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29 November 2012

Mr Bobby Soobrayan
Director General
Department of Basic Education
222 Struben Street
PRETORIA

**AMESA report on the 2012 Mathematics & Mathematical Literacy
Examination Papers**

Dear Mr Soobrayan

On behalf of the National Council of the Association for Mathematics Education of South Africa (AMESA), I would like to commend the Department of Basic Education for the wonderful support afforded the Grade 12 learners and their teachers in the 2012 academic year.

As we have done for the past several years, I would like to make a formal submission of the AMESA Report on the 2012 Mathematics and Mathematical Literacy Examination Papers 1 and 2 that were written by the Grade 12 learners.

The purpose of the report is to provide constructive feedback to the Department in the spirit of promoting mathematics education and enhancing the quality of the teaching and learning of Mathematics in South Africa.

It is our hope that the report, especially the question by question analyses, will be useful to the examiners, markers and moderators in our attempt to promote the high standard of mathematics education in our country.

Sincerely

Alwyn Olivier
AMESA President

INTRODUCTION

The 2012 Grade 12 papers for Mathematics and Mathematical Literacy were written on Friday 2 November 2012 (Paper 1) and Monday 5 November 2012 (Paper 2).

AMESA regions (provinces) throughout South Africa soon after embarked on a workshop activity to review these papers according to specific criteria and guidelines. The provinces submitted their reports to the AMESA National Curriculum Committee. This report was then compiled by the Curriculum Committee and represents a summary of the findings and trends of the AMESA provincial reports.

The report covers specific comments on each paper focusing on the following aspects:

- A. Overall Review
 - 1. Technical Aspects (typing, diagrams, etc.)
 - 2. Language used and compliance with the cognitive levels of thinking
 - 3. Curriculum coverage
 - 4. Comparison with 2011 papers
 - 5. Overall Observations

- B. Question by Question Analysis

Participants were “trained” in the analysis of questions using the analysis tool at a workshop during AMESA’s annual congress in Potchefstroom in June 2012. Although we do not claim any validity of the analysis, we are nevertheless confident that it represents a fairly balanced and accurate perspective from a cross-section of teachers throughout the country.

MATHEMATICS PAPER 1

A. OVERALL REVIEW

1. Technical aspects (typing, diagrams, etc.)

The paper was clear with no typing errors. The diagrams were well constructed, neat and clear. The Department of Basic Education is to be complimented for its high technical standard.

2. Language used

The language used in the paper would be within the reach of most Grade 12 mathematics learners. Learners would have been familiar with the terms and concepts used in the paper. One area where there may have been confusion would be in question 7.1 where the term “diminishing-balance” rather than “reducing-balance” was used. However, this was not a serious issue as learners would have recognised the meaning of “diminishing” in this context.

3. Syllabus coverage

Code	Content/Topic	Suggested	November 2012
1	Patterns & Sequences (LO1)	30	31
2	Annuities & Finance (LO1)	15	17
3	Functions & Graphs (LO2)	35	33
4	Algebraic manipulation; equations (LO2)	20	21
5	Calculus (LO2)	35	34
6	Linear Programming (LO2)	15	14
	Total	150	150

The above table gives a clear indication of the sections which appeared in the paper. These are in line with the prescriptions of the Subject Assessment Guidelines for Mathematics.

4.1 Standard of paper

The paper appeared to be a reasonable paper with a good spread of questions across ability levels.

4.2 Compliance with levels of thinking

Code	Levels of thinking	Suggested	November 2012
1	Knowledge	± 25%	22,7%
2	Routine procedures	± 30%	36%
3	Complex procedures	± 30%	26%
4	Solving problems	± 15%	15,3%

The table above shows that the paper was well balanced and within the acceptable range for each level of thinking as prescribed by the Subject Assessment Guidelines.

5. Comparison with 2011 paper

The paper was similar in standard to the 2011 paper with a good alternation of testing concepts between 2011 and 2012. This ensured that the 2012 paper was “different” from the 2011 paper and was not easily predictable.

