NSC 2011 CHIEF MARKER'S REPORT

SUBJECT	MATHEMATICS

PAPER	2

DATE OF EXAMINATION:	31-11-2011	DURATION:	3 hrs

This report is aimed at providing valuable feedback to schools, subject advisors, teachers and learners about common errors committed by candidates in the answering of questions, to assist teachers and subject advisors to identify areas that need to be given special attention in the teaching and learning of the subject in 2012.

Your responses will be based on two parts:

Section 1: General overview of Learner performance in the question paper as a whole

Section 2: Comment on candidates' performance on individual questions (Detailed explanations must be provided **per question** as follows: (You may include sub questions where necessary)

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

(b) Why the question was poorly answered?

(c) Provide suggestion for improvement in relation to teaching and learning

(d) Describe any other specific observations relating to responses of learners

(e) Any other comments useful to teachers, subject advisors, teacher development

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SECTION 1:

(General overview of Learner Performance in the question paper as a whole)

If one reports on the performance of candidates from an <u>overall</u> perspective, in view of the situation that a very high percentage of candidates scored less than 30%, then one would have to say that it was a VERY HARD PAPER indeed.

However, if one looks at the situation from the perspective of those candidates (a small minority) who enjoy competent teaching and put in hard work, then one's comment is entirely different. I would say that the paper, on the whole, was fair.
It is noted that learners from urban areas performed far better than those from rural areas.

Lack of commitment from the part of learners is obvious.

The paper contained a generous share of routine Level 1 questions which made it easy to pass and, indeed, easy to do reasonably well. Against this, there were some really testing questions which will reduce the number of learners scoring more than 95%.

Bearing the above in mind, then, it has to be said AGAIN that <u>unless and until the vast majority of pupils are in Mathematics classes being taught by interested and capable teachers,</u> the above scenario will play out repeatedly year after year.
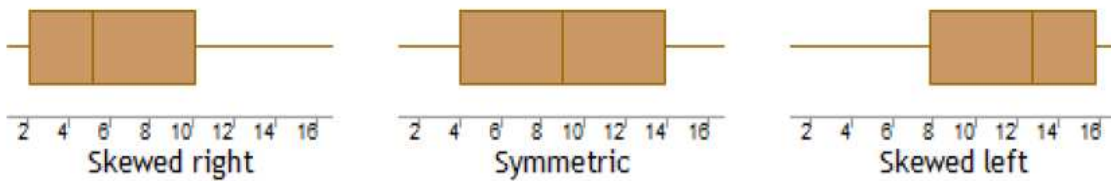
That said, despite a couple of weird questions (1.4; 10.4), the examiners have come up with a good paper. This tougher examination is to be welcomed.

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(c) **Provide suggestions for improvement in relation to Teaching and Learning**

➢ A clear understanding of the topic'' Box and whisker diagram and skewness'' is emphasized here.

| 2 4 6 8 10 12 14 16 | 2 4 6 8 10 12 14 16 | 2 4 6 8 10 12 14 16 |
| Skewed right | Symmetric | Skewed left |

➢ The misconceptions about this topic must be clarified by the subject advisors. A workshop on this particular topic is essential.

(d) **Describe any other specific observations relating to responses of learners**

➢ In Q 1.2 many learners calculated "range" instead of IQR.

➢ Some learners used the formula: $\dfrac{Q_3 - Q_1}{2}$ to calculate IQR.

➢ In Q 1.3 many learners simply drew a median line anywhere in the box and lost 1 mark for the skewness.

➢ Learners were not properly taught. Even the teachers were confused whether it is skewed to the left or skewed to the right.

e) **Any other comments useful to teachers, subject advisors, teacher development etc.**

➢ A chart may be displayed in the class with the relevant formulae or diagrams used in a topic.

➢ Teachers and subject advisors must do research on such topics by referring good books or by means of internet.

➢ Some text books mislead both teachers and learners.

➢ Text books must be approved by the subject experts from the National department of education.

➢ A prescribed text book for Mathematics approved by the National department of education for the whole country is highly recommended.

QUESTION 2

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

This question was well answered. It is noted that most of the learners have the knowledge of using calculator to find the standard deviation.

