



# Recognition of Prior Learning (RPL)

## ***EVIDENCE GUIDE FOR MATHEMATICS***



**National Certificate in Professional  
Driving  
Qualification ID: 50285**

***Evidence Guide for REPLY***

***Document 4***

***Mathematics***

## UNIT STANDARDS IN THIS VOLUME

Unit Standard Number	Unit Standard Title	NQF Level	Credit Value
9010	Demonstrate an understanding of the use of different number bases and measurement units and an awareness of error in the context of relevant calculations	3	2
9013	Describe, apply, analyse and calculate shape and motion in 2-and 3-dimensional space in different contexts	3	4
9012	Investigate life and work related problems using data and probabilities	3	5
7456	Use mathematics to investigate and monitor the financial aspects of personal, business and national issues	3	5

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# INTRODUCTION TO RPL MATHEMATICS EVIDENCE DOCUMENT

## 1. Background

In the Recognition of Prior Learning (RPL) Evidence Document 4, you will be assessed in line with all four Unit Standards in this volume. There will be an Evidence Collector who will submit your assessments to an Assessor. The Assessor will assess your work and will find your evidence either, 'competent' or 'not yet competent' that is based on the evidence you submitted to the Evidence Collector.

### HOW WILL THE COMPETENCY-BASED ASSESSMENT WORK?

All the instruments developed for this qualification are competency-based followed by the following approaches:

#### a. Criterion based

Each candidate who is assessed is not in competition with their peers, but is assessed against standard criteria or benchmarks. The criteria used are, SAQA US ID National certificate in Professional Driving against the specific outcomes and assessment criteria of all unit standards that are made up in this qualification.

#### b. Evidence based

Whether a person is competent is based upon evidence provided by the learner. The evidence may be demonstrated or produced by the candidate or gathered by the assessor.

#### c. Participatory

The candidate is encouraged to be involved in the process of assessment. The candidate and assessors have the scope to negotiate the form and range of assessment activities.

#### d. The Assessment process involves:

- Collection of evidence
- Judgment
- Recording

## 2. Defining RPL

Recognition of Prior Learning (RPL) is the comparison of the previous learning and experience of a learner howsoever obtained against the learning outcomes of a specific qualification, and the acceptance thereof for purposes of certification. The above definition holds the following implications:

- a. That a comparison of contextualized competence be done against the unit Standards requirements in a holistic way,
- b. That recognition is done for learning and experience, not one or the other only, and
- c. That the process is focused, on the learner and his/her current competence, not historical evidence only.

To understand the process, you need to understand the role of the two role players that are going to help you to become competent:

### **3. The Two Role Players in RPL**

There are two role players in this process. They are:

- a. The **Evidence Collection Facilitator (ECF)** is a person familiar with this field, who can help you to gather and organise evidence to prove to the assessor that you are competent.
- b. The **Assessor** is a subject-matter expert who is registered as an assessor and will be able to weigh up the evidence you provide against the outcomes of each unit standard and qualification.

### **4. The Steps of the RPL Process**

- a. If you follow the five steps outlined below, you will progressively achieve competence, and at the end of the process be equipped.
- b. You will apply a step-by-step method (see *Steps in the RPL process*) to all three unit standards in this Evidence Guide for RPL.

**Table 1: Steps in the RPL Process**

Step 1	Review the Evidence Guides for each outcome of the unit standard.
Step 2	On each Evidence Guide, the assessment criteria are listed. Each of these criteria includes different ways of assessments for e.g. assignment, direct observation, written test, project etc. This will help you to show evidence of your competence of the specific outcomes.
Step 3	Keep on collecting evidence and put them into your portfolio of evidence. This evidence will include all the work you have completed.
Step 4	You can monitor your progress by initialling and dating the <b>SELF-ASSESSMENT</b> checkboxes for each specific outcome.
Step 5	Once you have initialled all the self-assessment checkboxes on a page, you can ask the 'Evidence Collection Facilitator' to check the evidence, and to initial and date each of the <b>ECF EVALUATION</b> checkboxes.

**Note:**

Complete the above five steps for each RPL Evidence Guide for all the unit standards in this RPL Evidence Guide. Remember to refer to the original unit standard reproduced in this RPL Evidence Guide to cross-check the evidence.

You may discover when you go through the process that you need more training. If a need arises then you should arrange training with the person who is responsible for your training. Ask for a training plan.

Once you have collected all the evidence for this RPL Evidence Guide and the ECF has signed off the evidence, then you are ready to do the Summative Assessment.

## Unit Standard 1 of this Volume

1. Unit Standard ID Title	Demonstrate an understanding of the use of different number bases and measurement units and an awareness of error in the context of relevant calculations
2. Unit Standard Number	9010
3. NQF Level	3
4. Total Credit Value	2
5. Field	Field 10 - Physical, Mathematical, Computer and Life Sciences
6. Registration Date	2008-01-22
7. Registration End date	2011-01-22
8. Purpose of the Unit Standard	<p>This unit standard is designed to provide credits towards the mathematical literacy requirements of the NQF at level 2. The essential purposes of the mathematical literacy requirements are that, as the learner progresses with confidence through the levels, the learner will grow in:</p> <p>An insightful use of mathematics in the management of the needs of everyday living to become a self-managing person            An understanding of mathematical applications that provides insight into the learner's present and future occupational experiences and so develop into a contributing worker            The ability to voice a critical sensitivity to the role of mathematics in a democratic society and so become a participating citizen.</p> <p>People credited with this unit standard are able to:</p> <p>Convert numbers between the decimal number system and binary number system</p> <p>Work with numbers in different ways to express size/magnitude.</p> <p>Demonstrate the effect of error in calculations.</p>
9. Learning assumed to be in place	The credit value is based on the assumption that people starting to learn towards this unit standard are competent in Mathematical Literacy and Communications at NQF level 2.
10. Unit Standard Range	This unit standard covers: Approximation in relation to the use of computing technologies, the distinction between exact and approximate answers in a variety of problem settings. More detailed range statements are provided for specific outcomes and assessment criteria as needed.
11. Specific outcomes and assessment criteria	<p><b>Specific Outcome 1</b>            Convert numbers between the decimal number system and the binary number system. (Perform addition and subtraction of positive whole numbers in binary up to 100002 (16 in decimal).</p> <p>Demonstrate understanding of the mathematical relationships and principles involved in the computations.)</p> <p><b>Assessment Criteria</b></p> <ol style="list-style-type: none"> <li>1. Conversion between binary and decimal numbers is done correctly.</li> <li>2. Basic addition and subtraction calculations in the binary number system are done correctly. ( Using positive whole numbers up to the 16 in decimal.)</li> <li>3. Practical applications of the decimal and binary system are explained correctly.</li> </ol> <p><b>Specific Outcome 2</b>            Work with numbers in different ways to express size and magnitude. (Use scientific notation for small and large numbers.)</p>

