TELEMATIC SCHOOLS PROJECT

2023 SUBJECT WORKBOOK
Grade 10

$a+b=c$ **MATHEMATICAL LITERACY**

A joint initiative between the Western Cape Education Department and Stellenbosch University.

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Education

Stellenbosch UNIVERSITY IYUNIVESITHI UNIVERSITEIT

BROADCAST SESSIONS

GRADE 10
- Session 1 :
- **Patterns, Relationships & Representations**

GRADE 10
- Session 2:
- **Income, Expenditure, Profit , Loss,Income & Expenditure Statements and Budgets**

GRADE 10
- Session 3:
- **Plans , Assembly Diagrams & Models**

Session	Date	Time	Topic
1	06/02/2023	15h00-16h00	**Patterns, Relationships & Representations**
2	24/07/2023	16h00-17h00	**Income, Expenditure, Profit , Loss Income & Expenditure Statements and Budgets**
3	31/07/2023	15h00-16h00	**Plans , Assembly Diagrams & Models**

INTRODUCTION AND TOPICS

INTRODUCTION

Patterns, Relationships & Representations

- When we need to make sense of information presented to us, we can make use of representations of patterns and relationships.
- This is a basic skill that we can apply to all content areas and help us to answer questions in our 5 main topics.

Income, Expenditure, Profit , Loss,Income & Expenditure Statements and Budgets

- In order to understand and manage our personal finances we need to be familiar with income and expenditure.
- We need to be able to complete and interpret income & expenditure statements as well as Budgets to help us make informed decisions about our finances.
- We need to practice sound financial management to ensure we do not go into debt.

Plans , Assembly Diagrams & Models

- When we understand how to use plans and what is represented we can make informed decisions about placement of objects and the layout of certain areas.
- We also need to be able to write steps or follow steps of assembly diagrams of certain products.
- When we look at models – investigating packaging problems will help us with problem solving.

Topics	Description
Patterns, Relationships & Representations	- **work with and identify different patterns & relationships** - **Make sense of graphs that tell a story** - **Represent patterns/relationships in tables , graphs, equations**
Income, Expenditure, Profit , Loss,Income & Expenditure Statements and Budgets	- Identify and perform calculations with income and expenditure. - Analyse and prepare Income and Expenditure Statements and budgets.
Plans , Assembly Diagrams & Models	- **Use instruction / Assembly diagrams to complete a presented task or explain what the steps mean .** - **Use plans to describe what is being represented, analyse the layout, determine actual measurements and determine quantities of materials needed.** - **Investigate packagaing arrangements to determine the most appropriate way to package objects as well as the most cost effective way to package objects.**

TERMINOLOGY

Term	Definition
Relationships	Sets of values in ordered pairs.
Representations:	Relationships can be represented in equations, tables and graphs.
Independent variable	Found on the x-axis.
Dependent variable	Found on the y-axis. Values of the dependent variables depend on the values of the independent variables.
Budget	A plan of how to spend money. An estimate of income and expenditure.
Income and Expenditure Statement	An actual representation of how income and expenditure was utilised over a certain time period.
Expenditure	An amount of money that is spent on something.
Income	Money earned from selling goods or services rendered.
Fixed Expenses	These are amounts that must be paid every month and which stay the same, like rent, school fees and transport costs
Variable Expenses	Expenses that change over time or from one week/month to the next. These are things that you usually pay or buy each month, but the amount changes e.g. telephone and electricity costs.
Occasional Expenses	Expenses that do not occur frequently and do not have a fixed amount. E.g: buying a new backpack
Fixed Income	These are amounts that is earned every month and which stay the same, like salary
Variable Income	Income that changes over time or from one week/month to the next. E.g.: Commission from sales
Occasional Income	Income that is not often received and does not have a fixed amount. E.g: getting money for your birthday.
Floor plan	Shows the design and dimensions of the inside of a building, from a top view
Scale drawing	A diagram of a real-life object drawn in proportion.