(c) Provide suggestions for improvement in relation to Teaching and Learning

➤ Teachers must encourage learners to use good scientific calculators.

(d) Describe any other specific observations relating to responses of learners

➤ Many learners still use the table method to calculate the standard deviation. It should be discouraged as it takes too much of their time in the exam.

e) Any other comments useful to teachers, subject advisors, teacher development etc.

➤ Subject advisors must recommend good scientific calculators for all learners in Grade 12 as part of LTSM.

➤ Learners promoted to Grade 10 don't have the knowledge of most of the basic concepts in maths. An external examination for Grade 9 and centralised marking is recommended.

QUESTION 3

(a)	General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

This question was well answered.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

(c) Provide suggestions for improvement in relation to Teaching and Learning

> ➢ More practice on scatter plot using graph sheets will improve the understanding of this topic.

> ➢ A clear understanding of the best fit line (linear, quadratic or exponential) is emphasized.

(d)	Describe any other specific observations relating to responses of learners

> ➢ The concept of ''best fit line'' is not clear to many learners.

> ➢ Some learners answered ''quadratic'' or "exponential'' relationship.

> ➢ Some answered in terms of gradient.

e)	Any other comments useful to teachers, subject advisors, teacher development etc.

> ➢ Provide graph papers or grid when teaching this topic.

> ➢ CASS assessment tasks (control tests, investigations, projects, June exam and trial exam etc.) must be standardised and should be common to all learners in the province.

> ➢ Teachers must make a list of the sections where they need support and submit to the subject advisors.

QUESTION 4

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

In general it was well answered.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Teachers have to give more practice in drawing an ogive.
- ➤ The upper limits of the intervals are used as the x-values.
- ➤ Do not use lower limits or middle values as the x-values.
- ➤ Cumulative frequencies are used as the y-values.
- ➤ The ogive must be grounded to the lower limit of the first interval.
- ➤ Do not use ruler to join the points.
- ➤ Draw a smooth curve.

(d) Describe any other specific observations relating to responses of learners

- ➤ Many learners used the lower limits or middle values of the intervals as the x-values.

- ➤ Many learners grounded the ogive at (0; 0) instead of at (1; 0).

- ➤ In Q 4.2 some learners did not insert the diagram sheet.

- ➤ In Q 4.3 many learners failed to estimate the percentage.

(e) Any other comments useful to teachers, subject advisors, teacher development etc.

- ➤ Teachers must provide graph sheets or grid when practicing questions on ogive.

- ➤ Learners must be taught how to read the accurate value from an ogive.

QUESTION 5

(a) **General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?**

This question was answered very well by some, but many answered poorly.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

➢ All subsections of this question were indirect.

➢ Learners lack even the basic concepts of "gradient", "midpoint", "parallel and perpendicular lines", "equation of a straight line" etc.

➢ Q 5.1; 5.2; 5.3; 5.6 could be answered in many ways. But the learners failed in their knowledge and method.

➢ Q 5.7: Most of the learners failed in translating the points P and S. The minimum value of $k + l$ was a bit confusing.

(c) Provide suggestions for improvement in relation to Teaching and Learning

➢ Analytical geometry must be taught very well in Grade 10, 11 and 12. Teachers must make sure that the learners learn the concepts and then apply them in the context.

➢ Simply teaching the formulae and using them in direct questions is not enough in the examination context.

➢ Practice more level 4 questions.

➢ A proper revision of Analytical geometry taught in Grade 11 must be done in Grade 12.

➢ Make use of the past exam papers.

(d) **Describe any other specific observations relating to responses of learners**

In Q 5.7 some learners answered $k \geq 4$ and $l \geq 4$

e)   Any other comments useful to teachers, subject advisors, teacher development etc.

Subject advisors must visit their educators time to time and give them set of good questions and memorandums.

QUESTION 6

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

In general the question was answered very poorly. Some answered it perfectly well.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

➢ It was a challenging question.

➢ Learners could not identify the angle θ at B and D the same.

➢ In Q 6.4 they failed to realize the gradient of DC = $\tan\theta$

➢ In Q 6.5 learners failed to get the equations of AB and DC and then to solve simultaneously for the coordinates of A.