	<p><b>Assessment criteria</b></p> <ol style="list-style-type: none"> <li>1. The prefixes indicating magnitude in measurements are correctly related to the decimal system (From Giga to Pica (10<sup>12</sup> to 10<sup>-12</sup>))</li> <li>2. Conversions between related units in different measurement systems are correctly applied in real-life contexts. (SI to Imperial; Degrees F to degrees C.)</li> </ol> <p><b>Specific Outcome 3</b> Demonstrate the effect of error in calculations (Work with rational and irrational numbers. Explore repeating decimals, convert them to common fraction form, and Use scientific notation for small and large numbers.)</p> <p><b>Assessment Criteria</b></p> <ol style="list-style-type: none"> <li>1. Symbols for irrational numbers such as <math>\sqrt{c}</math> and <math>\sqrt[4]{2}</math> are left in formulae or steps to calculations except where approximations are required.</li> <li>2. Descriptions are provided of the effect of rounding prematurely in calculations.</li> <li>3. The desired degree of accuracy is determined in relation to the practical context.</li> <li>4. The final value of a calculation is expressed in terms of the required unit.</li> </ol>
<p>12. Unit Standard Accreditation and Moderation Options</p>	<p>Providers of learning towards this unit standard will need to meet the accreditation requirements of the GENFETQA.</p> <p>Moderation Option: The moderation requirements of the GENFETQA must be met in order to award credit to learners for this unit standard.</p>
<p>13. Unit Standards Essential Embedded knowledge</p>	<p>The following essential embedded knowledge will be assessed through assessment of the specific outcomes in terms of the stipulated assessment criteria. Candidates are unlikely to achieve all the specific outcomes, to the standards described in the assessment criteria, without knowledge of the listed embedded knowledge. This means that the possession or lack of the knowledge can be inferred directly from the quality of the candidate's performance against the standards.</p> <p>Number systems and rational and irrational numbers Estimation and approximation Scientific notation</p>
<p>14. Critical Cross-field Outcomes</p>	<p><b>COLLECTING</b> Collect, analyse, organise and critically evaluate information: Gather, organise, and interpret numerical information.</p> <p><b>COMMUNICATING</b> Communicate effectively: Use everyday language and mathematical language to describe relationships, processes, and problem solving methods.</p> <p><b>CONTRIBUTING</b> Use mathematics: Use mathematics to describe and represent realistic situations and to solve problems relevant to the learner.</p>

## EVIDENCE GUIDE

**Unit Standard ID Title:** Demonstrate an understanding of the use of different number bases and measurement units and an awareness of error in the context of relevant calculations  
**Unit Standard number:** 9010

### Specific Outcome 1

Convert numbers between the decimal number system and the binary number system. (Perform addition and subtraction of positive whole numbers in binary up to 100002 (16 in decimal).

Demonstrate understanding of the mathematical relationships and principles involved in the computations.)

### Assessment Criteria

1. Conversion between y and decimal numbers is done correctly.
2. Basic addition and subtraction calculations in the binary number system are done correctly. ( Using positive whole numbers up to the 16 in decimal.)
3. Practical applications of the decimal and binary system are explained correctly.

Evidence Required	Evidence sign off																																					
<b>Complete the following: questions:</b>																																						
<p><b>Question 1</b>  <b>The decimal number system problem solving question</b>                      Statement: Several digits '8' are written and some '+' signs are interested to get the sum 1000. Figure out how it is done.</p> <p style="text-align: center;">Here is a lead:</p> $\begin{array}{r} \dots 8 \\ \dots \\ \dots 8 \\ \hline 1000 \end{array}$ <p><b>Question 2</b>  <b>The binary system</b>                      Use the following table to get your answer:                      What correspond to 14 in the right hand column? What corresponds to 1000 in the left column?                      A conversion table between decimal and binary number systems</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Decimal</th> <th style="padding: 2px;">Binary</th> </tr> </thead> <tbody> <tr><td style="padding: 2px;">0</td><td style="padding: 2px;">0</td></tr> <tr><td style="padding: 2px;">1</td><td style="padding: 2px;">1</td></tr> <tr><td style="padding: 2px;">2</td><td style="padding: 2px;">10</td></tr> <tr><td style="padding: 2px;">3</td><td style="padding: 2px;">11</td></tr> <tr><td style="padding: 2px;">4</td><td style="padding: 2px;">100</td></tr> <tr><td style="padding: 2px;">5</td><td style="padding: 2px;">101</td></tr> <tr><td style="padding: 2px;">6</td><td style="padding: 2px;">110</td></tr> <tr><td style="padding: 2px;">7</td><td style="padding: 2px;">111</td></tr> <tr><td style="padding: 2px;">8</td><td style="padding: 2px;">1000</td></tr> <tr><td style="padding: 2px;">9</td><td style="padding: 2px;">1001</td></tr> <tr><td style="padding: 2px;">10</td><td style="padding: 2px;">1010</td></tr> <tr><td style="padding: 2px;">11</td><td style="padding: 2px;">1011</td></tr> <tr><td style="padding: 2px;">12</td><td style="padding: 2px;">1100</td></tr> <tr><td style="padding: 2px;">...</td><td style="padding: 2px;">...</td></tr> </tbody> </table>	Decimal	Binary	0	0	1	1	2	10	3	11	4	100	5	101	6	110	7	111	8	1000	9	1001	10	1010	11	1011	12	1100	...	...	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr style="background-color: yellow;"> <th style="padding: 5px;">Self-assessment</th> </tr> <tr> <td style="padding: 5px; text-align: center;"><i>Initial</i></td> </tr> <tr> <td style="padding: 5px; text-align: center;"><i>Date</i></td> </tr> <tr> <td style="padding: 5px; text-align: center;"> </td> </tr> <tr style="background-color: yellow;"> <th style="padding: 5px;">ECF evaluation</th> </tr> <tr> <td style="padding: 5px; text-align: center;"><i>Date</i></td> </tr> <tr> <td style="padding: 5px; text-align: center;"><i>Initial</i></td> </tr> </table>	Self-assessment	<i>Initial</i>	<i>Date</i>		ECF evaluation	<i>Date</i>	<i>Initial</i>
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<b>Evidence Required</b> <b>Complete the following: questions:</b>	<b>Evidence sign off</b>
<b>Question 3</b> Demonstrate understanding of the mathematical relationships and principles involved in the computations. Give a practical solution and describe the context.	<b>Self-assessment</b>
	<i>Initial</i>
	<i>Date</i>
	<b>ECF evaluation</b>
	<i>Date</i>  <i>Initial</i>

## Specific Outcome 2

Work with numbers in different ways to express size and magnitude. (Use scientific notation for small and large numbers.)

