

MATHEMATICAL LITERACY CORE ASSESSMENT STANDARDS FOR EXAMINATION IN GRADE 12 IN 2008, 2009 and 2010

Learning Outcome 1: Number and Operations in Context

The learner is able to use knowledge of numbers and their relationships to investigate a range of different contexts which include financial aspects of personal, business and national issues.

Grade 10 We know this when the learner is able to:	Grade 11 We know this when the learner is able to:	Grade 12 We know this when the learner is able to:
<p>10.1.1 Solve problems in various contexts, including financial contexts, by estimating and calculating accurately using mental, written and calculator methods where appropriate, inclusive of:</p> <ul style="list-style-type: none"> • working with simple formulae e.g. $A = P(1+i)^n$ • using the relationships between arithmetical operations (including the distributive property) to simplify calculations where possible;. (NOTE: students are not expected to know the distributive property by name) <p>(The range of problem types includes percentage, ratio, rate and proportion).</p> <p>For example <i>* explore compound growth in various situations numerically and work with the compound interest formula;</i> <i>* find a percentage by which a quantity was increased;</i> <i>* calculate the number of person hours needed for a job if the number of workers is increased;</i> <i>* calculate proportional payments for work done by groups of people;</i> <i>* calculate the amount of money allocated to education by the budget if it is 8,4% of R36,04 billion;</i> <i>* criticise numerically-based arguments.</i></p>	<p>11.1.1 In a variety of contexts, find ways to explore and analyse situations that are numerically based, by:</p> <ul style="list-style-type: none"> • estimating efficiently; • working with formulae by hand and with a calculator, e.g. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ • showing awareness of the significance of digits; • checking statements and results by doing relevant calculations. <p>For example: <i>*estimate the length of a side if the volume of a cube is 10 cubic units,</i> <i>*do calculations to compare different currencies,</i> <i>*check a claim that costs of phone calls have risen by 8% by doing relevant calculations,</i> <i>*check the effect of rounding on effective repayments on a loan or account (one of the payments will have to be adjusted to reach the total amount to be repaid).</i></p> <p>(The range of problem types includes percentage, ratio, rate and proportion).</p>	<p>12.1.1 Correctly apply problem-solving and calculation skills to situations and problems dealt with.</p> <p>For example <i>*work with issues involving proportional representation in voting.</i></p>

<p>10.1.2 Relate calculated answers correctly and appropriately to the problem situation by:</p> <ul style="list-style-type: none"> • interpreting answers in terms of the context; • reworking a problem if the first answer is not sensible, or if the initial conditions change; • interpreting calculated answers logically in relation to the problem and communicating processes and results. 	<p>11.1.2 Relate calculated answers correctly and appropriately to the problem situation by:</p> <ul style="list-style-type: none"> • interpreting answers in terms of the context; • reworking a problem if the first answer is not sensible or if the initial conditions change; • interpreting calculated answers logically in relation to the problem, and communicating processes and results. 	<p>12.1.2 Relate calculated answers correctly and appropriately to the problem situation by:</p> <ul style="list-style-type: none"> • interpreting answers in terms of the context; • reworking a problem if the first answer is not sensible or if the initial conditions change; • interpreting calculated answers logically in relation to the problem and communicating processes and results.
<p>10.1.3 Apply mathematical knowledge and skills to plan personal finances, inclusive of:</p> <ul style="list-style-type: none"> • income and expenditure; • the impact of interest (simple and compound) within personal finance contexts. <p><i>For example:</i></p> <ul style="list-style-type: none"> * identify variable expenses and calculate new values to adapt a budget to deal with increased bond repayments due to rising interest rates, * adapt a budget to accommodate a change in the price of petrol, * calculate the value of the fraction of a bond repayment that goes towards repaying interest or capital, * calculate the real cost of a loan of R10 000 for 5 years at 5% capitalised monthly and half yearly. 	<p>11.1.3 Apply mathematical knowledge and skills to plan personal finances and investigate opportunities for entrepreneurship inclusive of:</p> <ul style="list-style-type: none"> • specifying and calculating the value of income and expenditure items; • estimating and checking profit <p><i>For example:</i></p> <ul style="list-style-type: none"> * calculate the effect of increased prices of imported vehicle parts on the profit margin of a motor car manufacturer or a small vehicle service workshop, * investigate the effect of increasing the number of employees on the profit margin of a small company, * investigate the effect of a sales discount on the profit margin. 	<p>12.1.3 Analyse and critically interpret the a variety of financial situations mathematically, inclusive of:</p> <ul style="list-style-type: none"> • personal and business finances; • the effects of taxation, inflation and changing interest rates • the effects of currency fluctuations; • critical engagement with debates about socially responsible trade. <p><i>For example:</i></p> <ul style="list-style-type: none"> * calculate the effect of a fixed interest rate against probable variations in interest rates when buying a house or when choosing an investment, * calculate the net effect of different interest offerings and bank charges when saving schemes are considered, * calculate and compare the projected yields of different retirement options, * interpret changes in indices such as the consumer price index or the business confidence index, * compare different credit options, * calculate the effect of defaulting payments over a period of time, * consider different currencies for investment purposes, * calculate values in simplified situations in order to discuss the effect of import/export control, levies and rebates, linking the discussion to the way mathematics can be used to argue opposing points of view.