Learners were eased into the examination paper as question 1 this year was straight forward, thus, not putting learners off right from the start.

Certain questions also tested the understanding of concepts, rather than just normal procedures, for example, questions 1.3, 6, 8.3.2, 9.2.2, 9.3, 11.3.3

6. Overall verdict

It would appear to be a well-balanced, but cognitively demanding paper.

B. QUESTION BY QUESTION ANALYSIS

Quest.	Content	Levels				Marks	Topic	Comment
		1	2	3	4			
Question 1: Algebraic manipulation – Equations and inequalities								
1.1.1	Quad equation	2				2	4	Straight-forward
1.1.2	Quad equation	2	2			4		Use of formula
1.1.3	Quad inequality		3	1		4		Use number line or graph
1.2.1	Simultaneous equation	2	2	2		6		Solve for x in terms of y then substitute in $xy = 8$
1.2.2	Reflection		1	1		2		Procedural
1.3.1	Equal solutions		2			2		Equating term under square root sign to zero
1.3.2	No real solutions		1			1		Term under square root sign must be less than zero
Total		6	11	4		21		
Question 2: Patterns and sequences								
2.1	Arithmetic sequence	1	1			2	1	Form appropriate equation and solve for x
2.2.1	Term of arithmetic sequence	1	1			2		Use of simultaneous equations
2.2.2	Given S_n , calculate n	1	2	3		6		Forming a quadratic equation in n and solving
Total		3	4	3		10		
Question 3: Patterns and Sequences								
3.1.1	nth term of geometric sequence	2				2	1	Using appropriate formula for nth term
3.1.2	Sum to infinity	1				1		Recognising that $r < 1$
3.1.3	Calculate S_∞		2			2		Direct application
3.2	Problem solving				4	4		Applying sum of a series to a real-life problem
3.3.1	Quad sequence	3				3		Substitution in given expression
3.3.2	Greatest value	1				1		Maximum value of quadratic expression
3.3.3	2^{nd} difference		2			2		Find first and second differences
3.3.4	Determination of terms < -110			4	2	6		Solving quadratic inequality
Total		7	4	4	6	21		
Question 4: Functions and graphs								
4.1.1	y-intercept of exponential graph	1				1	3	Substituting $x = 0$ in function
4.1.2	x-intercept of exponential graph	1	1			2		Substituting $y = 0$ in function
4.1.3	Sketch of exponential graph	1	2			3		Sketch using calculated values and considering asymptotes
4.1.4	Range	1				1		Interpreting drawn graph
		1	2	3	4			
Quest.	Content	Levels				Marks	Topic	Comment

Quest.	Content	Levels				Marks	Topic	Comment
		1	2	3	4			
Question 4: Functions and graphs (cont.)								
4.2.1	Calculation of y-intercept			2		2		y-intercept of straight line; not obvious
4.2.2	Equation of parabola		2	2		4		Applying x-intercepts and using d's value from 4.2.1
4.2.3	Turning point of parabola		2			2		Routine procedure to calculate turning point
4.2.4	Two distinct roots				2	2		Interpreting parabola and a line parallel to x-axis which cuts parabola at two points
4.2.5	Maximum value of compound function			2	1	3		Finding the maximum value of f(x) and then h(x)
Total		4	7	6	3	20		
Question 5: Functions and Graphs								
5.1	Solve graph inequality		2			2	3	Use graph to find out when graph is above line $y = -9$
5.2	Inverse	1	1	1		3		Calculating inverse
5.3	Sketch of inverse	1	2			3		Sketching inverse and showing some points
5.4	Transformation	1				1		Describing a given transformation
Total		3	5	1		9		
Question 6: Functions and Graphs								
Total	Determining equation of hyperbola			2	2	4	3	Using given information to obtain equation of hyperbola; no obvious route
Question 7: Annuities and Finance								
7.1.1	Scrap value	2	1			3	2	Depreciation
7.1.2	Cost of new machine	1	2			3		Replacement cost
7.1.3	Sinking fund		1	2	2	5		Calculation of monthly payment
7.2	Compound investment; determining number of months	1	1	2	2	6		Calculation of n from investment and given monthly income
Total		4	5	4	4	17		
Question 8: Calculus								
8.1	First principles	2	3			5	5	Finding derivative from first principles
8.2	Using rules to differentiate	1	2			3		Using rules; different notation
8.3.1	Divide then differentiate		1	1		2		Derivative of a quotient; simplify first
8.3.2	Reasoning			1		1		$g(1)$ is undefined
Total		3	6	2		11		
		1	2	3	4			
Quest.	Content	Levels				Marks	Topic	Comment