SESSION 1 | Patterns, Relationships & Representations

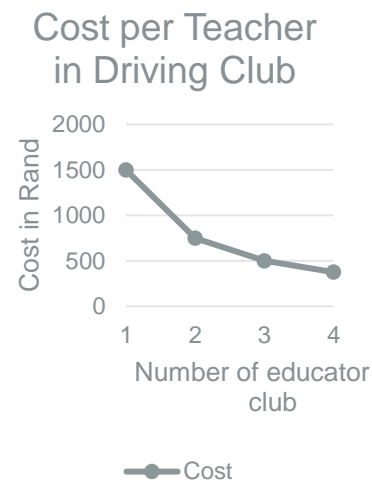| Relationships	⟶	Sets of values in ordered pairs.
Patterns	⟶	Can be seen & interpreted from relationships.
Representations	⟶	Relationships can be represented in equations, tables and graphs.

SUMMARY

WHAT YOU SHOULD KNOW

- When we need to make sense of information presented to us, we can make use of representations of patterns and relationships.
- This is a basic skill that we can apply to all content areas and help us to answer questions in our 5 main topics.

· **Types of Relationships:**

Relationships with no difference (Fixed relationship)

Fixed cost of hiring a bus per day
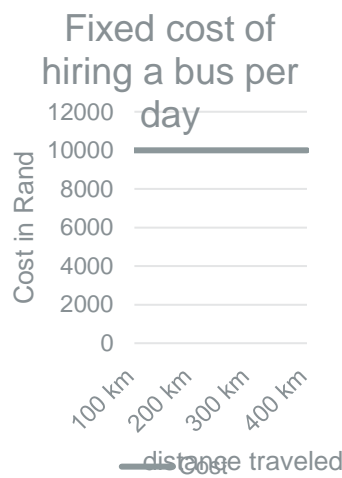
Relationships with constant difference (Direct proportion)

Cost of filling up a tank of petrol
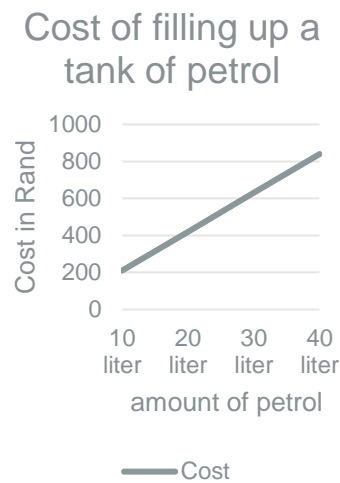
Relationships with inverse proportion

Cost per Teacher in Driving Club

What do we need to be able to take from relationships/graphs?

(let's practice these skills on the examples above)

Recognise that graphs:	Recognise and describe:	Describe features of patterns and/or relationships in words:
· tell a story and be able to explain the story/message/impression represented in a graph · represent a relationship between two or more items/quantities and be able to identify those items and describe the relationship	· how the shape and direction of a graph and changes to the shape/direction affect the story/message represented in the graph · the meaning of different points on the graph.	• independent and dependent variables • discrete /continuous variables • increasing/decreasing relationships • critical values including maximum, minimum and zero values.

SESSION 1 | Patterns, Relationships & Representations

SUMMARY

WHAT YOU SHOULD KNOW

- We can represent relationships as :
- Formulae
- Tables
- Graphs

- We need to be able to complete missing values of these representations.
- We need to know what story the data is telling

• Representing Relationships:

- We need to be able to represent relationships in equations, tables and graphs.
- We need to be able to find missing values from different representations.

Example 1:

Kayo drew the graph below representing his journey to work:

Kayo's journey to work
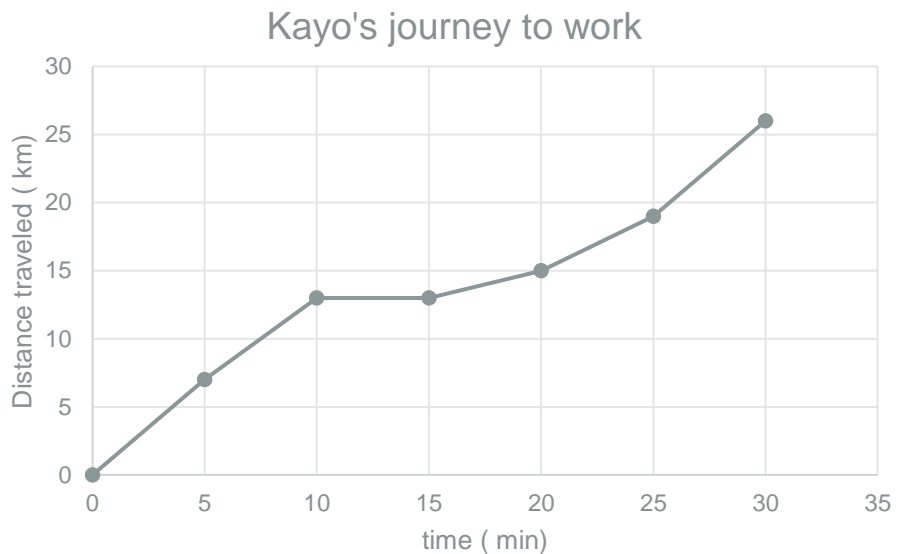
a) Describe Kayo's journey to work in words.
b) Identify the independent and dependent variables.
c) Kayo stopped to pick up a friend on his way to work, calculate how long he waited at the friend's house.
d) Identify the time period where Kayo was driving at a constant speed.
e) Write down the total distance Kayo traveled to work.

Solutions:

Example 1:

a) Kayo drives at a constant rate for 10 min. He then stops for five minutes. After this he continues to drive at an increasing speed until he reaches his place of work.
b) Independent: Time (min) Dependent: Distance traveled (km)
c) 5 min
d) 0-10 min
e) 30 km

SESSION 1 | Patterns, Relationships & Representations

SUMMARY

WHAT YOU SHOULD KNOW

- We can represent relationships as :
- Formulae
- Tables
- Graphs

- We need to be able to complete missing values of these representations.
- We need to know what story the data is telling

> Can you identify the dependent and independent variable?

> Can you describe the relationship represented in words?

- ## Representing Relationships:

Example 2:

Sethu wants to start selling muffins at school for pocket money. He does some calculations and finds that he can sell them for R8 each and still make a profit.
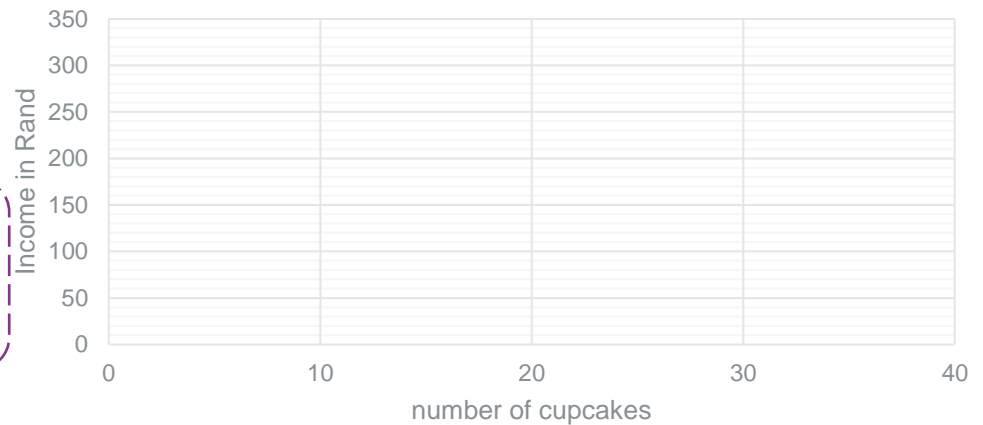
a)   Write an equation for income for the above scenario in the format:
$$Income = \ldots\ldots$$

b) Complete the following table for Sethu's income:

	Number of muffins:				
	0	10	20	ii)	40
Income (R)	0	i)	160	240	320

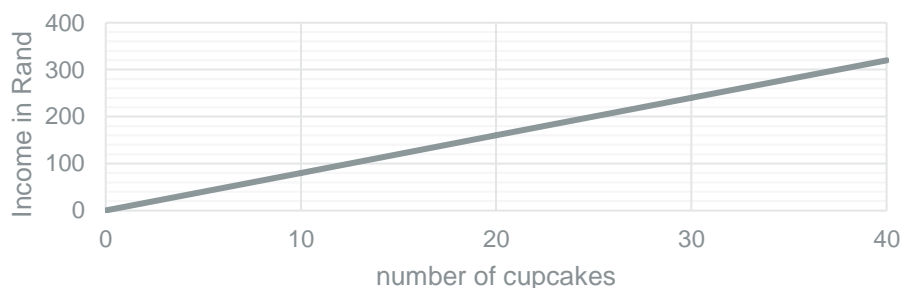c) Complete the graph for Sethu's income:

Sethu's income from selling muffins

Solutions
Example 2:

a)   Income = R8 x n where n is the number of muffins sold.

	Number of muffins:				
	0	10	20	30	40
Income (R)	0	80	160	240	320

Sethu's income from selling muffins

SESSION 1 | Patterns, Relationships & Representations

SUMMARY

WHAT YOU SHOULD KNOW

- We can represent relationships as :
- Formulae
- Tables
- Graphs

- We need to be able to complete missing values of these representations.
- We need to know what story the data is telling

Can you see that we are working with equations, tables and graphs for the same relationship?

You should be able to use one representation of a relationship to complete the types of representations.

• Representing Relationships:

Example 3:

Keshmika found the following information about buying biltong online:

Cost of buying different quantities of biltong
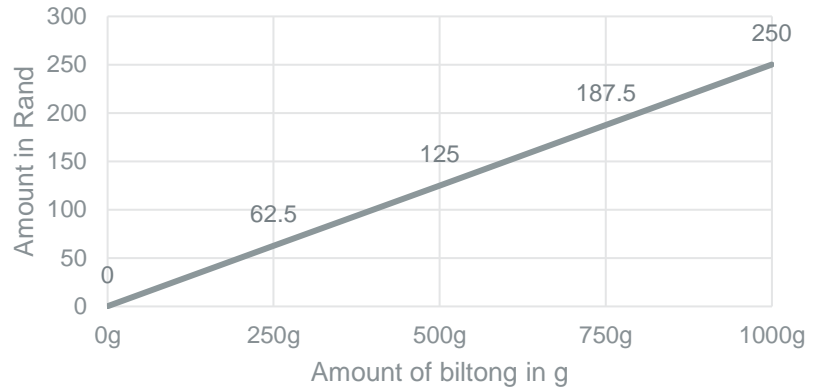
a)   Describe the relationship represented in this graph in words.
b)   Identify the independent variable.
c)   Identify the type of relationship represented in the graph above.
d)   Write down the cost of buying 1 kg of biltong (1 000g)
e)   Write down the equation for the cost of biltong in the format:
           Cost (in R) = ……
f)   Complete the table below from the graph and information above for   the cost of Biltong

Solutions
Example 3:

a)   There is a constant difference in the price of biltong. The more you buy the more you pay.
b)   Amount of biltong (g)
c)   Direct Proportion
d)   R250
e)   Cost = R250 x n where n is the kg of biltong bought
f)

Amount of biltong in grams				
0	250	500	750	1 000
Cost in Rand 0	62,50	125	187,5	250

SESSION 2 | Income, Expenditure, Profit , Loss
Income & Expenditure Statements and Budgets

SUMMARY

WHAT YOU SHOULD KNOW

What do we need to be able to do?

· Identify and perform calculations with different types of income & expenditure.
· Analyse & Prepare income & Expenditure Statements and Budgets.

Income, Expenditure, Profit , Loss

Income & Expenditure:

· You need to be able to identify types of income and expenditure from lists as well as prepared documents.

· **Example 1 :**

· From the list below classify the income / expenditures below into the table:

Salary paid into bank account	Recharging cellphone airtime	Inheriting money from a relative
Sales from selling cupcakes	Paying rent	Buying a new purse

Type:	Income:	Expenditure:
Fixed		
Variable		
Occasional		

Solution:
Example 1

Type:	Income:	Expenditure:
Fixed	Salary paid into bank account	Paying rent
Variable	Sales from selling cupcakes	Recharging cellphone airtime
Occasional	Inheriting money from a relative	Buying a new purse

Profit & Loss:

Profit : Profit is the difference between the Selling price and the Cost price

Loss: Is when the cost price is more than the selling price.

