OBE for FET

Colleges Mathematical Literacy

Level 3 Lecturer's Guide

nc edition

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Contents

Commonly used acronyms

AG	Assessment Guideline
CCO	Critical Cross-field Outcomes
DoE	Department of Education
EMS	Economic and Management Sciences
FET	Further Education and Training
GET	General Education and Training
HET	Higher Education and Training
HIV/Aids	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
ICASS	Internal Continuous Assessment
IKS	Indigenous Knowledge Systems
LB	Student's Book
LO	Learning Outcome
LP	Learning Programme
LSEN	Students with Special Education Needs
LSM	Student Support Material
LTSM	Learning and teaching support materials
NC	National Certificate
NCS	National Curriculum Statement
NSC	National Senior Certificate
NQF	National Qualifications Framework
OBE	Outcomes-based Education
SAG	Subject Assessment Guideline
SO	Subject Outcome
TG	Lecturer's Guide

Introduction

This series for the subject Mathematical literacy offers a Lecturer's guide and a Student's Book Level 3 in the Further Education and Training (FET) Colleges. The content of the Lecturer's Guide and the Student's Book has been integrated for better teaching and learning where all topics are covered in a module within a term.

How to use this Lecturer's Guide

Every topic in the Lecturer's Guide includes guidance and additional information.

Solutions and teaching tips

The sections on guidance and additional information offer useful suggestions on how to present the learning material, how to prepare and how to conduct each activity. Ideas for individual, pair, group, class and Portfolio of Evidence activities have been designed to cover the LOs

Possible solutions to questions in the Lecturer's Guide are also provided for most of the activities. Although you will find these suggestions useful when preparing a lesson, you can choose to adapt these methods or to use your own, since you know what will work best for your students. Additional information is intended to serve as background for the lecturer is supplied for some of the activities.

Assessment should be continuous. At the end of each unit in the Student's Book, there is an opportunity for self-assessment by the students or peer-/ lecturer-assessment as well as cumulative assessment at end of the topic which can be used as a test or examination should a lecturer wishes to do so.. These formative assessment questions are directly linked to the LOs of each unit.

In each unit in this Lecturer's Guide, guidance has been given regarding assessment for the activities in the Student's Book. Some additional assessment opportunities are also included. Rubrics and checklists have been prepared to assist you with assessment (You can choose to use these assessment tools as they are, or adapt them to suit your specific needs. At the end of each topic in this Lecturers Guide, there is a grid summarising the assessment for each activity. This could be used or adapted for Portfolio of Evidence assessment purposes for each student.

Using this Lecturer's Guide with the Student's Book

Icons have been used throughout the Student's Book to consolidate and facilitate the learning process, and to adopt an interactive approach between the student and the text. The icons indicate different types of activity - for example, a group or a question or feedback activity. The icons are also used to indicate what is being dealt with - for example, outcomes, assessment, career links or a cross reference to something else.

	Cross reference This icon shows forward or backward links or references to other sections in the book.
	Outcomes Outcomes appear in the outcomes table at the beginning of each unit. The students should achieve these unit outcomes, which are derived from the Subject Outcomes and the Learning Outcomes in the National Certificate ('Finance, Economics & Accounting) Mathematical literacy Subject Guidelines.
	Individual This icon indicates that students should work on their own.
	Pair work This icon indicates that the students should work in pairs.
	Group work This icon indicates that the students should works in groups. Groups of four or five students are usually ideal, but depend on the type of activity.
	Minds This icon indicates knowledge outcomes that students should have acquired.
	Hands This icon shows skills-based outcomes or activities developed for students to apply knowledge (and values) that they have acquired.
	Hearts This icon shows values-based outcomes that assist the students to express or develop particular values (or attitudes) to the issues raised.

The new curriculum

A process of transforming education and training to realise the aims of our democratic society and of the Constitution has been underway since 1994. As part of this process, the outcomes-based curriculum (OBE) was developed as one united curriculum for all school students in the General Education and Training (GET) and Further Education and Training (FET) bands.

The OBE curriculum was designed to be student-centred, integrated and holistic, relevant to students' lives and the needs of the country, and to promote critical and creative thinking.

What has changed?

The table below outlines some of the changes and compares terms used in the pre-OBE and OBE stages.

Pre-OBE	OBE
Old terms/phrases	New terms/phrases.
Core syllabus	Subject Guidelines
Scheme of work	A Learning Programme consists of 3 stages of planning 1. Subject Framework (3 year plan or Band plan per Subject) 2. Work Schedule per level per subject 3. Lesson Plans
Aims/themes/topics	Subject outcomes (SOs)
Objectives /content	Assessment standards (ASs)
Lesson plan	Lesson plan
Text books	Learning and Teaching Support Materials (LTSM) – includes various learning and teaching resources like CDs, videos, text books, etc.
Learning/syllabus is content-driven. Rote learning takes place.	Learning is outcomes-based. The curriculum is relevant, communicative, connected to real-life situations and provides for the development of knowledge, skills , values and attitudes in an integrated way.
Traditional teaching methods may have included learning being textbook-driven.	Traditional teaching methods are enhanced through methods that require the students to be actively involved.
Lecturer-centred	Student-centred and lecturer plays a facilitator/mediator role.
Students' work is assessed by the lecturer	A variety of assessment methods is used (self-assessment, peer assessment, group assessment, lecturer assessment, etc.).
Test-based assessment	Observation, Test and Task-based assessment takes place.
Lecturer is responsible for learning – motivation depends on the personality of the lecturer.	Students take responsibility for their own learning – students are motivated by constant feedback and affirmation.

Purpose of Mathematical literacy

- Why is the subject important?

In order to be a more effective: self-managing individuals; contributing workers; life-long students; and critical citizens in the modern world people need to be able to engage with the numbers, numerically-based arguments and data represented (and misrepresented) in a large variety of ways that confront them on a day-to-day basis. Mathematical Literacy develops the knowledge, skills, attitudes and values that enable people to do so.

- The link between the learning outcomes and the critical and developmental outcomes

Mathematical Literacy aims to:

- Develop logical thought processes
- Develop analytical ability
- Encourage systematic approach to solving problems
- Lead students to identify and solve problems

- Critically evaluate information
- Be accurate
- Work with numbers with confidence
- Meaningfully interpret financial information and manage personal finances

- Factors that contribute to achieving the Mathematical Literacy learning outcomes
  Interest in working with numbers, experience in and/or exposure to working with numbers, experienced in working with a calculator, be able to work orderly, analytic ability, being critical and/or evaluative. Accuracy when analysing; calculating and recording will be an attribute.

The Mathematical literacy learning outcomes provide a platform for the achievement of all seven Critical Outcomes and five Developmental Outcomes.

The Critical Outcomes require students to be able to:

CO1 Identify and solve problems and make decisions using critical and creative thinking;

CO2 Work effectively with others as members of a team, group, organisation and community;

CO3 Organise and manage themselves and their activities responsibly and effectively;

CO4 Collect, analyse, organise and critically evaluate information;

CO5 Communicate effectively using visual, symbolic and/or language skills in various modes;

CO6 Use science and technology effectively and critically showing responsibility towards the environment and the health of others; and

CO7 Demonstrate an understanding of the world as a set of related systems by recognising that problem solving contexts do not exist in isolation.

The Developmental Outcomes require students to be able to:

DO1 Reflect on and explore a variety of strategies to learn more effectively;

DO2 Participate as responsible citizens in the life of local, national and global communities;

DO3 Be culturally and aesthetically sensitive across a range of societal contexts;

DO4 Explore educational and career opportunities.

DO5 Develop entrepreneurial opportunities.

Inclusivity

Students with special needs should not be excluded from any activities. These students should get the opportunity to decide at which point to stop or take up different tasks. Students with special needs are not only students who need more time to complete an activity or who complete work very quickly, but any student who may have a barrier to learning, such as a medical condition (e.g. epilepsy, asthma, wheelchair-bound, and so on), visual impairment, speech impediment or language difference.

Adapting the curriculum to include students at all levels is not an easy task. Breaking a lesson down into simpler and shorter tasks can go a long way towards serving special needs of students.

When you introduce an activity to the class, the aims should stay the same for all students, but you can present new concepts at different levels to include any students with special needs.

How to present work at different levels:

- simplify your instructions and vocabulary;
- where necessary, make pictures and flashcards large and bold;
- give clear instructions;
- let students work in groups;
- break up work into smaller tasks;
- make use of demonstrations, role-play, drama and repetition;
- present work in different ways to ensure consolidation; and
- make use of a multimedia approach, e.g. use pictures, books, calculators, tape recorders, videos and computers where available.

Recommended alternative methods of assessment for students with special needs:

	Visual Barriers	Hearing Barriers	Deafness and Blindness	Physical Barriers	Learning Disability
Tapes	✓			✓	✓
Braille	✓		✓		
Enlarged print	✓			✓	
Dictaphone	✓			✓	✓
Video		✓			✓
Sign-language interpreter		✓	✓		
Computer typewriting	✓	✓	✓	✓	✓
Alternative questions and tasks	✓	✓	✓	✓	✓
Additional time	✓	✓	✓	✓	✓

Amanuensis (scribe reads questions to student and writes down Student's spoken answers)	✓	✓	✓	✓	✓
Oral presentation to lecturer	✓	✓	✓	✓	✓

Assessment in Mathematical literacy

Assessment requirements

INTERNAL ASSESSMENT (25%)

Internal Assessment requirement

All internal assessments must be finalised by an assessor with at least a certificate of competence.

Processing of Internal assessment mark for the year

A year mark out of 100 is calculated by adding the marks of the internal continuous assessment.

Moderation of internal assessment mark

(To be consulted with National Exams and Assessments)

EXTERNAL ASSESSMENT (75%)

National examination

A formal examination is conducted in October/November each year by means of two papers set externally and marked and moderated externally (level 4) and internally (levels 3 and 2). The examination will be structured as follows:

<table>
<tr><th></th><th>Knowing
30%</th><th>Applying routine procedures in familiar contexts
30%</th><th>Applying multi-step procedures in a variety of contexts
20%</th><th>Reasoning and reflecting
20%</th></tr>
<tr><td>Numbers
20%</td><td colspan="2" rowspan="5">Paper 1
(150 marks)

Paper 1 is intended to be a basic knowing and routine applications paper</td><td colspan="2" rowspan="5">Paper 2
(150 marks)

Paper 2 is intended to be an applications and reasoning and reflecting paper</td></tr>
<tr><td>Patterns and relationships
20%</td></tr>
<tr><td>Finances
20%</td></tr>
<tr><td>Space, Shape and Orientation
20%</td></tr>
<tr><td>Information communicated …
20%</td></tr>
</table>

Nature of paper : External

Number of papers : 2

Duration : 3 hours each

Total mark allocation : 300

Compulsory sections : all

WEIGHTED VALUES OF TOPICS/THEMES/SPECIFIC OUTCOMES

TOPICS/THEMES	WEIGHTED VALUE
Numbers	20%
Patterns and Relationships	20%
Finance	20%
Space, Shape and Orientation	20%
Information communicated through numbers, graphs and tables	20%
TOTAL	100%

CALCULATION OF THE FINAL MARK

Continuous Assessment

Mark out of 100 ÷ 4 = a mark out of 25 (a)

Examination Mark

Mark out of 300 ÷ 4 = a mark out of 75 (b)

Final Mark

(a) + (b) = a mark out of 100

All marks are systematically processed and accurately recorded to be available as hard copy evidence for, amongst others, purposes of moderation and verification.

Note:

Assessment should be done by assessors with the correct credentials as required by the government. An assessor should be a subject specialist and should be declared competent against standards set by the ETDP SETA

GUIDELINES FOR ASSESSMENT OF PRACTICAL WORK

The question or hypothesis given for research should be as straight forward as possible to avoid ambiguity and collection of wrong information to complete the task. Enough time equal to the task must provided. Practical work maybe an assignment, an investigation. Remember that home works and other activities that are formally assessed form part of the practical component.

You may assess students on the following:

What to assess	description	Possible points
Knowledge and under-standing	This element covers facts, skills and concepts needed to solve a mathematical problem. It includes the following • Correct use of mathematical language • Correct use of notations and symbols	
Reasoning and applica-tion	This element assesses the Student's understanding and ability to make decisions about solutions. This will include: • Student's ability to show originality and presentation of the best possible solution to a given mathematical problem	
Investigation skills	This reflects the use of important mathematical activities like the collection of data and the exploration of patterns, making conjectures and generating a solution or making a mathematical model from the results. This will include: • The Student's ability to integrate knowledge learned from other themes except for the theme where the task was given • Student's ability to write a report on the findings	

The meanings of the most frequently used verbs in questioning are listed below.

Knowledge and understanding	
Define	Give the exact meaning of a term or concept using words or mathematical symbols. (e.g. Define assets)
Describe	Give an account. (e.g. Describe the double entry principle.)
Identify	Single out from other information. (e.g Identify the assets, liabilities, expenses and income from the following list of items.)
Illustrate	Use examples to explain a point. (e.g. Illustrate by means of an example the double entry principle .)
List	State briefly. (e.g. List three possible sources of capital for a new business)
Outline	Give a short description of the main aspects or features. (e.g. Outline by means of a diagram the 8 steps in the accounting cycle.)
State	Give or say. (e.g. State three reasons why the bank can dishonour a cheque.)
Summarise	Bring out the main points from a complex set of data (e.g. Draw a mind map that summarise the nine different types of businesses.)
What	Clarify a point. (e.g. What are the main characteristics of a company?)
Application	
Apply	Use knowledge of Mathematical literacy to understand an issue or to solve a problem. (e.g. Apply your knowledge on equity to identify whether the follow-ing transactions would have a positive or a negative effect on equity.).)
Calculate	Use mathematical literacy to work out an answer. (e.g. Calculate the cost price of a T-shirt if the selling price is R150 and the profit mark-up is 25%.)

Distinguish between	Identify the characteristics that make two or more ideas, concepts, issues, etc. different. (e.g. Distinguish between the characteristics of a Partnership and a Close Corporation.)
Explain	Make clear. (e.g. Explain the two main sections that the General Ledger is divided into.)
Suggest	Give possible reasons or ideas that are plausible but not necessarily correct. 'Suggest' may require candidates to analyse a problem and not just apply Mathematical literacy problems. (e.g. Suggest reasons why a business would sell to customers on credit)
Analysis	
Analyse	Break down into constituent parts in order to be able to understand an issue or problem. Analysis involves recognising what is important, and applying knowledge and understanding of Mathematical literacy. (e.g. Analyse the following transactions using the basic accounting equation.)
Compare and contrast	Show similarities and differences between two or more ideas or problems (e.g. Compare by tabulating the similarities and differences between a partnership and a close corporation.)
Examine	Break down an issue or problem to understand it. (e.g. Examine the following ledger account and point out the possible errors.)
Investigate	Look for evidence to explain and analyse. (e.g. Investigate the initial problems when starting a business by interviewing the owner of a mall business and present your findings in a report)
Evaluation	
Assess	Analyse an accounting issue or problem, and then weigh up the relative importance of different strands. (e.g. Assess the success of the different methods used by the business to encourage debtors to pay their accounts on time.)
Comment on	Invites students to make judgements based upon the evidence they have presented. (e.g. Comment on why good management is the key to a successful business .)
Critically analyse	Analyse an issue/problem and weigh up the relative importance. (e.g. Critically analyse the three options to obtain capital to start a new business.)
Do you think	Invites students to give their own opinions about an issue or problem. However, marks will always be awarded for the quality of the argument and not for any individual opinions. (e.g. Do you think it is better for a business to sell credit that only cash?)
Discuss	Compare a number of possible views about an issue and weigh up their relative importance. A conclusion is essential. (e.g. Discuss the importance of screening customers before allowing them to buy on credit.)
Evaluate	Similar to discuss; to compare a number of possible views. A final judgement is essential. (e.g. Evaluate the advantages and disadvantages of buying on credit.)
To what extent	Explain and analyse and then comment upon the relative importance of the arguments. (e.g. To what extent should a owner make use of loans to finance his/her business?)

Types of assessment

- **Summative assessment**

It gives an overall picture of the Student's performance at a given time. This is a form of assessment that is used to judge the Student's readiness to progress to the next level

- **Formative assessment**

Formative assessment informs the lecturer and the student of the Student's progress. It contributes towards the formation and the development of the Student's formative years. The formative component of college-based assessment comprises 50% of the total for the year. The formative component of ICASS must include various activities. For example:

- research and monitoring of relevant, contemporary economic issues
- other ongoing tasks to develop skills that are necessary for successful functioning within the subject
- creative responses to problems within the subject field
- more informal assessment of day-to-day knowledge and skills acquired through creative class tests, presentations of the previous day's work, class quizzes, etc.

The formative component should cater for the multiple intelligences (i.e. verbal-linguistic, interpersonal, intra-personal, musical-rhythmic, bodily-kinaesthetic, mathematical/logical, spatial) of students in an inclusive education context.

Assessment Tools (Rubrics and Checklists)

Rubrics are a combination of rating codes and descriptions of standard. They consist of a hierarchy of standards with benchmarks that describe the range of acceptable performance in each code band. Rubrics require lecturers to know exactly what is required by the outcome. Rubrics can be holistic, giving a global picture of the standard required, or analytic, giving a clear picture of the distinct features that make up the criteria, or can combine both.

Holistic rubrics score the overall process, while analytic rubrics score the individual parts. It is important to note that:

- the student is only assessed once for each criterion within a rubric
- the comments column should be completed as this makes the moderation process easier
- rubrics can be used individually or combined with others
- rubrics may be joined together for ease of marking
- lecturers are encouraged to formulate rubrics in consultation with other lecturers at cluster or school level
- working in clusters and setting up collaborative rubrics would bring about comparable standards.

The following steps may help you in drawing up a rubric:

Step 1: Examine the AS that describes the task.

Step 2: Specify the skills, knowledge and attitudes to be evaluated.

Step 3: Identify the observable attributes.

Step 4: Identify the attributes that you do not wish to see.

Step 5: Brainstorm the characteristics that describe each attribute and how they can be described so that they can be classified into average, above average and below average.

Step 6: Write descriptions for excellent and poor performances.

Step 7: Write descriptions for other levels.

Step 8: Collect samples of work that represent each level.

RUBRIC: Student's own experience when doing a project

This rubric could be used as a journal entry for students. It is your duty as their lecture to check on this so that you know the Student's attitude on the task given or completed.

Amount of time spent on project (time scale to be determined)	less than	1	2	3	4	5	or more
Number of family members spoken to							
Do you feel you learned anything about yourself when doing this project?	yes			no			
Comment:							
Do you feel the project helped you understand yourself?	yes			no			
Comment:							
Did you think you expressed this information about yourself in an interesting and exciting way?	yes			no			
Comment:							
Do you think you put a lot of effort into this project?	yes			no			

RUBRIC to assess Group skills

Group Name/Number:................................ NAMES:...			
	YES	NO	Comment
Did our group members:			
Listen to each other?			
Talk about the task?			
Co-operate within the group?			
Suggest good ideas?			
Encourage each other?			
Achieve the outcomes?			
What went well? .... What could we have done better? .... Signed:.. Date			

Assessing a research project

The following marking grid could be used where marks allocated are circled according to the sub-criteria (below the grid) and are then transferred to this grid by the different persons assessing the project.

RUBRIC to assess a research project

MARK AWARDED				
	Self	Peer/group	Consensus	Educator
Criteria				
1 planning				
2 quality of research				
3 continuous collection of information and material				

4 final product: creativity				
5 final product: quality of contents				
6 technical quality				
7 oral presentation				
8 individual / group role				
Converted to				

General guideline

5 Excellent

4 Exceeds the requirement

3 Meets the requirement

2 Does not meet the requirement – student needs support

1 Made very little effort – student needs substantial support

0 Student made no / almost no effort – student needs substantial support and guidance

Planning

5 Most practicable planning schedule, independently drawn up by student

4 Very good, practicable planning schedule, with only minor adjustments by educator needed

3 Good planning schedule, with a only a number of small adjustments by educator needed

2 Planning schedule not totally practicable - a substantial degree of adjustments needed

1 Planning schedule totally impracticable - totally new planning necessary

0 Planning schedule not handed in at all

Quality of research

5 Wide variety of sources used

4 More than required number of sources used

3 Adequate number of sources used

2 Less than adequate number of sources used

1 No recognised resources used; no research done

Continuous collection of information and material

5 A lot of information collected continuously / submitted before due dates

4 More than adequate information collected / submitted before/on due dates

3. Adequate information collected continuously / submitted on due dates

2 Less than adequate information collected / some due dates missed

1. Very little information collected/seldom met due dates; no information collected or handed in at all

Final project: originality / creativity

5 Unique presentation of extremely high quality

4 Original presentation – however, based upon existing ideas

3 Standard presentation - content is relevant and interesting

2 Requirements have been met, and no more

1 Content entirely / almost entirely copied directly from sources; no effort made

Final project: quality of content

5 In-depth presentation pertaining to real-world practice / evidence is shown of insight into relationship between subject theory and real-world practice

4 Relevant and well-researched presentation - Student demonstrates very good insight

3 Relevant content shows good insight, area of research well covered.

2 Some part of content is relevant - partly copied directly from sources - insight lacking

1 Very little effort made - content largely copied directly from sources; content only slightly in line with topic – copied directly from sources

Technical quality

5 Proof of pride and very hard work - impressive final product

4 Excellent presentation - made full use of available sources/technology

3 Good final project

2 Minimal effort made – presentation still acceptable.

1. Very little trouble taken - untidy, shabby presentation; project not handed in / unacceptable presentation and/or appearance of content

APPENDIX B

LEVEL 3: WORK SCHEDULE FOR THE YEAR

TERM 1: MODULE 1 NUMBERS ARE A PART OF OUR LIVES!										
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10 sessment
Monday	Registra-tion and organisation of classes	Unit 1 Counting numbers integers, fractions, percentages and time notations	Unit 1 Counting numbers integers, fractions, percentages and time notations	: Unit 2 Why are patterns so important in our lives	Unit 2 Why are patterns so important in our lives	Unit as-sessment/ summative assessment	Unit 3 Focus on Finance	Unit 4 Space, shape and orientation vocabulary and calcula-tions	Unit 4 Space, shape and orientation vocabulary and calcula-tions	Module 1 sessment
Tuesday	Registra-tion and Organisation of classes	Unit 1 Counting numbers integers, fractions, percentages and time notations	Unit 1 Positive and negative numbers used as directional numbers Unit 1 Counting numbers integers, fractions, percentages and time notations	Unit 2 Why are patterns so important in our lives	Unit 2 Why are patterns so important in our lives	Unit 3 Focus on Finance	Unit 3 Focus on Finance	Unit 4 Space, shape and orientation vocabulary and calcula-tions	: Unit 4 Space, shape and orientation vocabulary and calcula-tions	Intervention after assess-ment and remedial

Wednesday	Registration and Organisation of classes	Unit 1 Counting numbers integers, fractions, percentages and time notations	Unit 1 Counting numbers integers, fractions, percentages and time notations	Unit 2 Why are patterns so important in our lives	Unit 2 Why are patterns so important in our lives	Unit 3 Focus on Finance	Unit 3 Focus on Finance	Unit 4 Space, shape and orientation vocabulary and calculations	: Unit 4 Space, shape and orientation vocabulary and calculations	Exam preparation
Thursday	Diagnostic test	Unit 1 Counting numbers integers, fractions, percentages and time notations	Unit 1 Counting numbers integers, fractions, percentages and time notations	Unit 2 Why are patterns so important in our lives	Unit 2 Why are patterns so important in our lives	Unit 3 Focus on Finance	Summative assessment	Unit 4 Space, shape and orientation vocabulary and calculations	Unit 4 Space, shape and orientation vocabulary and calculations	exams
Friday	Grouping students according to diagnostic test results	Unit 1 Counting numbers integers, fractions, percentages and time notations	Unit assessment	: Unit 2 Why are patterns so important in our lives	Unit 2 Why are patterns so important in our lives	Unit 3 Focus on Finance	Project/ Investigation / assignment	Unit 4 Space, shape and orientation vocabulary and calculations	Summative assessment/ Test	exams
Notes	Diagnostic test must have all themes/topics and should be used to identify learning needs and abilities. Decide whether you want homogeneous or heterogeneous groups in terms of learning abilities and use your diagnostic test such.									

Remark: Integration of topics has been done here for you. You can use the tests provided or you can develop your own tests.

TERM 2: MODULE 2 ALL FORMS OF PATTERNS AROUND US !										
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
Monday	Unit 5 calcula-tions and measuring techniques	Unit 5 calcula-tions and measuring techniques	Unit 6 identifying and using information from patterns to solve workplace problems	Unit 6 identifying and using information from patterns to solve workplace problems	Unit 7 Solv-ing work-place based problems Using repre-sentations	Unit 7 Solv-ing work-place based problems Using repre-sentations	Unit 8 Col-lecting and representing information	Unit 8 Col-lecting and representing information	Module 2 sessment	Tests / Exams
Tuesday	Unit 5 calcula-tions and measuring techniques	Unit 5 calcula-tions and measuring techniques	Unit 6 identifying and using information from patterns to solve workplace problems	Unit 6 identifying and using information from patterns to solve workplace problems	Unit 7 Solv-ing work-place based problems Using repre-sentations	Unit 7 Solv-ing work-place based problems Using repre-sentations	Unit 8 Col-lecting and representing information	Unit 8 Col-lecting and representing information	Intervention after assess-ment	Tests / Exams
Wednesday	Unit 5 calcula-tions and measuring techniques	Unit 5 calcula-tions and measuring techniques	Unit 6 identifying and using information from patterns to solve workplace problems	Unit 6 identifying and using information from patterns to solve workplace problems	Unit 7 Solv-ing work-place based problems Using repre-sentations	Unit 7 Solv-ing work-place based problems Using repre-sentations	Unit 8 Col-lecting and representing information	Unit 8 Col-lecting and representing information	Tests / Exams	Tests / Exams
Thursday	Unit 5 calcula-tions and measuring techniques	Unit 5 calcula-tions and measuring techniques	Unit 6 identifying and using information from patterns to solve workplace problems	Unit 6 identifying and using information from patterns to solve workplace problems	Unit 7 Solv-ing work-place based problems Using repre-sentations	Unit 7 Solv-ing work-place based problems Using repre-sentations	Unit 8 Col-lecting and representing information	Summative assessment/ unit assess-ment	Tests / Exams	

Friday	Unit 5 calcula-tions and measuring techniques	Assessment	Unit 6 identifying and using information from patterns to solve workplace problems	assessment	Unit 7 Solv-ing work-place based problems Using repre-sentations	Unit assess-ment	Unit 8 Col-lecting and representing information	Projects/as-signments for portfolios	Tests / Exams	
Notes										

TERM 3: MODULE 3 REPRESENTING SOLUTIONS OF REAL LIFE PROBLEMS; MODULE 4MATHEMATICS AT WORK!										
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
Monday	Unit 9 using representa-tions of relationships to solve problems involving patterns	Unit 9 using representa-tions of relationships to solve problems involving patterns	Test/ unit assessment	Unit 10 Financial knowledge is power!	Summative assessment	Unit 11 information presenta-tions and misrepre-sented	Assessment/ test	Unit 12 time tabling and graphs Character-istics of perspective drawings	Unit 12 time tabling and graphs Character-istics of perspective drawings	Module 3 and 4 assessment
Tuesday	Unit 9 using representa-tions of relationships to solve problems involving patterns	Unit 9 using representa-tions of relationships to solve problems involving patterns	Unit 10 Financial knowledge is power!	Unit 10 Financial knowledge is power!	Unit 11 information presenta-tions and misrepre-sented	Unit 11 information presenta-tions and misrepre-sented	Unit 12 time tabling and graphs Character-istics of perspective drawings	Unit 12 time tabling and graphs Character-istics of perspective drawings	Unit 12 time tabling and graphs Character-istics of perspective drawings	Intervention after assess-ment

Wednesday	Unit 9 using representa-tions of relationships to solve problems involving patterns	Unit 9 using representa-tions of relationships to solve problems involving patterns	Unit 10 Financial knowledge is power!	Unit 10 Financial knowledge is power!	Unit 11 information presenta-tions and misrepre-sented	Unit 11 information presenta-tions and misrepre-sented	Unit 12 time tabling and graphs Character-istics of perspective drawings	Unit 12 time tabling and graphs Character-istics of perspective drawings	Unit 12 time tabling and graphs Character-istics of perspective drawings	Intervention after sess-ment
Thursday	Unit 9 using representa-tions of relationships to solve problems involving patterns	Unit 9 using representa-tions of relationships to solve problems involving patterns	Unit 10 Financial knowledge is power!	Unit 10 Financial knowledge is power!	Unit 11 information presenta-tions and misrepre-sented	Unit 11 information presenta-tions and misrepre-sented	Unit 12 time tabling and graphs Character-istics of perspective drawings	Unit 12 time tabling and graphs Character-istics of perspective drawings	Projects/as-signment for portfolios	Intervention after sess-ment
Friday	Unit 9 using representa-tions of relationships to solve problems involving patterns	Unit 9 using representa-tions of relationships to solve problems involving patterns	Unit 10 Financial knowledge is power!	Unit 10 Financial knowledge is power!	Unit 11 information presenta-tions and misrepre-sented	Unit 11 information presenta-tions and misrepre-sented	Unit 12 time tabling and graphs Character-istics of perspective drawings	Unit 12 time tabling and graphs Character-istics of perspective drawings	Unit 3 Unit assess-ment	
Notes										

Remark: The Process and Thinking skills, Values and Attitudes, well the Critical Outcomes must be integrated into each lesson plan.