Quest.	Content	Levels				Marks	Topic	Comment
		1	2	3	4			
Question 9: Calculus								
9.1.1	x-coordinates of turning points cubic graph		2	2		4	5	Differentiate and solve for x
9.1.2	x-coordinate of point where $f'(x)$ is a maximum		2	1		3		Maximum value of derived function (quadratic)
9.2.1	Equation of tangent		2	2		4		Substitute $x = -1$ in derivative to obtain gradient; substitute $x = -1$ in function to get y value; use gradient-point method
9.2.2	No point of intersection			2	1	3		Roots are not real
9.3	Reasoning				3	3		Derivative is always positive
Total			6	7	4	17		
Question 10: Calculus								
10.1	Initial velocity	1	2			3	5	Differentiate distance
10.2	Rate of change of velocity	1				1		Differentiate velocity
10.3	Calculation of time		1	1		2		Calculate t when $s(t)$ is a minimum
Total		2	3	1		6		
Question 11: Linear programming								
11.1	Interpreting graphs in linear programming			1		1	6	Check whether the point (15;5) lies in feasible region
11.2	Algebraic inequalities/constraints	2	2	2		6		Formulating algebraic inequalities
11.3.1	Maximum profit		1			1		Identifying the point which shows maximum profit
11.3.2	Profit from graph				2	2		Comparing profit
11.3.3	Maximum value of a quotient			2	2	4		Calculation of gradient
Total		2	3	5	4	14		

Summary of marks and levels					
Question	Levels				Marks
	1	2	3	4	
1	6	11	4		21
2	3	4	3		10
3	7	4	4	6	21
4	4	7	6	3	20
5	3	5	1		9
6			2	2	4
7	4	5	4	4	17
8	3	6	2		11
9		6	7	4	17
10	2	3	1		6
11	2	3	5	4	14
Total	34	54	39	23	150
Percentage	22,7	36	26	15,3	100%

MATHEMATICS PAPER 2

A. OVERALL REVIEW

1. Technical Aspects (typing, diagrams, etc)

As far as the technical criteria of compliance are concerned, the typing was clear and error free, diagrams were clear and understandable. In question 6, the point K is not specified or described. However, most learners took K as the x-intercept of the line PQ. It would have helped learners see the 3D in question 12 if the floor plane CBD was shaded.

2. Language used

The language usage was clear and understandable. It is expected that learners would have been familiar with the language used in the paper as they would have come across terms and concepts used in this paper in their school based assessment tasks and from previous papers. There were no terms or phrases that would have disadvantaged learners considerably.

3. Syllabus coverage

Code	Content/Topic	Suggested	November 2012
1	Coordinate Geometry	40	37
2	Transformation Geometry	25	23
3	Trigonometry	60	62
4	Data Handling	25	28
	Total	150	150

4.1 Standard of paper

It was an excellent paper with a good balance between routine and higher order questions. There were some challenging questions but these could not be regarded as unfair.

4.2 Compliance with levels of thinking

Code	Levels of thinking	Suggested	November 2012
1	Knowledge	± 25%	22%
2	Routine procedures	± 30%	33,3%
3	Complex procedures	± 30%	30%
4	Solving problems	± 15%	14,7%

The above table shows that the paper was well balanced and in line with the prescriptions of the Subject Assessment Guidelines for Mathematics.

5. Comparison with 2011 paper

Teachers commented that this paper was far superior to the 2011 paper. The examiners are to be commended for a thought-provoking, quality paper.