### Assessment criteria

1. The prefixes indicating magnitude in measurements are correctly related to the decimal system (From Giga to Pica (10<sup>12</sup> to 10<sup>-12</sup>))
2. Conversions between related units in different measurement systems are correctly applied in real-life contexts. (SI to Imperial; Degrees F to degrees C.)

Evidence Required	Evidence sign off
<b>Remember to include this evidence in your Portfolio of Evidence</b>	
<p><b>Question 1</b> Write <math>\frac{1}{2}</math> as a decimal fraction.</p> <p><b>Question 2</b> Write <math>\frac{3}{4}</math> as a decimal fraction.</p> <p><b>Question 3</b> <b>Encircle the correct answer</b> The formulae for Giga is ...</p> <p>A SI unit decimals of 10 B SI unit multitude of 9-9 C SI unit multiplier of 10-9</p> <p><b>Question 4</b> Encircle the correct answer The formulae for Pico is ...</p> <p>A SI unit multiplier of 10-12) B SL unit multiplier of 10=11 C None of the above</p> <p><b>Question 5</b> <b>Encircle the correct answer</b> Scientific notion is defined as</p> <p>A Both B a way to assess the sequence of decimal functions. C a way to assess the order of magnitude and to visually decrease the zeros that the person sees.</p> <p><b>Question 6</b> <b>Give the scientific notion of the following numerical representation</b></p> <div style="background-color: yellow; text-align: center; padding: 5px;"> <p>4500000000 years or 4,500,000,000 years</p> </div>	<p><b>Self-assessment</b></p> <p style="text-align: center;"><i>Initial</i></p> <hr/> <p style="text-align: center;"><i>Date</i></p> <hr/> <p style="background-color: yellow;"><b>ECF evaluation</b></p> <p style="text-align: center;"><i>Date</i></p> <p style="text-align: center;"><i>Initial</i></p>

### Specific Outcome 3

Demonstrate the effect of error in calculations (Work with rational and irrational numbers. Explore repeating decimals, convert them to common fraction form, and Use scientific notation for small and large numbers.)

#### Assessment Criteria

1. Symbols for irrational numbers such as  $\sqrt{c}$  and  $42$  are left in formulae or steps to calculations except where approximations are required.
2. Descriptions are provided of the effect of rounding prematurely in calculations.
3. The desired degree of accuracy is determined in relation to the practical context.
4. The final value of a calculation is expressed in terms of the required unit.

Evidence Required	Evidence sign off
<b>Test</b>	<b>Self-assessment</b>
<p>Base the test on the following instructions:</p> <ul style="list-style-type: none"> <li>o <i>Demonstrate the effect of error in calculations</i></li> <li>o <i>Explore repeating decimals and convert them to common fraction form</i></li> <li>o <i>Use scientific notion for small and large number</i></li> </ul> <p><b>Section A</b> Use a calculator to convert the following fractions into decimals:            (a) <math>\frac{3}{4}</math>      (b) <math>\frac{2}{5}</math>      (c) <math>\frac{3}{8}</math>      (d) <math>\frac{12}{17}</math></p> <p><b>Section B</b> Convert the following decimals into common fractions:            (a) 0,3      (b) 0,84      (c) 1,65      (d) 8,08</p> <p><b>Section C</b> Determine the following roots by converting the decimal into a fraction first            (a) <math>\sqrt{0,81}</math>      (b) <math>\sqrt{0,0169}</math>      (c) <math>\sqrt{0,0225}</math></p> <p><b>Section D</b> Calculate <math>a = b - c</math>, <math>b = 5</math> and <math>c = 3</math></p> <p><b>Section E</b> Replace the given values in each formula and calculate the answer  <math>a = bc</math>, <math>b = 4</math> and <math>c = 3</math></p>	<p>Initial</p> <hr/> <p>Date</p> <hr/> <p style="background-color: #FFD700;"><b>ECF evaluation</b></p> <p>Date</p> <hr/> <p>Initial</p>

## Unit Standard 2 of this Volume

1. Unit Standard ID Title	Describe, apply, analyse and calculate shape and motion in 2- and 3-dimensional space in different contexts
2. Unit Standard Number	9013
3. NQF Level	3
4. Total Credit Value	4
5. Field	Field 10 - Physical, Mathematical, Computer and Life Sciences
6. Registration Date	2008-01-22
7. Registration End Date	2011-01-22
8. Purpose of the Unit Standard	<p>This unit standard is designed to provide credits towards the mathematical literacy requirements of the NQF at level 3. The essential purposes of the mathematical literacy requirements are that, as the learner progresses with confidence through the levels, the learner will grow in:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> An insightful use of mathematics in the management of the needs of everyday living to become a self-managing person</li> <li><input type="checkbox"/> An understanding of mathematical applications that provides insight into the learner's present and future occupational experiences and so develop into a contributing worker</li> <li><input type="checkbox"/> The ability to voice a critical sensitivity to the role of mathematics in a democratic society and so become a participating citizen.</li> </ul> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Measure, estimate, and calculate physical quantities in practical situations relevant to the adult in life or the workplace</li> <li><input type="checkbox"/> Explore describe and represent, interpret and justify geometrical relationships and conjectures to solve problems in two and three dimensional geometrical situations</li> </ul>
9. Learning assumed to be in place	The credit value is based on the assumption that people starting to learn towards this unit standard are competent in <i>Mathematical Literacy and Communications</i> at NQF level 2.
10. Unit Standard Range	<p>The scope of this unit standard includes length, surface area, volume, mass, speed; ratio and proportion; making and justifying conjectures.</p> <p>Contexts relevant to the adult, the workplace, and the local community.</p> <p>More detailed range statements are provided for specific outcomes and assessment criteria as needed.</p>
11. Specific outcomes and assessment criteria	<p><b>Specific Outcome 1</b> Measure, estimate, and calculate physical quantities in practical situations. (Measure, estimate, and calculate physical quantities in practical situations relevant to the adult in life or the workplace)</p> <p><b>Outcome Range:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Basic instruments to include those readily available such as rulers, measuring tapes, measuring cylinders or jugs, thermometers, spring or kitchen balances, watches and clocks.</li> <li><input type="checkbox"/> In situations which necessitate it such as in the workplace, the use of more accurate instruments such as vernier callipers, micrometer screws, stop watches and chemical balances.</li> <li><input type="checkbox"/> Quantities to estimate or measure to include length/distance, area, mass, time, speed and temperature.</li> <li><input type="checkbox"/> Estimate the area and volume of simple irregular shapes and objects.</li> <li><input type="checkbox"/> The quantities should range from the low or small to the high or large.</li> <li><input type="checkbox"/> Mass, volume temperature, distance, and speed values are used in practical situations relevant to the learner or the workplace.</li> <li><input type="checkbox"/> Calculations involving the effects on area and volume when altering linear dimensions.</li> </ul>