Learning Outcome 2: Functional Relationships

The learner is able to recognise, interpret, describe and represent various functional relationships to solve problems in real and simulated contexts.

Grade 10 We know this when the learner is able to:	Grade 11 We know this when the learner is able to:	Grade 12 We know this when the learner is able to:
<p>10.2.1 Work with numerical data and formulae in a variety of real-life situations in order to establish relationships between variables by:</p> <ul style="list-style-type: none"> determining output values for given input values; determining input values for given output values; <p>(Types of relationships to be dealt with include linear and inverse proportion relationships)</p> <p><i>For example:</i> * critique information about functional relationships in media articles such as telephone costs before and after rate changes, * calculate relationships in speed, distance and time.</p>	<p>11.2.1 Work with numerical data and formulae in a variety of real-life situations in order to establish relationships between variables by:</p> <ul style="list-style-type: none"> finding break-even points involving linear functions by solving simultaneous equations <p>(Types of relationships to be dealt with include linear and inverse proportion relationships)</p> <p><i>For example:</i> * interpret and critique quotations for two similar packages given by cell phone providers or car hire companies, * use rate of change to offset impressions created by magnification of scales on the axes of graphs.</p>	<p>12.2.1 Work with numerical data and formulae in a variety of real-life situations, in order to:</p> <ul style="list-style-type: none"> solve design and planning problems; <p><i>For example:</i> * find optimal values for two discrete variables, subject to two or more linear constraints.</p> <ul style="list-style-type: none"> investigate the impact of compound change on situations. <p><i>For example:</i> * investigate the rate of depletion of natural resources, * investigate the spread of HIV/AIDS and other epidemics, * critique articles and reports in the media that are based on graphs or tables.</p>
<p>10.2.2 Draw graphs (by hand and/or by means of technology where available) in a variety of real-life situations by:</p> <ul style="list-style-type: none"> point-by-point plotting of data; working with formulae to establish points to plot. <p><i>For example, draw graphs of:</i> * mass against time when on diet, * surface area against side length of a cube, * volume against surface area, * lengths of a spring against mass added, * amount of savings against the investment period.</p>	<p>11.2.2 Draw graphs (by hand and/or by means of technology where available) as required by the situations and problems being investigated.</p> <p><i>For example:</i> * compare costs of cell phone packages for different call intervals by drawing graphs of cost against time.</p>	<p>12.2.2 Draw graphs (by hand and/or by means of technology where available) as required by the situations and problems being investigated.</p> <p><i>For example:</i> * draw graphs of number of AIDS related deaths and deaths caused by malaria over time, on the same system of axes to describe the extent of the AIDS epidemic.</p>