6. Overall verdict

The paper could be classified as a **fair, well balanced paper**. Learners who were well prepared should pass as there were enough "knowledge and "routine procedures" to enable learners to pass.

B. QUESTION BY QUESTION ANALYSIS

Quest.	Content	Levels				Marks	Topic	Comment
		1	2	3	4			
Question 1: Data handling								
1.1	Interpret scatter plot	1				1	4	Straight-forward
1.2	Analyse scatter plot		1			1		Describe trend
1.3	Reading off approximate values		2	1		3		Approximate increase
1.4	Reasoning				1	1		Knowing that one's height reaches a maximum value by age 18 and remains the same
	TOTAL	1	3	1	1	6		
Question 2: Data handling								
2.1	Average	2				2	4	Add and divide by 8
2.2	Standard deviation		2			2		Simple use of calculator
2.3	Adding data and effect on standard deviation			2		2		Effect of performance with larger data set
2.4	Average	1		2		3		Average of last 5 games to influence overall average, no obvious route
	TOTAL	3	2	4		9		
Question 3: Data handling								
3.1	Interpret box-and-whisker diagram	1				1	4	Simple application
3.2	Draw box-and-whisker diagram	2	2			4		Simple drawing
3.3	Interpret diagram drawn		1	1		2		Interpretation
3.4	Validity of claim				2	2		Justification of claim
	TOTAL	3	3	1	2	9		
Question 4: Data handling								
4.1	Modal class from ogive		1			1	4	Determining the highest frequency
4.2	Median weight from ogive		1			1		Locating the middle value
4.3	Calculation from ogive	1	1			2		Simple calculation
	TOTAL	1	3	0	0	4		
Question 5: Coordinate geometry								
5.1	Midpoint of a rhombus		2			2	1	Simple calculation
5.2	Gradient of line BC	1	1			2		Gradient of BC = gradient of BE
5.3	Equation of line AD		2	1		3		Gradient of AD = gradient of BC, use point -gradient
5.4	Calculate angle using gradient			3	3	6		High level, using two sets of gradients and properties of triangles and rhombus
	TOTAL	1	5	4	3	13		
		1	2	3	4			
Quest.	Content	Levels				Marks	Topic	Comment

Quest.	Content	Levels				Marks	Topic	Comment	
		1	2	3	4				
Question 6: Coordinate geometry									
6.1	Radius \perp tangent	1				1	1	Known fact	
6.2	Coordinate of point on x-axis	1				1		Simple procedure	
6.3	Equation of circle	1	2			3		Know centre and radius NL	
6.4	Length of KL		1	2		3		Find K and subtract	
6.5	Equation of AB	2	2			4		Know gradient of PQ, use gradient-point method	
6.6	Calculation of coordinates of A		1	2		3		Point of intersection	
6.7	Length of KA		1	2		3		Use distance formula	
6.8	Show KLNA is a kite		1		1	2		Properties of a kite	
6.9	Show angle $ABK = 45^\circ$		1		2	3		Know KA and AB, use tan ratio	
6.10	Coordinates of centre of new circle		1			1		Simple procedure	
	TOTAL	5	10	6	3	24			
Question 7: Transformation geometry									
7.1	Transformation		1	1		2	2	Describing a single transformation (rotation)	
7.2	General rule	1	1			2		Writing down the general rule	
7.3	Drawing an enlargement		2			2		Drawing enlarged triangle	
7.4	General rule	1				1		Writing down the general rule	
7.5.1	Reflection		1	1		2		Coordinates of image	
7.5.2	General rule	2				2		Writing down the general rule	
7.5.3	Transformation				2	2		Describing a single transformation	
	TOTAL	4	5	2	2	13			
Question 8: Trigonometry									
8.1.1	Value from diagram		2			2	3	Calculate k using theorem of Pythagoras	
8.1.2	Value of $\cos \alpha$	1				1		Simple procedure	
8.1.3	Value of $\cos \beta$	2				2		Reduction, simple procedure	
8.1.4	Value of $\sin(\beta - \alpha)$	1	1	2		4		Application of compound angle expansion	
8.2.1	Proving an identity			4		4		Using known identities to prove given identity	
8.2.2	Solving trig equation	1	2	1		4		Simple trig equation	
	TOTAL	5	5	7	0	17			
Question 9: Trigonometry									
9.1	Simplifying trig Expression	1	2	2		5	3	Different reductions and special angle	
9.2	Simplifying without using a calculator	2	2	2	2	8		Rewriting angles in terms of suitable angles and simplify without a calculator	
	TOTAL	3	4	4	2	13			
Question 10: Trigonometry									
10.1	Calculation from trig graphs	1				1	3	Substitute or read off and subtract	
10.2	x-coordinates of points of intersection to be calculated			5	2	7		Solve trig equations	
10.3	Interpreting graph inequality	1	1			2		When is $f(x)$ above and equal to $g(x)$?	
10.4	The relationship between two graphs			2		2		Describing a given relationship; solution not obvious	
	TOTAL	2	1	7	2	12			
		1	2	3	4				
Quest.	Content	Levels				Marks	Topic	Comment	