	<ul style="list-style-type: none"> <li><input type="checkbox"/> Calculate heights and distances using Pythagoras' theorem.</li> <li><input type="checkbox"/> Calculate surface areas and volumes of right prisms (i.e., end faces are polygons and the remaining faces are rectangles) and cylinders from measurements in practical situations relevant to the life of the learner or in the workplace.</li> </ul> <p><b>Assessment Criteria</b></p> <ol style="list-style-type: none"> <li>1. Scales on the measuring instruments are read correctly.</li> <li>2. Quantities are estimated to a tolerance justified in the context of the need.</li> <li>3. The appropriate instrument is chosen to measure a particular quantity.</li> <li>4. Quantities are measured correctly to within the least step of the instrument.</li> <li>5. Calculations are carried out correctly.</li> <li>6. Symbols and units are used in accordance with SI conventions and as appropriate to the situation.</li> </ol> <p><b>Specific Outcome 2</b> Explore, describe and represent, interpret and justify geometrical relationships and conjectures. (Explore, describe and represent, interpret and justify geometrical relationships and conjectures to solve problems in two and three-dimensional geometrical situations.)</p> <p><b>Outcome Range:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Applications taken from different contexts such as packaging, arts, building construction, dressmaking.</li> <li><input type="checkbox"/> The use of tessellations and symmetry in artifacts and in architecture.</li> <li><input type="checkbox"/> Use rough sketches to interpret, represent and describe situations.</li> <li><input type="checkbox"/> Use and interpret scale drawings of plans (e.g., plans of houses or factories; technical diagrams of simple mechanical household or work related devices such as jacks,</li> <li><input type="checkbox"/> Nets of prisms and cylinders.</li> <li><input type="checkbox"/> Road maps relevant to the local community.</li> <li><input type="checkbox"/> The use of the Cartesian co-ordinate system in determining location and describing relationships in at least two dimensions.</li> </ul> <p><b>Assessment Criteria</b></p> <ol style="list-style-type: none"> <li>1. Descriptions are based on a systematic analysis of the shapes and reflect the properties of the shapes accurately, clearly and completely.</li> <li>2. Descriptions include quantitative information appropriate to the situation and need.</li> <li>3. Conjectures as appropriate to the situation are based on well-planned investigations of geometrical properties.</li> <li>4. Representations of the problems are consistent with and appropriate to the problem context. The problems are represented comprehensively and in mathematical terms.</li> <li>5. Results are achieved through efficient and correct analysis and manipulation of representations.</li> <li>6. Problem-solving methods are presented clearly, logically and in mathematical terms.</li> <li>7. Solutions are correct and are interpreted and validated in terms of the context of the problem.</li> </ol>
<p>12. Unit Standard Accreditation and Moderation Options</p>	<p>Accreditation Option: Providers of learning towards this unit standard will need to meet the accreditation requirements of the GENFETQA.</p> <p>Moderation Option: The moderation requirements of the</p>

	GENFETQA must be met in order to award credit to learners for this unit standard.
13. Unit Standards Essential Embedded knowledge	<p>The following essential embedded knowledge will be assessed through assessment of the specific outcomes in terms of the stipulated assessment criteria. Candidates are unlikely to achieve all the specific outcomes, to the standards described in the assessment criteria, without knowledge of the listed embedded knowledge. This means that the possession or lack of the knowledge can be inferred directly from the quality of the candidate's performance against the standards.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Properties of geometric shapes</li> <li><input type="checkbox"/> Length, area, volume, mass, time, temperature, speed</li> <li><input type="checkbox"/> The Cartesian system</li> <li><input type="checkbox"/> Scale drawing</li> </ul>
14. Critical Cross-field Outcomes	<p><b>IDENTIFYING</b> Identify and solve problems using critical and creative thinking: Solve a variety of problems involving space, shape and time using geometrical techniques related to the life or workplace of the learner</p> <p><b>ORGANISING</b> Collect, analyse, organise, and critically evaluate information: Gather, organise, and interpret information about objects and processes.</p> <p><b>COMMUNICATING</b> <input type="checkbox"/> Communicate effectively: Use everyday language and mathematical language to describe properties, processes, and problem solving methods.</p> <p><b>SCIENCE</b> <input type="checkbox"/> Use mathematics: Use mathematics to analyse, describe, and represent realistic and abstract situations and to solve problems relevant to the adult, the workplace, and the local community.</p>

## EVIDENCE GUIDE

**Unit Standard ID Title:** Describe, apply, analyse and calculate shape and motion in 2-and 3-dimensional space in different contexts  
**Unit Standard number:** 9013

### Specific Outcome 1

Measure, estimate, and calculate physical quantities in practical situations. (Measure, estimate, and calculate physical quantities in practical situations relevant to the adult in life or the workplace.

