought.
- Failing to follow the instructions might lead to the equipment not been able to work properly.

### Note to learners:

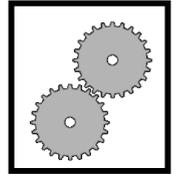
The following points are important when you have to write your own set of instructions:

- Use short and clear sentences.
- Use precise and descriptive words.
- Numbering, arrows, and dotted lines help to show the measurement and direction.
- Diagrams and pictures should be clear, large and easily understandable.
- Colourful diagrams are very effective.

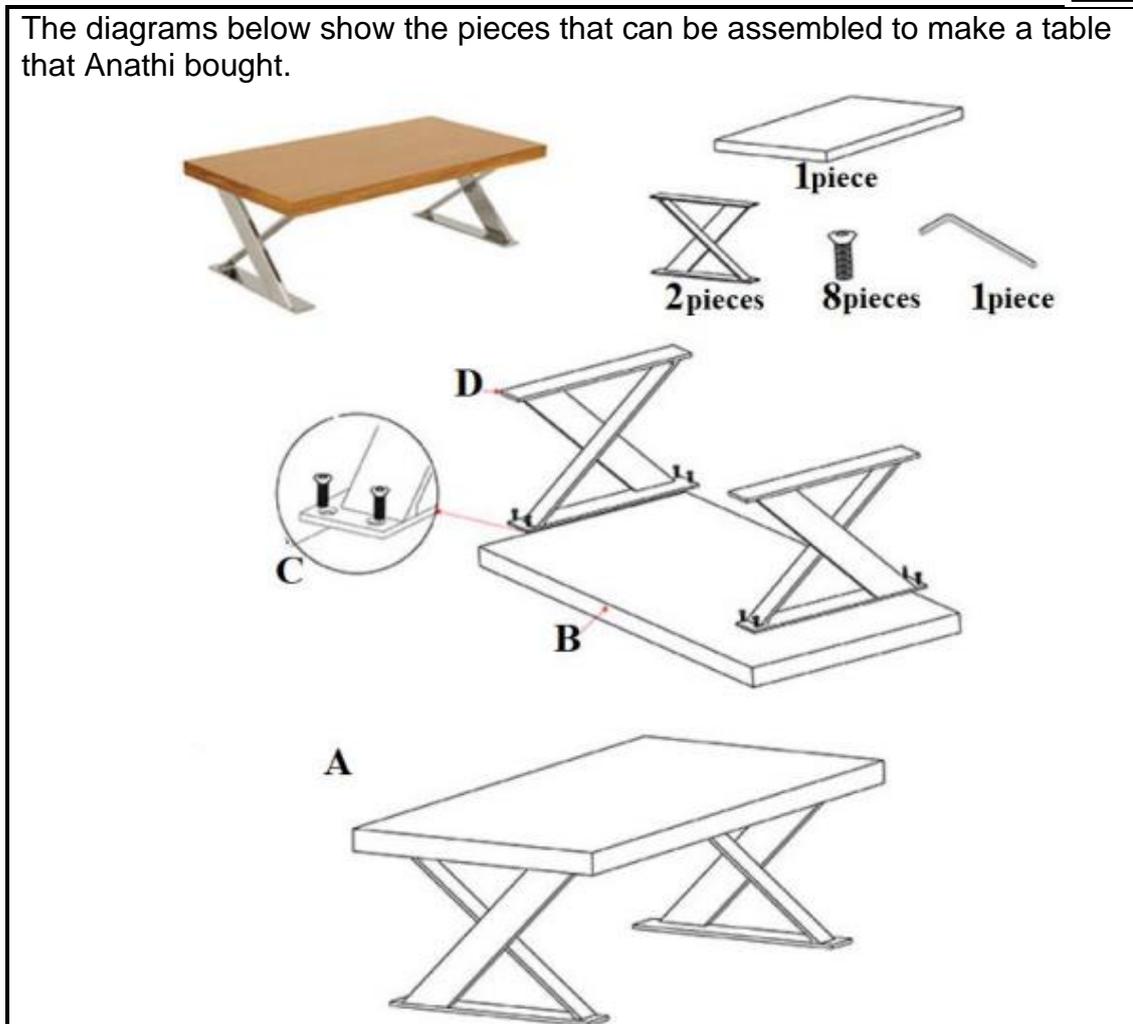
Example:

| Instructions to assemble the Cell phone holder  |   |  |
|---|---|--|
| <p>Clean the desired location then peel the protective skin from the suction pad.</p>  | <p>Place the suction pad on the desired surface.</p>   | <p>Pull down the lever to secure the mount.</p>       |
| <p>Adjust the car mount in any angle.</p>    | <p>Place your cell phone on the holder and adjust the holder according to the size of the cell phone.</p>  | <p>Pull on the tab at the side for easy removal.</p>  |

## Worked Example



- 1.1 The diagrams below show the pieces that can be assembled to make a table that Anathi bought.



Study the diagram above and answer the questions that follow.

- 1.1.1 Determine the number of pieces needed to assemble this table. (2)

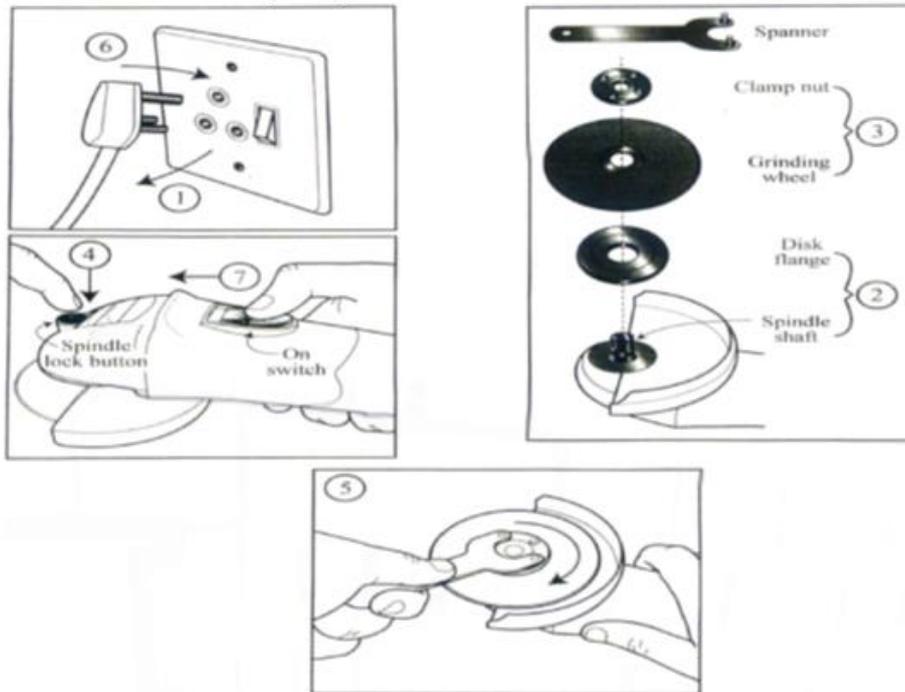
**Possible answer**  
**1 piece + 2 pieces + 8 pieces + 1 piece**  
**= 12 parts**

- 1.1.2 Arrange the given steps (using A to D) to show Anathi how this table can be assembled. (4)

**Possible Answer**  
**B, D, C, A**

1.2

The school maintenance supervisor had to install a new grinding disc onto an angle grinder.



Write the instructions below (A to G) in the correct order.

(7)

- A. Push down on the spindle lock button to lock the spindle before tightening the clamp nut with the spanner.
- B. Put the disc flange on the grinder spindle shaft, and then put the grinding wheel on top.
- C. Plug the three-pin plug into the power socket.
- D. Isolate and remove the angle grinder plug before assembling the grinding disc.
- E. Put the clamp nut on top of the grinding wheel and screw until tight onto the spindle shaft.
- F. Once the spindle lock button is pressed, tighten the clamp nut onto the grinding disc with the spanner, turning clockwise.
- G. Push the ON switch forward to test the grinder.