Quest.	Content	Levels				Marks	Topic	Comment
		1	2	3	4			
Question 11: Trigonometry								
11.1	Area of parallelogram	1	2			3	3	Simple application
11.2	Given the area, calculate θ	1	2			3		Calculating an angle from the area formula
11.3	Area of parallelogram is a maximum				2	2		What angle will make $6\sin \theta$ a maximum?
	Total	2	4		2	8		
Question 12: Trigonometry								
12.1	Using trig rules to determine CB in terms of k and $\sin x$	1	2	2		5	3	Application of trig rules and identities
12.2	Length (of rope)	1		2		3		Use the cosine ratio
12.3	Calculate angle (between ropes)	1	1	1	1	4		Use of cosine rule
	TOTAL	3	3	5	1	12		
Question 13: Transformation geometry/Trigonometry								
13.1	Calculate transformed point (after rotation through an angle about the origin)			4	2	6	2/3	Rotation through an angle
13.2	Calculate the angle between OD and OD'		2		2	4		Difference between angle POD and P'OD'
	TOTAL		2	4	4	10		

Summary of marks and levels					
Question	Levels				Marks
	1	2	3	4	
1	1	3	1	1	6
2	3	2	4	-	9
3	3	3	1	2	9
4	1	3	0	0	4
5	1	5	4	3	13
6	5	10	6	3	24
7	4	5	2	2	13
8	5	5	7	0	17
9	3	4	4	2	13
10	2	1	7	2	12
11	2	4	-	2	8
12	3	3	5	1	12
13		2	4	4	10
Total	33	50	45	22	150
Percentage	22%	33,3%	30%	14,7%	100%

MATHEMATICAL LITERACY PAPER 1

A. OVERALL REVIEW

1. Technical Aspects (typing, diagrams, etc.)

The technical aspects of the paper are in keeping with the high standard set by the Department of Basic Education. All diagrams, graphs, etc were clear and readable.

2. Language used

There was good use of language in the paper. The terminology used should have been familiar to most Mathematical Literacy learners. However, learners had to do a lot of reading before getting to the questions (questions 2.1; 2.4; 4.1; 5.2, 6). This would disadvantage 2nd language learners. Some teachers described the paper as a “comprehension” test.

3. Syllabus coverage

Code	Learning Outcomes	Suggested	November 2012
LO1	Numbers and operations in context	37	34
LO2	Functional relationships	38	36
LO3	Space, Shape and measurement	38	39
LO4	Data Handling	37	41
	Total	150	150

The coverage of the paper in terms of the 4 learning outcomes was in keeping with the Subject Assessment Guidelines for Mathematical Literacy.

4.1 Standard of paper

The question paper was of a good and acceptable standard for Mathematical Literacy paper 1. The questions were set in such a way that it is easy to distinguish between the sub-sections. The questions ranged from very easy to slightly difficult. This is in keeping with the departmental requirement that only “knowledge” and “routine procedures” questions form part of Mathematical Literacy P1.