Cost Price	Profit		Selling Price
100	+ 60	=	60 / 100

CP+Profit = SP	SP-Profit = CP	SP-CP = Profit

SESSION 2 | Income, Expenditure, Profit , Loss
Income & Expenditure Statements and Budgets

SUMMARY

WHAT YOU SHOULD KNOW

What do we need to be able to do?

· Identify and perform calculations with different types of income & expenditure.

· Analyse & Prepare income & Expenditure Statements and Budgets.

- **Example 2 :**

- Chloe has a small shop she runs from her home where she sells household essentials. She buys all her products from a wholesaler and then puts a mark-up on it. The table below shows three of her products:

Corned Meat:	Omo:	Cooking Oil
Wholesale Price: R20 each Selling Price : R28	Wholesale Price : R10,25 each Profit Mark-up: 40%	Selling Price: R32 Profit : R7

a)   Calculate the amount of profit she makes on a tin of corned beef.

b)   Determine the selling price of the 300g bag of Omo washing powder.

c)   Calculate the Wholesale Price at which Chloe buys the cooking oil.

Solution:
Example 2

a)   R28 – R20 = R8

b) $R10,25 \times \frac{40}{100} = R4,10$
     R10,25+R4,10 = R14,35

a)   R32-R7 = R25

Income & Expenditure Statements and Budgets

- **Example 3 :**

- Miriam is an avid baker who wants to make more money by baking cupcakes

Miriam's Budget for March 2022			
Income:	Amount (R)	Expenditure:	Amount (R)
Salary	14 000	Rent	6 500
Selling cupcakes	2 000	Water and Electricity	550
		Car repayment	2 400
		Groceries etc.	1 900
		Cost of making cupcakes	1 250
		Entertainment etc.	2 400

a) Is this a monthly or annual budget?

b) Is this person making a profit selling cupcakes?

c) From the budget identify one variable income and expense.

d) Is this person budgeting their money well? Validate your answer with a calculation.

SESSION 2 | Income, Expenditure, Profit , Loss
Income & Expenditure Statements and Budgets

SUMMARY

WHAT YOU SHOULD KNOW

What do we need to be able to do?

· Identify and perform calculations with different types of income & expenditure.
· Analyse & Prepare income & Expenditure Statements and Budgets.

Solution:
Example 3
a) Monthly
b) R2 000 – R 1 250 = R750.
   So yes, a profit is made
c) Variable income : Selling Cupcakes ;
   Variable Expense : Electricity
d) Total income : R 14 000 + R 2 000 = R 16 000
Total Expenses : R 6 500 +R 550 + R 2 400 + R 1 900+ R 1 250+ R 2 400
= R15 000
 R16 000 – R 15 000 = R 1 000
∴ Yes, they are, as they have money left over at the end of the month.

- **Example 4 :**

Fran recently started a small business selling fudge. He drew up the income & expenditure Statement below:

Income & Expenditure Statement of Fran's Fudge			
Income:	Amount (R)	Expenditure:	Amount (R)
Sales from fudge at market	19 000	Fudge ingredients	14 000
Sales from fudge online	4 000	Salary of employee	7 000
Sales from fudge to school	(a)	Marketing	450
		Data	500
		Transport	1 975
		Electricity	(5 % of cost of ingredients)
Total Income:	R29 000	Total Expenses:	b)

a) Calculate the missing value of the sale from fudge at schools (a).
b) Calculate the cost of electricity and the total expenses of Fran's fudge.
c) What percentage of their total income is spent on salaries?
d) Is this company doing well financially? Motivate your answer with calculations.

Solution:
Example 4
a)   R 29 000 – (R 19 000 + R 4 000) =R6 000
b) 5% x R 14 000 = R 700
       R 14 000+R 7 000 + R450 + R 500 + R 1 975+ R 700 = R24 625
c) $\frac{7\ 000}{29\ 000} \times 100$ =24,14%
d) Surplus:R29 000 – R24 625 = R 4 375

Yes, they are, as they have money left at the end of the year.