TERM 4: MODULE 5 INTEGRATED MODULE									
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9
							Formative and summative assessment		
Monday	Unit 13 inte-grated unit	Unit 13 inte-grated unit	Unit 13 inte-grated unit	Unit 14 Integrated unit	Unit 14 Integrated unit	Unit 14 Integrated unit	Module 4 assessment	Revision	Tests and exams
Tuesday	Unit 13 inte-grated unit	Unit 13 inte-grated unit	Unit 13 inte-grated unit	Unit 14 Integrated unit	Unit 14 Integrated unit	Unit 14 Integrated unit	Intervention after assess-ment	Revision	Tests and exams
Wednesday	Unit 13 inte-grated unit	Unit 13 inte-grated unit	Unit 1 Graphical rep-resentation of information	Unit 14 Integrated unit	Unit 14 Integrated unit	Unit 14 Integrated unit	Intervention after assess-ment	Tests and exams	Tests and exams
Thursday	Unit 13 inte-grated unit	Unit 13 inte-grated unit	Unit 13 Assessment	Unit 14 Integrated unit	Unit 14 Integrated unit	Unit 14 Integrated unit	Revision	Tests and exams	Tests and exams
Friday	Unit 13 inte-grated unit	Unit 13 inte-grated unit	Unit 13 Unit assess-ment	Unit 14 Integrated unit	Unit 14 Integrated unit	Unit assess-ment	Revision	Tests and exams	
Notes									

Lesson Plan

Teacher: Mr. Apollis   Date to start: Date to end:
Mathematical Topic: Percentages in daily life   Level: 2

Learning outcomes: AS1.1,1.2, LO1.1.b; LO1.2.b
Critical and Developmental Outcomes: Identify and solve problems and make decisions; Work effectively with others as a team; Communicate effectively

Teacher's Actions	Learner's Activities	Assessment (methods, instruments)	Resources	Expanded Opportunities	Duration
1. Solving two problems involving commission • Reads through the activity in the textbook, identifying the concepts and skills involved. • Reads the Teacher's Guide comments on the activity. • Makes sure the class understands concepts like "commission", "transaction". • Ensures that all learners have calculators. • Facilitates discussion of learners' responses to problems 1 and 2.	1. Solving two problems involving commission • Solve 2 problems involving commission. • Discuss findings in their groups. • Participate in class discussion.	• Informal	• Calculators	• Discuss the implications of commission and whether the public is able to calculate and compare different percentages of commission.	30 min
2. Solving problems in Learner's Book involving percentage increases in everyday life • Reads through the activity identifying the concepts and skills involved. • Reads the Teacher's Guide comments on the activity. • Makes sure the class understands concepts like "raise", "invested", and "inflation". • Ensures that all learners have calculators. • Moves around the classroom, making sure that all learners become involved with the problems and can participate in the discussions. • Pulls together the discussions to ensure that the correct mathematical conclusions are reached	2. Solving problems in Learner's Book involving percentage increases in everyday life • Engage in the problems posed, talking about them and then solving them, using calculators where necessary. • Discuss their findings in their groups. • Each learner provides a written record of his/her working. • Participate in class discussion.	• Rubric for task list assessment • Observation	• Calculators	• Serious discussions on ▷ the effects of salary increases ▷ inflation ▷ investment	$1\frac{1}{2}$ h

Rubric for Task List Assessment

This is an example of a rubric to assess problems 3-8 of the activity described in the previous lesson plan.

TASK	SCORE	WEIGHT	MARKS
Unit 20, activity 2, questions 3-8, LO1 ASS 2,4			
Understands "raise" Observe no. 3	1 2 3 4 5 6.7	1	
Calculates raise correctly Observe no. 3	1 2 3 4.6.7	2	
Understands "increase" Observe no. 3, 4, 8	1 2 3 4 5 6.7	1	
Calculates increases Observe no. 3, 4, 5	1 2 3 4 5 6.7	2	
Compares increases Observe no. 4, 5	1 2 3 4 5 6.7	3	
Calculates % increase Observe no. 4, 5	1 2 3 4 5 6.7	2	
Understands investment Observe no. 6,7	1 2 3 4 5 6.7	1	
Understands interest rate Observe no. 6,7	1 2 3 4 5 6.7	1	
Compares and makes informed choices of different investment options Observe no. 7	1 2 3 4 5 6.7	3	
Understands "inflation" Observe no. 8	1 2 3 4 5 6.7	1	
Calculates the effect of inflation correctly Observe no. 8	1 2 3 4 5 6.7	2	
TOTAL SCORE	MAX: 7x 19	19	

How to score:

Grading	Marks %	Descriptors
7	80–100	Outstanding
6	70–79	Meritorious
5	60–69	Substantial
4	50–59	Adequate
3	40–49	Moderate
2	30-39	Elementary
1	0–29	Not achieved

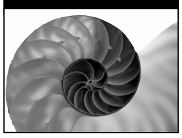
- Encircle the learner's mark.
- Multiply mark by weighting to get final score for that Learning Outcome.
- Add marks for each outcome to get your Total Score.

TASK LIST ASSESSMENT TEMPLATE (FOR YOU TO USE)

TASK	SCORE	WEIGHT	MARKS
	1 2 3 4 5 6.7		
	1 2 3 4 5 6.7		
	1 2 3 4 5 6.7		
	1 2 3 4 5 6.7		
	1 2 3 4 5 6.7		
	1 2 3 4 5 6.7		
	1 2 3 4 5 6.7		
	1 2 3 4 5 6.7		
TOTAL SCORE			

Module 1
Numbers are a part of our lives!

Unit 1



Counting numbers, integers, fractions, percentages and time notations

SB page 10

Topic 1: LO 1.1.a ; LO 2.2.a

ACTIVITY 1 NUMBERS

1.1 a)

Volume of juice bought	Volume of diluted juice	Number of household days
10 litres	50 litres	50 days

It took Lesego's household 50 days to finish 2 × 5–litre juices.

b)

Number of days	Volume of diluted juice drunk by household	Number of 5–litre juices	Cost price of the juices
120	120 litres	24	R960

c)

Volume of undiluted juice	Volume of diluted juice	Cost of undiluted juice	Selling price of diluted juice	Cost of empty 1- litre bottles	Profit
150 litres	750 litres	R1 050	R3 000	R750	R2 250

1.1 (d) 1 person = 125ml

$\frac{1 \text{ person x } 1\,000\text{ml}}{125\text{ml}} = 1\,000\text{ml}$

= 8 people

1.2 Leonard is correct

(f) (i) $\frac{4}{20} = \frac{1}{5}$

(ii) $\frac{20}{4} = \frac{5}{1}$

(iii) $\frac{20}{5} = \frac{4}{1}$

2.1 The following are the rules students are expected to come up with:

- Use any operation – addition, subtraction, multiplication, division – on the given digits to generate as many consecutive numbers as possible.
- For the calculation of each number, each digit must be used once.
- You do not have to calculate a number whose digit is already given.
- The group that generates the most consecutive numbers wins.

The idea is to monitor the application of the B ODM AS rule. For instance, if the students talk of 8 = 3 + 1 × 2 without using brackets, then contrary to what they wish for, they are actually talking of the number 5.

(a)

Given digits	Numbers generated	Operations used
1,3,7	1	Number given
	2	3 – 1
	3	Number given
	4	7 – 3
	5	7 + 1 – 3
	6	7 – 1
	7	Given
	8	7 + 1
	9	7 + 3 – 1
	10	7 + 3
	11	7 + 3 + 1

(b)

Given digits	Numbers generated	Operations used
1,2,9	1	Number given
	2	Number given
	3	2 + 1
	4	(9–1)ffi2
	5	(9+1)ffi2
	6	9 – 2 – 1
	7	9 – 2
	8	9 – 1
	9	Given
	10	9 + 1
	11	9 + 2
	12	9 + 2 + 1

SB page 12

Topic 1: LO 1.1.a, LO 1.1.b

ACTIVITY 5 HOW MUCH?

1.1.

Month	Loss
January 2007	1. Material for foundation: R3 000 2. Bricks for the broken wall: R250. 3. Days wasted: 3days 2 hours = 3,25 × R1000 = R3250
TOTAL LOSS R 6 500	
Profit of R 30 000 – R6 500 – R10 000 = R13 500 .	

1.2. This is an estimate because it would be difficult to quantify the time it takes to break down and remove the rubble from the foundation and part of the wall, before they are restarted.

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Topic 1: LO 1.1.a, LO 1.1.b

ACTIVITY 6 NUMBERS IN CONTEXT

Month	Anomalies	Expenditure / Loss		Income/ Gain		Net Income
		Single storey	Double storey	Single storey	Double storey	
January	6 days went without any job done because of delay in delivery of material by Y3	–R16 500	–R69 000	+R30 000	+R16 000	–R39 500
February	Had to wait for three months for ecoslab for the double–storey house	–R20 000	–R60 000	+R60 000	R0	–R20 000
March		–R20 000	–R60 000	+R60 000	R0	–R20 000
April		–R20 000	–R60 000	+R60 000	R0	–R20 000
May	Ecoslab delivered.	–R20 000	–R60 000	+R60 000	+R66 000	+R46 000
TOTAL		–R96 500	–R309 000	+R270 000	R82 000	–R53 500

1.1 We use negative to indicate money "money owing" or "taken out of pocket", and positive to indicate "money received".

1.2 (a) +R13 500 (b) −R53 000 (c) +R40 000 (d) +R6 000

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Topic 1: LO 1.1.c; LO 1.2.a; LO 1.2.b

Activity 9 Fractions in context

1.1 Khumo is incorrect. The fact that she is involved twice – once with each group means that her assertion that her contribution of $\frac{1}{4}$ is not correct.

1.2 The students should be facilitated to put $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{5}$ in order from smallest to biggest. The fraction template should be sufficient to show the students that $\frac{1}{5}$ is the smallest of the three, with the result that the sum of $\frac{1}{2}$ and $\frac{1}{3}$ cannot be $\frac{1}{5}$. Sum of two positive bigger numbers cannot be a smallest number.

1.3 Using the above fraction template, the two fractions that $\frac{1}{2}$ and $\frac{1}{3}$, put side–by–side, will be exactly of the same length as are respectively $\frac{5}{6}$ and $\frac{10}{12}$. This means that $\frac{1}{2} + \frac{1}{3} = \frac{5}{6}$ or $\frac{1}{2} + \frac{1}{3} = \frac{10}{12}$.

1.4 $\frac{1}{3}$ and $\frac{2}{6}$, $\frac{1}{3}$ and $\frac{4}{12}$, $\frac{2}{6}$ and $\frac{4}{12}$, $\frac{1}{2}$ and $\frac{6}{12}$, $\frac{3}{6}$ and $\frac{6}{12}$

- Two fractions are said to be equivalent if the numerator and denominator of one are the constant multiple of the numerator and denominator of the other. $\frac{1}{3}$ and $\frac{4}{12}$ are equivalent because 4 and 12 are constant multiples of 1 and 3 ($4 = 1 \times 4$ and $12 = 3 \times 4$) In this case 4 is the constant multiple.
- In terms of what has so far happened, you find the equivalent fraction whose denominator is the common multiple of the denominators of the fractions you add.
- $\frac{1}{3} = \frac{4}{12}$
  $\frac{1}{4} = \frac{3}{12}$
  $\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$
- It will always work.

2. Student's answers

3. Student's own answers

4. The prefix "deci" refers to 10. A decimal number is any number in which any digit represents number of powers of 10. For instance,
213,5213,523 = $2 \times 10^2 + 1 \times 10^1 + 3 \times 10^0 + 5 \times 10^{-1} + 2 \times 10^{-2} + 3 \times 10^{-3}$

5. Thabo is correct. For instance, $\frac{1}{100} \times 100\% = 1\%$. $100\% = \frac{100}{100} = 1$, so that

multiplying by 100% does not change the value of the original fraction.

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Topic 1: LO 1.3.a

ACTIVITY 13 WHAT TIME!

2. Elsie: Lunch: 1pm – 1:30pm
   Thomas: Lunch: 13:40 –14:10

3.

Departure time from home	Arrival time at work	
	Eslie's watch	Thomas's watch
Monday 06:25	6:55am	06:55
Tuesday 07:10	8:20am	08:20
Wednesday 06:35	7:45am	07:45
Thursday: 06:00	6:30am	06:30
Friday: 07:45	8:55am	08:55

4.

Paris	Jhb	Miami	Hong Kong	Tokyo	Wellington
3pm;15:00	5pm; 17:00	9pm; 21:00	11pm;23:00	1am;01:00	3am;03:00

5.

Paris	Jhb	Miami	Hong Kong	Tokyo	Wellington
11pm;23:00		1pm;13:00	3am; 03:00	11pm; 23:00	11am; 11:00

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Topic 1: LO 1.3.a

ACTIVITY 14 TIME ZONES

Measurement, Level 4

Overview of the unit

In this unit we introduce and explore time zones and international Date Line.

Relevant Achievement Objectives

- read and construct a variety of scales, timetables and charts
- perform calculations with time, including 24-hour clock times

Specific Learning Outcomes

The children will be able to:

- read and use a variety of timetables and charts
- perform calculations with time, including 24-hour clock times and time zones

A description of the mathematics explored in the unit

This unit introduces the ideas of time zones and the International Date Line. These are very important concepts that the students will probably have to bear in mind more in their lifetime than we have in ours. This will be for reasons of both work and pleasure. We know someone in England who has a computer that makes a noise when email arrives. So we don't email him during the English night or he may be wakened by the noise. This requires a knowledge of the English time zone. In the same way, if we wanted to phone him, then we would also need to know the time difference between us.

On the pleasure front, nowadays it appears that a flight from Auckland to Los Angeles arrives before it departs. This is again a time zone problem. Further, viewing difficulties arise when sporting events, such as the Olympics, occur elsewhere in the world and are broadcast live. So the concepts of time zone and International Date Line have important consequences for our lives. Indeed the students may well have been affected by these already.

In this unit we use the 24 hour clock as well as timetables. Consequently the unit draws on skills from the unit 24 hours, Level 4. This unit should therefore follow that one.

Resources

- globe and a torch
- map of Australia and the world
- Copymaster for Time and Place game
- Copymaster for International Date Line Time and Place game
- international and domestic airline timetables (Qantas NZ and Air New Zealand)
- www.aimz.co.za
- www.worldtimeserver.com

Teaching Sequence

Session 1

In the first session we introduce the idea of time zones using a globe and possibly by making a phone call.

1. If it possible to darken the room then do so. Have someone hold the globe and another child shine the torch on it. Discuss what you can see. Out of this should come the idea that when we are in daylight there are some places in the dark.
   What does this mean for the time in other places?
   If it is 1200 hours here, what time will it be in England? How about India? America, etcIf it's 22:00 here what times will it be there? (Approximate answers will do so long as the students get times in the right ballpark. The important thing is that they realise that different places on Earth have different times.)
2. Tell them that this difference is recognised by what are called time zones. Two places in the same time zone have the same time. New Zealand has one time zone. So everywhere in New Zealand has the same time.

3. Have you ever tried phoning someone in Australia?
   Let's do it.
   Using a mobile phone ring someone in Melbourne. (We can organise a school for you to contact if you would like us to. We will need to have at least two weeks notice.) No matter what else you say, be sure to ask them the time.
4. After the phone call, ask
   What was the time in Melbourne? So what is the difference between their time and ours?
   What do you think the time in Sydney is? Why?
5. Explain that Sydney and Melbourne are in the same time zone. In fact the whole of the East Coast of Australia plus Tasmania is in the Eastern Time Zone. Show them this on the globe or on a map of the world. (There will be a problem with Queensland at certain times of the year. When the rest of Australia goes into daylight saving time, Queensland doesn't.)
6. How many time zones do you think Australia has?
   Let them guess. Ask them to explain why they guessed the way they did. In fact Australia has three time zones. After the Eastern Time Zone there is the Central Time Zone and the Western Time Zone. The Central Time Zone includes Adelaide and Alice Springs (show these on a map or globe). This zone is half an hour behind Eastern Standard Time. Put this information on the board.
   So what time is it in Adelaide when it is 12:00 in Melbourne?
   What time is it in Sydney when it is 13:00 in Adelaide?
7. Is Perth (show this on the map) behind or ahead of Melbourne? **(Behind.)**
   By how much do you think they are behind? Let the class guess. **(5 hours.)**
   Write this on the board.
   So what is the time in Perth when it's 8:00 in Melbourne? 3:00am (8:00 – 5:00)
   What is the time in Melbourne when it is 13:30 in Perth? 18h30 in Melbourne (13:30 + 5:00)
8. Get them to write the key information in their books for use in the next lesson. We summarise this information below:

New Zealand	Eastern Standard Time	Central Time	Western Standard Time
0	- 2 hours	- 2 hours 30 minutes	- 5 hours
10:00	8:00	7:30	5:00
23:30	21:30	21:00	18:30

* Note that the times given here will vary from time to time depending on Daylight Saving. New Zealand and Australian Daylight Saving does not always begin and end on the same date. In addition, not all Australian States always go on Daylight Saving.

Session 2

In this section we do time zone calculations by playing the game Time and Place.

First Time	First Place	Second Time	Second Place

1. If you have access to the internet in your class you could introduce the class to the web-site www.wordtimeserver.com. The site tells you the current time in countries and major cities in the world.
2. The class plays Time and Place in pairs. The time cards are put face down in one pile and the place cards are put face down in another. Students draw a Time card, put the time in the left-hand column of the table and place the card on the bottom of the deck. They then draw a Place card and put the name of the city in the next (First place) column and place the card on the bottom of the deck. They then draw another Place card put this in the 'Second place' column of the table and place the card on the bottom of the deck. If this card is in the same time zone as the last card, they put the Place card on the bottom of the pack and take another Place card. They then calculate what time it is at the Second place when it is the first time at the First place. They put their answer in the last column of the table.
3. Check that the children understand the task and are carrying it out correctly.
4. When the table is filled, get the class to report on what it has done.

Session 3

In this session the class practice using timetables and their knowledge of time zones to plan a trip to Perth from where they live. You will need to provide your class with domestic and international flight timetables that are freely available from Air New Zealand and Qantas New Zealand. If you are unable to access the complete timetables we have provided Copymasters of the relevant pages from the timetables with this unit.

1. You are going to have a two-week holiday in Perth. I want you to plan the trip. Because of your parents' work, you can't leave before June 4th and you can't get backafter June 17th. Plan the transport that will give you the longest possible time actually in Perth.
2. Get the children to report back with their results. Who was able to get the longest time in Perth?

3. If you have access to the internet in your classroom you could log onto www.aimz.co.nz to be provided with an itinerary for the trip.

Session 4

In this session we are going to talk about the International Date Line and perform calculations around it.

1. Tell them that when the New Year comes, New Zealand is always the first place to see it. Discuss with them why they think that this might be. Don't necessarily come to any conclusion.
2. Get out the globe and the torch again. Arrange things so that the torch (i.e. the Sun) is shining on New Zealand. Assume that the time in New Zealand is 10:00. Go West around the world and guess what the times are in the various places. Help them realise that some places not only have different times they are have different days!
3. Use these two situations to explain the concept of the International Date Line.

4. Make up a table showing the times and dates at different places in the world, when it is 9:00 on 24th January in New Zealand.

place	time	date
New Zealand	9:00	24th January
Sydney	7:00	24th January
Adelaide		
Perth		
New Delhi		
Cape Town		
Rome		
London		
New York		
Los Angeles		
Honolulu		
Nadi		

1. Now play International Date Line Time and Place.
2. The class plays International Date Line Time and Place in pairs in a similar way to Time and Place. Again, the Time cards are put face down in one pile and the place cards are put face down in another. Students draw a Time card, put the time and date in the left-hand (First time and date) column of the table and place the card on the bottom of the deck. They then draw a Place card and put the name of the city in the 'First place' column and place the card on the bottom of the deck. They then draw another Place card and put this in the 'Second place' column of the table and place the card on the bottom of the deck. If this card is in the same time zone as the last card, they put the Place card on the bottom of the pack and take another Place card. They then calculate what time and date it is at the Second place when

it is the first time and date at the First place. They put their answer in the last column of the table.

3. Check that the children understand the task and are carrying it out correctly.
4. When the table is filled, get the class to report on what it has done.

Session 5

In this session the class practice using timetables and their knowledge of time zones to plan a trip to London from where they live.

1. You are going to have a three-week holiday in London. I want you to plan the trip. Because of your parents' work, you can't leave before December 6th and you can't get back after December 26th. Plan the transport that will give you the longest possible time actually in London.
2. Get the children to report back with their results. Who was able to get the longest time in London? The children might like to think of some of the things that they might do while they are there.
3. If you have access to the internet in your classroom you could log onto www.aimz.co.nz and any other airline's web site, to be provided with an itinerary for the trip.

Homelinks

At home this week we work out the times in different cities around the world.

Are you about to make an International long distance phone call? Are you planning a trip to a foreign destination? Are you preparing for a web cast or online meeting? Are you looking for a free clock for your own web site or blog? With the Internet bringing everyone closer together, we still have to deal with our different locations having different times. World Time Server is here to help!

In 2007, the U.S. will move daylight-saving time to March 11th, the second Sunday of the month. While not on the scale of Y2K, this change could generate problems that modestly disrupt business operations, irritate customers and tarnish professional

Vendors are coming up with initial patches and fixes...[but] there's more complications involving multiple time zones."

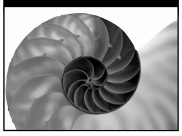
Matthew W. Cain, Research VP

Get more information on this on:

http://www.gartner.com/it/products/podcasting/asset_167848_2575.jsp

Time is a measure but it is a different from the other measures in that it cannot be seen or touched. However, we are surrounded by the effect of time passing, for example, day to night and one season to another. There are two aspects of time children must develop:

- time as an instant which can be named, for example, 6:15;



Why are patterns so important in our lives?

Use the following problems to teach your students arithmetic sequences and series before they explore the contents of activity 1

1 (a) T_1; T_2; T_3; T_4; T_5

5; 9; 13; 17; 21

This is an arithmetic series with 5 terms. The first term of this sequence is 5 and the last term 21.

An arithmetic sequence has a common difference (d) that is calculated from:

$d = T_2 - T_1 = T_3 - T_2 = T_4 - T_3 = T_5 - T_4 = \dots$

If we denote the first term by a, then this sequence becomes:

T_1;	T_2;	T_3;	T_4;	T_5
a;	a + d;	a + 2d;	a + 3d;	a + 4d
5;	9;	13;	17;	21

This sequence has a common difference of 4.

Any term of arithmetic sequence can be obtained from the formula:

$Tn = a + (n - 1)d$

This term is called the general term of the sequence.

(b) If we change the above sequence to: 5 + 9 + 13 + 17 + 21 it becomes an arithmetic series. What applies for a general term in terms of the common difference and the general term also applies for an arithmetic series. Moreover the sum of the terms of a series to any number of terms can be calculated from: $Sn = \frac{n}{2} [2a + (n - 1)d$

5; 9; 13; 17; 21; … is an infinite sequence and

5 + 9 + 13 + 17 + 21 + … an infinite series

Examples

1. Find the
   (a) tenth term of the sequence given above
   (b) the sum of the series given above to ten terms

Solutions

(a) $Tn = a + (n - 1)d$

$T10 = 5 + (10 - 1)4$

$= 41$

The tenth term of this sequence is 41

(b) $Sn = \frac{n}{2} [2a + (n - 1)d]$

$= \frac{7}{2} [2(5) + (10 - 1)4]$

$= 230$

The sum of the terms of this series to ten terms is 230

After this presentation your students can tackle activity 1 and activity 1(c) with confidence.

LB page 59

SO 1, AS 1.1, LO 1.1a

ACTIVITY 1 CONSTANT RATIO

This is an example of an arithmetic sequence.

1. The first term here is 60 000 and d = 35 000.
   The sequence is:

a	60 000	
a + d	60 000 + 35 000 = 95 000	
a + 2d	60 000 + 2(35 000)	= 130 000
a + 3d	60 000 + 3(35 000)	= 165 000
a + 4d	60 000 + 4(35 000)	= 200 000
a + 5d	60 000 + 5(35 000)	= 235 000
a + 6d	60 000 + 6(35 000)	= 270 000

2. $S_n = \frac{n}{2}$ [2a + (n –1)d
   $= \frac{7}{2}$ [2(60 000) + (7 –1)35 000]
   = 1 155 000

3.1 a + 11d = 60 000 + 11(35 000) = 445 000

3.2 a + 9d = 60 000 + 9(35 000) = 375 000

3.3 a + 10d = 60 000 + 10(35 000) = 410 000

3.4 a + 12d = 60 000 + 12(35 000) = 480 000

3.5 a + 8d = 60 000 + 8(35 000) = 340 000

4. No. Visit: www.housing.gov.za to find out why.

5. $a + (n - 1)d = T_n$

   60 000 + (n – 1)35 000 = 410 000

   (n – 1)35 000 = 410 000 – 60 000

   $n - 1 = \frac{350\ 000}{35\ 000}$

   n = 10 + 1

   n = 11

   A geometric sequence has a common ratio that is obtained from:
   $r = \frac{T2}{T1} = \frac{T3}{T2} = \frac{T4}{T3} = \ldots$
   Use the following sequence to present an example of a geometric sequence/ series
   (a) 1; 7; 49; 343; …
   (b) 1 + 7 + 49 + 343 + …
   Find the eighth term and the sum to five terms
   $Tn = ar^{n-1}$
   $= (1)(7^{8-1})$
   = 823 543

The eighth term of this sequence is 823 543

$S_n = \frac{a(r^n - 1)}{r - 1}$

$\frac{1(7^5 - 1)}{7 - 1}$

= 2801

The sum of the first five terms of this series is 2801

Your students can now do rest of the activities of this unit.