<p>10.2.3 Critically interpret tables and graphs that relate to a variety of real-life situations by:</p> <ul style="list-style-type: none"> • finding values of variables at certain points; • describing overall trends; • identifying maximum and minimum points; • describing trends (including in terms of rates of change). <p><i>For example, interpret graphs that:</i></p> <ul style="list-style-type: none"> * compare the incidence of AIDS over time, * indicate trends in road fatalities, * show the expected changes in the mass of a baby with age. 	<p>11.2.3 Critically interpret tables and graphs in a variety of real-life and simulated situations by:</p> <ul style="list-style-type: none"> • estimating input and output values; <p><i>For example:</i></p> <ul style="list-style-type: none"> * do spot calculations of the rate of change of population growth in different countries by taking readings from supplied graphs to check figures quoted and to verify estimations of future growth. 	<p>12.2.3 Critically interpret tables and graphs in real life situations including in the media, inclusive of:</p> <ul style="list-style-type: none"> • graphs with negative values on the axes (dependant variable in particular); • more than one graph on a system of axes. <p><i>For example:</i></p> <ul style="list-style-type: none"> * interpret graphs of temperature against time of day during winter over a number of years to investigate claims of global warming, * compare graphs of indices such as the consumer price index and business confidence index to graphs of percentage change in those indices over a particular time interval.
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Learning Outcome 3: Space, Shape and Measurement

The learner is able to measure using appropriate instruments, to estimate and calculate physical quantities, and to interpret, describe and represent properties of and relationships between 2-dimensional shapes and 3-dimensional objects in a variety of orientations and positions.

Grade 10 We know this when the learner is able to:	Grade 11 We know this when the learner is able to:	Grade 12 We know this when the learner is able to:
<p>10.3.1 Solve problems in 2-dimensional and 3-dimensional contexts by:</p> <ul style="list-style-type: none"> • estimating, measuring and calculating (e.g. by the use of the Theorem of Pythagoras) values which involve: <ul style="list-style-type: none"> ▪ lengths and distances, ▪ perimeters and areas of common polygons and circles, ▪ volumes of right prisms, • checking values for solutions against the contexts in terms of suitability and degree of accuracy. <p>(Accept the following as common polygons: triangles, squares, rectangles, parallelograms, trapeziums, regular hexagons)</p>	<p>11.3.1 Solve problems in 2-dimensional and 3-dimensional contexts by:</p> <ul style="list-style-type: none"> • estimating, measuring and calculating values which involve: <ul style="list-style-type: none"> ▪ lengths and distances, ▪ perimeters and areas of polygons, ▪ volumes of right prisms and right circular cylinders, ▪ surface areas of right prisms and right circular cylinders, • making adjustments to calculated values to accommodate measurement errors and inaccuracies due to rounding. 	<p>12.3.1 Solve problems in 2-dimensional and 3-dimensional contexts by:</p> <ol style="list-style-type: none"> 1.1. estimating, measuring and calculating values which involve: <ol style="list-style-type: none"> 1.1.1. lengths and distances, 1.1.2. perimeters and areas of polygons, 1.1.3. volumes of right prisms, right circular cylinders, 1.1.4. surface areas of right prisms, right circular cylinders, 1.2. making adjustments to calculated values to accommodate measurement errors and inaccuracies due to rounding.
<p>10.3.2 Convert units of measurement within the metric system.</p> <p><i>For example:</i> * convert km to m, mm³ to litres, km² to m², cm³ to m³.</p>	<p>11.3.2 Convert units of measurement between different scales and systems using conversion tables provided.</p> <p><i>For example:</i> * convert km to m, mm³ to litres, miles to km, kg to lb, * work with international times</p>	<p>12.3.2 Convert units of measurement between different scales and systems using conversion tables provided as required in dealing with problems.</p> <p><i>For example:</i> * the dimensions of an imported washing machine are given in inches and must be converted accurately to centimetres for installation purposes, * a recipe that is written with imperial measures must be rewritten with accurate metric measures, * measures of temperature must be converted between Fahrenheit and Celsius (conversion ratios and formulae given).</p>
<p>10.3.3 Draw and interpret scale drawings of plans to represent and describe situations</p> <p><i>For example:</i> * draw and interpret top, front and side views or elevations on a plan.</p>	<p>11.3.3 Use and interpret scale drawings of plans to:</p> <ul style="list-style-type: none"> • represent and identify views, estimate and calculate values according to scale. <p><i>For example:</i> * study a plan of the school building and identify locations or calculate available real area for extensions.</p>	<p>12.3.3 Use and interpret scale drawings of plans to:</p> <ul style="list-style-type: none"> • estimate and calculate values according to scale, and build models. <p><i>For example:</i> * build a scale model of a school building, based on the plan of the building.</p>