SESSION 2 | Income, Expenditure, Profit , Loss
Income & Expenditure Statements and Budgets

SUMMARY

WHAT YOU SHOULD KNOW

What do we need to be able to do?

· Identify and perform calculations with different types of income & expenditure.
· Analyse & Prepare income & Expenditure Statements and Budgets.

- **Example 5 :**

Lebo is in grade 11. His parents give him R250 pocket money monthly. To increase his income, he works as a waiter at a restaurant for two shifts per weekend, four weekends a month. He receives R 200 per shift.

Lebo is responsible for the following monthly expenses:

Cellphone contract: R450,Fuel for scooter: R275,Toiletries: R175,Repay loan from dad: R150,Entertainment / Other: R400

a)   What is Lebo's total monthly income?
b)   Draw up a monthly budget for Lebo that includes all financial responsibilities.
c)   Identify one fixed expense from Lebo's budget.
d)   Will Lebo have any money left at the end of the month to put in his savings account?

Lebo's monthly budget:			
Income:	Amount (R)	Expenditure:	Amount (R)

Solution:
Example 5
a)   R 250 + (R 200 x 2 x 4)
          = R1850

b) Lebo's monthly budget:

Income		Expenses:	
Pocket money	R 250	Cellphone	450
Waitering income	R 1 600	Fuel	275
		Toiletries	175
		Repay loan	150
		Entertainment / Other	400
Total:	R1 850	Total:	R1 450

c)   Cellphone contract, repay loan from dad
d) Yes, he will have R400 left
          (R1 850 – R1 450 = R400)