**Possible answer**

**A = 4, B = 2, C = 6, D = 1, E = 3, F = 5, G = 7**

### ACTIVITY 3: Assembly Diagrams

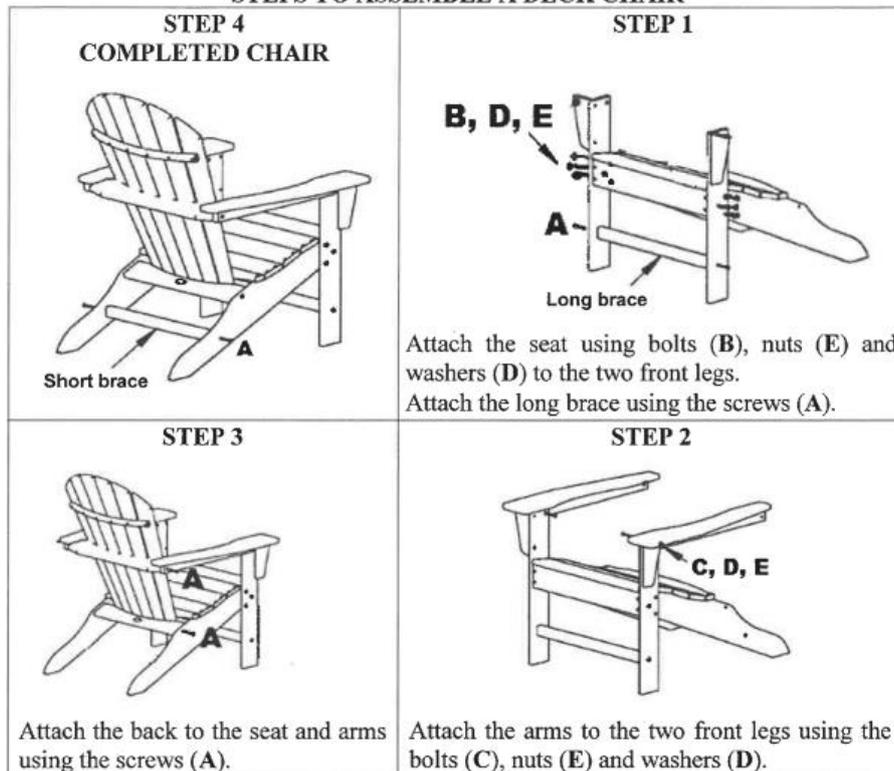


(14 marks:10 minutes)

1.1

Illustrated below are steps and some instructions to assemble a deck chair. To assemble the deck chair, the wooden pieces are joint together using fasteners (screws, bolts, washers and nuts). There are 32 pieces in the packet of fasteners. Each bolt is screwed by a nut and a washer.

#### STEPS TO ASSEMBLE A DECK CHAIR



#### TYPE OF FASTENER

|                 | A   | B   | C   | D   | E   |
|-----------------|---|---|---|---|---|
|                 | Screw   | Bolt  | Bolt  | Washer  | Nut   |
|                 |  |  |  |  |  |
| <b>Quantity</b> | 8   | 6   | ...   | 8   | 8   |

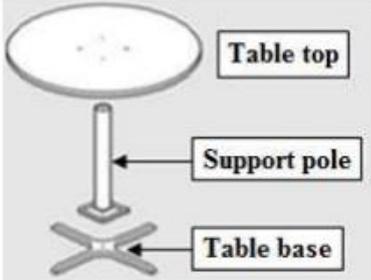
[Adapted from www.bin.com]

Use the information above to answer the questions that follow.

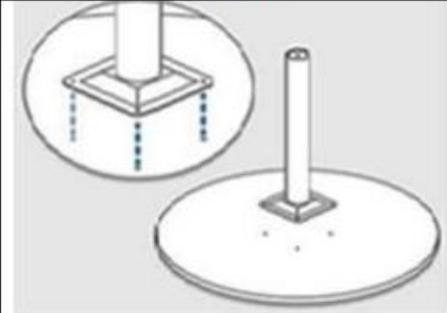
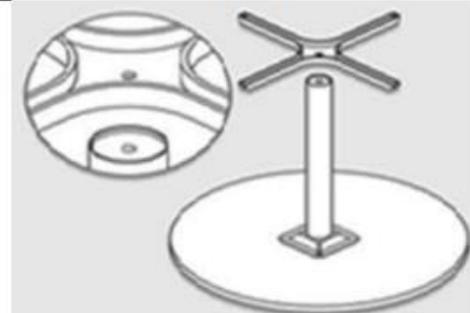
- 1.1.1 Determine the number of type C bolts used to assemble the deck chair (2)
- 1.1.2 State the number of nuts left over after step 1 is completed. (2)
- 1.1.3 Name the piece required to complete the assembly of the deck chair. (2)