LB page 60

SO 1, AS 1.1, LO 1.1a

ACTIVITY 3 NUMBER SEQUENCES

1. $T_1; T_2; T_3; T_4; T_5$

   1; 2; 4; 8; 16

2. $T_1 + T_2 + T_3 + T_4 + T_5$

   1 + 2 + 4 + 8 + 16

3.1 $\frac{T_2}{T_1} = \frac{2}{1} = 2$

3.2 $\frac{T_3}{T_2} = \frac{4}{2} = 2$

3.3 $\frac{T_4}{T_3} = \frac{8}{4} = 2$

3.4 $\frac{T_5}{T_4} = \frac{16}{8} = 2$

3.5 They give the same answer. The quotient is 2

4.1 $T_n = ar^{n-1}$

$T_8 = (1)(2^{8-1}) = 128$

4.2 $T_n = ar^{n-1}$

$T_{11} = (1)(2^{11-1}) = 1024$

4.3 $T_n = ar^{n-1}$

$T_{14} = (1)(2^{14-1}) = 8\ 192$

5. $S_n = \frac{a(r^n - 1)}{r - 1}$

   $S_n = \frac{1\{(2^5 - 1)}{2 - 1}$

   = 31

6. $ar^{n-1} = T_n$

   $(1)(2^{n-1}) = 512$

   $2^{n-1} = 2^9$

   n – 1 = 9

   n = 9 – 1

   n = 8

   512 is term number 8 of this sequence.

LB page 61

SO 1, AS 1.1, LO 1.1a

ACTIVITY 4 DIRECT PROPORTION IN PATTERNS

1. 2;3;4;5
   $\frac{1}{5};\frac{1}{25};\frac{1}{125};\frac{1}{625}$
2. 1;3;9;37
3. arithmetic 3;2;1;0
4. Each of these will be calculated from:
   $T_n = a + (n-1)d$ where Tn is the term
   a is the first term
   n is the term's position
   d is the common difference

5.1 Neli
$T_n = a + (n-1)d$
$T_9 = 10 + (9-1)10$
$= 90$

Michael
$T_n = a + (n-1)d$
$T_9 = 8 + (9-1)8$
$= 72$

Nancy
$T_n = a + (n-1)d$
$T_9 = 5 + (9-1)5$
$= 45$

5.2 Neli
$T_n = a + (n-1)d$
$T_{11} = 10 + (11-1)10$
$= 110$

Michael
$T_n = a + (n-1)d$
$T_{11} = 8 + (11-1)8$
$= 88$

Nancy
$T_n = a + (n-1)d$
$T_{11} = 5 + (11-1)5$
$= 55$

LB page 62

ACTIVITY 5 INVERSE PROPORTIONS OF PATTERNS

SO 1, AS 1.1,
LO 1.1a

1. Note that for each learner to 36 learners that enroll in a school, a teaching post becomes available to the school. For this reason, rounding up approach to the nearest natural number is the way out here.
   (a) Number of teaching posts = 1234 ÷ 36
   = 34,3
   = 35
   (b) Number of teaching posts = 925 ÷ 36
   = 25,7
   = 26
   (c) Number of teaching posts = 715 ÷ 36
   = 19,9
   = 20
   (d) Number of teaching posts = 631 ÷ 36
   = 17,5
   = 18
   (e) Number of teaching posts = 511 ÷ 36
   = 14,2
   = 15
   (f) Number of teaching posts = 326 ÷ 36
   = 9,1
   = 10
   (g) Number of teaching posts = 251÷ 36
   = 7,0
   = 7

2. The way out here is to subtract the number of educators the school was entitled to in the previous year from the number of educators the school is entitled to in that year. The difference here is the number of educators that are in excess in that year.
   (a) Number of educators in excess = 35 – 26 = 9
   (b) Number of educators in excess = 26 – 20 = 6
   (c) Number of educators in excess = 20 – 18 = 2
   (d) Number of educators in excess = 18 – 15 = 3
   (e) Number of educators in excess = 15 – 10 = 5
   (f) Number of educators in excess = 10 – 7 = 3
3. (a) ± 5
   (b) ± 3
   (c) ± 2

4. Yes :– There will be learners who will be in the neighborhood of the whose parents will not have money to pay for transport for their children to be transported to distant schools. According to our Bill of Rights these children are entitled to receive education as well. If the department closes this school their right to receive education at a public institution of their choice will be violated.

No :– Running this school will be a huge expense to the Department of Education and hence to the tax payers.

5. – Negative impact by educators of the school
   – Negative impact by the community
   – Not enough support from department officials
   – Not enough support from the Department of Education in terms of equipping the school with the required infrastructure. The example here are children who are receiving education under trees
   – Not enough support from the government in terms of developing the required infrastructure of the community. It will be difficult for such a school to attract properly qualified and dedicated educators
   The list is endless

6. You will receive different responses from students for this one.

LB page 64

SO 1, AS 1.1,
LO 1.1a

ACTIVITY 6 DEPENDENT AND INDEPENDENT VARIABLES

Students are NOT expected to give you problems in this one

LB page 65

SO 1, AS 1.1,
LO 1.1a

ACTIVITY 7 DESCRIPTIONS OF PATTERNS

1. A geometric sequence. It has a common ratio
2. 5
   Obtained from: $r = \frac{T_2}{T_1} = \frac{T_3}{T_2} = \frac{T_4}{T_3} = \frac{T_5}{T_4} = 5$
3. An increasing sequence. Each following camp has more buffalos than the previous one
4. Camp 1
5. Camp 5

LB page 65

SO 1, AS 1.1,
LO 1.1a

ACTIVITY 8 APPLICATION

1. Speed $= \frac{\text{distance covered}}{\text{time taken}}$
   $= \frac{45}{15}$
   $= 3$ km/h
2. Increase in average speed = 0,5 × 10 = 5 km/h
   His average speed in the marathon race = 3 + 5
   = 8 km/h

3. Arithmetic
4. It decreases
5. An inverse proportion
6. No. Distance is a continuous physical quantity
7. No. Speed is a continuous physical quantity
8. No. Time is a continuous physical quantity.

ACTIVITY 9 TRENDS IN PATTERNS

LB page 67

SO 1, AS 1.1, LO 1.1a

1. 25 m

2.1 Increases

2.2 Decreases

ACTIVITY 10 APPLICATION

LB page 69

SO 1, AS 1.1, LO 1.1a

1. (a) Maximum value: 8
   (b) Critical value: 2
   (c) Interval of increase: –1 to 2
   Interval of decrease: 2 to 5
2. (a) Minimum value: –5
   (b) Critical value: –1
   (c) Interval of increase: –1 to 5
   Interval of decrease: –3 to –1
3. (a) Minimum value: –6
   Maximum value: 9
   (b) Critical values: 2 and 4
   (c) Intervals of increase: $-\frac{3}{2}$ to 2 and 4 to 7
   Interval of decrease: 2 to 4
4. (a) Minimum value: –8
   Maximum value: 9
   (b) Critical values: –5 and –2
   (c) Interval of increase: –5 to –2
   Intervals of decrease: –9 to –5 and –2 to 1

LB page 45

SO 1, AS 1.1, LO 1.1a

ACTIVITY 11 ARITHMETIC AND GEOMETRIC PATTERNS FROM FORMULAE

1. A geometric sequence. It has a common ratio
2. 5
   Obtained from: $r = \frac{T_2}{T_1} = \frac{T_3}{T_2} = \frac{T_4}{T_3} = \frac{T_5}{T_4} = 5$
3. An increasing sequence. Each following camp has more buffalos than the previous one
4. Camp 1
5. Camp 5

LB page 70

SO 1, AS 1.1, LO 1.1a

ACTIVITY 12 APPLICATION

1.

Figure	1	2	3	4	5	6	7	8	9	10
Number of lines	1	3	5	7	9	11	13	15	17	19

2. (a) 29
   (b) 43
   (c) 213
   (d) 6 915
   (e) 19 999
3. (a) 50
   (b) 29
   (c) 519
   (d) 168
   (e) 221

LB page 71

SO 1, AS 1.1, LO 1.1a

ACTIVITY 13 UNIT ASSESSMENT

1.1 (a) $531441 = 3^{12}$
$177147 = 3^{11}$
$59049 = 3^{10}$
$19683 = 3^{9}$
$6561 = 3^{8}$

(b)

Year	1	2	3	4	5
Number of ants	3^{12}	3^{11}	3^{10}	3^{9}	3^{8}

(c) 3^{12}; 3^{11}; 3^{10}; 3^{9}; 3^{8}. This is a geometric sequence.

(d) $\frac{1}{3}$

(e) It is a decreasing sequence. Each following term is lesser than the preceding one

(f) In the 14th year.

1.2 (i) 3; 6; 10; 15; 21; 28; 36; 45; 55; 66; 78 ; 91

(ii) 72; 56; 42; 30; 20; 12; 6; 2

(v) 2; 5; 10; 17; 26; 37; 50; 65 ; 82

1.3 (a) 1015

(b) 1450

(c) (i)

1993:	Classes used:	13
	Classes not used:	16
1994:	Classes used:	19
	Classes not used:	10
1995:	Classes used:	27
	Classes not used:	2

(ii) Classes used: 29

Number of students short of space: 70

(iii) Number of classes with 37 students: 17

Number of classes with 38 students: 12

(iv) Number of classes with 41 students: 16

Number of classes with 42 students: 13

(vi) The number of unused classes decreases with an increase in student enrolment and increases with a decrease in student enrolment. This is undoubtedly an inverse proportion relationship.

(vii) The number of classes that are used in any given year increases with an increase in student enrolment and vice versa. This is a direct proportion relationship.

(viii) 1993: 13
1994: 18
1995: 26
1996: 31
1997: 34

1.4 Student's answers.

1.5) (a) 1 000 km
(b) 3 000 km
(c) 1 000 km
(d) 1 500 km
(e) From 0 km to 1 500 km
(f) From 1 500 km to 3 000 km
(g) This is a continuous relationship. The distance moved by the dummy missile can not be counted like coins in a wallet.

Class test 1

Time: 42 min **Total: 35**

1.1 In her effort to increase the sales of her home based business, Matilda bought 41 layers in order to avoid continuing buying eggs from a local farmer.

1.1.1 Given that each layer lays one egg per day, make a sequence of Matilda's eggs if the first 41 eggs laid on the first day added to 29 eggs she had bought from the local farmer. Take note that the first term will be 29 here. (2)

1.1.2 Is this an arithmetic or geometric sequence? (1)

1.1.3 What is the common difference or ratio of the sequence? (1)

1.1.4 Find the seventh term of the sequence: (2)

1.1.5 What term of the sequence is 1259? (2)

1.1.6 Find the sum of the series that will be formed from this sequence to twenty one terms. (4)

1.2 An HIV infected person can infect another person if they engage themselves in unprotected sex. If these two people separate and find themselves new partners each of them will be infecting his or her new partner if they engage themselves in unprotected sex. The following sequence can be formed from these infections:
1; 2; 4; 8; 16; 32; …

1.2.1 Is this an arithmetic or geometric sequence? (1)

1.2.2 What is the common difference or ratio of the sequence? (1)

1.2.3 Find the fifteenth term of the sequence (2)

1.2.4 What term of the sequence is 33 554 432? (2)

1.2.5 Find the sum of the series made from this sequence to sixteen terms (4)

1.3 Classify the following relationships as direct, inverse or no mathematical relationship

(a) A steady increase in enrolment in schools if properly managed and attract properly qualified and dedicated educators. (1)

(b) An increase in the number of children benefiting from child support grants over the years with an increase in the number of parents who are retrenched over the same years (1)

(c) A decrease in income over a given time interval with a decrease in the number of items sold over that same time interval. (1)

(d) An increase in the number of rows with a decrease in the number of columns for the same number of items (1)

(e) A decrease in the volume of water in a tank with an increase in time if the tap is opened (1)

1.4 Classify each of the data in relationships in 1.3 as discreet or continuous. (4)

1.5 Give one example of a relationship with continuous data. (2)

1.6 Generate the first five terms of each sequence from each of the following general terms:
(a) Tn = n + 2 (1)
(b) Tk = 2 k + 2 (1)

TEST SOLUTIONS

1.1.1 29; 111; 152; …
Note that each successive term is obtained by adding 41 to the preceding term.

1.1.2 An arithmetic sequence

1.1.3 41 Note that $d = T_2 - T_1 = T_3 - T_2 = T_4 - T_3 = \ldots$

1.1.4 (a) $T_n = a + (n-1)d$
$T_7 = 29 + (7-1)41$
$= 275$

(b) $T_n = a + (n-1)d$
$T_{12} = 29 + (12-1)41$
$= 480$

1.1.5 $a + (n-1)d = Tn$
$29 + (n-1)41 = 1259$
$(n-1)41 = 1259 - 29$

$n - 1 = \frac{1230}{41}$
$n = 30 + 1$
$= 31$

1.1.6 $S_n = \frac{n}{2}[\ 2a + (n - 1)d]$
$= \frac{21}{2}[\ 2(29) + (21 - 1)41]$
$= 9\ 219$

1.2.1 Geometric sequence

1.2.2 $r = \frac{T_2}{T_1} = \frac{T_3}{T_2} = \frac{T_4}{T_3} = 2$

1.2.3 $T_n = ar^{n-1}$
$T_{15} = (1)(2^{15-1})$
$= 16384$

1.2.4 $ar^{n-1} = T_n$
$(1)(2^{n-1}) = 33\ 554\ 432$
$2^{n-1} = 2^{25}$
$n - 1 = 25$
$n = 26$

1.2.5 $S_n = \frac{ar^{n-1}}{r-1}$
$= \frac{(1)2^{16} - 1}{2 - 1}$
$= 65\ 535$

1.3 Classify the following relationships as direct, inverse or no mathematical relationship

(a) No mathematical relationship

(b) Direct

(c) Direct

(d) Inverse

(e) Inverse

1.4 (a) Discreet

(b) Discreet

(c) Discreet

(d) Discreet

(e) Continuous

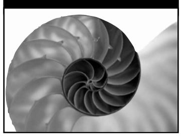
1.5 Increase in height of a tree with an increase in the number of months

1.6 Generate the first five terms of each sequence from each of the following general terms:

(a) 3; 4; 5; 6; 7

(b) 8; 16; 32; 64; 128

Unit 3



Focus on finance

LB page 77

SO 1, AS 1.1,
LO 1.1a

ACTIVITY 1 REVISION AND DEVELOPMENT

1. answers will vary

2.1 R4 000

2.2 Loss; R1 560

2.3 (a) R6 250

  (b) R6,25

  (c) R25

3.1 The first of 8 pages.

3.2 Yes; R517,09

3.3 11 July 2005

3.4 R319,48

3.5 4 Aug. 2005; 24 days

3.6 Rent; usage

4.1 A) 49c

  B) 55 c

  C) 135 c

  D) 227c

  E) 60c

  F) 105c

  G) 219c

4.2 R35,98

5.1 R1 437,17

5.2 R68 984,16

5.3 No; 11c

6. ADG; JBH; EKI; CFL

7.1 $249 597,42

7.2 (a) yes

  (b) R70,63

LB page 82

SO 1, AS 1.1, LO 1.1a

Activity 2 Application

1.1 student's answers will vary according to their own purchase prices chosen.

1.2 (a) R1101

(b) R8 072

(c) R264 240;

(d) Capital R100 000; Interest R164 240

(e) Instalment (monthly) : R1 200; Total interest less R116 000; difference = R48 240 760.

2.1 Total expenditure = total income = R11 000

Membership fees R 9 120

Fund-raising event R1 880

3.1 Yes

3.2 Yes, except for 2003

3.3 Revenue (Growth %: 2000 to 2003: revenue 44% with operating expenses 26%)

3.4 9,4 x 10; operating expenses 26

4.1 SIBULELE

4.2 Sibulelu: 36,4 % profit Shireen: 35,9% profit Sibulelu fared better

5.1 R604,80

5.2 R589,68

6.1 35,1%

6.2 53,2%

6.3 15,4%

6.4 23,2%

6.5 7,9

6.6 7,0

6.7 6,5

7.1 best and (b) worst

ACTIVITY 3 RESEARCH TASK

LB page 85

SO 1, AS 1.1, LO 1.1a

Student's responses

ACTIVITY 4 APPLICATION: TAX IN, TAX OUT

LB page 86

SO 1, AS 1.1, LO 1.1a

1. Personal income tax (R94,4 billion); VAT (R79,2 billion)
2. Tax on retirement funds
3. R292,8 billion
4. Education; Social Services and Welfare; Debt Service/Interest
5. R13 billion

ACTIVITY 5 APPLICATION: MINING AND MINERALS

LB page 87

SO 1, AS 1.1, LO 1.1a

1. Aluminium, chrome, manganese, gold, platinum, vanadium, vermiculite
2. USA by 2,2%
3. Fifth .

3.1 To represent fractions

ACTIVITY 6 APPLICATION: FRIENDS IN TRADE

LB page 88

SO 1, AS 1.1, LO 1.1a

1.1 (a) UK

(b) UK

1.2 0,491

2.1 Belgium, Israel, Holland, Japan, Spain, United Kingdom, Zambia, Mozambique

2.2 The other countries mentioned

3. UK, USA, Germany, etc.

ACTIVITY 7 PROJECT

LB page 90

SO 1, AS 1.1, LO 1.1a

Student's responses

Give students an opportunity to report their findings to the whole group

Unit 4

Space, Shape and orientation vocabulary and calculation

SB page 93

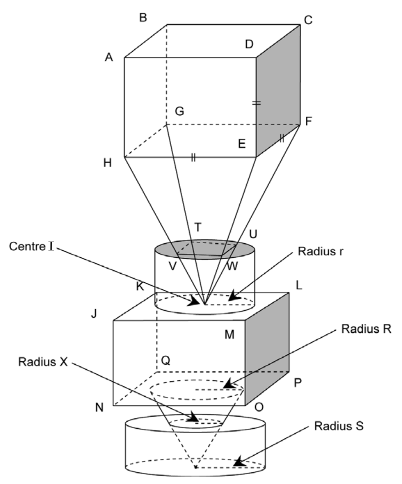
Topic 4: LO 1.1.a

ACTIVITY 1 THE VOCABULARY OF SPACE, SHAPE AND ORIENTATION

The vocabulary of space, shape and orientation is applied correctly when communicating about contextually appropriate problems.

Rationale behind the Activity

The activity is intended to facilitate the appropriate use of space, shape and orientation terms in description of contextual experiences.



The idea is to find out if students understand surface area.

1.1. (a) Rectangular prisms
ABCDEFGH; JKLMOPQN

(b) Pyramids
IEFGH and IWUTV

(c) Right cylinders
Cylinder with radius r;
Cylinder with radius S.

(d) Cubes
ABCDEFGH

(e) Cones
Cone with base radius R
Cone with base radius *X*

(f) Rectangles
All sides of cube ABCDEFGH (6 in number) and prism JKLMOPQN (Also 6 in number) and rectangle VWUT. It is important to remember here that a square is a rectangle.

(g) Triangles: All lateral sides of the pyramid IEFGH (4 in number)

(h) Circles: Top and bottom parts of the cylinders. 2 with radii r and 2 with radii S.

(i) Lateral surfaces: Students need to know that by lateral surfaces, we refer to the “sideway” surfaces. Of the diagram that are not “hidden” inside any component of the diagram. Consequently the surface area of the diagram will consist of:

- Sides AHBG, BGFC, CFED and DEHA of prism ABCDEFGH

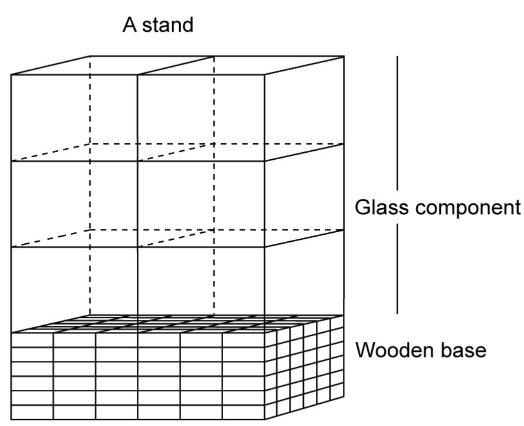
- Trapezia HEWV, EFUW, FGTU and GTVH, parts of pyramid IEFGH not immersed into the cylinder.
- Lateral sides of the cylinder with radius r
- Sides JMON, MOPL, LPQK and KQNJ of prism JKLMOPQN
- Lateral parts of cone with radius X not immersed in the cylinder with radius S.
- Lateral sides of cylinder with radius S.

(j) To obtain the total surface area of the diagram, we combine the lateral surfaces with the top-and bottom sides not immersed into, or share a common side with, the other figure. The following will be the components of the total surface area of the figure:

- Sides AHBG, BGFC, CFED and DEHA and ABCD of prism ABCDEFGH We do not include side EFGH because it is shared between the prism and pyramid.
- Trapezia HEWV, EFUW, FGTU and GTVH, parts of pyramid IEFGH not immersed into the cylinder.
- Lateral sides of the cylinder with radius r. plus its top circle less side VWUT.
- Sides JMON, MOPL, LPQK and KQNJ - plus side JKLM less circle area with radius r - of prism JKLMOPQN
- Lateral parts of cone with radius X not immersed in the cylinder with radius S.
- Lateral sides of cylinder with radius S plus circle area with radius S less circle
  Area with radius X.

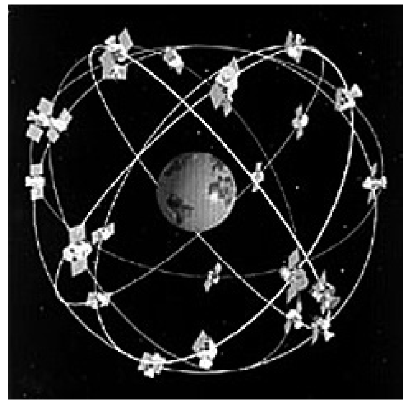
1.2. (a) 13: All of the rectangles.

(b) 6 squares. This stresses the fact that a square is a parallelogram.

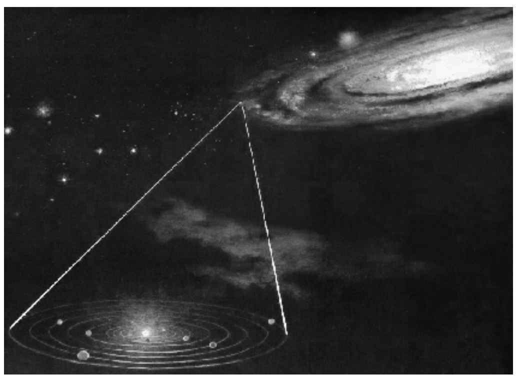


The capacity of the stand is given by the volume of the glass component, while the volume of the stand includes the volume of the wooden base plus that of the glass component.

1.3. The students are expected to physically count the number of circular paths traversed by the satellites. In some cases, a path is traversed by more than one satellite. The earth, when looked at 2 dimensionally – also generates a circle. It is, 3 dimensionally speaking, a sphere.



1.4



Let the students count the number of stars, knowing that stars are spherical. The students should be further asked to read about galaxies, universe etc.

SB page 129

Topic 4: LO 2.1.a; LO 1.1.a

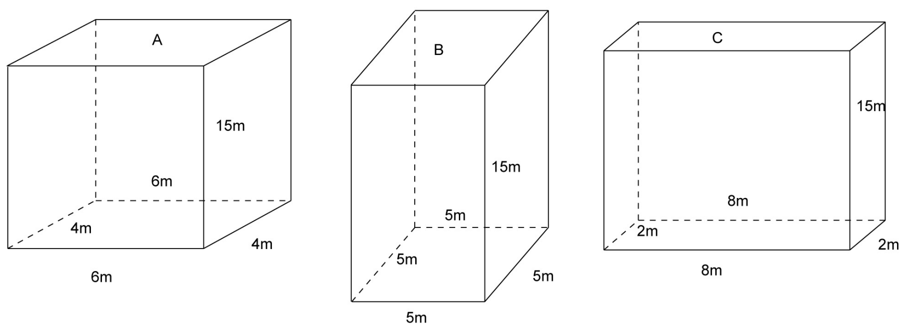
Activity 21 Area, Volume, time and distance

Use the following formulae:

Lateral surface area A of a cylinder with height l and radius r is $A = 2\pi rl$
Area A of a circle with radius r is $A = \pi r^2$
Volume V of a cylinder with height h and radius r is $V = \pi r^2 h$
Volume V of a sphere with radius r is $V = 4/3\ \pi r^3$
Volume V of a cube with side x is $V = x^3$
Volume V of a right cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$
Surface area A of a sphere with radius r is $A = 4\pi r^2$
Lateral surface area A of a right cone with radius r and height h is $A = \pi r\ Rr^2 + h^2$

Answers

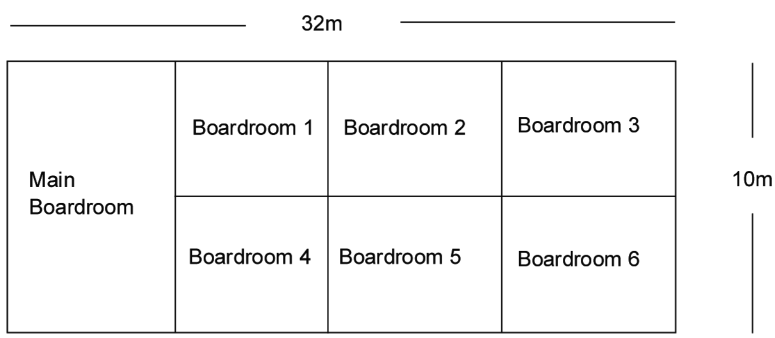
1. Despite the fact that all three have the same base perimeter (20m) and the same height (15m), the three rectangular tanks are of different storage volumes:



A. $V = 24m^2 \times 15m = 360m^3$
B. $V = 25m^2 \times 15m = 375m^3$
C. $V = 16m^2 \times 15m = 240m^3$
The students should observe that the closer the base of the tank is to the square, the more will be its volume.

2. As per discussion above, the garden will be maximal if it is in the form of a square. This example can be used by the students, through trial and error, to confirm that the closer the length and breadth describe a square, the larger will be the resulting area.