### Assessment Criteria

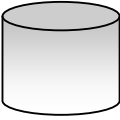
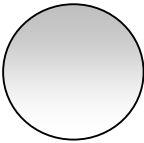
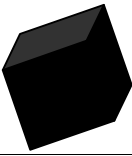

1. Scales on the measuring instruments are read correctly.
2. Quantities are estimated to a tolerance justified in the context of the need.
3. The appropriate instrument is chosen to measure a particular quantity.
4. Quantities are measured correctly to within the least step of the instrument.
5. Calculations are carried out correctly.
6. Symbols and units are used in accordance with SI conventions and as appropriate to the situation.

Evidence Required	Evidence sign off
<b>Test</b>	
<p><b>Question 1</b> Calculate how many 1 cm<sup>3</sup> cubes will fit into each right prism:</p> <p>(a) 3 cm x 2 cm x 1 cm                      (b) 4 cm x 3 cm x 2 cm                      (c) 5 cm x 4 cm x 3 cm</p> <p><b>Question 2</b> Calculate the area of the circle with a radius of ...</p> <p>(a) r1 = 0,564 cm                      (b) r2 = 0,798 cm</p> <p><b>Question 3</b> Sketch a cylinder with height 1 cm and base area ...</p> <p>(a) 1 cm<sup>2</sup>                      (b) 2 cm<sup>2</sup>                      (c) 3 cm<sup>3</sup></p>	<b>Self-assessment</b>
	<i>Initial</i>
	<i>Date</i>
	<b>ECF evaluation</b>
	<i>Date</i>
	<i>Initial</i>

**Specific Outcome 2**

Explore, describe and represent, interpret and justify geometrical relationships and conjectures. (Explore, describe and represent, interpret and justify geometrical relationships and conjectures to solve problems in two and three-dimensional geometrical situations.)

1. Descriptions are based on a systematic analysis of the shapes and reflect the properties of the shapes accurately, clearly and completely.
2. Descriptions include quantitative information appropriate to the situation and need.
3. Conjectures as appropriate to the situation are based on well-planned investigations of geometrical properties.
4. Representations of the problems are consistent with and appropriate to the problem context. The problems are represented comprehensively and in mathematical terms.
5. Results are achieved through efficient and correct analysis and manipulation of representations.
6. Problem-solving methods are presented clearly, logically and in mathematical terms.
7. Solutions are correct and are interpreted and validated in terms of the context of the problem.

Evidence Required			Evidence sign off	
Test			Self-assessment	
<p><b>Question 1</b> Name the five axioms or rules from which Euclidean geometry can be developed.</p>			Initial	
<p><b>Question 2</b> Identify the under mentioned shapes that are 3-D, and link them with the relevant name. (Remember there is only one answer).</p>			Date	
<b>A</b>	<b>B (Insert the correct answer next to column A)</b>	<b>C Select your answer here</b>	<b>ECF evaluation</b>	
		Length Cylinder Sphere Octagon Circle Pentagon Cube Prism	Date	
			Initial	
				
				

### Unit Standard 3 of this Volume

1. Unit Standard ID Title	Investigate life and work related problems using data and probabilities
2. Unit Standard Number	9012
3. NQF Level	3
4. Total Credit Value	5
5. Field	Field 10 - Physical, Mathematical, Computer and Life Sciences
6. Registration Date	2008-01-22
7. Registration End Date	2011-01-22
8. Purpose of the Unit Standard	<p>This Unit Standard is designed to provide credits towards the mathematical literacy requirement of the NQF at Level 3. The essential purposes of the mathematical literacy requirement are that, as the learner progresses with confidence through the levels, the learner will grow in:</p> <p>a confident, insightful use of mathematics in the management of the needs of everyday living to become a self-managing person</p> <p>An understanding of mathematical applications that provides insight into the learner's present and future occupational experiences and so develop into a contributing worker</p> <p>The ability to voice a critical sensitivity to the role of mathematics in a democratic society and so become a participating citizen</p> <p>People credited with this Unit Standard are able to:</p> <p>Pose questions, collect and organise data.</p> <p>Represent and interpret data using various techniques to investigate real life and work problems.</p> <p>Use random events to explore and apply probability concepts in simple life and work related situations.</p>
9. Learning assumed to be in place	The credit value is based on the assumption that people starting to learn towards this unit standard are competent in Mathematics and Communications at NQF level 2.
10. Unit Standard Range	<p>This unit standard includes the requirement to:</p> <p>Identify issues suited to resolution by statistical methods</p> <p>Select a suitable sample</p> <p>Collect and generate data through the use of questionnaires and suitable experiments</p> <p>Calculate statistics and probability values through the use of calculators</p> <p>Represent data in the form of tables, charts and graphs</p> <p>Use statistics and representations of data to argue a resolution of an issue</p> <p>Interpret statistics, the use of probabilities, and representations of data</p> <p>Determine probability values</p> <p>Work with probability in practical situations</p> <p>Use available technology (i.e. whatever is available for working with data e. g. pencil and ruler, including spreadsheets, graphical calculators) to fit appropriate curves (e.g., linear, quadratic) to</p>

	<p>data</p> <p>More detailed range statements are provided for specific outcomes and assessment criteria as needed.</p>
<p>11. Specific outcomes and assessment criteria</p>	<p><b>Specific Outcome 1</b> Pose questions, collect, and organise data.</p> <p><b>Outcome Notes</b> Determining trends in societal issues such as crime and health. Identifying relevant characteristics of target groups such as age, range, gender, socio-economic group, cultural belief and performance. Predicting the likelihood of the occurrence of events. Considering the attitudes or opinions of people on issues.</p> <p><b>Outcome Range</b> Techniques include:</p> <p>The selection of a sample from a population with due sensitivity to issues relating to bias.</p> <p>The formulation and use of questionnaires and interviews to obtain data for specific purposes related to surveys and censuses.</p> <p>Use of databases to obtain information (e.g., StatsSA for national census data) and data suited to the resolution of particular issues.</p> <p>Work with different types of measuring instruments and scales such as yes/no (dichotomous) 5 point (Likert), discrete, and continuous variables (e.g., temperature).</p> <p>Evaluation of data gathering techniques and of data collected so that faults and inconsistencies are identified. (e.g., in cases where a person may be counted more than once such as when collecting ST13 data).</p> <p><b>Assessment Criteria</b></p> <ol style="list-style-type: none"> <li>1. Situations or issues that can be dealt with through statistical methods are identified correctly.</li> <li>2. Variables contributing to a problem situation are identified and addressed in data gathering, e.g. crime is related to time of day and location.</li> <li>3. Appropriate and efficient methods are used to collect, record and organise data.</li> <li>4. Data samples are of adequate size and are representative of the population.</li> </ol> <p><b>Specific Outcome 2</b> Represent, analyse and interpret data using various techniques.</p> <p><b>Outcome Notes</b> Represent, analyse and interpret data using various techniques to investigate real-life and work problems</p> <p><b>Outcome Range</b> Calculation of measures of centre and spread such as mean, median, mode, range and inter-quartile range.</p> <p>Use of scatter plots and intuitively placed lines of best fit to represent the association between two variables. (Regression analysis not included,).</p> <p>Fit curves (e.g., linear and quadratic cases) to predict trends.</p>

Use of a variety of representations applicable to the issue being investigated.