- 1.2 Miss Ndoe, the manager of the theatre bought a table for her home. The pieces needed to assemble the table comes in a box and the assembly instructions are as shown below.

**DIAGRAM 2: TABLE- & JOINING PIECES AND TOOLS NEEDED**

| TABLE PIECES   | JOINING PIECES AND TOOLS NEEDED  |
|--|--|
|  <p>Table top</p> <p>Support pole</p> <p>Table base</p> |  <p>4 screws   1 bolt   1 washer</p> <p>TOOLS FOR ASSEMBLY</p> <p>Drill   Wrench</p> |

**DIAGRAM 3: ASSEMBLY INSTRUCTIONS**

| STEP 1   | STEP 2  |
|--|---|
|  |  |

[Source: [www.globalindustrial.com](http://www.globalindustrial.com)]

Use DIAGRAM 2 AND DIAGRAM 3 above to answer the questions that follow.

- 1.2.1 Determine the number of screws that are provided to assemble this table. (2)
- 1.2.2 Name ONE tool that must be used to assemble the table. (2)
- 1.2.3 Identify the STEP (give number only) in the ASSEMBLY INSTRUCTIONS that represents the following instruction:  
 “Use the bolt and the washer to install the table base to the table support pole.” (2)
- 1.2.4 What kind of shape is the long part of the support pole? (2)

## Models

### What is a model?

- A three-dimensional representation of an object/structure, which is made to scale of the original or proposed object/structure.

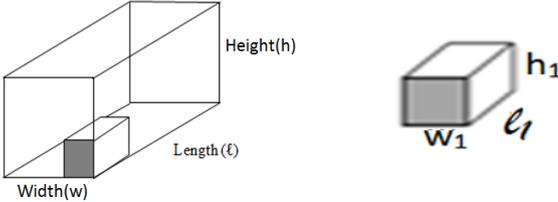
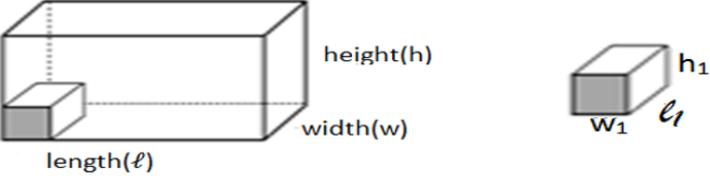
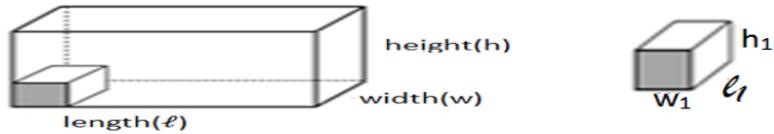
**When investigating the most cost effective and most appropriate way to package cans and/or boxes for optimal use of space, we can use one of two ways**

**Practical Method:**  
Using 2-D diagrams or 3-D models of the scenario, to evaluate how many can/boxes can fit into a space, using lengths, breadths, heights and diameters.

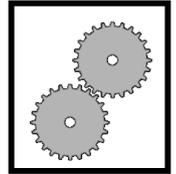
**Mathematical method:**  
Using volume and surface area formulae to analyse the scenario. Remember the need to round down, as rounding up would result in the can/box not fitting in the desired space.