SESSION 3 | Maps Plans & Other Representations

SUMMARY

WHAT YOU SHOULD KNOW

*In this session we will focus on:*

Plans

Assembly Diagrams
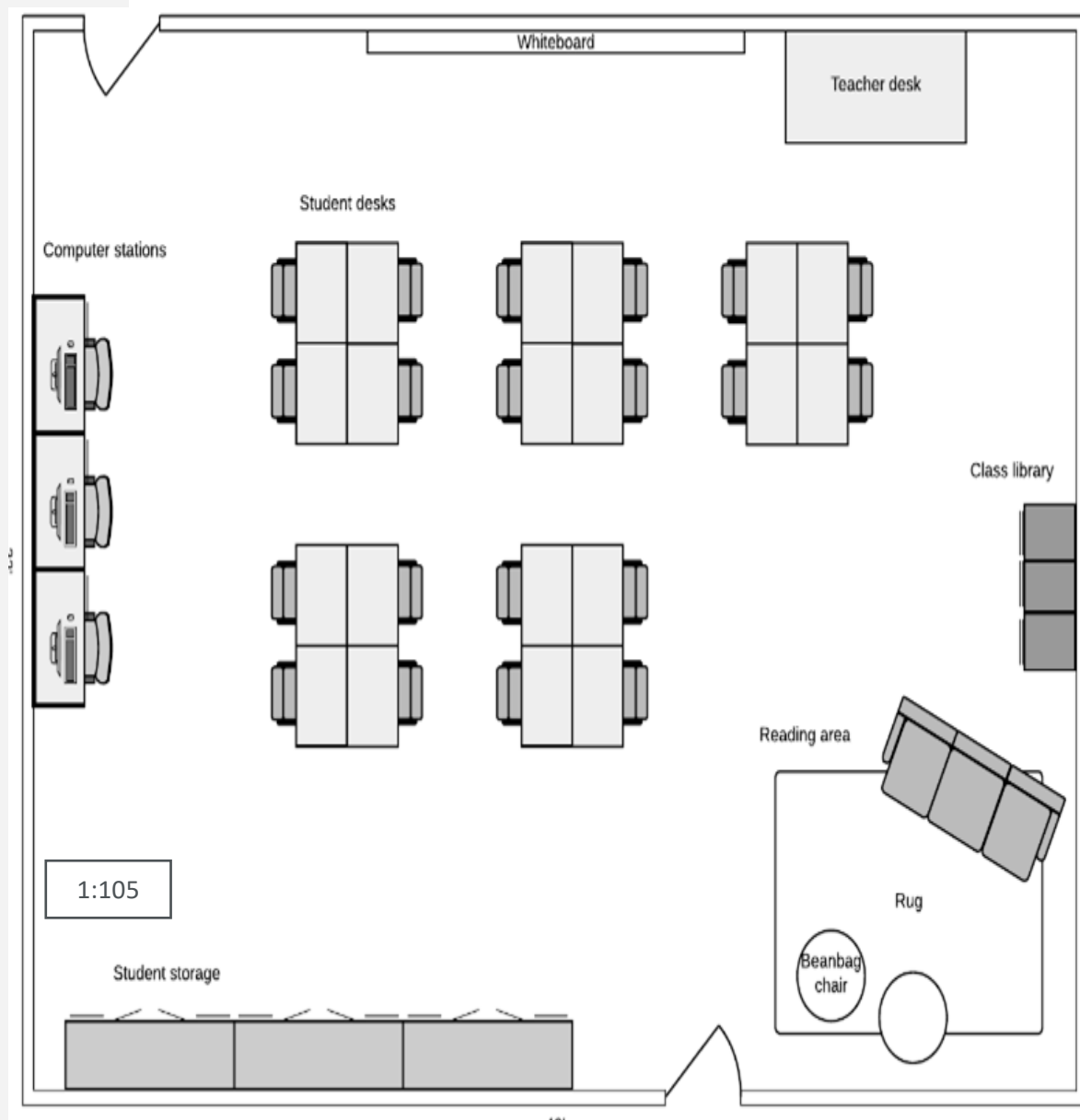
Models

Instruction/Assembly Diagrams

- **We need to be able to:**
  - o   Complete the task presented in the instructions.
  - o   Explain what the instructions mean
  - o   Determine the correct order of the steps

- **Example 1 :**

- Kay wants to assemble an Ikea mamut child chair. She finds the following instructions online:

Source: https://usermanual.wiki/Ikea/IkeaMammutChildChairAssemblyInstruction.
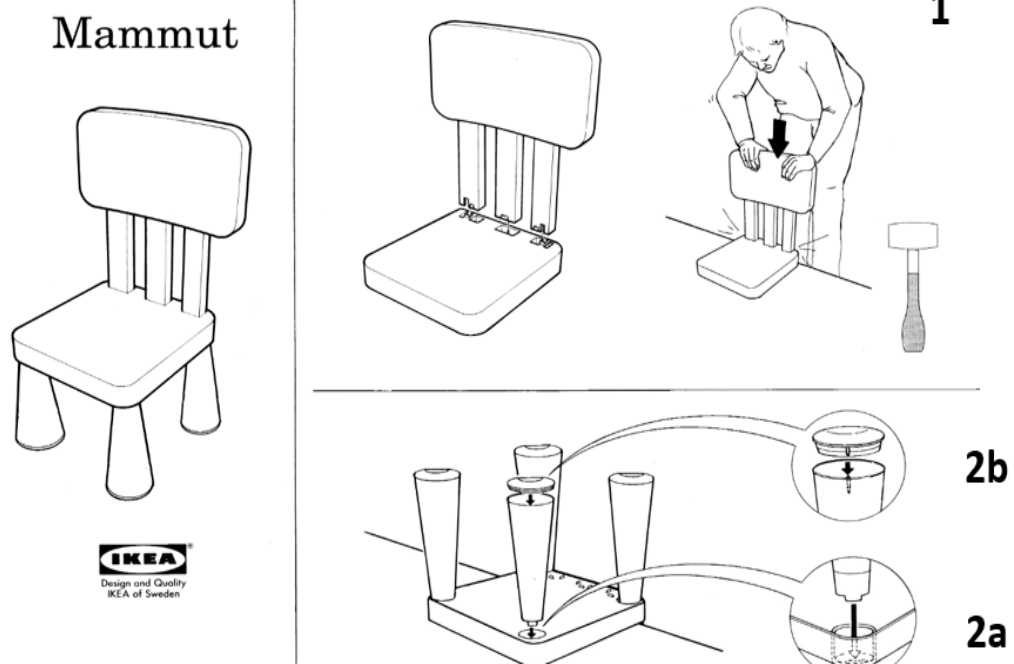
a)   Describe the action required in step 1.
b)   At step 2 determine the number of legs needed.
c)   Give one possible reason for step 2b.
d)   From the diagram above determine how many parts of the chair will be present in the box when receiving it.