3.1



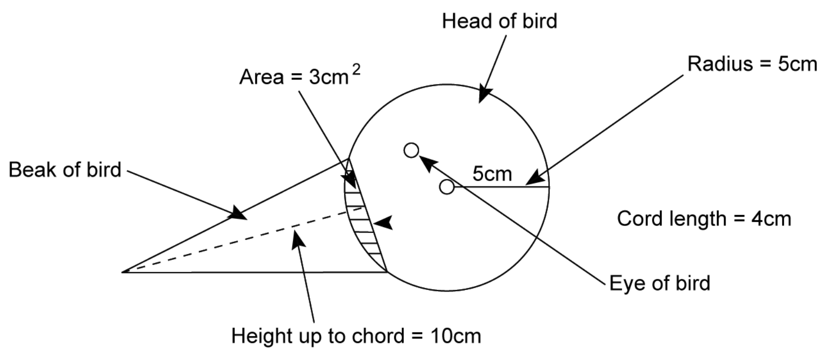
The total area of the conference centre is $320m^2$

$\therefore$ Area of each small boardroom = $\frac{320m^2}{8}$ = $40m^2$, meaning that the area of the main boardroom is $80m^2$.Since, for instance, boardrooms 3 and 6 have the same length and breadth, the breadth of bedroom 3 will be 5m, and its length will be 8m. So boardrooms 1-6 will each be of dimensions 5m by 8m, with main boardroom being of dimensions 10m by 8m.

3.2 There are an equivalent of 8 small boardrooms in the centre. Number of square tiles per small boardroom =$\frac{8000}{8}$ = 1000. This effectively means that there will be 2000 square tiles in the main boardroom, and 1000 square tiles in each of the small boardrooms. The area of each square tile in each of the small boardrooms =

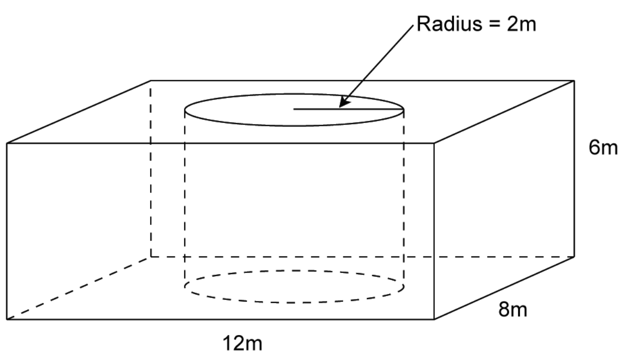
$\frac{40m^2}{1000} = 0{,}04m^2 = 0{,}04(100\ cm)^2 = 400\ cm^2$. The side of each square tile will then be R400 cm^2 = 20 cm

3.1



The amount of material used will be the area of the circle (head) plus the area of the triangle less twice 3 cm^2.
Amount = $\pi\ (25\ cm^2) + \frac{1}{2} \times 3\ cm \times 10\ cm - 6\ cm^2 \approx 87{,}54\ cm^2$

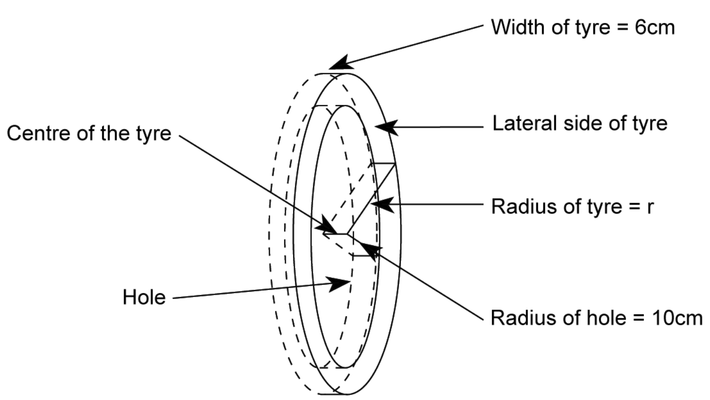
4.



Required volume = Volume of prism – volume of cylinder.

$V = 12\ m \times 6\ m \times 8\ m - \pi(4\ m^2)(6\ m) = 500{,}6\ m^3$

5.



The tyre is cylindrical in shape.
Volume of tyre = volume from centre to circumference of tyre – volume of hole.

$V = \pi(r^2 - 100)(6)\ cm^3 = 264\ \pi\ cm^3$

$\Rightarrow 6\ \pi r^2 = 864\ \pi$

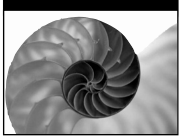
$\Rightarrow r^2 = 144 \Rightarrow r = 12\ cm$

$A = \pi(r^2 - 100)\ cm^2$

$= 44\ \pi\ cm^2$

Module 2
All forms of patterns around us!

Unit 5



Calculations and measuring techniques

SB page 138

Topic 1: LO2.1.a; LO 2.1.b;c;f

ACTIVITY 1 PERCENTAGES IN CONTEXT

1.1 The 12 and 15 are respectively included in the 102 and 148, so that the total workforce is 250.

1.2 The required percentage is
$\frac{102}{250} \times 100\% = 40{,}8\%$

1.3 The required percentage is $\frac{223}{250} \times 100\% = 89{,}2\%$

2.1 From the graph, 44% of management was black. This means that there were 44% × 1000 = 440 black managers in the company in 2003.

2.2 Number of managers in 2005 = 0,125 × 20000 = 2500
Percentage of black managers in 2005 = 60%
$\therefore$ Number of black managers in 2005 = 60% × 2500 = 1500

3.2 Number of black executive managers in 2005 = $\frac{35}{100} \times 180 = 63$
Total number of executive managers in 2005 = $\frac{1}{10} \times 1500 = 150$
Number of black executive managers in 2005 = $\frac{40}{100} \times 150 = 60$
Total number of middle managers in 2005 = 1 350
Number of black middle managers in 2005 = $\frac{60}{100} \times 1350 = 810$
$\therefore$ Number of black managers in 2005 = 870

3.3 Suppose the number of executive managers in 2003 was x. Then
$\frac{35}{100}x = 70 \Rightarrow x = 70 \times \frac{100}{35} = 200$
This means the number of executive managers in 2003 was 200.
But then the number of middle managers in 2003 was 2 300.
Number of black middle managers in 2003 = $\frac{50}{100} \times 2300 = 1150$
$\therefore$ Number of black managers in 2003 = 1220

4.1 (a) Number of interventions in 2005 = 2,4 × 10000 = 2400

Number of daily interventions in 2005 = $\frac{2400}{200}$ = 12

Number of employees in 2006 = 10000 + 10% × 10000 = 11000

Number of interventions in 2006 = 3,2 × 11000 = 35200

Number of daily interventions in 2006 = $\frac{35200}{200}$ = 176

(b) This is a case of distribution of addition over multiplication:

10000 + 10% × 10000 = 10000 × 100% + 10% × 10000 = 10000(100% + 10%) = 110% × 10000

4.2 (a)

Period	Amount invested	Interest per annum	Amount due to investor at end of period
1st year	R1 000	10%	R1100
2nd year	R1 100	10%	R1210

(b) Student's solutions

(c) This is a case of simplifying by applying distributive property of addition over multiplication.
For instance, at the end of second year, we have:
A = (P + r%P)+r%(P + r%P) = P(1 + r%) [1+r%] = p(1+r%)^2

(d) A = P(1 + r%)^2 = 1000(1 + 10%)^3 = 1000(110%)^3 = 1331,
meaning that at the end of the third year the amount received by the investor would, as expected, be R1 331.

(e) A = $1500(1 + \frac{7}{100})^{15}$ = 1500(107%)^{15} = 4138,55

The amount received at the end of 15 years would be R4138,55.

Key	Display
1.07	1.07
y^x	1.07
15	15
=	2.759
x	2.759
1500	1500
=	4138,55

5. % prevalence = 10,2% of 42 42%x = 1200, where x is the number of employees.
That is,
0.04284x = 1200 $\Rightarrow x \approx$ 28011
There were about 28011 employees in the company.
Or
Let x be the number of employees who went for VCT. Then
10,2% $of\ x$ = 1200 $\Rightarrow x \approx$ 11765
If y is the total number of employees in the company in 2007, then
42% of y = 11765 $\Rightarrow y \approx \frac{11765}{0,42}$ = 28012

SB page 142

Topic 1: LO 2.2.a

ACTIVITY 3 RATIO AND RATE

1.1. Ratio = 1:4

1.2. % = $\frac{1}{5} \times 100\% = 20\%$

2. $250ml = \frac{1}{4} \times 1000\text{ml} = \frac{1}{4}\ litre$
Number of litres of dilute juices drunk = $\frac{1}{4} \times 200 = 50\ litres$
Number of 5-litre concentrates = 2 (Each 5 - litre concentrates produces 25 litres of dilute juices).

3.1 200 loaves = 5 loaves × 40, meaning that each ingredient will be increased 40-fold. This justifies the following table:

Ingredient	Quantity in grams
Flour	36 000
Baking powder	4 000
Margarine	10 000
Yeast	4 000
Salt	4 000
Sugar	2 000

3.2 4kg = 4 000g = 50g × 80. This means that each of the ingredients will be increased 80-fold, giving 80 loaves. The table outlines the amount of ingredients needed:

Ingredient	Quantity in grams
Flour	72kg
Baking powder	8kg
Margarine	20kg
Yeast	8kg
Salt	8kg
Sugar	4kg

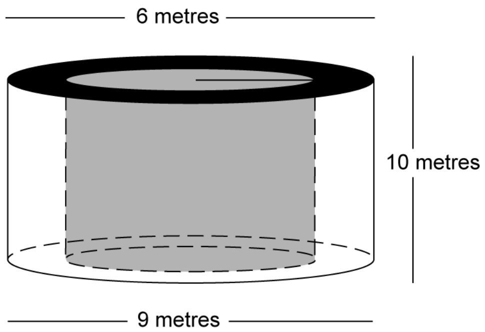
SB page 152

Topic 1: LO 3.2.a

ACTIVITY 5 VOLUME

1.1 Lateral surface area of a cylinder with radius r and height h: $A = 2\pi rh$
Volume of a cylinder with radius r and height h: $V = \pi r^2 h$

(a) Total surface area = lateral surface area + shaded area.+ surface area of water.



(b) The amount of cement-sand mixture used to build the reservoir
= Volume of the reservoir – volume of the water
$= \pi(9^2 - 6^2)\ 10m^3 = 1413{,}7m^3$

(c) The amount of water in the filled reservoir
$V = \pi 6^2(10)m^3 \approx 113m^3$

1.2 **For enrichment**

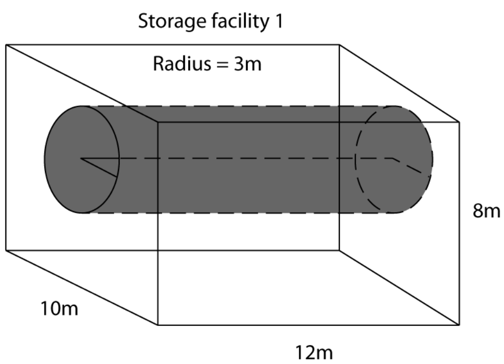
Volume V of the facility is

$V = [\frac{2}{3}\pi(20)^3 + \pi(15)^2(50) + \frac{1}{3}\pi(15)^2(22)]m^3 = 57281{,}7m^3$

Lateral surface of the facility is

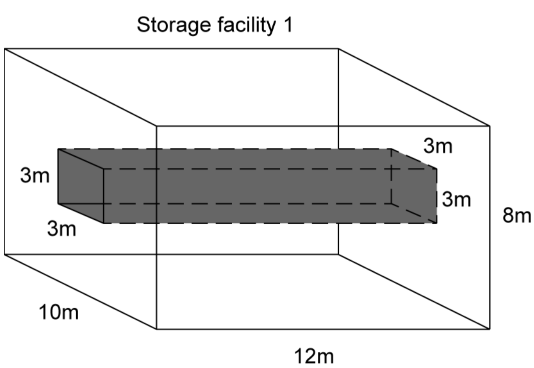
$A = [4\pi(20)^2 + 2\pi(15)(50) + \pi(15)\sqrt{15^2 + 22^2} = 6284{,}46$

1.3



(a) Volume of hole in storage facility 1:
$V = \pi(9)(12)m^3 \approx 339{,}3m^3$

(b) Surface area of storage facility 1:
$= 2(12m \times 8m)$
$+ 2(12m \times 10m)$
$+ 2[(10m \times 8m) - 9\pi m^2]$
$- 2\pi(3m)(12m)$
$\approx 309{,}26m^2$



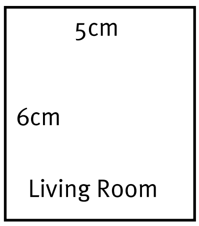
(a) Volume of hole in storage facility 2:
$V = 9 \times 12m^3 = 108m^3$.
The hole in facility 1 is bigger than in facility 2.
Therefore it is cost effective to buy storage facility 2.

(b) Surface area of storage facility 2:
$= 2(12m \times 8m)$
$+ 2(12m \times 10m)$
$+ 2[(10m \times 8m) - 9\pi m^2]$
$- 2\pi(3m)(12m)$
$\approx 309{,}26m^2$

1.4 1. Area of the triangle = $6\ cm^2 = \frac{5H}{2} \therefore H = \frac{12}{5}\ cm$

2. Area of the triangle = $6\ cm^2 = 3H \therefore H = 2\ cm$

1.5 (a) The scale $1cm = 1m$ means that every $1cm$ length on the drawing paper represents $1m$ on the ground.



- The scale 2cm = 10m means that every 2cm length on the drawing paper represents 10m on the ground or, alternatively, 1cm on the drawing paper represents 5m on the ground.
- 2cm = 10m is equivalent to 1cm = 5m and 5cm = 15m is equivalent to 1cm = 3m.
- Using the scale 1cm = 1m, the length of the room will be 6m, while its breadth will be 5m, so that the area of the room will be 30 square metres.

1.6 Using the scale 2cm = 10cm, which is equivalent to 1cm = 5cm, the area of the room will be 25m × 30m = 750 square metres.

(a) 2cm = 10m implies 2cm = 1000cm or, equivalently, 1cm = 500cm. The ratio scale is therefore 1:500.

1.7 5cm = 15m implies 5cm = 1500cm or, equivalently, 1cm = 300cm. The ratio scale is therefore 1:300.

1.8 Student's responses.

NOTES TO THE LECTURER:

You will make a choice of a tool to use for assessment.

Rubric Assessment

Assessment standards	Student is competent	Student is not competent
The student solves problems using a range of strategies including using and converting between appropriate S.I. units.	Student successfully used appropriate scale conversion.	Student failed to use appropriate scale conversion.
Student solves problems involving known geometric figures and solids in a range of measurement contexts by selecting measuring instruments appropriate to the problem.	Student successfully solved the problems.	Student fails to identify the representations that are required.

Task List Assessment			
Task	Score Comment	Weighting	Total Points
Student was able to correctly change from one scale to the other.	1 2 3 4 5 6 7	3	

How to use this rubric

e.g. If a student recieves a score of 4, we then have 4 × 3 = 12 as total points. The maximum is 7 × 3 = 21 points. We then calculate the student's percentage mark: $\frac{12}{21} \times 100 = 57\%$

Assessment on group work: Evaluating Team Work

Criteria: Use the following symbols:

S: Strong M: Moderate N: Needs attention

	Criteria	Score					
1	Appropriate working methods	Individual			Consensus		
2	Trust and mutual understanding	S	M	N	S	M	N
3	Use of team members' strengths	S	M	N	S	M	N
4	Open and effective communication	S	M	N	S	M	N
5	Sharing of ideas and resources	S	M	N	S	M	N
6	Cohesiveness and comradeship	S	M	N	S	M	N
7	Constructive conflict management						
8	Climate of mutual support	S	M	N	S	M	N
9	Openness to new ideas and change	S	M	N	S	M	N
10	Decision making	S	M	N	S	M	N
11	Motivation	S	M	N	S	M	N

MODULE 2

12	Success acknowledged and celebrated	S	M	N	S	M	N
13	Expertise / resources improved	S	M	N	S	M	N
14	Roles and responsibilities clear to all	S	M	N	S	M	N
15	Overall team effectiveness	S	M	N	S	M	N

Unit 6

Identifying and using information from patterns to solve workplace problems

The activities that include concepts that might be to the student are preceded by examples that are explained in detail. The purpose of this is to give the students the opportunity to go through these examples and answer the activities.

Do with them examples of problems that involve finding square roots of perfect squares and cube roots of perfect cubes before giving them activities on square roots and cube roots.

Remember that a perfect square is a number with rational square root and a perfect cube is a number with a rational cube root.

Definition of a rational number: A number that can be written as $\frac{a}{b}$ where $a; b \in Z$

SB page 160

Topic 2: LO 2.1.a; LO 2.2.a

ACTIVITY 1 DEPENDENT AND INDEPENDENT VARIABLES

1. Independent: Provinces
   Dependent: Number of houses
2. Gauteng province has more job opportunities than any other province in South Africa. The discovery of gold in Johannesburg in 1926 made Guateng the most industrialized province in South Africa. More people from all over South Africa flocked to this province. Even foreign investors invested in numbers. All these necessitate the development of good infrastructure. Hence, the building of more houses.
3. Northern Cape is a poorly developed province.
4.

Province	Number of million houses built per year
Eastern Cape:	14,809
Free State:	10,935
Gauteng:	53,730
KwaZulu-Natal:	29,687
Mpumalanga:	8,734
Northern Cape:	3,802
Northern (Limpompo) Province:	10,359
North West:	12,263
Western Cape:	21,774

5. Students will give different answers to this one.

SB page 161

Topic 2: LO 2.1.a

ACTIVITY 2 APPLICATION

1. dependant variable – total number of co-operatives (x)
   independant variable – total amount of funding (y)

2.

x	15	19	27	33	23	
y	750 000	950 000	1350 000	1650 000	1150 000	

3.1 $y = 50\ 000x$
$= 50\ 000(85)$
$= 4\ 250\ 000$
R4 250 000 will be needed to fund 85 co-operatives

3.2 $y = 50\ 000x$
$= 50\ 000(101)$
$= 5\ 050\ 000$

3.3 $y = 50\ 000x$
$= 50\ 000\ (1\ 020)$
$= 51\ 000\ 000$

3.4 $y = 50\ 000x$
$= 50\ 000(8\ 500)$
$= 425\ 000\ 000$

4.1 $50\ 000x = 3\ 400\ 000$
$x = 3\ 400\ 000$
$50\ 000$
$x = 68$
68 co-operatives can be funded from R3 400 000

4.2 $50\ 000x = 4\ 750\ 000$
$x = 4\ 750\ 000$
$50\ 000$
$= 95$

4.3 $50\ 000x = 12\ 000\ 000$
$x = 12\ 000\ 000$
$50\ 000$
$= 240$

4.4 $50\ 000x = 123\ 000\ 000$
$x = 123\ 000\ 000$
$50\ 000$
$= 2\ 460$

5 – 7 Student's own responses

ACTIVITY 3 LINEAR EQUATIONS

SB page 60

Topic 2: LO 2.2.b

1. 12
2. 25
3. 9
4. 84
5. 8
6. 3
7. 11
8. –13
9. –1
10. –139
11. 6
12. 7, 75
13. 2, 4
14. –42

ACTIVITY 4 QUADRATIC EQUATIONS

SB page 167

Topic 2: LO 2.2.b

$x = -2$ or $x = 3$

ACTIVITY 5 APPLICATION

SB page 167

Topic 2: LO 2.2.b

1. $x^2 + 5x - 6 = 0$
   $(x + 6)(x - 1) = 0$
   $x + 6 = 0$ *or* $x - 1 = 0$
   $x = 6$ *or* $x = 1$

2. $2x^2 - x - 3 = 0$
   $(2x - 3)(x + 1) = 0$
   $2x - 3 = 0$ *or* $x + 1 = 0$
   $x = 3$ *or* $x = -1$
   2

3. $x^2 - 4x - 21 = 0$
   $(x - 7)(x + 3) = 0$
   $x - 7 = 0$ *or* $x + 3 = 0$
   $x = 7$ *or* $x = -3$

4. $3x^2 - 4x + 1 = 0$
$(3x - 1)(x - 1) = 0$
$3x - 1 = 0$ *or* $x - 1 = 0$
$x = 1$ *or* $x = 1$
3

5. $x^2 = 4 - 3x$
$x^2 + 3x - 4 = 0$
$(x + 4)(x - 1) = 0$
$x + 4 = 0$ or $x - 1 = 0$
$x = -4$ or $x = 1$

6. $p^2 + 9p + 20 = 0$
$(p + 5)(p + 4) = 0$
$P + 5 = 0$ *or* $p + 4 = 0$
$P = -5$ *or* $p = -4$

7. $6t^2 + 4 = 10t$
$6t^2 - 10t + 4 = 0$
$3t^2 - 5t + 2 = 0$
$(3t - 2)(t - 1) = 0$
$3t - 2 = 0$ *or* $t - 1 = 0$
$T = 2$ *or* $t = 1$
3

8. $5 - 4x - x^2 = 0$
$(5 + x)(1 - x) = 0$
$5 + x = 0$ *or* $1 - x = 0$
$x = -5$ *or* $x = 1$

9. $16 + 6x - x^2 = 0$
$(8 - x)(2 + x) = 0$
$8 - x = 0$ or $2 + x = 0$
$x = 8$ or $x = -2$

10. $4k^2 - k - 3 = 0$
$(4k + 3)(k - 1) = 0$
$4k + 3 = 0$ *or* $k - 1 = 0$
$k = -3$ *or* $k = 1$

SB page 168

Topic 2: LO 2.2.b

ACTIVITY 6 DIFFERENCE OF TWO SQUARES

8.1. $x^2 - 100 = 0$
$(x - 10)(x + 10) = 0$
$x - 10 = 0$ *or* $x + 10 = 0$
$x = 10$ *or* $x = -10$
Critical point: $x = -b$
$2a$
$x = -0$
$2(1)$
$= 0$

8.2. $p^2 - 64 = 0$
$(p - 8)(p + 8) = 0$
$p - 8 = 0$ *or* $p + 8 = 0$
$p = 8$ *or* $p = -8$
Critical point: $p = 0$

8.3. $t^2 - 36 = 0$
$(t + 6)(t - 6) = 0$
$t + 6 = 0$ *or* $t - 6 = 0$
$t = -6$ *or* $t = 6$
Critical point: $t = 0$

8.4. $k^2 - 49 = 0$
$(k + 7)(k - 7) = 0$
$k + 7 = 0$ *or* $k - 7 = 0$
$k = -7$ *or* $k = 7$
Critical point: $k = 0$

1. Zeros / Critical point
$x = -4$ or $x = 4$ $x = 0$

	Zeros			Critical points
8.1.	$x = -10$	or	$x = 10$	$x = 0$
8.2.	$x = -8$	or	$x = 8$	$x = 0$
8.3.	$x = -6$	or	$x = 6$	$x = 0$
8.4.	$x = -7$	or	$x = 7$	$x = 0$

9.1. critical point: $x = -1$

9.2. minimum value $y = -4$

9.3. zeros $x = -3$ or $x = 1$

9.4. Interval of decrease: [–5; –1]
Interval of increase: [–1; 4]

10.1. critical points: $x = -5$ and $x = 4$
maximum value: $y = 5$
minimum value: $y = -6$

10.2. zeros: $x = -7$ or $x = -1$ or $x = 11$

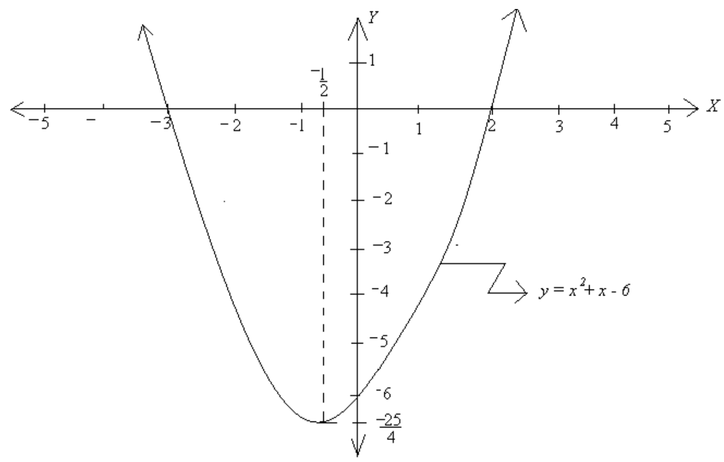
10.3. intervals of increase: [–9; –5] and [4; 13]
Intervals of decrease: [–5; 4]

MODULE 2

MODULE 2

10.4.