## Packaging

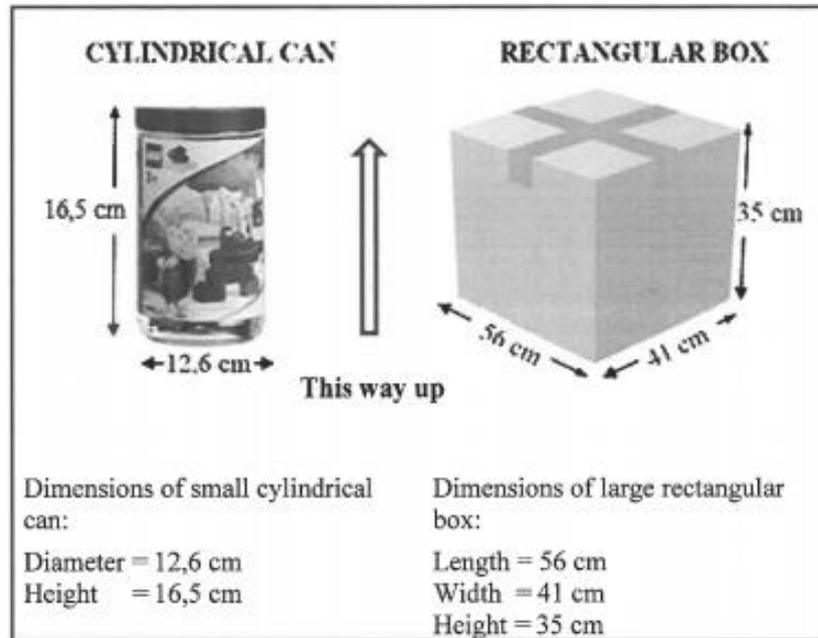


|                                     |  |
|-------------------------------------|--|
| <p><b>PACKAGING LENGTH-WISE</b></p> |  <p>The <b>Length(l<sub>1</sub>)</b> of the small box is packed along the <b>Length(l)</b> of the large box.</p> <p><b>CALCULATION:</b><br/>The number of small boxes = <b>Length</b> of large box ÷ <b>Length(l<sub>1</sub>)</b> of the small box that can be packed along <b>Length(l)</b> of the large box.</p>   |
| <p><b>PACKAGING WIDTH-WISE</b></p>  |  <p>The <b>Width</b> of the small box is packed along the <b>Width/Breadth</b> of the large box.</p> <p><b>CALCULATION:</b><br/>The number of small boxes = <b>Width(w)</b> of large box ÷ <b>Width(w<sub>1</sub>)</b> of the small box that can be packed along <b>Width(w)</b> of large box</p>  |
| <p><b>PACKAGING HEIGHT-WISE</b></p> |  <p>The <b>Height(h<sub>1</sub>)</b> of the small box is packed along the <b>Height(h)</b> of the large box.</p> <p><b>CALCULATION:</b><br/>The number of small boxes = <b>Height(h)</b> of large box ÷ <b>Height(h<sub>1</sub>)</b> of the small box that can be packed along <b>Height(h)</b> of the large box</p> <p>Total number of small = number at length × number at width × number at height boxes packed</p> |

## Worked Example



- 1.1 The building blocks are packed into small cylindrical cans that are then packed into a large rectangular box as shown in the diagrams below.



The cylindrical cans are placed upright in the box.

- 1.1.1 Determine the number of layers of cans that can be placed in an upright position of the box. (2)