Specific purposes include:

Determining trends societal issues such as crime and health;

Identifying relevant characteristics of target groups such as age, range, gender, socio-economic group, cultural belief and performance;

Considering the attitudes or opinions of people on issues.

#### **Assessment Criteria**

1. *Graphical representations and numerical summaries are consistent with the data, are clear and appropriate to the situation, and target audience.*
2. *Different representations of aspects of the data are compared to take a position on the issue.*
3. *Calculations and the use of statistics are correct and appropriate to the problem.*
4. *Interpretations of statistics are justified and applied to answer questions about the problem.*
5. *New questions that arise from the modeling of the data are discussed.*

#### **Specific Outcome 3**

Use random events to explore and apply, probability concepts in simple life.

#### **Outcome Notes**

Use random events to explore and apply, probability concepts in simple life and work related situations

#### **Outcome Range:**

Distinguish outcomes, which are equally likely (e.g. spinning a coin, rolling a die) from those that are not (e.g. dropping a drawing pin, spinning a biased coin).

Distinguish between a trial (e.g. a turn at rolling a die), outcome (getting a 6 when the die is rolled) and event (getting any even number when rolling a die -a collection of outcomes).

Interpret probability values expressed as fractions between 0 and 1 or as percentages.

Use the term "odds on" in relation to a probability value (e.g. the odds on getting a 4 when rolling a die are 1 to 5 while the probability of getting a 4 is one sixth).

Distinguish between theoretical (e. g., for a fair coin on the basis of equal likelihood) and experimental probabilities (e.g. for getting a pin to land with its point up or its point down when dropped on the basis of relative frequency after a large number of trials).

Use tree diagrams in representing and working with events.

Use basic counting techniques to determine the number of ways an event can occur. (The formal use of permutations and combinations not expected.)

Distinguish between situations in which probabilities need to be

	<p>multiplied from those in which probabilities need to be added (e.g., drawing the ace of hearts and the ace of spades as opposed to drawing one or the other).</p> <p>Make and test predictions about probability in the context of games, real-life situations and the workplace.</p> <p><b>Assessment Criteria</b></p> <ol style="list-style-type: none"> <li>1. <i>Data are gathered, organised, sorted, and classified in a suitable manner for further processing and analysis.</i></li> <li>2. <i>Experiments and simulations are chosen appropriately in terms of the situation to be investigated.</i></li> <li>3. <i>Probabilities are determined correctly.</i></li> <li>4. <i>Distinctions are correctly made between theoretical and experimental probabilities.</i></li> <li>5. <i>Predictions are based on validated experimental or theoretical probabilities.</i></li> <li>6. <i>The outcomes of experiments and simulations are communicated clearly.</i></li> </ol>
<p>12. Unit Standard Accreditation and Moderation Options</p>	<p>Providers of learning towards this unit standard will need to meet the accreditation requirements of the GENFETQA.</p> <p>Moderation Option: The moderation requirements of the GENFETQA must be met in order to award credit to learners for this unit standard.</p>
<p>13. Unit Standards Essential Embedded knowledge</p>	<p>The following essential embedded knowledge will be assessed through assessment of the specific outcomes in terms of the stipulated assessment criteria. Candidates are unlikely to achieve all the specific outcomes, to the standards described in the assessment criteria, without knowledge of the listed embedded knowledge. This means that the possession or lack of the knowledge can be inferred directly from the quality of the candidate's performance against the standards.</p> <p>Methods for collecting, organising data and calculating statistics</p> <p>The meaning of concepts such as centre and spread</p> <p>Techniques for statistically modeling a situation</p> <p>Random events, equal likelihood, probability</p>
<p>14. Critical Cross-field Outcomes</p>	<p><b>IDENTIFYING</b> Identify and solve problems using critical and creative thinking: Solve a variety of problems or take a position on issues related to the learner based on data, statistics, and probability.</p> <p><b>COLLECTING</b> Collect, analyse, organise, and critically evaluate information: Collect, organise, and interpret data and statistics to make sense of adult situations.</p> <p><b>COMMUNICATING</b> Communicate effectively: Use everyday language and mathematical language to represent data, statistics, and probability and to communicate conclusions.</p> <p><b>CONTRIBUTING</b> Use mathematics: Use mathematics to, describe and represent and interpret life or work related situations and to solve problems relevant to the learner.</p>

## EVIDENCE GUIDE

**Unit Standard ID Title:** Investigate life and work related problems using data and probabilities

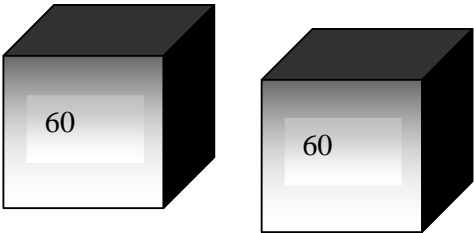
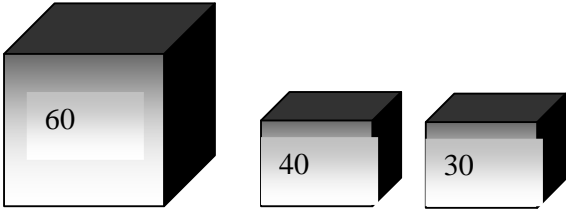
**Unit Standard number:** 9012

### Specific Outcome 1

Pose questions, collect and organise data.

### Assessment Criteria

1. Situations or issues that can be dealt with through statistical methods are identified correctly.
2. Variables contributing to a problem situation are identified and addressed in data gathering, e.g. crime is related to time of day and location.
3. Appropriate and efficient methods are used to collect, record and organise data.
4. Data samples are of adequate size and are representative of the population.