(a)



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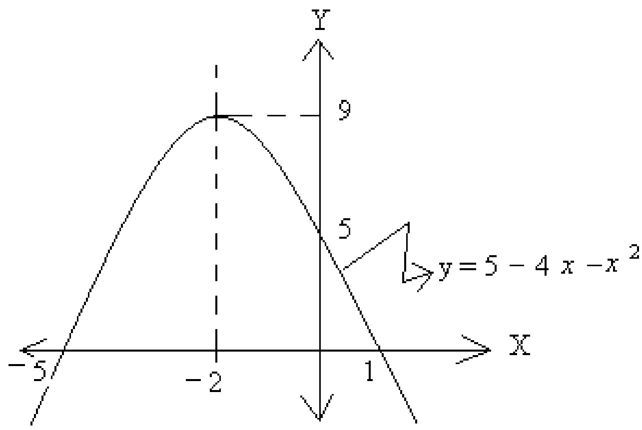
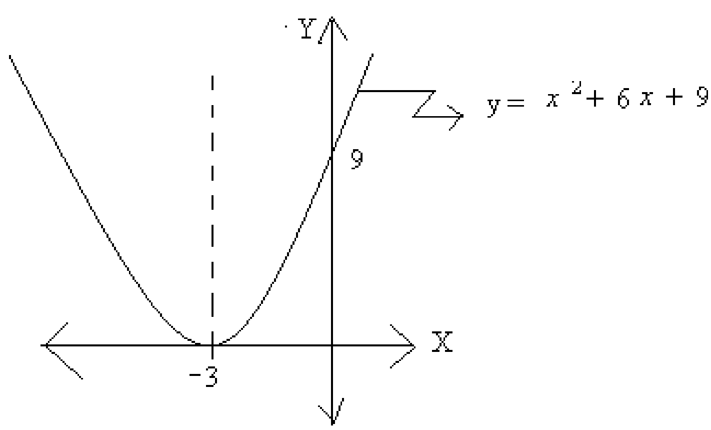
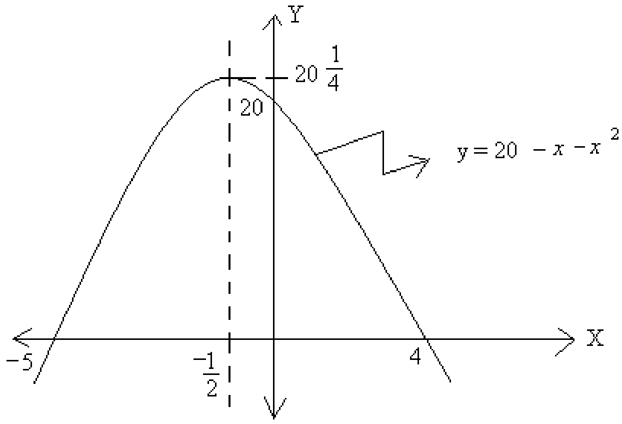


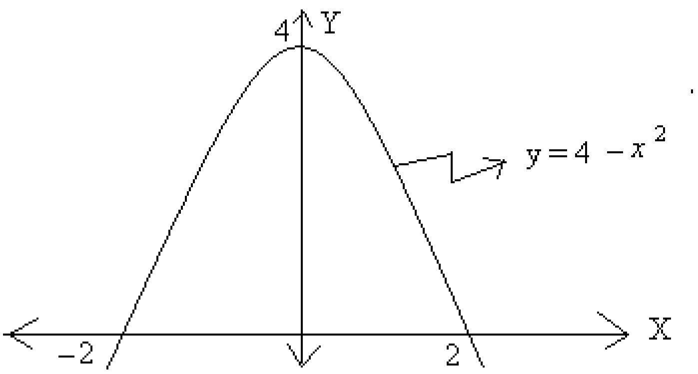
(f)



(g)



(k)



Using the formulae supplied to determine the dependent or independent variable from given formula if one of them is given

Exponents

SB page 170

Topic 2: LO 2.2.a

Activity 8 Application

1 – 3 Student's responses

5. $a^0 \times a^1 = a^{0+1} = a^1 = a$ but $1 \times a = a$
   It follows that $a^0 = 1$

6. $1 \times a^m = a^m = a^{m-m} = a^0 = 1$ but $a^{-m} \times a^m = a^{-m+m} = a^0 = 1$
   $a^m \quad a^m$
   $\therefore a^{-m} = 1$
   a^m

7.1 $5^2 \times 5^3 = 5^{2+3} = 5^5 = 3125$

7.2 $\frac{3^4 \times 3^2}{3^5} = \frac{3^{4+2}}{3^5} = 3^{6-5} = 3^1 = 3$

7.3 $2^3 \times 2^5 \times \frac{2^3}{4} \times 2^4 = \frac{2^{3+5+3}}{2^{2+4}} = \frac{2^{11}}{2^6} = 2^{11-6} = 2^5 = 32$

7.4 $\frac{(2^4)^3 \times (3^5)^4 \times 8}{(3^2)^4 \times (2^6)^2 \times 2^7} = \frac{2^{12} \times 3^{20} \times 2^3}{3^8 \times 2^{12} \times 3^3} = 2^{12+3-12} \times 3^{20-8-3} = 2^3 \times 3^9 = 8 \times 1\,968 = 157\,464{,}00$

7.5 $\frac{(6)^3 \times (12)^2}{3^7 \times 2^8} = \frac{6^3 \times 12^2}{3^7 \times 2^8} = \frac{(3 \times 2)^3 \times (3 \times 4)^2}{3^7 \times 2^8} = \frac{3^3 \times 2^3 \times 3^2 \times 2^4}{3^7 \times 2^8} = \frac{3^5 \times 2^7}{3^7 \times 2^8} = 3^{5-7} \times 2^{7-8}$
   $= 3^{-2} \times 2^{-1} = \frac{1}{3^2 \times 2^1} = \frac{1}{18}$
   $= 3^{-2} \times 2^{-1} = \frac{1}{3^2} \times \frac{1}{2} = \frac{1}{3^2 . 2} = \frac{1}{18}$

7.6 $\frac{125 \times 27}{3^4 \times 5^4} = \frac{5^3 \times 3^3}{3^4 \times 5^4} = 5^{3-4} \times 3^{3-4} = 5^{-1} \times 3^{-1} = \frac{1}{5 . 3} = \frac{1}{15}$

7.7 $\frac{2^5 \times 2 \times (3^4)^2 \times (7^2)^3}{(2^3)^2 \times 3^3 \times 3^5 \times 7^5 \times 7} = 2^{6-6} \times 3^{8-8} \times 7^{6-6} = 2^0 \times 3^0 \times 7^0 = 1$

8. Years of investment is dependent variable amount at the end of investment period is the independent variable.

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Topic 2: LO 2.2.a

Activity 9 Square roots

1. Student's responses
2. $L^2 = A$
   120
   $= \frac{60 \times 50}{120}$
   $= 25$
   $L = \sqrt{25}$
   $= 5\ m$
3. 2 cubes

MODULE 2

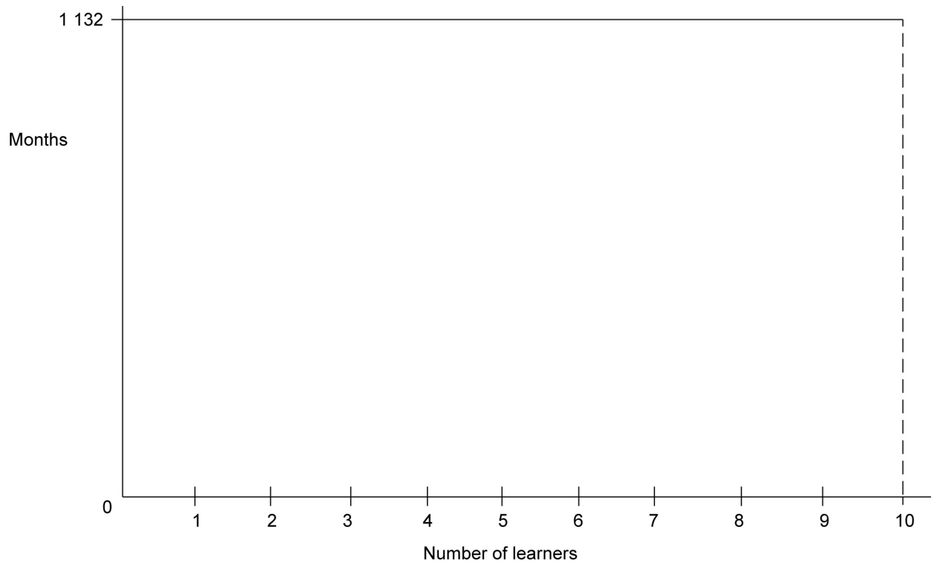
SB page 174

ACTIVITY 10 CONSTANT AND LINEAR RELATIONSHIPS

SO 1, AS 1.1,
LO 1.1a

2. Independent variable: Months(x)
   Dependent variable: Number of students(y)

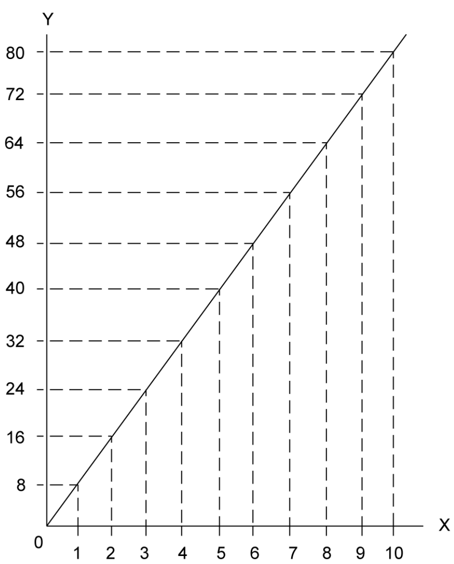
3.



6.1. Independent variable: Number of tourists
     Dependent variable: Number of job opportunities created

6.2. $y = 8x$

6.3.

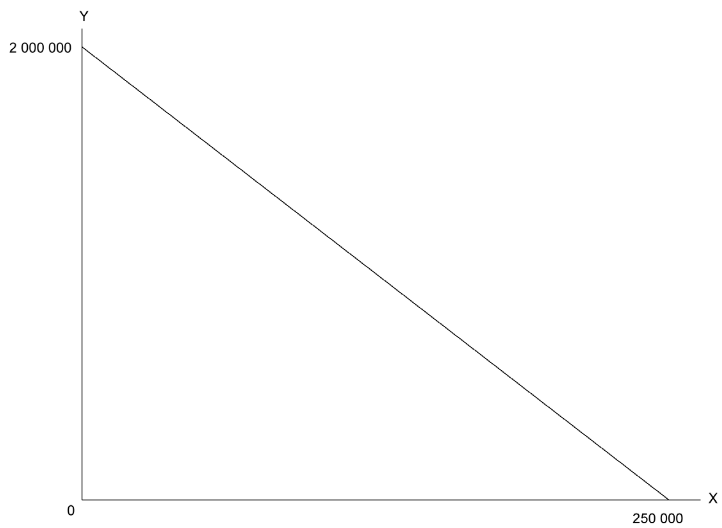


6.4. (a) 400
(b) 1616
(c) 5 168
(d) 8 000 000

6.5. (a) 16
(b) 23
(c) 46
(d) 18 546
(e) 2 365 418

6.8. $y = 2\ 000\ 000 - 8x$

6.9.



6.10. (a) 1 999 952
(b) 1 999 480
(c) 1 992 072
(d) 1 987 552
(e) 195 000

6.11. (a) 209 806
(b) 187 500
(c) 187 222
(d) 142 193
(e) 94 276

7.3. $y = 2x$

7.4. (a) 1 120

(b) 17 490

(c) 2 330

(d) 4 642

(e) 9 552

7.5. (a) 4 446

(b) 60 000

(c) 2 284

(d) 499

(e) 225 252

SB page 178

ACTIVITY 11 INVERSE PROPORTIONAL RELATIONSHIPS

Topic 2: LO 2.2.b

1.1. 5

1.3. decreases

1.4. $y = \frac{36}{x}$

1.5. (a) 18

(b) 12

(c) 6

(d) 4

(e) 2

SB page 179

ACTIVITY 12 UNIT ASSESSMENT

Topic 2: LO 2.2.b

1.1. (a) 1300

(b) y = 50x

(d) y = 1300 – 50x

1.2. (a) Inverse proportion.
Reason: Number of marbles per column decreases with an increase in the number of marbles per row. Moreover, number of marbles per row multiplied by number of marbles per column of the same column on the table gives the total number of marbles.

1. 12
2. 5 m
3. 20

4. 108
5. 4 m × 4 m × 4 m
6. 3 m × 3 m × 3 m

MODULE 2

CLASS TEST 2

The information in the table below represents the motion of a ball that was projected vertically upwards and held at its point of projection on its way down.

t(s)	0	1	2	3	4	5	6
s(m)	0	9,8	39,2	88,2	39,2	9,8	0

1.1. Identify the dependent and independent variables in this given relationship. (1)

1.2. What maximum distance was covered by the ball? (1)

1.3. What is the axis of symmetry of the ball? (1)

1.4. Hence give the coordinates of the turning point of the ball. (1)

1.5. What is the interval of increase for this relationship? (1)

1.6. What is the interval of decrease for this relationship? (1)

1.7. The distance (in metres) covered by the car during the time (in seconds) is defined by the following relationship
$f(t) = t^2 - 10t + 16$

1.8. 1) Fill in the table below using the given formula defining the relationship.

t(s)	0	1	2	3	4	5	6	7	8
f(t)(m)									

(2)

1.9. 2) What distance had already been covered by this car when motion was first observed? (1)

1.10. 3) Calculate:

1.11. 3) 1) the zero points of this relationship. (2)

1.12. 3) 2) the critical point of this relationship. (1)

1.13. 3) 3) the turning point of the graph. (2)

1.14. 4) Sketch the graph of this motion from the information you have calculated in 1.2.3.1 to 1.2.3.3 and the information from the table. (4)

1.15. 5) During which time interval was the distance covered by the car increasing? (1)

1.16. 6) During which time interval was the distance covered by the car decreasing? (1)

TOTAL [20]

2. At an assembly students of a certain school stand in rows and columns.

Thirty one (32) rows and twenty nine (29) columns were identified.

2.1. How many students were present at the assembly? (1)

2.2. Give five different combinations of rows and columns that can be formed from this number of students. (5)

2.3. Is this a direct or inverse proportion relationship? Support your answer. (1)

2.4. Represent the number of rows with x and the number of columns with y and give the formula for this relationship in terms of x and y. (1)

2.5. Sketch the graph of this relationship with x and y extended to the set of real numbers. (4)

TOTAL [12]

3. David has a close corporation that specializes in roofing ceilings. He obtained a job where he was supposed to roof a hall of dimensions 20m × 60m with ceiling boards. Each ceiling board had dimensions 0,5m × 0,5m. His lack of mathematical literacy skills made him to give a quotation of 4000 boards as the number of boards that would be necessary to finish the job.

3.1. 1) How many ceiling boards were actually necessary to finish this job? Show all your working. (3)

3.2. 2) Calculate the dimensions of each board if 75 square ceiling boards were necessary to do all this job. (3)

3.3 144 cubes must be cut from a cube of dimensions 48cm × 36cm × 18cm. Calculate the dimensions of each cube. (3)

3.4 A car is moving at a constant speed of 18 m/s on a level road.

3.5. 1) Use the information given in 2.5 to fill in the following table:

Time(s)	0	1	2	3	4	5	6	7	8	9	10
Speed (m/s)											

(2)

3.6. Use the table in 3.4.1 to sketch the graph of velocity-time for this object. (2)

TOTAL [13]

TEST SOLUTIONS

1.1. Dependent variable: distance
Independent variable: time

1.2. 88,2 m

1.3. t = 3 seconds

1.4. T.P.(3;88,2)

1.5. 0 to 3 seconds

1.6. 3 to 6 seconds

1.7 The distance (in metres) covered by the car during the time (in seconds) is defined by the following relationship
$f(t) = t^2 - 10t + 16$

1.8. Fill in the table below using the given formula defining the relationship.

t(s)	0	1	2	3	4	5	6	7	8
f(t)(m)	16	7	0	–5	–8	–9	–8	–5	0

1.9. 16 m

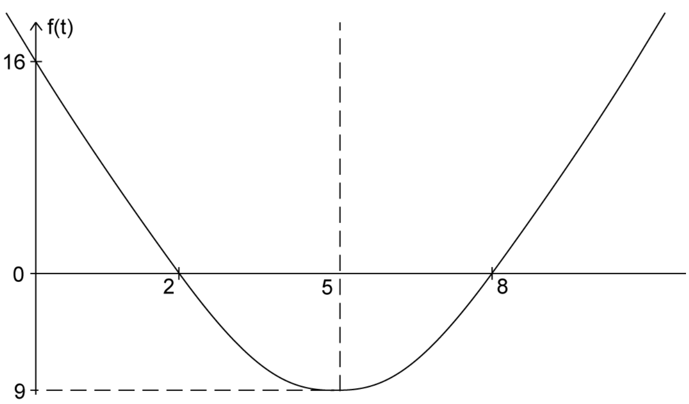
1.10. Calculate:
$t^2 - 10t + 16 = 0$
$(t - 2)(t - 8) = 0$
$t - 2 = 0 \quad or \quad t - 8 = 0$
$t = 2 \quad t = 8$

1.11. $t = \frac{-b}{2a} = \frac{-(-10)}{2(1)} = 5$

1.12. $f(t) = t^2 - 10t + 16$
$f(5) = (5)^2 - 10(5) + 16$
$= -9$

1.13 $T.P.(5;-9)$

1.14.



1.15. From 0 to 5 seconds

1.16. From 5 seconds onwards

2. At an assembly students of a certain school stand in rows and columns. Thirty one (32) rows and twenty nine (29) columns were identified.

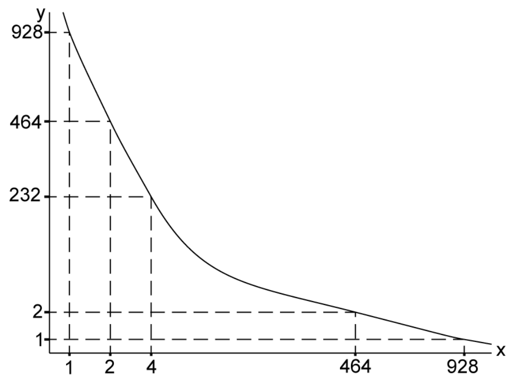
2.1. 928

2.2.

Rows	Columns
16	58
8	116
4	232
2	464
1	928

2.4. $y = \frac{928}{x}$

2.5.



3. David has a close corporation that specializes in roofing ceilings. He obtained a job where he was supposed to roof a hall of dimensions 20m × 60m with ceiling boards. Each ceiling board had dimensions 0,5m × 0,5m. His lack of mathematical literacy skills made him to give a quotation of 4000 boards as the number of boards that would be necessary to finish the job.

3.1. Number of boards = $\frac{A_{total}}{A_{tile}}$

$= 20 \times \frac{60}{0,5} \times 0,5$

$= \frac{1200}{0,25}$

$= 4\ 800$

3.2. $l^2 = \frac{A_{total}}{75}$

$= \frac{1200}{75}$

$= 16$

$= R16$

$= 4$ m

Dimensions of each tile are: 4 m × 4 m

3.3 $l^3 = \frac{V_{total}}{144}$

$= 48 \times 36 \times \frac{18}{144}$

$= \frac{31104}{144}$

= 216

$l = \sqrt[3]{216}$

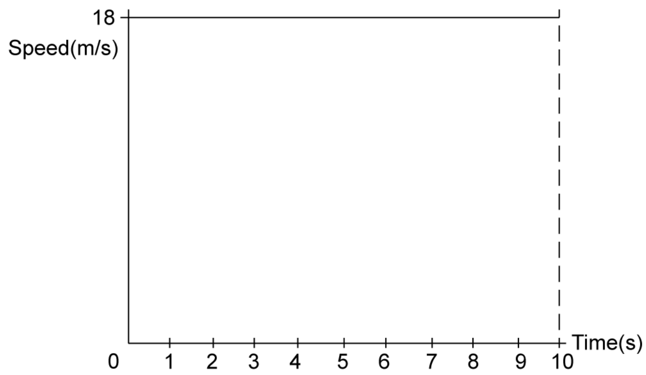
= 6 m

Dimensions of each cube are: 6 m × 6 m × 6 m

3.4. Use the information given in 2.5 to fill in the following table:

Time(s)	0	1	2	3	4	5	6	7	8	9	10
Speed(m/s)	18	18	18	18	18	18	18	18	18	18	18

3.5.



Unit 7

Solving workplace-based problems and using representations

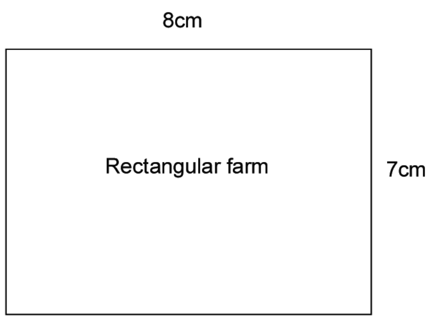
LB page 186

Topic 4: LO 3.1.a LO 3.1.b; LO 3.2.b

ACTIVITY 1 USING MAPS

2.1. (a) The length according to the plan is 6cm. The scale along the length of the floor is 6 cm: 30 m ⇒ 6 : 3 000 ⇒ 1 : 500. In other words, 1cm on the plan represents 5m on the actual floor. Therefore 5cm on the plan will represent 25m on the floor, so that the actual area of the floor will be 30 × 25 m^2 = 750 m^2

(b)



The area of the farm according to the plan = 56 cm^2
This means that 56 cm^2 = 2016 m^2 ⇒ 1 cm^2 = 36 m^2 on the floor. In that case
R1 cm^2 = R36 m^2, or 1 cm = 6 mon the floor. This is equivalent to a scale of 1: 600, which will apply to the sides of the farm.

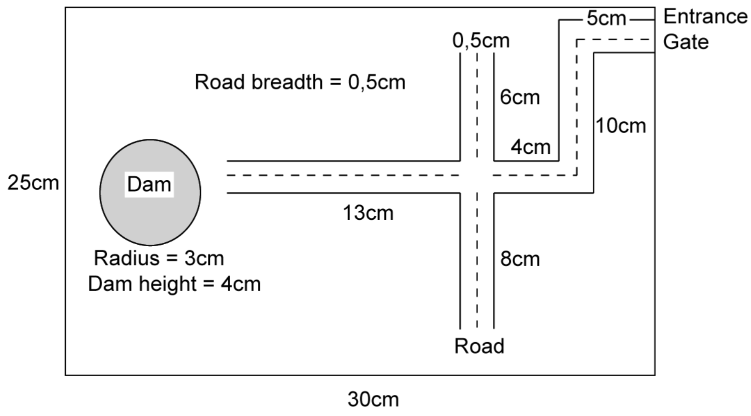
3.1 30 cm^2 =30 × 100 m^2= 3000 m^2

3.2 student's responses

3.3. (a) 1:200. According the plan, 1cm on the paper represents 2m on the ground. So the length of the room will measure 60m, and is breadth 40m, making its area 2400 m^2. This means that the number of tiles will be $\frac{2400}{0,01}$ = 240000

(b) 1:500. According the plan, 1cm on the paper represents 5m on the ground. So the length of the room will measure 150m, and is breadth 100m, making its area 15000 m^2. This means that the number of tiles will be $\frac{15000}{0,01}$ = 1500000.

3.4.



Total distance travelled by the car according to the plan = 46cm × 2 = 92 cm. According to the scale of 1:5000, the car actually travelled 50 m × 92 = 4600 m = 4,6 km inside the farm. At R5 per kilometre, the car was hired at R23.

3.5.) Student's responses

Rubric Assessment

Assessment standards	Student is competent	Student is not competent
The student uses and applies vocabulary of space; shape and orientation correctly.	Student successfully used appropriate vocabulary in at least 60% of the questions..	Student failed to use appropriate vocabulary in at least 40% of the questions.
Student successfully solves job-related space, shape and related problems in workplace,	Student successfully calculated area, volume, time and distance with appropriate conversions in at least 60% of the case..	Student fails to calculate area, volume, time and distance with appropriate conversions in at least 40% of the case

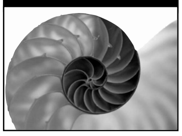
Task List Assessment			
Task	Score Comment	Weighting	Total Points
The student uses and applies vocabulary of space; shape and orientation correctly.	1. 2. 3. 4. 5. 6. 7	3	
Student successfully solves job-related space, shape and related problems in workplace,	1. 2. 3. 4. 5. 6. 7		

Assessment on group work: Evaluating Team Work
Criteria: Use the following symbols:
S: Strong M: Moderate N: Needs attention

	Criteria	Score					
1	Appropriate working methods	Individual			Consensus		
2	Trust and mutual understanding	S	M	N	S	M	N
3	Use of team members' strengths	S	M	N	S	M	N
4	Open and effective communication	S	M	N	S	M	N
5	Sharing of ideas and resources	S	M	N	S	M	N
6	Cohesiveness and comradeship	S	M	N	S	M	N
7	Constructive conflict management						
8	Climate of mutual support	S	M	N	S	M	N
9	Openness to new ideas and change	S	M	N	S	M	N
10	Decision making	S	M	N	S	M	N
11	Motivation	S	M	N	S	M	N
12	Success acknowledged and celebrated	S	M	N	S	M	N
13	Expertise / resources improved	S	M	N	S	M	N
14	Roles and responsibilities clear to all	S	M	N	S	M	N
15	Overall team effectiveness	S	M	N	S	M	N

MODULE 2

Unit 8



Collecting and representation information

In this unit we focus on communicating information through numbers, tables and graphs in terms of data collection, organizing, summarizing and representing it in order to answer questions.

SB page 193

Topic 5: LO 1.1.a

ACTIVITY 1 SPECIFYING AND LISTING A HYPOTHESIS

Teaching method: Problem solving

1.1 Hypothesis is a statement or conjecture that is supported by evidences to make it true or false

(a) All Greyhound buses are not roadworthy in KZN

(b) Pregnant women between 21 and 30 years of age do not know the HIV status of their partners

(c) Drop out rate of school girls under 16 years of age is related to pregnancies in our college

1.2 (a) To focus on students who only study maths in the college

(b) To collect and list all their maths marks
List all their marks according to gender this is male and female

(c) No collecting maths test marks for one test in your class does not justify Dorothy's hypothesis because it may happen that the test was too simple or difficult

(d) One test is not sufficient to make Dorothy's hypothesis to be true or false

1.3 (a) South African government department of minerals and energy

(b) Department of education

(c) Name of the college that have enrolled black females engineers
Search information from the Internet or check from the college enrollment for almost six trisemesters
Indicate whether the female engineers has increased or decreased by 3%

(d) Motorists

(e) Students

SB page 194

Topic 5: LO 1.1.b: LO 1.2.c

ACTIVITY 2 DEVELOPMENT

Teaching method: Problem-centered

Table 1

numbers	names	month	day	year	Same month
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Table 2

	names	transport	home to school		Distance covered	time taken
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

1.1 Read the answer from the table

1.3 Draw a bar graph using information from table 1

1.4 8 Use the data collected information from the table 2

SB page 195

Topic 5: LO 1.1.a; LO 1.1.c; LO 1.2.c

ACTIVITY 3 DATA REPRESENTATION

1.1 Use the data collected information in Activity 2

1.2 The size of a sample is representative for the whole school, if the size for the whole school is a simple model of random sample distribution

1.3 The size of a sample can formulate the conclusion for the whole school if each of the possible sample is equally likely to occur when we choose a random sampling

1.4 If a size of big sample has a specific interval which is close to the mean for the whole school

1.5 Majority of the students who came almost late to college lives 20km away from the college. On behalf of the college I would like to make a proposal to Department of education to subsidize 150 students with 2 buses

SB page 202

Topic 5: LO 1.2.b

ACTIVITY 10 SUMMARISING DATA

Table 3

names	ABSA	Nedbank	F.N.B	Standard
interest				
term	20	20	20	20

NB. The reserve bank/ government controls prime rate in all the banks

1. Use the table 3 to list all the banks you visited
2. According to the reserve bank interests of all the banks are similar
   Currently prime rate is13%
   If Mr Molusi makes a home loan of R200 000 for 20years then what will be final amount of prime rate:
   SI =[13 × R200 000 ×20]÷100 = R 520 000
   ∴ Final amount = 520 000 + 200 000
   = R 720 000
3. [R850 000 × 13 × 20] ÷100 = R2 210 000
   ∴ R 850 000 + R2 210 000 = R3 060 000
4. Mean : A = R 3 060 000 ÷ 20
   = R15300
5. Is similar to average of mortgage bond
6. R2 210 000 × 13% = R287 300

7. 30% of R850 000 = R255000
   R850 000 – R255 000 = R595 00
   ∴ R595000 × 13% = R77350
   ∴ R77350 × 13% = R1005.5

8 R1005.5 + R500 = R1505.5

SB page 203

ACTIVITY 11 ASSIGNMENT

Topic 5: LO 1.1.c; LO 1.2.a; LO 1.2.b

Teaching method: Cooperative

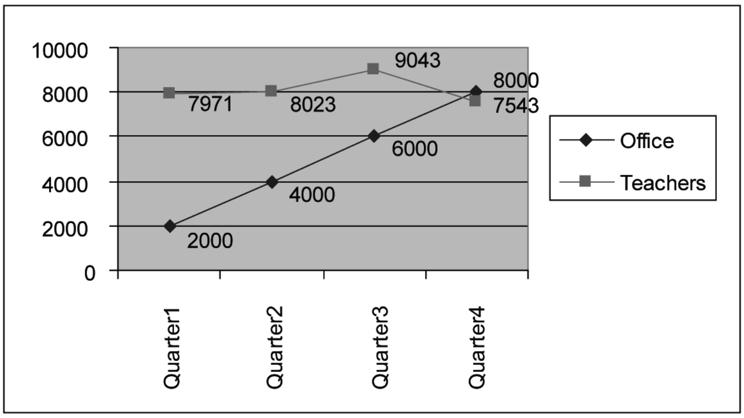
The auditor must check **how much coverage** does the following items (adverts, fashion and sports) get from two magazines. This enables the auditor to **compare** two magazines (A and B) in terms of marking their scores on each item. Each item will be **graded** according to their score that is **likely equally to compete** with other magazines. This allows auditor to advice his editor on what needs to be done to target market for the magazine.