<p>10.3.4 Use grids and maps in order to determine locations and plan trips</p> <p><i>For example:</i> <i>* draw floor plans and use symbols to indicate areas and positions taken up by furniture in different arrangements.</i></p>	<p>11.3.4 Use grids and maps, and compass directions, in order to:</p> <ul style="list-style-type: none">• Determine locations;• Describe relative positions. <p><i>For example:</i> <i>* local maps,</i> <i>* seat location in cinemas and stadiums,</i> <i>* room numbers in multi-leveled buildings.</i></p>	<p>12.3.4 Use grids and maps, and compass directions, in order to:</p> <ul style="list-style-type: none">• Determine locations;• Describe relative positions. <p><i>For example:</i> <i>* understand the use of latitude and longitude in global positioning systems.</i></p>
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Learning Outcome 4: Data Handling

The learner is able to collect, summarise, display and analyse data and to apply knowledge of statistics and probability to communicate, justify, predict and critically interrogate findings and draw conclusions.

Grade 10 We know this when the learner is able to:	Grade 11 We know this when the learner is able to:	Grade 12 We know this when the learner is able to:
<p>Assessment Standard 10.4.4. is the focal Assessment Standard of LO4. The other LO4 Assessment Standards serve to develop the skills that will enable learners to achieve this one.</p> <p>10.4.4 Critically interpret a single set of data and representations thereof (with awareness of sources of error) in order to draw conclusions on questions investigated and to make predictions and to critique other interpretations.</p> <p><i>For example:</i> * interpret data from the media on the number of stolen and recovered vehicles after a certain tracking device has been installed.</p>	<p>Assessment Standard 11.4.4. is the focal Assessment Standard of LO4. The other LO4 Assessment Standards serve to develop the skills that will enable learners to achieve this one.</p> <p>11.4.4 Critically interpret two sets of data and representations thereof (with awareness of sources of error and bias) in order to draw conclusions on problems investigated and make predictions and to critique other interpretations.</p> <p><i>For example:</i> * compare data from two providers of tracking devices and draw conclusions about success rates.</p>	<p>Assessment Standard 12.4.4. is the focal Assessment Standard of LO4. The other LO4 Assessment Standards serve to develop the skills that will enable learners to achieve this one.</p> <p>12.4.4 Critically data, in order to draw conclusions on problems investigated to predict trends and to critique other interpretations.</p> <p><i>For example:</i> * compare data about stolen vehicles from providers of tracking devices with data provided by official sources like SAPS, and draw conclusions about the trend in vehicle thefts (types of cars most at risk, areas most at risk).</p>
<p>10.4.1 Investigate situations in own life by:</p> <ul style="list-style-type: none"> • formulating questions on issues such as those related to: <ul style="list-style-type: none"> ▪ social, environmental and political factors, ▪ people’s opinions, ▪ human rights and inclusivity; • collecting or finding data by appropriate methods (e.g. interviews, questionnaires, the use of data bases) suited to the purpose of drawing conclusions to the questions. <p><i>For example, investigate:</i> * substance abuse in the school, * water conservation, * prevalence of flu during winter, * approaches to discipline in the school.</p>	<p>11.4.1 Investigate a problem on issues such as those related to:</p> <ul style="list-style-type: none"> ▪ social, environmental and political factors; ▪ people’s opinions; ▪ human rights and inclusivity by: <ul style="list-style-type: none"> • collecting or finding data by appropriate methods (e.g. interviews, questionnaires, the use of data bases) suited to the purpose of drawing conclusions to the questions. <ul style="list-style-type: none"> ▪ using appropriate statistical methods; ▪ selecting a representative sample from a population with due sensitivity to issues relating to bias; ▪ comparing data from different sources and samples. <p><i>For example:</i> * conduct a survey in own school about home languages and comparing that with related data from other sources, * identify possible sources of bias in gathering the data,</p>	<p>12.4.1 Investigate a problem on issues such as those related to:</p> <ul style="list-style-type: none"> • social, environmental and political factors; • people’s opinions; • human rights and inclusivity by: <ul style="list-style-type: none"> ▪ collecting or finding data by appropriate methods (e.g. interviews, questionnaires, the use of data bases) suited to the purpose of drawing conclusions to the questions. ▪ using appropriate statistical methods; ▪ selecting a representative sample from a population with due sensitivity to issues relating to bias; ▪ comparing data from different sources and samples. <p><i>For example:</i> * challenge learners to compare claims about preferred TV programmes among teenagers with data from schools in their area,</p>