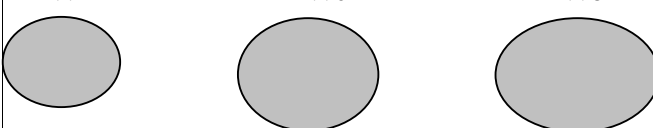
Evidence Required	Evidence sign off
<b>Problem Solving Technique</b>	<b>Self-assessment</b>
<p><b>Answer the following Assignment:</b> View the diagrams in line with a problem situation. You need to identify the problem when you view the data and explain the probabilities of misleading data. Identify the problems in picture 1 and picture 2.</p> <p>Mr Mahlangu is the Warehouse Supervisor. He received a document, which indicated to him the number of boxes he may be expecting from the suppliers at 09:00 tomorrow morning. He is dyslexics and cannot read and the suppliers know by now that they should rather include shapes with numbers in, in order for Mr Mahlangu to continue with his work.</p> <p>The fax Mr Mahlangu showed the following diagrams:</p>	Initial
<p>Picture 1</p> <div style="text-align: center;">  </div>	Date
<p>Picture 2</p> <div style="text-align: center;">  </div>	Initial
	<b>ECF evaluation</b>
	Date

**Specific Outcome 2**

Represent, analyse and interpret data using various techniques.

**Assessment Criteria**

1. Graphical representations and numerical summaries are consistent with the data, are clear and appropriate to the situation, and target audience.
2. Different representations of aspects of the data are compared to take a position on the issue.
3. Calculations and the use of statistics are correct and appropriate to the problem.
4. Interpretations of statistics are justified and applied to answer questions about the problem.
5. New questions that arise from the modeling of the data are discussed.

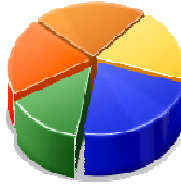
Evidence Required	Evidence sign off
<b>Analyse and interpret the diagram and draw a bar graph to represent the data</b>	<b>Self-assessment</b>
<p><b>Scenario:</b> Here is how the Shoe Company claim that they are making huge sales increases:</p>	<i>Initial</i>
<p>1994                      1996                      1998</p> 	<i>Date</i>
<p>(a) Make a quick response and indicate the ratio of 1998 sales of 1994 sales.</p> <p>(b) If you are told that the circle that symbolizes growth in the pictogram represents the sales, what is the true ratio of 1998 sales to 1994 sales?</p> <p>(c) What feature of the pictogram causes the sales performance to appear to be more dramatic than it is?</p> <p><b>Instruction:</b> Draw a bar graph to represent the data. Could your bar graph mislead someone as easily as the pictogram?</p>	<b>ECF evaluation</b>
	<i>Date</i>
	<i>Initial</i>

### Specific Outcome 3

Use random events to explore and apply probability concepts in simple life.

#### Assessment Criteria

1. Data are gathered, organised, sorted and classified in a suitable manner for further processing and analysis.
2. Experiments and simulations are chosen appropriately in terms of the situation to be investigated.
3. Probabilities are determined correctly.
4. Distinctions are correctly made between theoretical and experimental probabilities.
5. Predictions are based on validated experimental or theoretical probabilities.
6. The outcomes of experiments and simulations are communicated clearly.

Evidence Required						Evidence sign off													
Test						Self-assessment													
<b>Section A</b> <b>Scenario:</b> How to save water. Professor Ludik has done some research on the water assumptions in order to establish who is using the most vs. the least water. It was categorized according to the following:						Initial													
<table border="1"> <thead> <tr> <th>Private and public companies</th> <th>Industrial areas</th> <th>Mining</th> <th>Power generations</th> <th>Farm animals and</th> <th>Irrigation</th> </tr> </thead> <tbody> <tr> <td>7%</td> <td>11%</td> <td>15%</td> <td>13%</td> <td>12%</td> <td>42%</td> </tr> </tbody> </table>						Private and public companies	Industrial areas	Mining	Power generations	Farm animals and	Irrigation	7%	11%	15%	13%	12%	42%	Date	
Private and public companies	Industrial areas	Mining	Power generations	Farm animals and	Irrigation														
7%	11%	15%	13%	12%	42%														
<div style="border: 1px solid black; padding: 5px;"> <p><b>Instruction: Draw your own (1) pie chart (evidence 1) and a graph illustration (2) based on above information and answer the following questions.</b></p> <p><b>Question 1</b> Who uses the most water?</p> <p><b>Question 2</b> What percentage of the whole pie is used by homes?</p> <p><b>Question 3</b> Who is using the leases water?</p> </div>						Date													
						ECF evaluation													
						Initial													

## Unit Standard 4 of this Volume

1. Unit Standard ID Title	Use mathematics to investigate and monitor the financial aspects of personal, business and national issues
2. Unit Standard Number	7456
3. NQF Level	3
4. Total Credit Value	5
5. Field	Field 10 - Physical, Mathematical, Computer and Life Sciences
6. Registration Date	2008-02-26
7. Registration End Date	2011-02-26
8. Purpose of the Unit Standard	<p>This unit standard will be useful to people who aim to achieve recognition at some level in Further Education and Training or to meet the Fundamental requirement of a wide range of qualifications registered on the National Qualifications Framework.</p> <p>People credited with this unit standard are able to:</p> <p>Use mathematics to plan and control personal and/or household budgets and income and expenditure.</p> <p>Use simple and compound interest to make sense of and define a variety of situations including investments, stokvels, inflation, appreciation, and depreciation.</p> <p>Investigate various aspects of financial transactions including costs, prices, revenue, cost price, selling price, loss, and profit.</p>
9. Learning assumed to be in place	The credit value is based on the assumption that people starting to learn towards this unit standard are competent in Mathematics and Communications at NQF level 2.
10. Unit Standard Range	<p><b>Outcome Header:</b> Use mathematics to plan and control personal, regi</p>
11. Specific outcomes and assessment criteria	<p><b>Specific Outcome 1</b> Use mathematics to plan and control personal, regional and/or national budgets and income and expend</p> <p><b>Outcome Notes:</b> Plans describe projected income and expenditure realistically.</p> <p>Calculations are carried out using computational tools efficiently and correctly and solutions obtained are verified in terms of the context.</p> <p>Budgets are presented in a manner that makes for easy monitoring and control.</p> <p>Actual income and expenditure is recorded accurately and in relation to planned income and expenditure. Variances are identified and explained and methods are provided for control.</p> <p><b>Outcome Range:</b> Bank accounts, provincial and key elements of national budgets and tax.</p> <p><b>Assessment Criteria:</b> <i>Use mathematics to plan and control personal, regional and/or national budgets and income and expenditure.</i></p>

**Assessment Criterion Notes:**

1. Plans describe projected income and expenditure realistically.
2. *Calculations are carried out using computational tools efficiently and correctly and solutions obtained are verified in terms of the context.*
3. *Budgets are presented in a manner that makes for easy monitoring and control.*
4. *Actual income and expenditure is recorded accurately and in relation to planned income and expenditure. Variances are identified and explained and methods are provided for control.*

**Assessment Criterion Range:**

Bank accounts, provincial and key elements of national budgets and tax.