Teachers observed that too many marks were allocated to the following questions: 1.1.7 ; 1.2 ; 1.3.4 ; 1.4.2 ; 2.1.1 ; 2.1.2 ; 3.3.3 ; 4.1.3 ; 6.3.3 ; 6.4.2(b)

4.2 Compliance with levels of thinking

Code	Levels of thinking	Suggested	November 2012
1	Knowledge	± 25%	56%
2	Routine procedures	± 30%	44%
3	Complex procedures	± 30%	-
4	Solving problems	± 15%	-

According to the Subject Assessment Guidelines, Mathematical Literacy Paper 1, comprises of only “knowledge” and “routine procedures” questions. Our analysis of the paper revealed the above mark allocation which was within the prescribed guidelines.

5. Comparison with 2011 paper

The 2012 was set at a similar standard to the 2011 paper, but marginally more difficult when comparing the “knowledge” and “routine procedures” questions for both years.

Nonetheless, some teachers reported that learners were able to finish the paper within two hours.

6. Overall verdict

A very fair but “easy” paper, set at the appropriate Grade 12 standard. Learners (and teachers) cannot complain about this paper.

B. QUESTION BY QUESTION ANALYSIS

Quest.	Content	Levels				Marks	Topic	Comment
		1	2	3	4			
Question 1								
1.1.1	Number calculations	2				2		Easy calculations
1.1.2	Conversion of decimal to fraction	2				2		Very easy
1.1.3	Conversion of units	2				2		
1.1.4	Multiplication	2				2		
1.1.5	Time calculations	2				2		
1.1.6	Exchange rate	2				2		Division
1.1.7	Probability	2				2		'Silly' question!
1.1.8	Median	2				2		Some learners may struggle with three rows of data from a reading perspective
1.2	Reading off bar graph	3				3		May be difficult to read
1.3.1	Multiplication	2				2		Easy
1.3.2	Division	2				2		
1.3.3	Subtraction	2				2		
1.3.4	VAT calculation		3			3		Learners may find 14% of R21,89 instead of subtracting
1.4.1	Read off table	2				2		
1.4.2	Read off table	2				2		
1.4.3	Read off table	2				2		Subtraction
	TOTAL	31	3			34		
Question 2								
2.1.1	Counting	2				2		Easy
2.1.2	Probability	2				2		
2.1.3a	Circumference	2				2		Substitution in formula
2.1.3b	Area of sector	1	2			3		
2.2.1	Percentage increase	1	2			3		Is it necessary to give the formula?
2.2.2	Distance	2				2		
2.3.1	Read off graph	2				2		2 marks for reading-off a value
2.3.2	Read off graph	1				1		1 mark for identifying who lives closer
2.3.3	Calculation of time	2				2		
2.3.4	Estimation of arrival time	2				2		
2.3.5	Interpretation from graph	2				2		
2.4.1	Reading off table and then calculating		3			3		Not necessary to mention the R31,50 – it may just cause confusion
2.4.2	Substitution in formula	3				3		
	TOTAL	22	7			29		
Question 3								
3.1.1	Hire purchase		2			2		
3.1.2	Depreciation	1	2			3		
3.2.1	Petrol consumption	1				1		Easy substitution
3.2.2	Petrol consumption	2				2		
3.3.1	Grid reference	2				2		
3.3.2	Read off street map	2				2		
3.3.3	Direction		2			2		Will east be accepted?
3.3.4	Distance using a scale		2			2		
	TOTAL	8	8			16		
		1	2	3	4			
Quest.	Content	Levels				Marks	Topic	Comment