SB page 203

ACTIVITY 12 CASE STUDY

SO1, AS1.2, LO1.a & b

1. 52 580 and 32 580 for teachers
2. 2000 for office
3. Quarter 4
4. Survey results



SB page 204

ACTIVITY 13 INVESTIGATION

SO1, AS1.2, LO1.a & b

Teaching method: Dialectic

If Molefi and his three friends wish to start a business of Mothalehlo manufactures, they then apply for grant from IDC. I then advise and tell them to address the following items:

*To explore the establishment of Mathalehlo manufactures

*To provide an assessment of state of eco-labelling in general

- To identify the opportunities, obstacles and actions steps for the Development of Mothalehlo manufactures
- To examine practical aspects relating toe the implementation of a buy South African
- To provide information on both negative and positive impacts of proposed plan
- To implement strategies of proudly South Africa
  Source:www.idc.co.za

SB page 204

Topic 5: LO 1.1.a; LO 1.3.a

ACTIVITY 14 RESEARCH PROJECT

Teaching method: Socio-cultural

Table 4

countries	per capita	area	population	eco. Dev	currency	parties
S.A	$ 534,6 b	1millionsq	44 million		Rand	
Lesotho	$ 6 064 b	30 350sq	2 million		Maluti	
Swaziland	$ 6 billion	17 200sq	1 million		Lilangeni	
Botswana	$16 billion	600 370sq	1 million		Pula	
Namibia	$16 billion	825 418sq	2 million		Namibian dollar	1
Zimbabwe	$24 billion	390 580 sq	12 million		Zim dollar	2

Table 5

countries	Year of independ.	agric	export	mining	HIV
S.A	1994	wool	platinum	platinum	high
Lesotho	1966	corn	wool		high
Swaziland	1968	sugar cane	sugar	coal	low
Botswana	1966		diamond	diamond	high
Namibia	1960	sorghum	diamond	diamond	low
Zimbabwe	1965	cotton	cotton	coal	low

Source: www. .... History,Geography,Government and Culture

a) – d) Use the table 4 and 5 to answer the questions

e) Student's research

Test 1

1. A NQF level 2 students gained the following marks respectively out of a total of 25.

students	1	2	3	4	5	6	7	8	9
marks	11	12	11	17	18	19	18	11	21

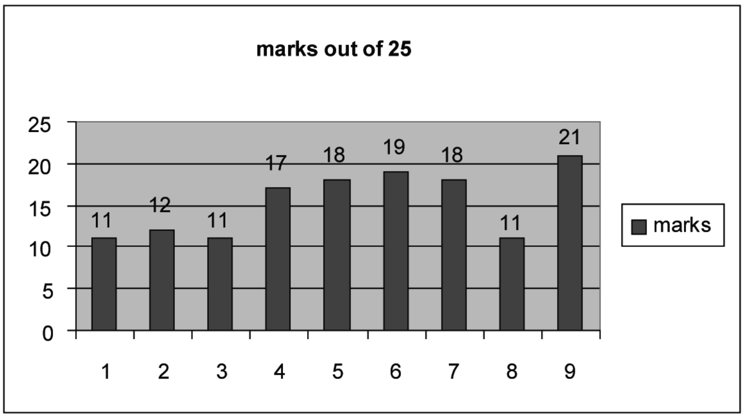
(a) Identify mode and median if exist. Explain (4)
(b) Calculate the mean (2)
(c) Draw a line graph to represent the above data (6)
(d) Calculate the percentage of the highest students' (3)
(e) Calculate the range to represent the above data (2)

2. You are asked to survey the 500 people in a village to find out what their leisure activities are. The village is within reach of industrial and business centers and also contains a number of retired people.
(a) How would you obtain a list upon which to base a sample for this purpose (2)
(b) Would your sampling unit be an individual person or a whole household (1)
(c) What form of sampling would you and why (3)
(d) What difficulties are there in defining leisure (2)

Test 1

Answers

1. (a) mode:11 which is the most common number in the set
median: 11 11 11 12 17 18 18 19 21 17
(b) mean: 138 ÷ 9
15.333
(c)



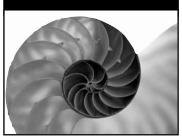
(d) [21×100] ÷ 25 = 84%
(e) Range: $\frac{21}{10}$ - 11

2. (a) Develops a questionnaire
   (b) Individual person to represent a group of village
   (c) random sampling or interested group to determine a certain percentage
   (d) It is difficult to find out leisure activities of different categories(retired and middle age people in a common village

Module 3

Representing solutions of real life problems!

Unit 9



Using different representations of relationships to solve problems involving patterns in real life

It will be necessary for you to go through sketching a bar and a pie graph with your students before giving them the opportunity to answer the activities of this unit.

As an example, let us sketch the following information first on a bar graph and then on a pie graph. You can use this example to teach your students how to sketch a bar graph and a pie graph.

Represent the following information on a bar graph and then on a pie graph.

A motor car dealer has the following cars in his garage:

Tazz	Astra	Uno	Cressida	Camry
230	255	215	286	204

1. Bar graph
   (a) Identify information
   The first thing to do here is to identify the information that must used on the horizontal axis and information to be used on the vertical axis
   Remember that the independent variable goes to the horizontal axis and the dependent variable on the vertical axis
   For this reason, the names of cars will be on the horizontal axis and their numbers on the vertical axis.

   (b) Choosing a suitable scale
   You will be using a ruler to draw this graph. Rulers are graduated in millimeters and centimeters.
   Choose a scale that will enable you to sketch this information on a piece of paper such that the diagram will be large enough to be read. A scale for the number of cars will be needed here.

A scale of 1 cm = 40 cars will do here. With this scale:

230 cars = $\frac{230}{40}$ = 5,75 cm which will be rounded off to 5,8 cm

255 cars = $\frac{255}{40}$ = 6,375 cm which will be rounded off to 6,4 cm

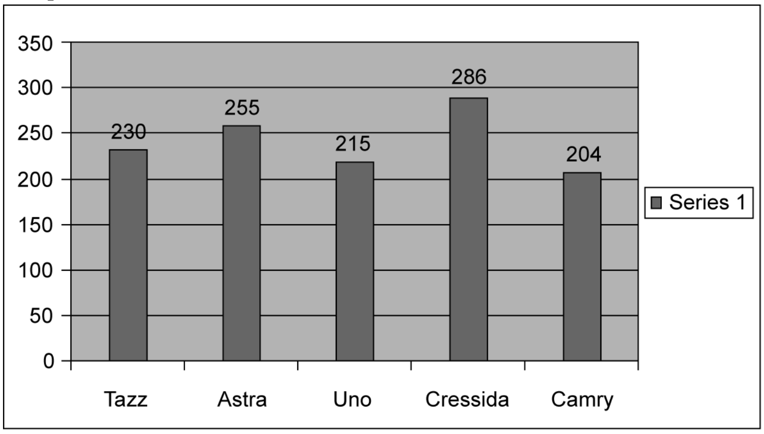
215 cars = $\frac{215}{40}$ = 5,375 cm which will be rounded off to 5,4 cm

286 cars = $\frac{286}{40}$ = 7,15 cm which will be rounded off to 7,2 cm

204 cars = $\frac{204}{40}$ = 5,1 cm

(c) Sketch the graph. The number of centimeters on the horizontal axis is only important in that the elements of the independent variable must be equally spaced.

Graph of cars



2. The pie graph

Tazz	Astra	Uno	Cressida	Camry
230	255	215	286	204

A pie graph is circular in shape. All these numbers must fit in a 360° diagram.

a) Find the number of degrees that will be occupied by each of the quantities to be represented on the graph. This is what we do in order to find that:

Add all the quantities: 230 + 255 + 215 + 286 + 204 = 1 190

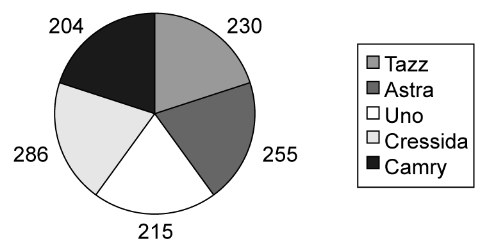
230 cars = $\frac{230}{1190} \times 360 = 70°$ 255 cars = $\frac{255}{1190} \times 360 = 77°$

215 cars = $\frac{215}{1190} \times 360 = 65°$ 286 cars = $\frac{286}{1190} \times 360 = 86°$

204 cars = $\frac{204}{1190} \times 360 = 62°$

If you add all the answers here you will get 360°.

(b) The graph
Use a protractor to measure the degrees for each of the quantities and draw the graph. The graph will look like:



SB page 213

ACTIVITY 1 READING VALUES FROM GRAPHS

Completing a table of values by reading values from the graph

1.

Subject	Biology	Economics	English	Mathematics	Science	Tourism	Zulu
% Mark	46	31	62	25	13	73	51

2.

Subject	Biology	Economics	English	Mathematics	Science	Tourism	Zulu
% Mark	43	31	62	25	13	73	51

3.

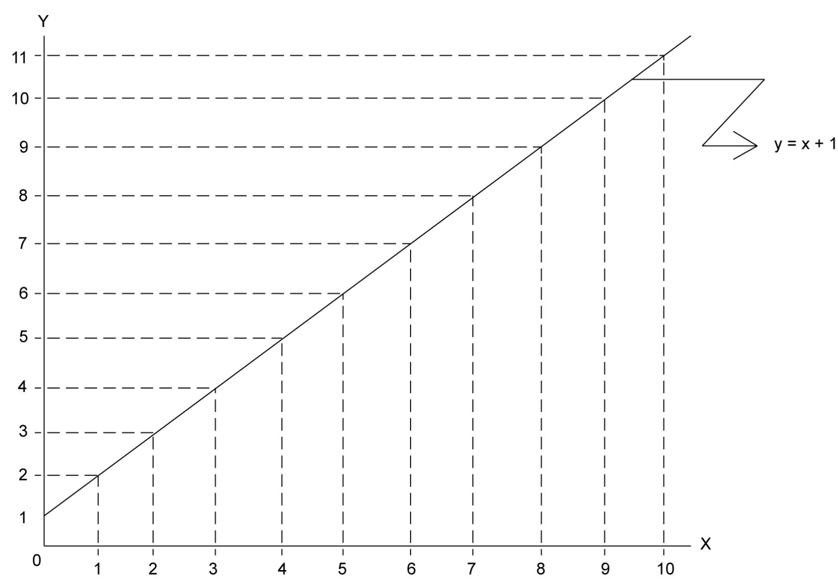
Subject	Biology	Economics	English	Mathematics	Science	Tourism	Zulu
% Mark	43	31	61	22	11	72	52

4. The third graph

5.1.

Quorum(x)	0	1	2	3	4	5	6	7	8	9	10
Members(y)	1	2	3	4	5	6	7	8	9	10	11

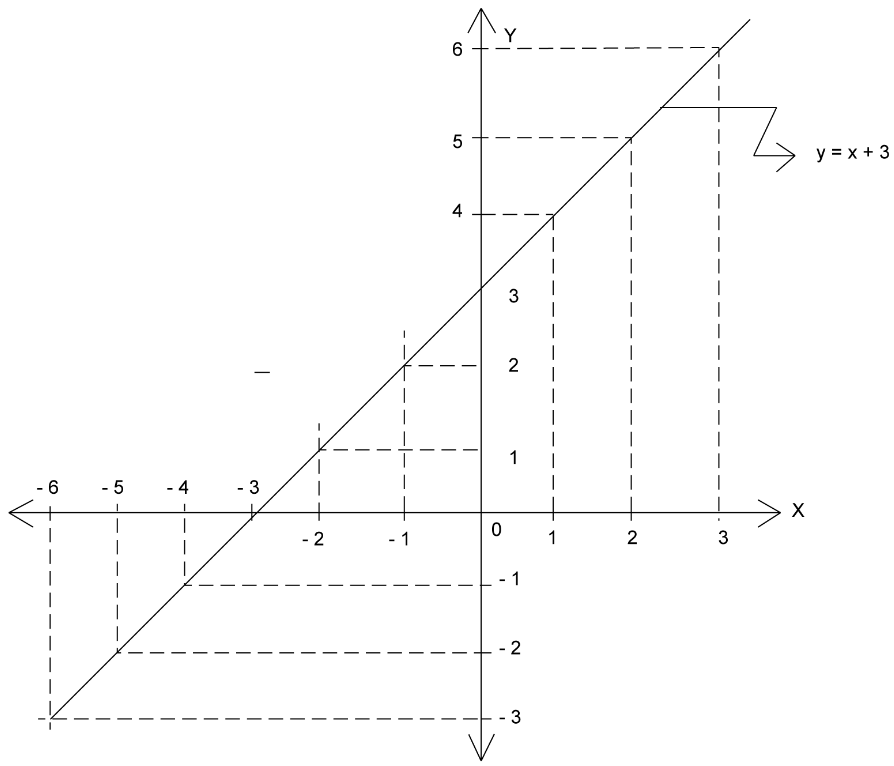
5.2.



5.3. Straight line graph or linear graph

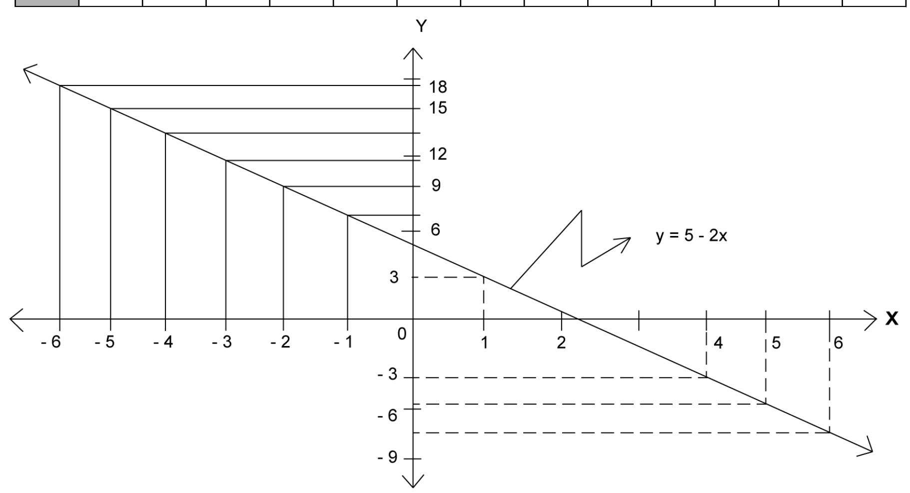
6.1

x	–6	–5	–4	–3	–2	–1	0	1	2	3	4	5	6
y	–3	–2	–1	0	1	2	3	4	5	6	7	8	9



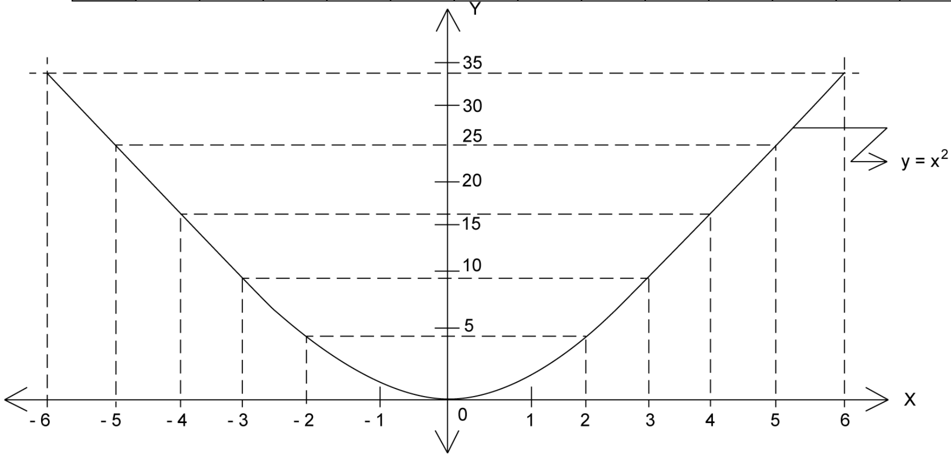
6.2

x	–6	–5	–4	–3	–2	–1	0	1	2	3	4	5	6
y	17	15	13	11	9	7	5	3	1	–1	–3	–5	–7



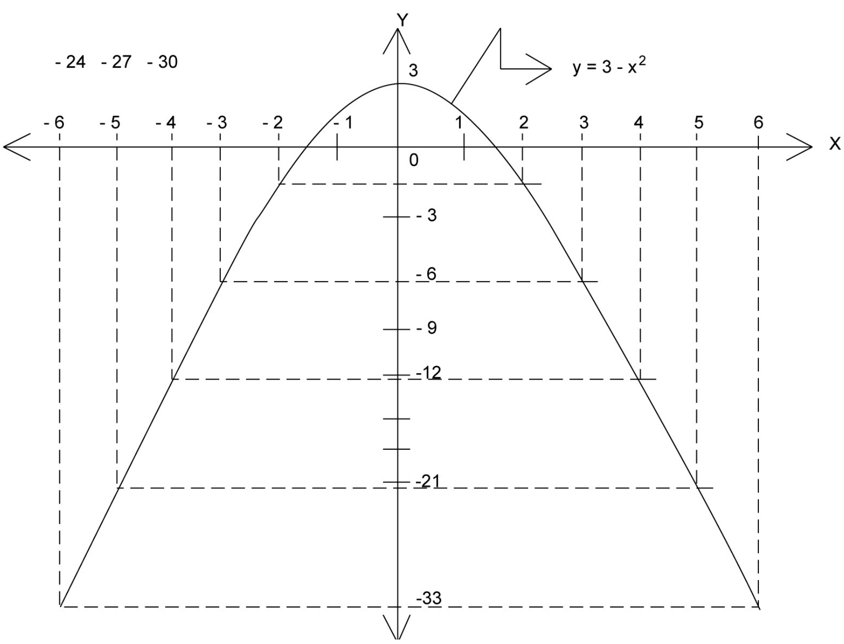
6.4.

x	–6	–5	–4	–3	–2	–1	0	1	2	3	4	5	6
y	36	25	15	9	4	1	0	1	4	9	16	25	36



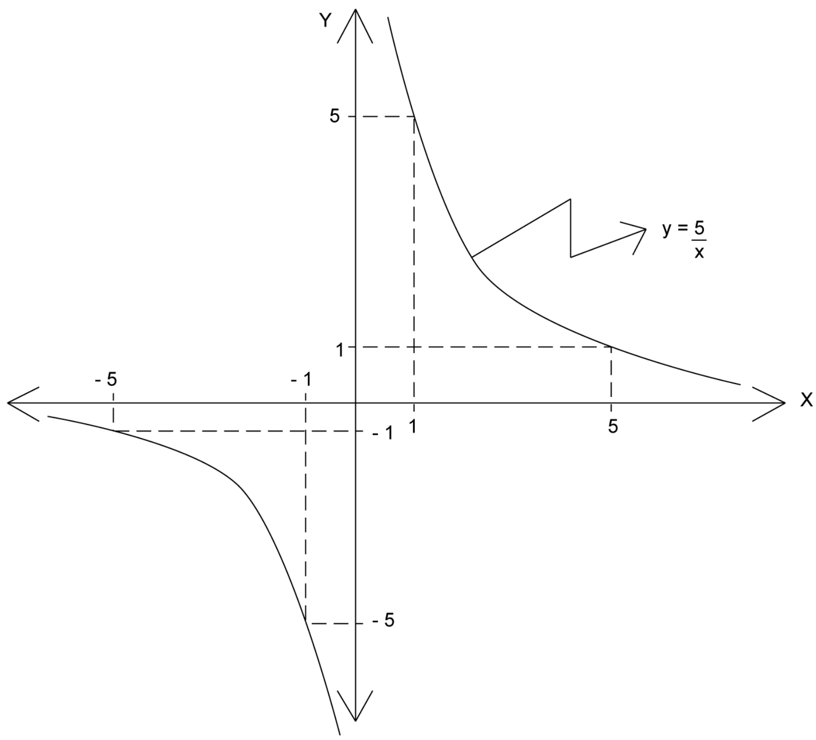
6.4.

x	–6	–5	–4	–3	–2	–1	0	1	2	3	4	5	6
y	–33	–22	–13	–6	–1	2	3	2	–1	–6	–13	–22	–33



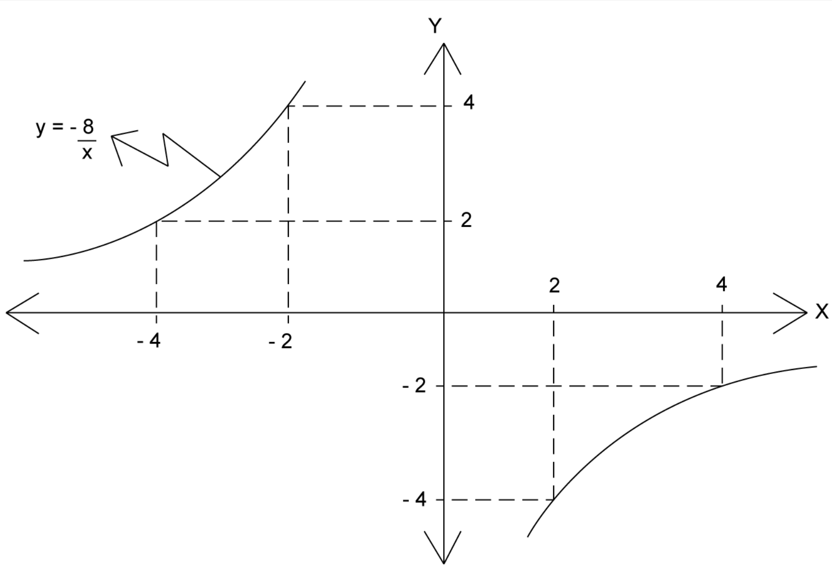
6.5.

x	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
y	$-\frac{5}{6}$	-1	$-\frac{5}{4}$	$-\frac{5}{3}$	$-\frac{5}{2}$	-5	∞	5	$\frac{5}{2}$	$\frac{5}{3}$	$\frac{5}{4}$	1	$\frac{5}{6}$



6.6

x	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
y	$\frac{4}{3}$	$\frac{8}{5}$	2	$\frac{8}{3}$	4	8	∞	-8	-4	$-\frac{8}{3}$	-2	$-\frac{8}{58}$	$-\frac{4}{3}$



6.2. (a) and (b) are straight line graphs

(c) and (d) are parabola graphs

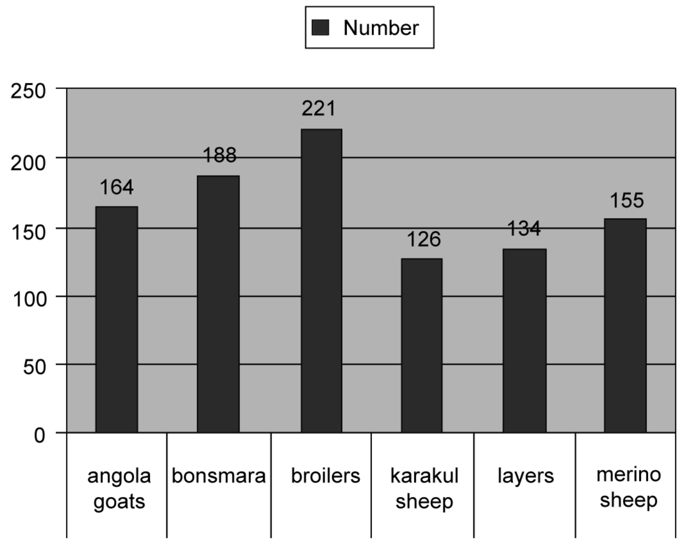
(e) and (f) hyperbola graphs

6.3. (a) and (b) are linear graphs

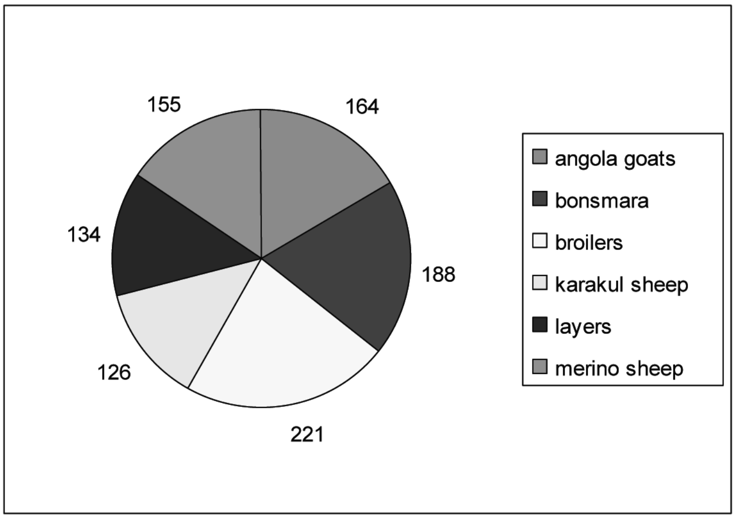
(c) and (d) are quadratic graphs

(e) and (f) inverse proportion graphs

7.1.

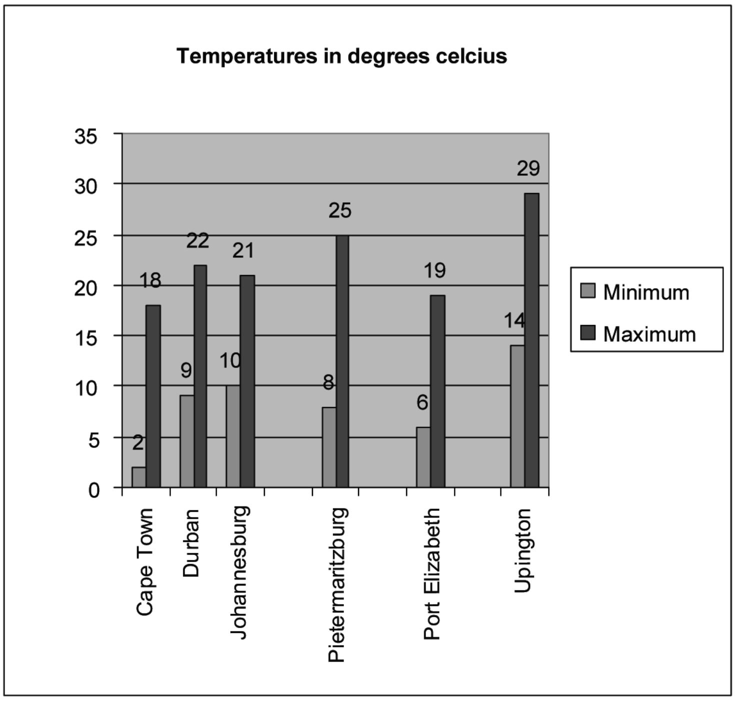


7.2.