	<p>* investigate the increase in absenteeism at school (e.g. investigate the correlation between living conditions – squatter camps, houses – and absenteeism),</p> <p>* investigate the correlation between distance from school and absenteeism.</p>	<p>* compare preferences across grades or gender.</p>
<p>10.4.2 Select, justify and use a variety of methods to summarise and display data in statistical charts and graphs inclusive of:</p> <ul style="list-style-type: none"> • tallies; • tables; • pie charts; • histograms (first grouping the data); • single bar and compound bar graphs; • line and broken-line graphs. <p><i>For example:</i></p> <p>* pie charts to show the relative proportions of learners who have flu,</p> <p>* compound bar graphs to show the abuse of different substances in the respective Further Education and Training grades.</p>	<p>11.4.2 Select, justify and use a variety of methods to summarise and display data in statistical charts and graphs inclusive of:</p> <ul style="list-style-type: none"> • tallies; • tables; • pie charts; • single and compound bar graphs; • line and broken-line graphs; <p><i>For example:</i></p> <p>* interpret the meaning of points on a broken-line graph of house prices in 2002 – does it make sense to assign a monetary value to a point halfway between January and February?</p>	<p>12.4.2 Select, justify and use a variety of methods to summarise and display data in statistical charts and graphs to:</p> <ul style="list-style-type: none"> • describe trends (e.g. a positive linear association) <p><i>For example:</i></p> <p>* Does a positive correlation between age and height necessarily mean that height is dependent on age?</p> <p>* Does a positive correlation between mathematics marks and music marks necessarily mean that facility in mathematics is dependent on musical aptitude?</p> <p>* Does a positive correlation between pollution levels and TB infections necessarily mean that pollution causes TB?</p>
<p>10.4.3 Understand that data can be summarised in different ways by calculating and using appropriate measures of central tendency and spread (distribution) to make comparisons and draw conclusions, inclusive of the:</p> <ul style="list-style-type: none"> • mean; • median; • mode; • range. <p><i>For example:</i></p> <p>* investigate the cost of a trolley of groceries at three different shops in the area and report the findings by means of mean, median, mode and range.</p>	<p>11.4.3 Understand that data can be summarised and compared in different ways by calculating, and using measures of central tendency and spread (distribution), for more than one set of data inclusive of the:</p> <ul style="list-style-type: none"> • mean; • median; • mode; • range; <p><i>For example:</i></p> <p>* conduct a survey in own school about home languages and compare that with related data from other sources,</p> <p>* identify possible sources of bias in gathering the data,</p> <p>* use concepts of average, mode or median to interpret the data.</p>	<p>12.4.3 Understand that data can be summarised and compared in different ways by calculating and using measures of central tendency and spread (distribution), including:</p> <ul style="list-style-type: none"> • mean; • median; • mode; • quartiles; (INTERPRETATION ONLY) • percentiles.(INTERPRETATION ONLY) <p><i>For example:</i></p> <p>* compare the increase in the cost of a trolley of groceries to the increase in the consumer price food index, and report the findings in terms of variance and standard deviation of specific items,</p> <p>* compare academic results in own school to those in the province in terms of quartiles and percentiles.</p>

<p>10.4.5 Work with simple notions of likelihood/probability in order to:</p> <ul style="list-style-type: none"> express probability values in terms of fractions, ratios and percentages. 	<p>11.4.5 Work with simple notions of likelihood/probability in order to:</p> <ul style="list-style-type: none"> design simple contingency tables to estimate basic probabilities; Draw tree diagrams. <p><i>For example:</i> * draw a tree diagram to investigate the probability of getting three 'heads' when tossing three coins. .</p>	<p>12.4.5 Critically engage with the use of probability values in making predictions of outcomes in the context of games and real-life situations.</p> <p><i>For example:</i> * Investigate claims that the probability of winning a game of chance (e.g. a slot machine) improves if it has not produced a winner for some time.</p>
<p>10.4.6 Effectively communicate conclusions and predictions (using appropriate terminology such as trend, increase, decrease, constant, impossible, likely, fifty-fifty chance), that can be made from the analysis and representation of data.</p>	<p>11.4.6 Demonstrate an awareness of how it is possible to use data in different ways to justify opposing conclusions.</p>	<p>12.4.6 Critique statistically-based arguments, describe the use and misuse of statistics in society, and make well-justified recommendations.</p>