**Possible answer**

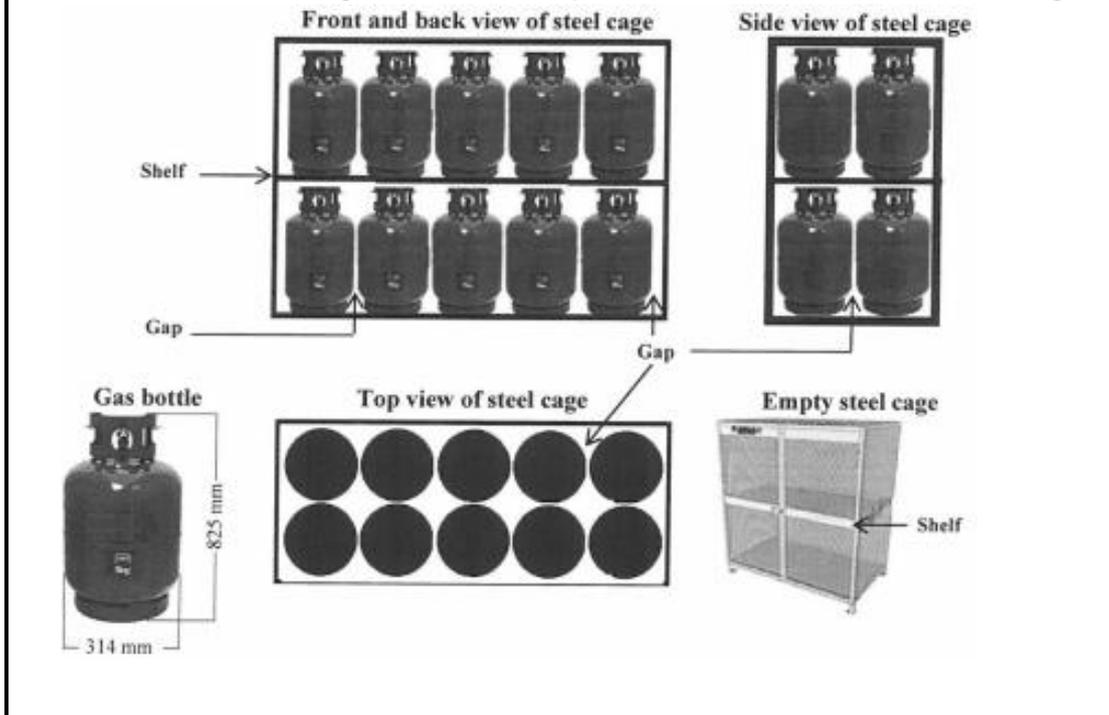
$$\begin{aligned}\text{Number of layers} &= 35 \text{ cm} \div 16, \\ &= 2,12\dots \\ &\approx 2\end{aligned}$$

- 1.1.2 Hence, determine the maximum number of cans that can be packed into ONE box. (3)

**Possible answer**

$$\begin{aligned}\text{Number of cans which can be packed lengthwise} &= 56 \text{ cm} \div 12,6 \text{ cm} \\ &= 4,444\dots \\ &\approx 4 \\ \text{Number of cans which can be packed width-wise} &= 41 \text{ cm} \div 12,6 \text{ cm} \\ &= 3,253\dots \\ &\approx 3 \\ \text{Maximum number of cans} &= 4 \times 3 \times 2 = 24\end{aligned}$$

- 1.2 A certified gas dealer sells 9 kg bottles. These cylindrical bottles are stored outside the shop in a steel cage, as shown below. There is a gap of 10 mm on either side of each gas bottle when placed on the shelf in the steel cage.



- 1.2.1 Calculate the maximum number of gas bottles that can fit into ONE steel cage. (2)

**Possible answer**

**Length = 5 bottles**

**Width = 2 bottles**

**Height = 2 bottles**

**Number of bottles in cage =  $5 \times 2 \times 2 = 20$  bottles**

- 1.2.2 A company sells rectangular metal sheets with dimensions 3,4 m by 2,1 m.

Determine, showing ALL calculations, the maximum number of shelves for the steel cage that could be cut from ONE metal sheet. (8)

**Possible answer**

$$\begin{aligned} \text{Length of shelf} &= 10 \text{ mm} \times 6 + 314 \text{ mm} \times 5 \\ &= 60 \text{ mm} + 1\,570 \text{ mm} \\ &= 1\,630 \text{ mm} \end{aligned}$$

$$\begin{aligned} \text{Width of shelf} &= 10 \text{ mm} \times 3 + 314 \text{ mm} \times 2 \\ &= 30 \text{ mm} + 628 \text{ mm} \\ &= 658 \text{ mm} \end{aligned}$$

$$\text{Length of sheet of metal} = 3,4 \text{ m} = 3\,400 \text{ mm}$$

$$\text{Width of sheet of metal} = 2,1 \text{ m} = 2\,100 \text{ mm}$$

$$\text{Lengthwise by lengthwise} = 2 \text{ shelf lengths}$$

$$\text{Width wise by width wise} = 3 \text{ shelf widths}$$

$$\text{Total number of shelves} = 2 \times 3 = 6 \text{ shelves}$$

## ACTIVITY 4: Packaging



(45 marks:40 minutes)

1.1 The cylindrical bottles of Coca-Cola are packaged as shown below:



Dimensions of the trailer cover:

- Length = 8,1 m
- Width = 2,45 m
- Height = 2,6 m

Measurements of a 2 litre Coca-Cola bottle:

- Radius = 52 mm and height = 327 mm
- Size of pallet consists of 8 x 8 bottles

NOTE:

- 1 ton = 1 000 kg
- 1 kg = 1 litre

Use the information above to answer the questions that follow.