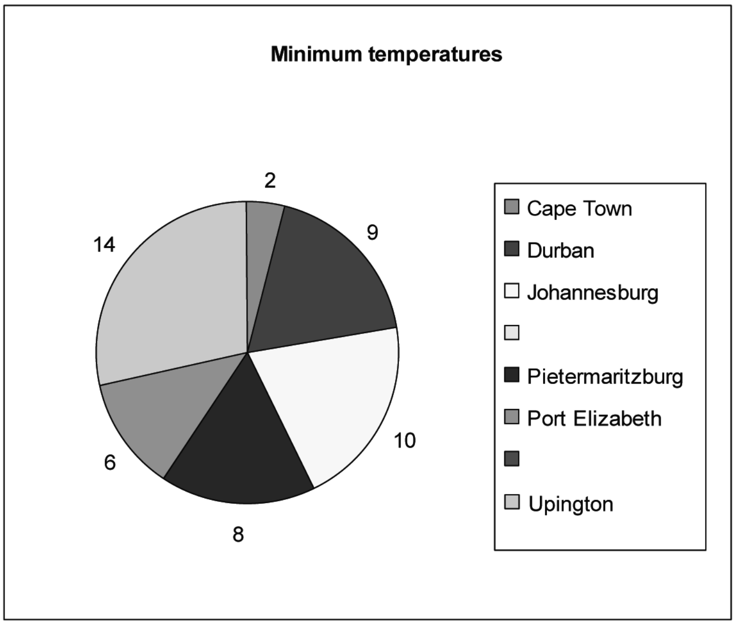


8.1. Tuesday 03 July 2007

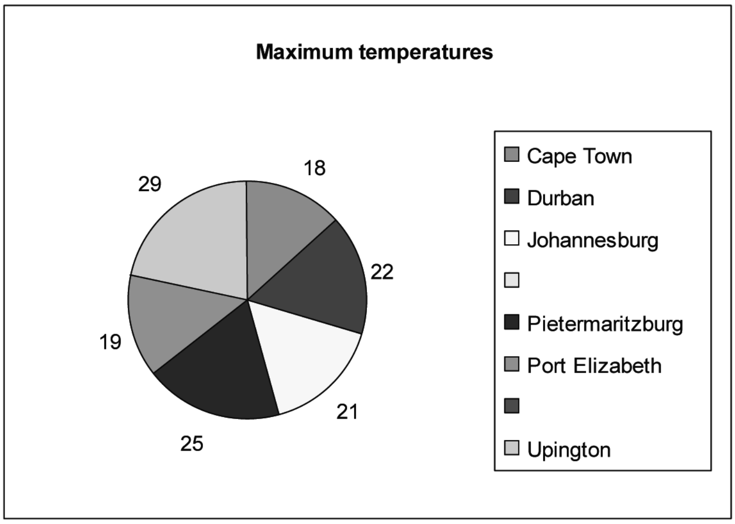
8.2.



8.3.



8.4.



9.1. $y = 4 - x^2$

9.2. $y = 5 + 4x - x^2$

9.3. $y = 4 - 4x$

9.4. $y = 4x + 4$

9.5. $y = \frac{-4}{x}$

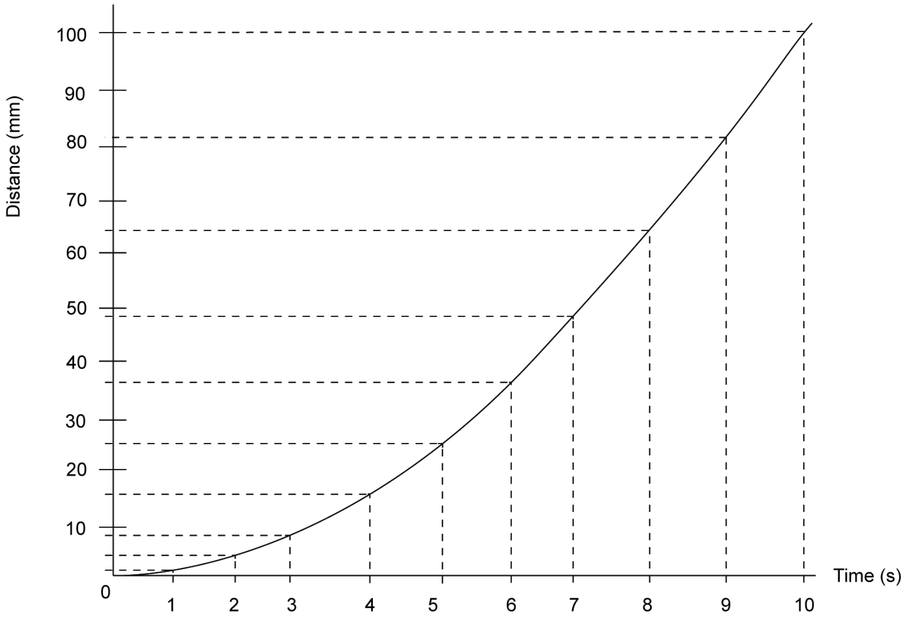
9.6. $y = \frac{4}{x}$

SB page 218

Topic: LO 3.1.a; LO 3.2.b

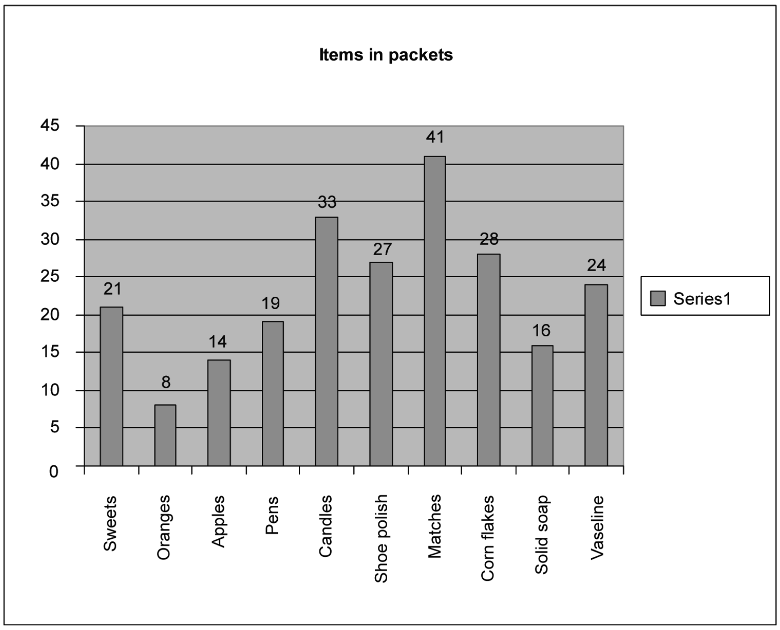
ACTIVITY 2 ENRICHMENT

1.

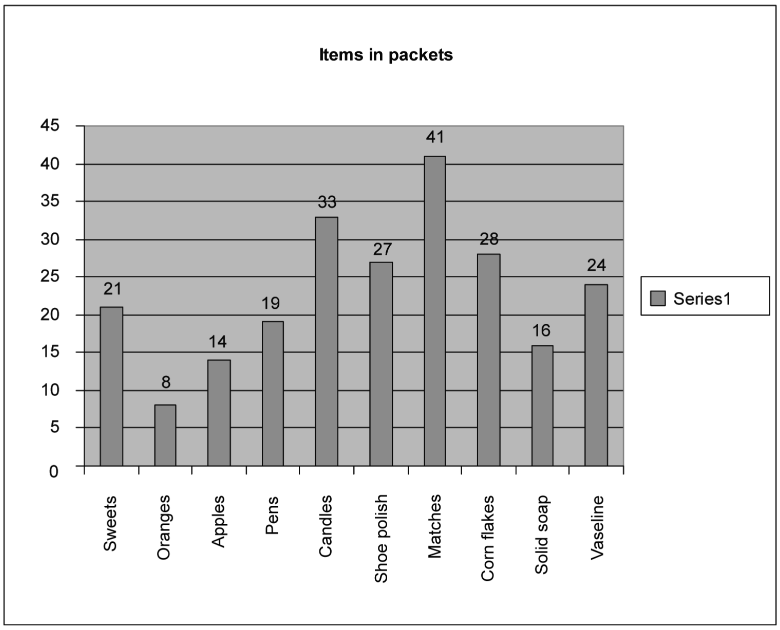


MODULE 3

2. **Representation 1**



Representation 2



SB page 219

Topic 2: LO 3.1.a LO 3.2.b

ACTIVITY 3 UNIT ASSESSMENT

1.1. (a) 785
(b) 917
(c) 648
(d) 801
(e) 723
(f) 857
(g) 1034

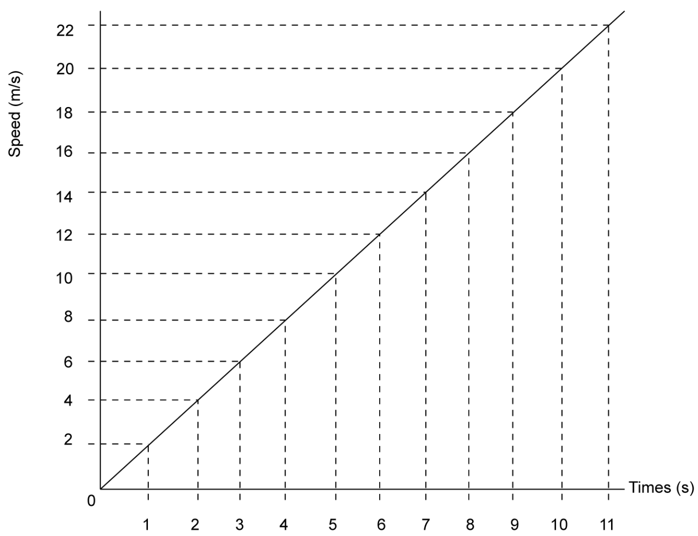
1.2
– Variation in grade 12 results
– Arrival of new educators and/or leaving of old educators
– School fees
– School Governing Body can have a direct impact on enrolment
The list is endless.

2. 1 Oranges: 5
Apples: 3
Bananas: 8
Peaches: 6
Lemons: 7
Pears: 6

3.1

Time (s)	0	1	2	3	4	5	6	7	8	9	10	11
Speed in (m/s)	0	2	4	6	8	10	12	14	16	18	20	22

3.3



MODULE 3

4.1 Table

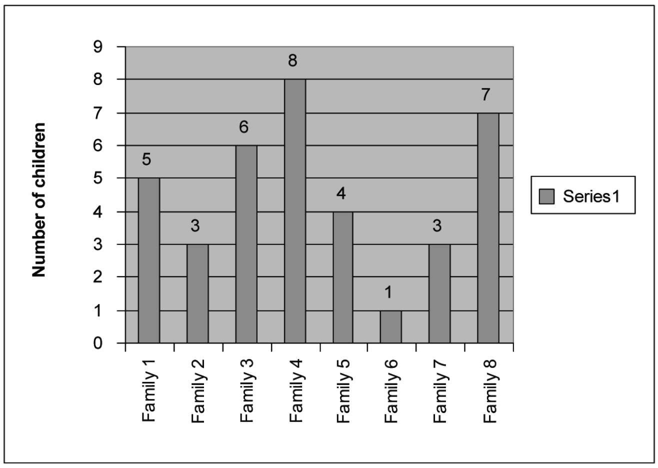
Bar graph

Pie graph

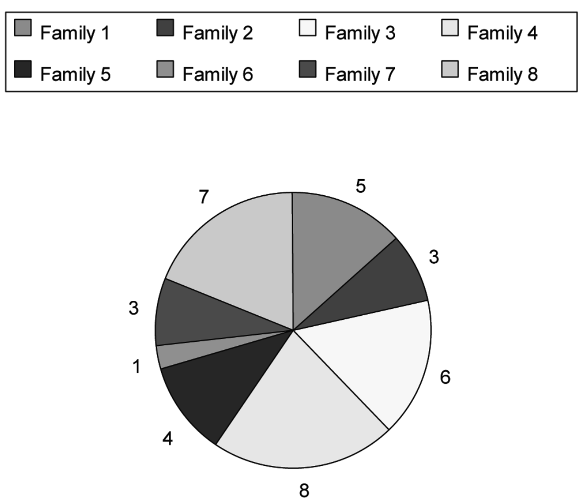
4.2 Table

Family	1	2	3	4	5	6	7	8
Number of children	5	3S	6	8	4	1	3	7

Bar graph



Pie graph



5.1 $y = -4x - x^2$

5.2 $y = x^2 - 4x$

5.3 $y = x^2 + x - 3$

5.4 $y = x - 1$

5.5 $y = \frac{2}{x}$

5.6 $y = \frac{-2}{x}$

CLASS TEST

Time: 30 min
Total: 25

1. A mother has four children; Don, Clive, Tendani and Snenhlanhla with the following ages 2, 8, 14 and 19 respectively.

1.1. Represent

(a) the ages of these children on a bar graph (4)

(b) their ages on a pie graph (6)

1.2. Given: $y = x^2 - 11x - 12$ and $y = x - 12$

Calculate:

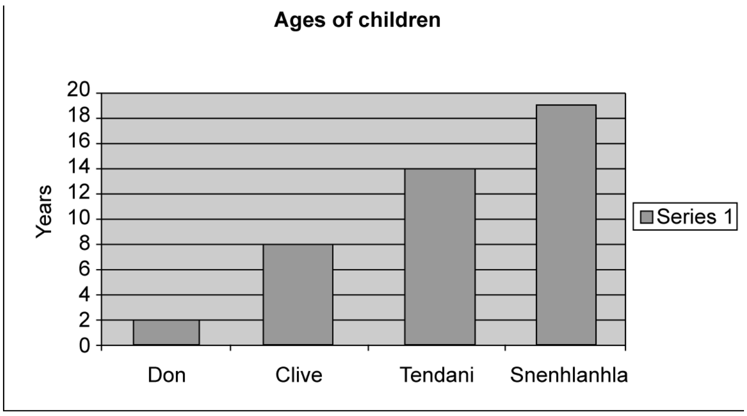
(a) the intercepts with the axes of both relations (5)

(b) the coordinates of the turning point where applicable (4)

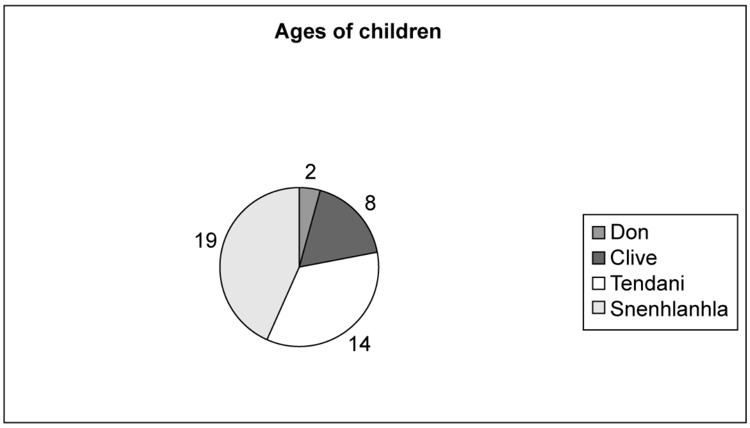
2. Sketch the graphs of the relations on the same set of axis. (6)

Class test solutions

1.1. (a)



(b)



MODULE 3

1.2. (a) y - intercepts of both graphs is – 12

(b) x - intercepts

Parabola:		Straight line
$x^2 - 11x - 12 = 0$		$x - 12 = 0$
$(x - 12)(x + 1) = 0$		$x = 12$
$x - 12 = 0$	or	$x + 1 = 0$
$x = 12$	or	$x = -1$

axis of symmetry:

$$x = -\frac{b}{2a}$$

$$= -\left(-\frac{11}{2(1)}\right)$$

$$= \frac{11}{2}$$

$$y = x^2 - 11x - 12$$

$$= \left(\frac{11}{2}\right)^2 - 11\left(\frac{11}{2}\right) - 12$$

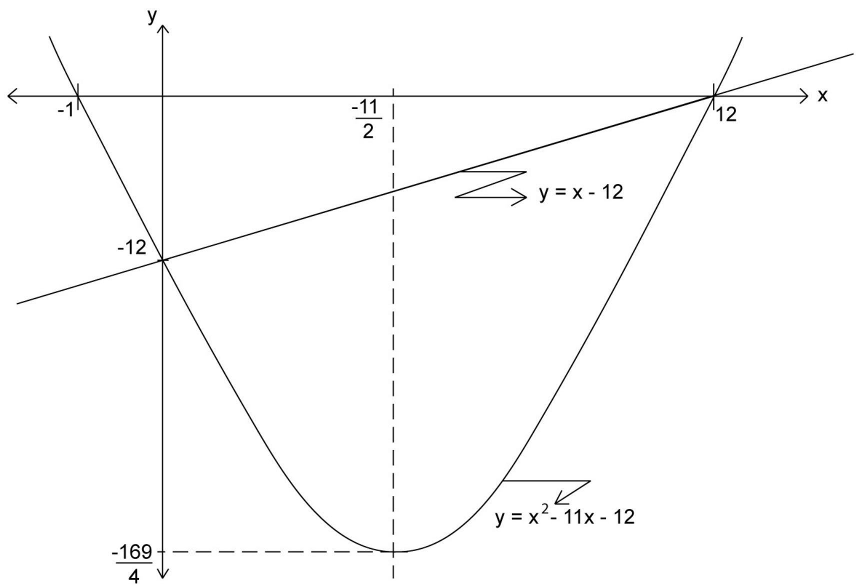
$$= \frac{121}{4} - \frac{121}{2} - 12$$

$$= 121 - 242 - \frac{48}{4}$$

$$= -\frac{169}{4}$$

$$\text{T.P.}\left(\frac{11}{2}; -\frac{169}{4}\right)$$

2.



Unit 10

Financial knowledge power!

LB page 251

SO 1, AS 1.1, LO 1.1a

ACTIVITY 15 GETTING INFORMATION TO MAKE AN INFORMED DECISION

1. Price; fuel index

2. Fiat Punto JTD (5,2 l/100 km)
Citroen C3 1.4 Hdi (5,5 l/100 km)
Hyundai Getz 1.5 CRDi (6,45 l/100 km)
Renault Clio 1.5 dCi (5,85 l/100 km)
VW Polo 1.4 TDi (6,26 l/100 km)

3. They are diesel-powered.

4.1 Yes it should (best-selling cars do so because they are reliable, relatively inexpensive to maintain, they have a good dealership network, and have a good resale value).

4.2 Fiat, Citroen, Hyundai and Renault are not from well-established and trusted manufacturers such as Volkswagen and Toyota, they have a limited dealership network, and vehicle buyers are not so sure of their maintenance costs and resale value.

5.1 Total cost of all spares listed/Price of car × 100%

5.2 (a) 4th out of the 6 cars; cheaper than the average

(b) 5th out of the 6 cars; more expensive than the average

(c) last of the 6 cars; more expensive than the average

(d) last of the 6 cars; more expensive than the average

5.3

Peugeot	Nissan	Honda	Opel	VW	MB
11,38	7,18	8,72	7,56	7,70	6,51

VW is 4th out of the 6 cars.

5.4 Yes. VW is not the cheapest to maintain, but it is a top-seller, from which we can conclude that the public is very satisfied with the product (it has an excellent reputation)

9. Refer to the graph at question 10.

10. 1.4TDi:

Fixed cost for the four year period (c):

Balance on monthly installments: R338,73 x 48 = R16 259,04

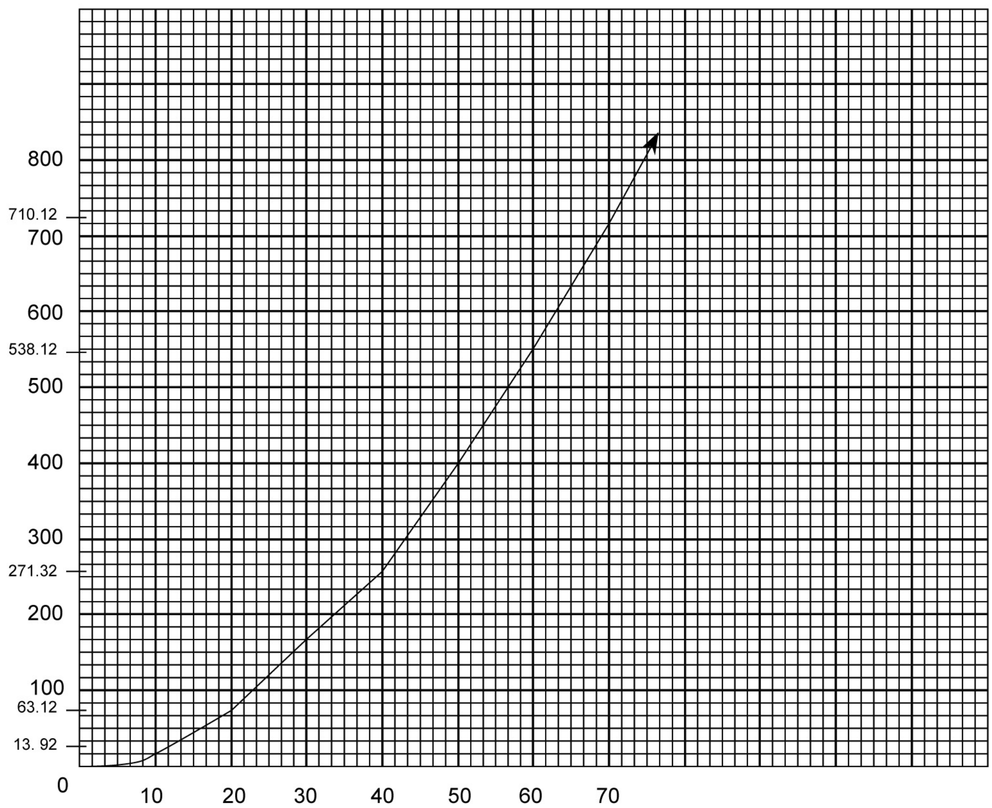
Service:	= R13 800,00
License: R295 per year x 4 years	= R 1 180,00
Insurance: R250 per month x 48 months	= R12 000,00
Total:	c = R43 239,04

Fuel cost per km (m):

6,26 l/100 km = 0,0626 l/km

At R4,50 per litre: Fuel cost per km = R4,50 x 0,0626 = R0,2817 per km

Equation: y = 0,2817x + 43 239,04



11. From the graph: ±120 000 km

Algebraically: 0,427x + 26 142,24	= 0,2817x + 43 239,04
0,1453x	= 17 096,8
x	= 117 666 km

12. VW Polo 1.4 TDi
13. The higher the resale value, the higher the price he can pay for his next car.
14. Polo1.6petrol: Value after 4 years = 135 420 (1 - = 135 420 (0,9)4 = R88 849,06
    Polo1.4TDi: Value after 4 years = 145 690 (1 - = 145 690 (0,88)4 = R87 367,62
    Decision time: In the long run (after 120 000 km) the 1.4 TDi becomes

cheaper than the 1.6 petrol. Since the resale value is about the same, the 1.4 TDi looks like the better choice.

LB page 259

SO 1, AS 1.1, LO 1.1a

ACTIVITY 16 FINALISING THE PROVISIONAL DECISION

2.1 Polo 1.6: max power 74 kw at 5500 r.p.m.
Polo 1.4: max power 55 kw at 4000 r.p.m.

2.2 Polo 1.6: max torque 140 Nm at 3250 r.p.m.
Polo 1.4: max torque 195 Nm at 2200 r.p.m.
Note: The answers to 2.1 and 2.2 also appear in the table in Activity 2.

2.3 (a) Engine speed (revolutions per minute – r.p.m.) in each gear at any speed.

(b) 1.6: ±3 800 r.p.m.
1.4: ±2800 r.p.m.

2.4 (a) Acceleration

(b) 1.6: 11,3 sec
1.4: 14,5 sec
Note: These answers also appear on the table in Activity 2

2.5 1.6 has more power, but at a higher engine speed
1.4 has less power, but at a lower engine speed
Therefore, the 1.6 feels more lively than the 1.4, but has to be driven using a fairly high engine speed.
1.4 has more torque, at a lower engine speed, than the 1.6
Therefore, the 1.4 is a more relaxing car to drive.
1.4 has a lower engine speed than the 1.6 at any road speed.
Therefore the 1.4 has less engine noise at any speed than the 1.6, and feels more relaxing to drive.
1.6 accelerates faster than the 1.4.
Therefore the 1.6 feels more lively than the 1.4.

Unit 11

Information presented and misrepresented

LB page 264

Topic 5: LO 2.1.a:
LO 2.1.b

ACTIVITY 1 INFORMATION ON GRAPHS

In this unit we focus on representing information through numbers, tables and graphs in terms of critically analyzing and interpreting expression of likelihood in order to answer questions.