Quest.	Content	Levels				Marks	Topic	Comment
		1	2	3	4			
Question 4								
4.1.1	Ascending order	2				2		Easy
4.1.2	Read from table	1	1			2		Subtraction
4.1.3	Mode of litter size	2				2		Use of the word "modal" may confuse learners
4.1.4	Range	2				2		
4.1.5	Mean	1	2			3		
4.1.6	Ratio	1	1			2		
4.1.7	Compound bar graph		7			7		Half the graph is given; mark allocation too high
4.2.1	Length		2			2		
4.2.2	Height – conversion	2				2		Easy multiplication
	TOTAL	11	13			24		
Question 5								
5.1.1	Counting from plan	1				1		
5.1.2	Scale – conversion		2			2		
5.1.3	Length	2				2		Easy subtraction
5.1.4	Percentage calculation	1	2			3		
5.2.1	Ratio calculations		3			3		Wording may confuse 2 nd language learners
5.2.2	Volume	2				2		Should the shape trapezium be in a routine application paper?
5.2.3	Tiled area		4			4		Selecting correct information and substituting in formula
5.2.4	Length of strip	2				2		Simple substitution
	TOTAL	8	11			19		
Question 6								
6.1	Distance - rate		2			2		Generally too much reading
6.2	Product of weight and grams per kg	1	2			3		
6.3.1	Interpret table	1				1		
6.3.2	Average pace		4			4		Formula over-explained
6.3.3	Line graph		8			8		
6.4.1	Frequency table		4			4		
6.4.2a	Percentage		2			2		
6.4.3b	Reading from graph	2				2		
6.4.3c	Actual number		2			2		
	TOTAL	4	24			28		

Summary of marks and levels					
Question	Levels				Marks
	1	2	3	4	
1	31	3			34
2	22	7			29
3	8	8			16
4	11	13			24
5	8	11			19
6	4	24			28
Total	84	66			150
Percentage	56%	44%			100%

MATHEMATICAL LITERACY PAPER 2

A. OVERALL REVIEW

1. Technical Aspects (typing, diagrams, etc.)

The technical aspects of the paper are in keeping with the high standard set by the Department of Basic Education. However, question 1.1 (map-work), was difficult to work with as the intersection of national roads was not easy to pick up from the map.

2. Language used

This paper required a great deal of reading and interpretation. Although the language was mostly fair and within the scope of learners' reading ability, learners with a poor grasp of English would have struggled with the paper. However, learners who were taught well and were given enough practice with paper 2 type questions should have no problem with the language in the paper.

3. Syllabus coverage

Code	Learning Outcomes	Suggested	November 2012
LO1	Numbers and operations in context	37	39
LO2	Functional relationships	38	34
LO3	Space, Shape and measurement	38	41
LO4	Data Handling	37	36
	Total	150	150

The allocation of marks in the four learning outcomes was in accordance with the subject assessment guidelines as indicated in the above table. However, teachers pointed out that key topics (contexts) such as compound interest, taxation and inflation were not included, while the horizontal bar graph and pie chart were included in both papers. Some teachers also questioned the relevance of the aircraft context in question 4.

4.1 Standard of paper

The paper was of a good standard as expected for Mathematical Literacy Paper 2.

Learners had to do a lot of reading as the questions were very wordy. Learners may have had problems with the terminology used in the paper. In this regard, 2nd language learners (with a poor grasp of English) would have been affected the most.

Teachers also stated that:

- Learners will struggle with the multi-step questions as very few guidelines were given.
- There are some cases where if learners can't get the first part of the question they will not be able to answer the rest of the question and will lose substantial marks
- In this regard, CA should be used in order for learners not to be unfairly penalized.

Teachers reported that, in general, learners struggled to complete the paper.

4.2 Compliance with levels of thinking

Code	Levels of thinking	Suggested	November 2012
1	Knowledge	± 25%	-
2	Routine procedures	± 30%	20%
3	Complex procedures	± 30%	42%
4	Solving problems	± 15%	38%

The cognitive levels in the paper as shown above are in keeping with the Subject Assessment Guidelines for Mathematical Literacy.

5. Comparison with 2011 paper

It was set along similar lines to the 2011 paper. There were a number of questions which required a great deal of reading and sifting through of information in a variety of guises (words, tables, graphs, pictures, diagrams). This made the paper very cognitively demanding and placed learners under added pressure.