(c) Provide suggestions for improvement in relation to Teaching and Learning

➢ Analytical geometry of circles linked to trigonometry was applied in the question. Therefore practicing more challenging questions is essential.

➢ Teachers must encourage their learners in applying their knowledge into challenging contexts.

(d) Describe any other specific observations relating to responses of learners

➢ Few learners somehow assumed A (-3; 5) and used in Q 6.2 while the coordinates of A could be calculated only in Q6.5.

e) Any other comments useful to teachers, subject advisors, teacher development etc.

➢ Study materials are of at most importance for both learners and teachers.

➢ Teachers have to dedicate themselves to give extra lessons on Saturdays especially for the weaker learners.

QUESTION 7
(a) **General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?**
Q 7.1 was answered fairly well but Q 7.2 was poorly answered.
(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.
➢ In Q 7.2 learners failed to reflect the centre (-5;-2). They used (-5;-2) as the centre of the image instead of (-2;-5) and determined the equation.
(c) Provide suggestions for improvement in relation to Teaching and Learning
➢ Demonstrate transformation geometry concepts using power point presentations. ➢ Transformation geometry taught in Grade 10 and 11 must be revised in Grade 12. ➢ Practice challenging questions on translation, reflection and rotation.
(d) **Describe any other specific observations relating to responses of learners**
➢ In Q 7.1 many learners wrote $(x; y) \rightarrow (x+4; y) \rightarrow (-x+4; -y)$
e)   Any other comments useful to teachers, subject advisors, teacher development etc.
➢ Laptop and digital projectors must be included in the LTSM. ➢ Subject advisors have to make necessary arrangements to supply these materials to all Maths teachers. ➢ Learners should be encouraged to take part in Maths Olympiad.

QUESTION 8

(a)   General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

Q 8.1 and 8.2 were well answered while Q 8.3 and 8.4 were poorly answered.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

➢ In Q 8.3 learners were a bit confused in reflecting ABCD about the line $x = -1$.

➢ Many wrote G (-5;-6) as the image of C.

➢ In Q 8.4 many learners failed to use $\left(\dfrac{3}{2}\right)^2$ to calculate the area of MNRP.

➢ Instead of writing the product of two areas learners wrote the ratio
Area ABCD: Area MNRP. They did not expect a question to find the product of two areas.

(c) Provide suggestions for improvement in relation to Teaching and Learning

➢ Demonstrate transformation geometry concepts using power point presentations.

➢ Transformation geometry taught in Grade 10 and 11 must be revised in Grade 12.

➢ Practice challenging questions on translation, reflection and rotation.

(d)   Describe any other specific observations relating to responses of learners

➢ Many learners failed in writing the unit^2 for the area as well as (unit)^4 for the final answer.

➢ Reflection on the line $x = -1$ was new to learners.

e)   Any other comments useful to teachers, subject advisors, teacher development etc.

➢ Teachers have to approach their colleagues in their cluster or the subject advisors for more support.

➢ Teachers have to refer as many text books as possible before introducing a topic.

➢ Make use of the vast resources available in internet in order to develop the teaching method and strategies. There are many interesting videos in YOUTUBE that teachers can download and use in classroom to make teaching and learning more interesting.

QUESTION 9

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

Most learners answered above average except Q 9.3

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- ➤ A lot of trigonometry is done in Grade 11 and never revised it in Grade 12.

- ➤ In Q 9.2 candidates wrote $\tan^2 120^o = -\tan^2 60^o$ and lost mark.

- ➤ Although the instruction was very clear **not** to use the calculator, some learners used the latest scientific calculator (fx- 82 ES) to get the answer and lost 6 marks.

- ➤ Q 9.3: The learners did not understand the question clearly. They failed to make use of the given information in the diagram.

(c) Provide suggestions for improvement in relation to Teaching and Learning

- ➤ Learners need to be taught how to choose the correct quadrant and also label the sides.

- ➤ The topics **''Reduction formulae''** and'' **Rotation''** must be taught very well in grade 11 and 12.
- ➤ Rotation of a point through any angle must be taught in Grade 12 and familiarize the learners with the formulae given on the information sheet.

- ➤ Practice challenging questions.