**Specific outcome 2**

Use simple and compound interest to make sense of and define a variety of situations.

**Outcome Notes:**

The differences between simple and compound interest are described in terms of their common applications and effects.

Methods of calculation are appropriate to the problem types.

Computational tools are used efficiently and correctly and solutions obtained are verified in terms of the context or problem.

Solutions to calculations are used effectively to define the changes over a period of time.

**Outcome Range:**

Effective and nominal rates, commission, appreciation, and depreciation.

**Assessment Criteria**

Use simple and compound interest to make sense of and define a variety of situations.

**Assessment Criterion Notes**

1. *The differences between simple and compound interest are described in terms of their common applications and effects.*
2. *Methods of calculation are appropriate to the problem types.*
3. *Computational tools are used efficiently and correctly and solutions obtained are verified in terms of the context or problem.*
4. *Solutions to calculations are used effectively to define the changes over a period of time.*

**Assessment Criterion Range:**

Effective and nominal rates, commission, appreciation and depreciation.

**Specific outcome 3**

Use mathematics to debate aspects of the national economy.

**Outcome Notes:**

Values are calculated correctly.

	<p>Mathematical tools and systems are used effectively to determine, compare, and describe aspects of the national economy.</p> <p>Debating points are based on well-reasoned arguments and are supported by mathematical information.</p> <p><b>Outcome Range:</b> Tax, productivity and the equitable distribution of resources.</p> <p><b>Assessment Criteria</b> Use mathematics to debate aspects of the national economy.</p> <p><b>Assessment Criterion Notes</b></p> <ol style="list-style-type: none"> <li>1. <i>Values are calculated correctly.</i></li> <li>2. <i>Mathematical tools and systems are used effectively to determine, compare and describe aspects of the national economy.</i></li> <li>3. <i>Debating points are based on well-reasoned arguments and are supported by mathematical information.</i></li> </ol> <p><b>Assessment Criterion Range:</b> Tax, productivity and the equitable distribution of resources.</p>
12. Unit Standard Accreditation and Moderation Options	<b>None specified in the unit standard</b>
13. Unit Standards Essential Embedded knowledge	<p>The following essential embedded knowledge will be assessed by means of the specific outcomes in terms of the stipulated assessment criteria. Candidates are unlikely to achieve all the specific outcomes, to the standards described in the assessment criteria, without knowledge of the listed embedded knowledge. This means that the possession or lack of the knowledge can be inferred directly from the quality of the candidate's performance against the standards.</p> <p>Budgets.</p> <p>Terminology and definitions associated with financial situations.</p> <p>Estimation and approximation.</p> <p>Compound increase and decrease.</p>
14. Critical Cross-field Outcomes	<b>None specified in the unit standard</b>

## EVIDENCE GUIDE

**Unit Standard ID Title:** Use mathematics to investigate and monitor the financial aspects of personal, business and national issues

**Unit Standard number:** 7456

### Specific Outcome 1

Use mathematics to plan and control personal, regional and/or national budgets and income and expend

### Assessment Criteria

1. *Plans describe projected income and expenditure realistically.*
2. *Calculations are carried out using computational tools efficiently and correctly and solutions obtained are verified in terms of the context.*
3. *Budgets are presented in a manner that makes for easy monitoring and control.*
4. *Actual income and expenditure is recorded accurately and in relation to planned income and expenditure. Variances are identified and explained and methods are provided for control.*

Evidence Required	Evidence sign off
<b>Assignment</b>	<b>Evidence sign off</b>
<b>Task 1 -Submit the income and expenditure statement for evidence</b>	<b>Self-assessment</b>
Draw up an income/expenditure statement Fill in your monthly expenses under the 'Estimate' column next to the items listed. List your income as well as your partner's income and any other earning. Deduct your monthly expenses from your monthly income to see how much you have over or what your shortfall is.	<i>Initial</i>
	<i>Date</i>
<b>Task 2 –</b> Show proof of your calculations that are carried out by using computational tools (An excel spreadsheet calculation) will be efficient. Submit electronically in order for assessor to identify whether you used the correct formulae in the excel spreadsheet.	<b>ECF evaluation</b>
<b>Task 3 –</b> Include in your income and expenditure statement a budget for a month and how you will monitor and control your expenses.	<i>Date</i>
	<i>Initial</i>

## Specific outcome 2

Use simple and compound interest to make sense of and define a variety of situations.

### Assessment Criterion Notes

1. Values are calculated correctly.
2. Mathematical tools and systems are used effectively to determine, compare, and describe aspects of the national economy.
3. Debating points are based on well-reasoned arguments and are supported by mathematical information.

Evidence Required Test	Evidence sign off
<p><b>Question 1</b> Mrs Khambi buys a new lounge suite for R15 000.00. She deposited R5000.00 and signed a purchase agreement stipulating 10% interest and insurance for R15.00 a month. Calculate</p> <p>(a) Her monthly payment over two years. (b) The total amount that she will pay.</p> <p><b>Question 2</b> Calculate the amount that must be invested to have R20 000.00 after 2 years, if interest is calculated annually at a:</p> <p>(a) Simple interest rate of 9% (b) compound interest rate of 9%</p> <p><b>Question 3</b> Mr Chokko imports a brand new motorcar series from Japan. He pays R800 000.00 yen. The exchange rate at the time of the transaction is R1 = 16.2 yen. He had to pay 20% excise duty. Calculate the amount he paid for the new car in rand value.</p>	<b>Self-assessment</b>
	Initial
	Date
	<b>ECF evaluation</b>
Date	
Initial	