1.1 (a) ± 54

(b) 2001 is the highest police officers trainees

(c) The police officers decreased by ± 3

(d) The police officers increased by ±2

(e)

1.2 (a) The rate of both boys and girls have increased each year except 1999 and 2001

(b) Internet was not utilized effectively maybe girls enrolment has dropped

(c) ± 325

(d) [320 ×100]÷325 = 98. 461 %

2. Teaching method: Problem-centered
   (a) What kind of snacks and how many students eat snacks of their choice
   (b) Vegetables
   (c) Popcorn
   (d) Fruit
   (e) Popcorn

3. Measures of central tendency and dispersion
Teaching method: Problem solving

3.1 [23+20+24+26+29+30+34+35+39+40+25+24+26+28+30+34+39+45+54+58]÷20
= 663÷20
= 33.15

3.2 mode: 24, 26, 30, 34
median:[40 + 25]÷2 = 65÷2
= 32.5
even set of numbers

3.3 [13 ×100] ÷20 = 60%

4. **Teaching method: Problem solving**

4.1 provinces: 440267 ÷ 9 = 48918.555

4.2 endorsement: 227197 ÷ 9 = 25244.111

4.3 passed candidates: 82010 ÷ 9 = 9112.222

4.4 13 021 or 59 843 or 68 903

5.1 120 ÷ 10 = 12

5.2 108 ÷ 10 = 10.8

5.3 10

5.4 12

5.5 [12+11]÷2 = 23 ÷ 2
= 11.5

5.6 [11+12]÷ 2 = 23 ÷ 2
= 11.5

5.7 11.5 +11.5 = 23

5.8 [10 ×100] ÷ 120 = 8.333% and [10 ×100] ÷ 108 = 9.259%

6.1 no mode

6.2 no mode

6.3 773 ÷ 5 = 154.6

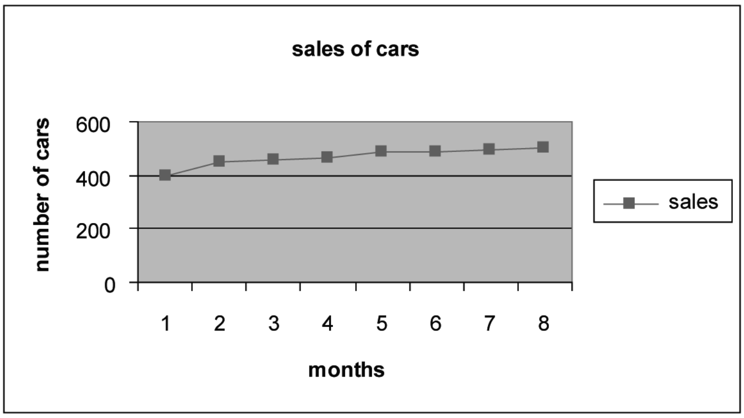
6.4 874 ÷ 5 = 174.8

6.5 125 137 145 161 205

7.1 average: 3745 ÷ 8 = 468.125

7.2 median: [465 + 485] ÷ 2 = 475

7.3



LB page 270

Topic 5: LO 2.2.b

ACTIVITY 2 SOURCES OF BIAS OR ERROR

1 Teaching method: Dialectic
Source: **www.prb.org or www.cdc.gov/travel**

1.1 Direct contact with blood, infectious secretion and sexual contact

1.2 Drivers should be advice to avoid sexual encounter with persons who are infected with HIV

1.3 On their most common spot such as garage or motels or hotels

2 Teaching method: Problem solving

2.1 During the different matches this was likely equal to random sampling

2.2 [50 ×100] ÷ 120 = 41.666%

2.3 [40 ×100] ÷ 120 = 33.333%
[15 ×100] ÷ 120 = 12.5%
20.833%

2.4 During the different matches so that we could find out the most common interest group

a) The random sampling is likely equally to answer question focused on a survey of a low cost houses or a school opposite a posh suburb

b) The interested grouping sample bias into their outcomes

c) The outcomes of the survey will determine whether to build low cost houses or a school opposite a posh suburb

LB page 281

Topic 5: LO 2.1.a,b
LO 2.2.a,b:
LO 2.2.a,b,c,d

ACTIVITY 8 ASSESSMENT

Teaching method: Diagnostic

1.1 (a) 17 students

(b) (i.) 1

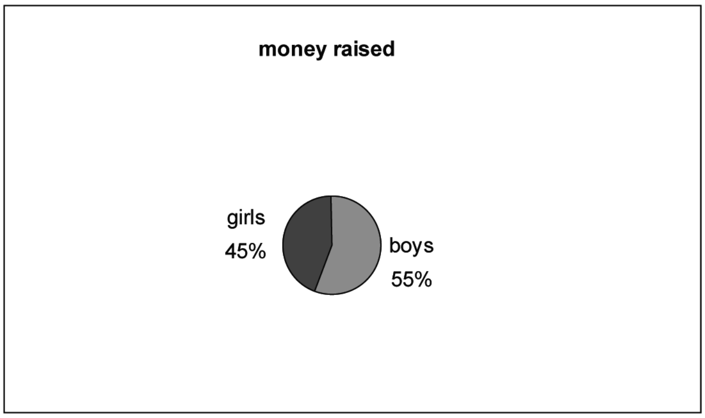
(ii) 7 – 1 = 6

(iii) 7 ÷ 9 = 1.888

1.2 (a) 77 ÷ 10 = 7.7 boys
62 ÷ 12 = 5.166 girls
boys are wearing big sizes than girls

(b) 5 = R10 5 = R10
77 = x 62 = y
5: R10 : : 77: x 5: R10 : : 62: y
770 = 5x 620 = 5y
R154 = x R124= y

(c)



1.3 (a) mean score of all these marks: 658 ÷ 14 = 47 average class

(b) range: 99 – 10 = 89 intelligent students

1.4 (a) mean: 33.85
median: 35
range: 37
mode : 28

(b) The minimum value of this set of data is 21 and the maximum value is 58. The median is 35, which is the average of two middle values because the sample size is even.
21 24 25 26 27 28 28 28 28 31 32 32 34 35 37 42 45 48 48 58
lower quartile: 21 24 25 26 27 28 28 28 28 31
55 ÷ 2 = 27.5
upper quartile: 32 34 35 37 42 45 48 48 48 58
87 ÷ 2 = 43.5

1.5 (a) 22 hours instead of 24 hours

(b) labeling x-axis and y-axis

(d) percentages

(e) no, there is 2hours remaining to make one day
percentage of the pie chart is 91.666%

1.6 (a) Graph1 number of crimes are represented by the differences of 10 but graph 2 is 5

(b) Graph 2 the number of crimes clearly indicated

(c) Graph 2 there is no assumption about number of crimes in the community

1.7 (a) The total of two dice can show any score of greater than 3 (3,1;3, 2; 3,3;3,4;3,5;3,6;2,2;4,4;5,5;6,6;4;5). This is just 11 of the 36 equally likely results $\frac{11}{36}$

(b) The total score of two dice is 7(1,6;2,5;3,4) then this is just 3 of 36 equally likely results 3/36 is $\frac{1}{12}$

(c) The score is not divisible by 4(1,2;4,3;5,2;5,4;5,6) then this is just 5 of 36 equally likely results $\frac{5}{36}$

1.9 (a) The probability of getting of more than 4 on two successive rolls of a fair dice (1,4;2,4;3,4;4,4;4,5;4,6;5,5;6,5;6,6;3,3;3,2). This is just 11 of 36 equally likely results $\frac{11}{36}$

(b) The sum of more than 4 on two successive rolls of fair dice

1.10 (a) The pack of 52 cards have 26 cards then this is just 26 of 52 equally likely results $\frac{26}{52}$ is $\frac{1}{2}$

(b) The pack of 52 cards have 4 aces then this is just 4 of 52 equally likely results $\frac{4}{52}$ is $\frac{1}{13}$

(c) The pack of 52 cards have 12 court cards then this is just 12 of 52 equally likely results $\frac{12}{52}$ is $\frac{3}{13}$

1.11 (a) The first set of traffic lights is 0.6 then this is just 0.6 of 3 equally likely results $\frac{0.6}{3}$ is $\frac{1}{5}$

(b) The second set of traffic lights is 0.5 then this is just 0.5 of 3 equally likely results $\frac{0.5}{3}$ is $\frac{1}{6}$

(c) 0.5 + 0.6 = 1.1 Nomathemba will reach her granny's house without having stop is 1.1 then this is just 1.1 of 6 equally likely results $\frac{1.1}{6}$ is $\frac{11}{60}$

Test 2

The Manager of an FET college has a rectangular bag that contains different spots (5 yellow balls and 4 red balls)

(a) What is the probability of picking up 2 yellow balls (2)

(b) What is the probability of each colour if a ball is drawn from a bag, replaced a second ball (3)

(c) Draw a diagram to carry out the structure of different balls (5)

Test 2 solutions

Teaching method: Problem solving

(a) Probability of 2 yellow is likely equally results: $\frac{5}{9} \times \frac{5}{9} = \frac{25}{81}$

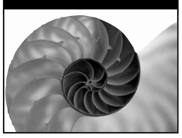
(b) Probability of each colour is likely equally results: $\frac{5}{9} \times \frac{4}{9} + \frac{4}{9} \times \frac{5}{9}$

$\frac{20}{81} + \frac{20}{81}$

$\frac{40}{81}$

Module 4
Integrated module!

Unit 12



Integrated unit

In this unit we focus on how learners' begins to become aware of the notion of tautology rather than rote learning is that learners' develops confidence about doing mathematical literacy in terms of reasoning, procedural and application.

LB page 288

Pattern and Relationships: SO1, AS1 LO1 & 2: AS3, LO1
Data Handling: SO2, AS1, LO1 & 2

ACTIVITY 2 COMPARING INVESTMENT OPTIONS

1. i) R1 500

ii)

Years	Simple interest	Amount invested	Compound interest	Invested amount
0		1000		1000
1	100	1100	100	1100
2	100	1200	110	1210
3	100	1300	121	1331
4	100	1400	133	1464
5	100	1500	146	1610

iii) Total : 1 000 + 1100 + 1 210 + 1 331 + 1 464 + 1 610 R7 715

iv)

Years	Simple interest	Amount invested	Compound interest	Invested amount
0		1500		1500
1	150	1650	150	1650
2	150	1800	165	1815
3	150	1950	181	1996
4	150	2250	199	2195
5	150	2400	219	2414

v) Total: 1500 + 1650 + 1815 + 1996 + 2195 + 2414 R11 570

vi) 1000: 1500 = 2:3

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Pattern and Relationships: SO1, AS1 LO1 & 2: AS3, LO1
Data Handling: SO2, AS1, LO1 & 2

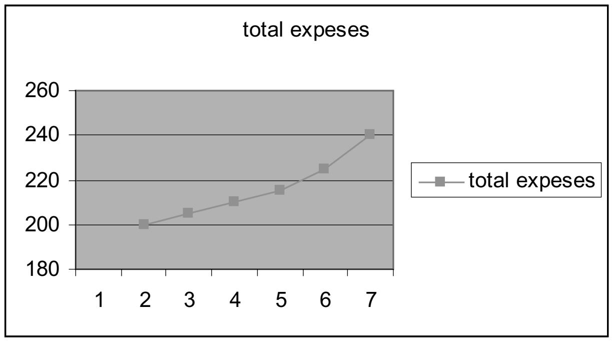
ACTIVITY 3 FROM TABLES TO GRAPHS

1. 10 × R60 = R600

2.1 A = 215
B = 8

2.2 19 cups
200 + (19 × 5)
200 + 95
295

2.3



2.4 240

2.5 240 ÷ 1295 ×100
18,532%

MODULE 4

LB page 290

Pattern and Relationships: SO1, AS 2.1, LO1 & 2
Data Handling: SO 1, AS 2, LO 2

ACTIVITY 4 MEASURES OF CENTRAL TENDENCY

1. a) = -3(0) ² + 100(0) h = -3(2)² + 100(2) h = -3(4)² + 100(4)
= 0 = -12 + 200 = – 48 + 400
= 188 = 352
h = -3(6)² + 100(6) h = -3(8)² + 100(8)
= – 108 + 600 = – 192 + 800
= 492 = 608

time in seconds	0	2	4	6	8
height in meters	0	188	352	492	608

1.b) 492

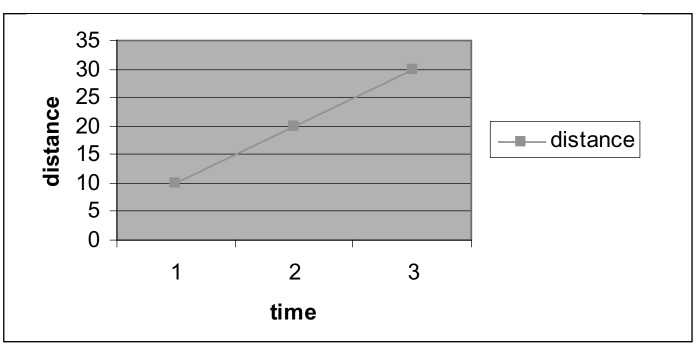
1.c) 20 seconds

2. i) range = 608 – 0
= 608

2.ii) mean = [0 + 188 + 352 + 492 + 608] ÷ 20
= 1640 ÷ 20
= 82

2.iii) median is 352 because it is in the centre of the odd set

3. $s = \frac{1}{3} at^2$
$= \frac{1}{3} (10)(3)^2$
= 30



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Pattern and Relationships: SO3. AS 3.1. LO1: AS3.1. LO1&2
Data Handling: SO1. AS2.1. LO1&3

ACTIVITY 5 INVESTIGATION

a) eBhayi

b) A2

c) G 8, because the O.R Tambo is found in Gauteng

d) 4cm = x and 1cm = 300km
4×300km = 1 × x
1200km = x

e) speed = distance ÷ time
time = distance ÷ speed
= 1200km ÷ 120 km/h
= 10 h
10 × 3600 sec = 36 000 sec

2.1 2,5% of 2 million pounds
0,025 × 2 million pounds
0,05 million pounds

2.2

months	simple interest	amount invested	compound interest	amount invested
0		2		2
1	0,05	2,1	0,05	2,05
2	0,05	2,15	0,051	2,1
3	0,05	2,20	0,052	2,15
4	0,05	2,25	0,053	2,20
5	0,05	2,30	0,054	2,25

2.3 Is arithmetic sequence because the invested growth increases by 0,05

2.4 1 pound = R10,50 and 2million pounds = x
10,50 × 2 million = 1 × x
21,0 million rand

2.5 $\frac{1}{36}$

File facts

Hypotheses is a sample that must be tested scientifically to determine whether the conjecture is write or wrong

Mean or average is the total sum of items divide by the number of items

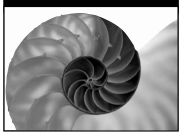
Mode is a number or item that appears more frequently

Median is the middle number or item of the odd set but even set has minimum value (lower quartile) and maximum value (upper quartile) that form a middle value

Range is the difference between higher value and lower value

Probability is a process that can be carried out in likely event

Unit 13



Integrated unit

MODULE 4

LB page 294

ACTIVITY 1 ROUNDING UP OR DOWN!

This activity integrates three topics: Numbers, Patterns and Relationships and Finances. Students will benefit most from it if it is treated after covering these topics.

1.

Month	1	2	3	4	5	6	7	8	9
Number of Children	7	11	15	19	23	27	31	35	39

2. $a + (n-1)d = T_n$

$7 + (n-1)4 = 55$

$(n-1)4 = 55 - 7$

$n - 1 = \frac{48}{4}$

$n = 12 + 1$

$n = 13$

3. (a) $\frac{3}{5} \times 100\% = 5\%$ (b) $\frac{6}{5} \times 100\% = 11\%$

(c) $\frac{7}{5} \times 100\% = 13\%$ (d) $\frac{9}{5} \times 100\% = 16\%$

4. (a) $\frac{3}{5} \times 100\% = 5{,}5\%$ (b) $\frac{6}{5} \times 100\% = 10{,}9\%$

(c) $\frac{7}{5} \times 100\% = 12{,}7\%$ (d) $\frac{9}{5} \times 100\% = 16{,}4\%$

5. (a) $\frac{3}{5} \times 100\% = 6\%$ (b) $\frac{6}{5} \times 100\% = 11\%$

(c) $\frac{7}{5} \times 100\% = 13\%$ (d) $\frac{9}{5} \times 100\% = 17\%$

6. (a) $\frac{3}{5} \times 100\% = 5\%$ (b) $\frac{6}{5} \times 100\% = 10\%$

(c) $\frac{7}{5} \times 100\% = 12\%$ (d) $\frac{9}{5} \times 100\% = 16\%$

7. (a) milliliters of milk consumed = 11 × 340 = 3 740 ml

(b) milliliters of milk consumed = 23 × 340 = 7 820 ml

(c) milliliters of milk consumed = 27 × 340 = 9 180 ml

(d) milliliters of milk consumed = 31 × 340 = 10 540 ml

(e) milliliters of milk consumed = 34 × 340 = 11 560 ml

(f) milliliters of milk consumed = 35 × 340 = 11 900 ml

8. (a) 3 740 ml = $\frac{3740}{1000}$ = 3, 74 l

(b) 7 820 ml = $\frac{7820}{1000}$ = 7, 82 l

(c) 9 180 ml = $\frac{9180}{1000}$ = 9, 18 l

(d) 10 540 ml = $\frac{10\ 540}{1000}$ = 10,54 l

(e) 11 560 ml = $\frac{11\ 560}{1000}$ = 11,56 l

(f) 11 900 ml = $\frac{11\ 900}{1000}$ = 11,9 l

9. (a) Gross salary = 7 × 100 = R700,00

(b) Gross salary = 11 × 100 = R1 100,00

(c) Gross salary = 15 × 100 = R1 500,00

(d) Gross salary = 19 × 100 = R1 900,00

(e) Gross salary = 23 × 100 = R2 300,00

(f) Gross salary = 27 × 100 = R2 700,00

(g) Gross salary = 31 × 100 = R3 100,00

(h) Gross salary = 35 × 100 = R3 500,00

(i) Gross salary = 39 × 100 = R3 900,00

10. (a) March
Net profit = Gross profit – Expenses
= 700 – (7 × 23 × 2,3)
= R329,70

(b) April
Net profit = Gross profit – Expenses
= 1 100 – (11 × 22 × 2,3)
= R543,40

(c) May
Net profit = Gross profit – Expenses
= 1 500 – (15 × 23 × 2,3)
= R706,50

(d) June
Net profit = Gross profit – Expenses
= 1 900 – (19 × 22 × 2,3)
= R938,60

(e) July
Net profit = Gross profit – Expenses
= 2 300 – (23 × 23 × 2,3)
= R1 083,30

(f) August
Net profit = Gross profit – Expenses
= 2 700 – (27 × 23 × 2,3)
= R1 271,70

(g) September
Net profit = Gross profit – Expenses
= 3 100 – (31 × 22 × 2,3)
= R1 531,40

(h) October
Net profit = Gross profit – Expenses
= 3 500 – (35 × 23 × 2,3)
= R1 648,50

(i) November
Net profit = Gross profit – Expenses
= 3 900 – (39 × 22 × 2,3)
= R1 926,60

11. (a) $\frac{329{,}7}{700} \times 100\% = 47{,}1\%$ (b) $\frac{543{,}5}{1\,100} \times 100\% = 49{,}4\%$
(c) $\frac{706{,}5}{1\,500} \times 100\% = 47{,}1{,}\%$ (d) $\frac{938.6}{1900} \times 100\% = 49{,}4\%$
(e) $\frac{1\,083{,}3}{2\,300} \times 100\% = 47{,}1\%$ (f) $\frac{1\,271{,}7}{2700} \times 100\% = 47{,}1\%$
(g) $\frac{1\,531{,}4}{3\,100} \times 100\% = 49{,}4\%$ (h) $\frac{1\,648{,}5}{3\,500} \times 100\% = 47{,}1\%$
(i) $\frac{1\,926{,}6}{3\,900} \times 100\% = 49{,}4\%$

12. (a) $\frac{700}{329{,}7} = \frac{1\,000}{471}$ Ratio is: 1 000 : 471
(b) $\frac{1\,100}{543{,}5} = \frac{2\,200}{1\,087}$ Ratio is: 2200 : 1087

The other ratios are calculated in the same way and they will be either 1 000 : 471 or 2200 : 1087 depending on whether it has the same answer as (a) or (b) in number 11.

13. A constant sequence

14. A oscillating sequence

LB page 295

ACTIVITY 2 DIMENSIONS

1

1.1 For longer walls: $A = l \times b$
$= 10 \times 4$
$= 40$
There are two of these walls: 2×40
$= 80 \text{ m}^2$
For shorter walls: $A = l \times b$
$= 8 \times 4$
$= 32$
There are two of these walls: 2×32
$= 64 \text{ m}^2$
$A_{total} = 80 + 64$
$= 144 \text{ m}^2$

1.2 Area of windows: $A = l \times b$
$= 1{,}8 \times 1$
$= 1{,}8$
There are five such windows: $5 \times 1{,}8$
$= 9 \text{ m}^2$
Area of the door: $A = l \times b$
$= 2{,}3 \times 1$
$= 2{,}3 \text{ m}^2$
Required Area = $A_{total} - (A_{windows} + A_{door})$
$= 144 - (9 + 2{,}3)$
$= 132{,}7 \text{ m}^2$

MODULE 4

1.3 $A_{floor} = l \times b$
$= 10 \times 8$
$= 80 \text{ m}^2$

1.4 $P_{floor} = 2(l + b)$
$= 2(10 + 8)$
$= 36 \text{ m}$

2.

2.1 $V_{floor} = l \times b \times h$

$= 10 \times 8 \times 0{,}3$

$= 24 \text{ m}^3$

2.2

2.2.1 Number of bags of cement = $\frac{24}{1}$ = 24

2.2.2 Number of wheelbarrows of sand = 3 × number of bags of cement

= 3 × 24

= 72

3. Cost = (24 × 45) + (72 × 8)

= R1 656

4. $A_{tile} = l \times b$

$= 0{,}3 \times 0{,}2$

$= 0{,}06 \text{ m}^2$

Number of tiles = $\frac{A_{floor}}{A_{tile}} = \frac{80}{0{,}06} = 1\,334$

5 Number of boxes needed = $\frac{1\,334}{15}$ = 89

Amount = 89 × 120 = R10 680

6.

6.1 A = 132,7 m^2 Calculated in 1.

6.2 Liters of first coat necessary = $\frac{132.7}{0{,}6}$ = 222

Liters of second coat necessary = $\frac{132{,}7}{0{,}9}$ = 148

6.3 Money spent on first coat = liters of first coat × 60
= 222 × 60
= R13 320

Money spent on second coat = liters of second coat × 65
= 148 × 65
= R9 620

ACTIVITY 3 SEQUENCES

1. 1 2 3 4 4 6

   Median = $\frac{3 + 4}{2}$ = 3,5

2. Range = 6 – 1 = 5

3. 4

4. Mean = $\frac{1 + 2 + 3 + 4 + 4 + 6}{6}$

   = 3,33

5.

6.

6.1 Probability = $\frac{6}{20} = \frac{3}{10}$

6.2 Probability = $\frac{3}{20}$

6.3 Probability = $\frac{2}{20} = \frac{1}{10}$

7.

7.1 Probability = $\frac{6}{20} = \frac{3}{10}$ = 0,3

7.2 Probability = $\frac{3}{20}$ = 0,2

7.3 Probability = $\frac{2}{20} = \frac{1}{10}$ = 0,1

8.

8.1 Probability = $\frac{6}{20} \times 100\% = 30\%$

8.2 Probability = $\frac{3}{20} \times 100\% = 15\%$

8.3 Probability = $\frac{2}{20} = \frac{1}{10}$ = 10%

9.

9.1 Probability of zero: An event that will never occur

Example: The probability of choosing the tenth province from the nine provinces of South Africa

9.2 Probability of one: An event that will always occur.

Example: The probability of choosing a learner of Amangwane High School from the learners of Amangwane High School

9.3 Probability of between zero and one: An event that will sometimes occur

Example: The probability of choosing the minister of Education from a pool of all the national ministers of South Africa

10. 1; 2; 3; 4

11. $a + (n - 1)d = T_n$

    $1 + (n - 1)1 = 150$

$n - 1 = 149$

$n = 150$

12. $S_n = \frac{n}{2}[2a + (n-1)d]$

$S_{200} = \frac{200}{2}[2(1) + (200-1)1]$

$= 20\ 100$

13. The sequence: 4; 2; 1

14. $S_n = \frac{a(1-r^n)}{1-r}$

$= \frac{4\left[1-\left(\frac{1}{2}\right)^{10}\right]}{1-\frac{1}{2}}$

$= 7{,}99$

15. The sequence: 1; 2; 4

$S_n = \frac{a(r^n-1)}{r-1}$

$= \frac{1(2^{10}-1)}{2-1}$

$= 1023$

LB page 298

ACTIVITY 4 SERIES

This activity integrates topics 1,2 and 3. It is advisable that this activity is treated after covering these three topics

1 Mass = 1,3 × 1000 000 = 1300 000 g

2. (a) Mass = (4 × 50) + (3 × 80) = 440 kg
   (b) Mass = (7 × 50) + (9 × 80) = 1 070 kg
   (c) Mass = (15 × 50) + (21 × 80) = 2 430 kg
   (d) Mass = (19 × 50) + (27 × 80) = 3 110 kg
   (e) Mass = (25 × 50) + (33 × 80) = 3 890 kg
   (f) Mass = (32 × 50) + (52 × 80) = 5 760 kg

3. (a) Mass = 440 kg = 440 ÷ 1 000 = 0, 44 tons
   (b) Mass = 1 070 kg = 1 070 ÷ 1 000 = 1, 07 tons
   (c) Mass = 2 430 kg = 2 430 ÷ 1 000 = 2, 43 tons
   (d) Mass = 3 110 kg = 3 110 ÷ 1 000 = 3, 11 tons
   (e) Mass = 3 890 kg = 3 890 ÷ 1 000 = 3, 89 tons
   (f) Mass = 5 760 kg = 5 760 ÷ 1 000 = 5, 76 tons

4. (a) Mass = 440 kg = 440 × 1 000 = 440 000 g
   (b) Mass = 1 070 kg = 1 070 × 1 000 = 1 070 000 g
   (c) Mass = 2 430 kg = 2 430 × 1 000 = 2 430 000 g

(d) Mass = 3 110 kg = 3 110 × 1 000 = 3 110 000 g

(e) Mass = 3 890 kg = 3 890 × 1 000 = 3 890 000 g

(f) Mass = 5 760 kg = 5 760 × 1 000 = 5 760 000 g

5. (a) Mass = 440 kg Number of loads transported = 1.
Mass of load lesser than 1 300 kg

(b) Mass = 1 070 kg Number of loads transported = 1
Mass of load lesser than 1 300 kg

(c) Mass = 2 430 kg Number of loads transported = 2
Mass of load greater than 1 300 kg but lesser than 2 600 kg

(d) Mass = 3 110 kg Number of loads transported = 3
Mass of load greater than 2 600 kg but lesser than 3 900 kg

(e) Mass = 3 890 kg Number of loads transported = 3
Mass of load greater than 2 600 kg but lesser than 3 900 kg

(f) Mass = 5 760 kg Number of loads transported = 5
Mass of load greater than 5 200 kg but lesser than 6 500 kg

6.

6.1 (a) Gross income = (4 × 160) + (3 × 210) = R1 270

(b) Gross income = (7 × 160) + (9 × 210) = R3 010

(c) Gross income = (15 × 160) + (21 × 210) = R6 810

(d) Gross income = (19 × 160) + (27 × 210) =R8 710

(e) Gross income = (25 × 160) + (33 × 210) =R10 930

(f) Gross income = (32 × 160) + (52 × 210) =R16 040

6.2 50 kg × 100 sacks bought for R12 000,00.

Then the price of each sack is = $\frac{12\ 00}{100}$ = R120

80 kg × 100 sacks bought for R18 000,00

Then the price of each sack is = $\frac{18\ 000}{100}$ = R180

(a) Net income = Gross income – cost price
= 1 270 – [(4 × 120) + (3 × 180)] = R250

(b) Net income = Gross income – cost price
= 3 010 – [(7 × 120) + (9 × 180)] = R550

(c) Net income = Gross income – cost price
= 6 810 – [(15 × 120) + (21 × 180)] = R1 230

(d) Net income = Gross income – cost price

= 8 710 – [(19 × 120) + (27 × 180)] = R1 570

(e) Net income = Gross income – cost price

=1 0 930 – [(25 × 120) + (33 × 180)] = R1 990

(f) Net income = Gross income – cost price

=16 040 – [(32 × 120) + (52 × 180)] = R2 840

7.

(a) For month 1: Probability = $\frac{4}{7}$

(b) For month 2: Probability = $\frac{7}{16}$

8. 3; 9; 15; 21; 27; 33; 39; 46; 52

This is an arithmetic sequence. It has a common difference

9. $d = T_2 - T_1 = 9 - 3 = 6$

10. $T_n = a + (n - 1)d$

$T_{15} = 3 + (15 - 1)6$

$= 87$

11. $a + (n - 1)d = T_n$

$3 + (n - 1)6 = 303$

$(n - 1)6 = 303 - 3$

$n - 1 = \frac{300}{6}$

$n = 51$

303 is term number 51 of the sequence

12. $S_n = \frac{n}{2}[2a + (n - 1)d]$

$S_9 = \frac{9}{2}[2(3) + (9 - 1)6]$

$= 243$