6. Overall verdict

A very comprehensive paper set at the appropriate Grade 12 standard. The paper appeared to be balanced both cognitively and in terms of content coverage. We would classify this paper as being **fair but challenging** (in the context of what Mathematical Literacy Paper 2 is intended to achieve).

Although some key content/ contexts were not covered, teachers believed that this paper would more than compensate for the “easy” Paper 1.

B. QUESTION BY QUESTION ANALYSIS:

Quest.	Content	Levels				Marks	Topic	Comment
		1	2	3	4			
Question 1								
1.1.1	Direction		2			2	LO 3 LO1 LO2	Fair
1.1.2	Map-work		2			2		Too many routes to consider
1.1.3	Map-work - direction			2	2	4		Difficult to mark as it is not clear where national roads join
1.2.1	Payment		2			2		What is "nearly a week"?
1.2.2a	Equation			3		3		Fair
1.2.2b	Cost of meals		2	2		4		Confusing questions; contradictory
1.2.3	Financial				9	9		Confusing question; difficult to answer because of contradictory information
TOTAL			8	7	11	26		
Question 2								
2.1.1.a	Measure of central tendency (time)		2			2	LO 3 LO4	If they can't do this question they will lose marks in the next two parts of this question
2.1.1 b	Use of mean calculation			2	2	4		
2.1.1 c	Median waiting			3		3		
2.1.2	Application of lower quartile		2			2		
2.1.3	Comparison with reasons				4	4		Too little marks allocated
2.2.1	Working with percentages			2	2	4		Ratio and proportion
2.2.2	Probability			2		2		
2.3.1	Reasoning		2	2		4		Context may be foreign to some learners
2.3.2	Length				9	9		Difficult - formula for cylinder, not half cylinder being given, many steps. CA should apply to marking
TOTAL			6	11	17	34		
Question 3								
3.1.1	Creating a formula		2			2	LO2	Question 3 is a good question requiring insight
3.1.2 a	Inverse proportion		1			1		
3.1.2 b	Calculation of missing values		2	2		4		
3.1.2 c	Drawing a graph			4		4		
3.2.1	Increase in price			2		2		Possible reason
3.2.2	Disadvantage of increase in price			2		2		
3.2.3	Drawing a graph		4	4		8		No table given
3.2.4	Calculation from graph			3		3		
TOTAL			9	17		26		
		1	2	3	4			
Quest.	Content	Levels				Marks	Topic	Comment

Quest.	Content	Levels				Marks	Topic	Comment
		1	2	3	4			
Question 4								
4.1.1	Choosing from table			3		3	LO3	Language "... along with 37..."
4.1.2	Working out a scale			4		4		
4.1.3	Distance			3		3		Too few marks
4.1.4	Making a choice after calculations				4	4		Reasoning and reflecting
4.1.5	Fuel capacity			3		3		
4.2.1	Choosing from table				3	3		Very wordy; lots of reading and calculations for only 3 marks
4.2.2 a	Drawing a line graph			4		4		
4.2.2 b	Interpret line graphs				3	3		Reasoning
	TOTAL			17	10			
Question 5								
5.1.1	Read off from graph at correct place		3			3	LO2 LO4	Many learners will give answer only
5.1.2	Verifying calculations				4	4		The word "verify" may confuse learners; the word "determine" could have been used
5.2.1	Calculate missing values in table		2	5		7		Too many marks
5.2.2	Verifying calculations				5	5		See 5.1.2
5.2.3 a	Calculation of bonus				2	2		
5.2.3 b	Verification of Mabel's bonus				8	8		
5.3.1	Interpreting compound bar graph			2		2		
5.3.2	Interpretation of graph (errors)			4		4		Explaining errors in misinterpretation.
5.3.3	Naming other types of graphs		2			2		
	TOTAL		7	11	19	37		

Summary of marks and levels					
Question	Levels				Marks
	1	2	3	4	
1		8	7	11	26
2		6	11	17	34
3		9	17		26
4			17	10	27
5		7	11	19	37
Total	0	30	63	57	150
Percentage	0%	20%	42%	38%	100%