Solution:
Example 1

a)   Insert the backrest into the base/ seat by pushing it down with two hands.
b)   4
c)   To protect the floor surface
d)   10

SESSION 3 | Maps Plans & Other Representations

Plans : Floor Plans & Design

· **We need to be able to:**
  o Understand the symbols used in the plan
  o Analyse the layout.
  o Determine the actual lengths of objects using a given scale
  o Determine quantities of materials needed for certain projects.
· **Example 2:**

· Ms van Wyk is a new teacher at a school and draws up the following classroom layout plan:

Source: https://www.lucidchart.com .

SUMMARY

WHAT YOU SHOULD KNOW

In this session we will focus on:

Plans

Assembly Diagrams

Models

Plans : Floor Plans & Design

·   **Example 2:**

a)   Define the term floor plan in this context.

b)   Write down the number of doors on this floorplan.

c)   Write down the total number of chairs present in the classroom.

d)   Identify one feature that is normally present on a floor plan that is   missing from this floorplan.

e)   Critically comment on the layout plan of this classroom for learning.

f)   The student storage measure 5,8 cm on the plan. Calculate the   actual length of the storage unit in meter.

g)   The teacher desk measures 2 cm by 1 cm on the plan. The teacher   wants to put a tablecloth on the table with a 20 cm overhang on each side. Calculate the measurements of material she needs to buy   to cover her table in m.

Solution:
Example 2:

a)   An aerial / top view of the design and dimensions of the inside   of a building.

b)   2

c)   23

d)   Windows

e)   Learners are able to work together in groups of four.
     It might be difficult for some learners to copy from the board with   their seat positioning.
     There are computers in this classroom to help with research .

f)   5,8 cm x 105
      = 609 cm
      = 6,09 m

g)   2 cm x 105 = 210 cm
      Overhang : 20 cm + 20 cm + 210 cm
      Total length : 250 cm
      Length in m : 2,5 m
     1 cm x 105 = 105 cm
      Overhang : 20 cm + 20 cm + 105 cm
      Total width : 145 cm
      Width in m : 1,45

SESSION 3 | Maps Plans & Other Representations

Models: Packaging Problems

· **We need to be able to:**
   o Investigate Packaging arrangements
   o Determine the most appropriate way to package objects
   o Determine the most cost- effective way to package objects.
Example 3:

· Tauriq wants to sell cupcakes at a market day and orders containers from a supplier.

· The measurements of the cupcake containers can be seen below:

80mm
80mm
80mm
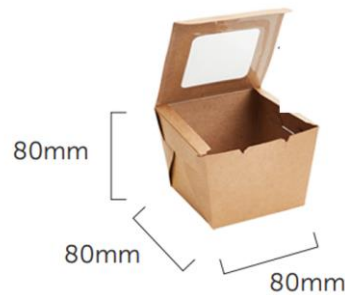
He plans to transport the cupcakes (in containers) in boxes like the one below:


440 mm   160 mm   510 mm

Source: Sources: Greenhome & Merrypak.

a) Draw a diagram of the base of the box indicating measurements.
b) Determine the number of containers that will fit into the length of the box.
c) Jane stated that Tauriq should be able to fit 6 boxes in the width of the box. Verify, with calculations if her statement is correct.

d) Comment on why it would not be advisable to use a box
with   a greater height than this

Solution:
Example 3:
a)
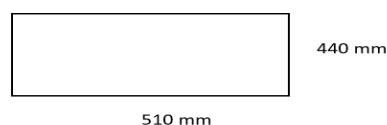
440 mm
510 mm

b) 510 mm ÷80 mm = 6,375 ≈6 containers
c) 440 mm ÷80 mm = 5,5 ≈5 containers
   ∴Jane's statement is not correct.
d) The cupcakes in the bottom layer might be damaged.

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