1.1.1 Calculate the maximum number of the Coca-Cola pallets that could be loaded on the second trailer of the truck. (8)

1.1.2 Duan states that 12 pallets of the load from the second trailer will fit into a smaller van used by a shop owner for his own stock.

The van load size is 1,5 tons.

Verify, showing ALL calculations, whether his statement is true. (5)

- 1.2 The TVs are boxed and packed into shipping containers before they are exported. The boxes the TVs are packaged into have the dimensions 97 cm × 10 cm × 59 cm. The shipping containers have the dimensions 6 m × 2,4 m × 2,6 m.



Use the information above to answer the following questions.

- 1.2.1 An employee calculates how many TVs will fit in one container.

His calculations are shown below:

$$\begin{aligned} \text{Volume of container} &= 6 \times 2,4 \times 2,6 \\ &= 37,44 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{Volume of each TV box} &= 0,97 \times 0,59 \times 0,1 \\ &= 0,05723 \text{ m}^3 \end{aligned}$$

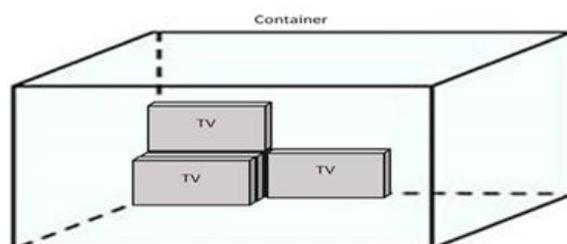
$$\begin{aligned} \text{Number of TVs in container} \\ &= \text{Volume of a container} \div \text{Volume of a box} \\ &= 37,44 \div 0,05723 \\ &= 654,2 \\ &\approx 654 \text{ TVs} \end{aligned}$$

Neo, a Mathematical Literacy learner, recognises that the employee has made a common mistake in calculating the number of boxes that can fit.

Explain, in words, the mistake that the employee made.

(2)

- 1.2.2 Neo stated that 576 TVs can fit into this container if the boxes are packed as in the diagram shown below. Show, by means of calculations, whether he is correct or not.



Note: The diagram is not drawn to scale and shows only a few of boxes.

(10)

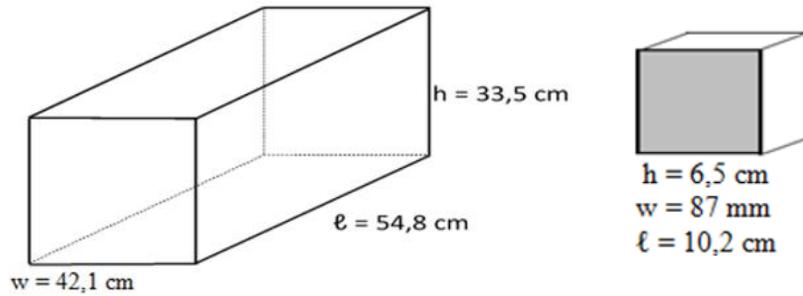
- 1.3 A company is selling biscuits packed in small boxes which are then packed in large boxes.

Verify which of the following packaging options will be cost effective:

**Option 1:** The length of the small box along the length of the large box.

**Option 2:** The width of the small box along the length of the large box.

Show all calculations to justify your answer.



(15)

- 1.4 Sipho opened a Spaza shop. He will purchase cans of Diet Coke from the wholesaler. A box of 24 cans of Diet Coke is displayed below. The radius of a can of Diet Coke is 3.5 cm. The cans are packed as shown in the picture. Calculate the minimum length and minimum width of the box to contain the 24 cans of Diet Coke.



(5)

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