(d) Describe any other specific observations relating to responses of learners

- ➤ In Q 9.1 many learners drew the diagram in wrong quadrants and labeled incorrectly.

- ➤ Learners tend to use calculators though they have been instructed not to use them.

- ➤ Many learners used wrong formula.

- ➤ Some failed to round off to TWO decimal places and lost 1 mark in Q 9.3.3

- ➤ Another alternate approach found in one of the scripts is given at the end of this report.

e) Any other comments useful to teachers, subject advisors, teacher development etc.

- ➤ Make use of a digital projector and PowerPoint presentation in teaching ''Rotations''.
  Learners will get more clarity on clockwise and anticlockwise rotation.

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QUESTION 10

(a)   General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

Generally this question was well answered except Q 10.4

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

➤   Q 10.4 was ambiguous and the memo was closed in that.(4marks)

➤   Learners were never allocated marks when they explained correctly without calculation.

➤   Proving $(180^{o} - \theta)$ as the x-coordinate of Q was a challenge to even the very clever learners.

(c) Provide suggestions for improvement in relation to Teaching and Learning

➤   Teachers should make sure that they include transformation geometry when they are dealing with trigonometry.

(d)   Describe any other specific observations relating to responses of learners

➤   Learners tend to fumble when answering questions.

➤   They lack interpretation skills.

➤   Many learners lack knowledge of period.

➤   Some learners have a problem of working with fractions.

    In Q 10. 3 they wrote $\dfrac{180^{o}}{\dfrac{1}{2}} = 90^{o}$

e)   Any other comments useful to teachers, subject advisors, teacher development etc.

➤   All schools need to be enrolled in Maths programmes.

QUESTION 11

(a) **General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?**

Learners' performance in this question was poor. Almost 50% of the candidates attempted this question but were unable to get through them successfully.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

➢ Lack of knowledge of sine, cosine and area rules mostly on 3D shapes.

➢ The learners lack revision of Grade 11 trigonometry.

➢ Instead of using sine rule, many of them used $\frac{1}{2} base.height$ to calculate the area.

➢ In Q11.2, many used the distance formula to find the length of AC

(c) Provide suggestions for improvement in relation to Teaching and Learning

➢ Application of sine rule, cosine rule and area rule is emphasized here.

➢ Teachers must emphasise that the area rule is applied when a triangle is not right angled.

➢ Revision and practice on past exam papers will improve the performance.

(d) **Describe any other specific observations relating to responses of learners**

➢ When the learners see area of a triangle, the first formula coming to their mind is $\frac{1}{2} base.height$. They fail to think whether it is right angled or not.

➢ When using the formula Area = ½ab sinC, some learners misunderstood ''ab'' as AB.

➢ Changing the subject of the formula is a challenge to many learners.

e)   Any other comments useful to teachers, subject advisors, teacher development etc.

This topic must be taught in Grade 11 and a proper revision must be done in Grade 12.

QUESTION 12

(a) **General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?**

Although the question (24 marks) was very difficult, many learners made an attempt to answer this.
Performance in this question was very poor.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- ➤ Q 12.2(7 marks): Most of the learners do not know how to solve trigonometric equations and to get the general solution. Seemingly the topic ''Compound angles and double angles '' was not taught well at schools.

- ➤ The method of getting the general solution is not clearly understood. Many learners just do few steps and write + k. 360° with any angle they get.

- ➤ Q 12.3.1(4 marks): Many of the learners do not know how to simplify the fractions. sinBcosB was not recognized as $\frac{1}{2} \times \sin 2B$

- ➤ Q 12.3.2(a);(b)(6 marks): Without looking at the word ''Hence or otherwise'' learners use the LHS of the equation and tried to get RHS and they reach nowhere.

- ➤ Q12.3.2 ©(4 marks) was really a challenging question. Even the very clever learners failed to do it.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Trigonometry is an important topic in Mathematics curriculum. Questions worth ± 60 marks are usually asked from trigonometry. Learners and teachers must realize the importance of this topic in the examination context. Most of the topics must be taught in Grade 11 and the rest in Grade 12. A good revision is essential in Grade 12 and practice past exam question papers.

(d)   Describe any other specific observations relating to responses of learners

Many learners' writing seems very untidy and illegible, especially the "-'' and "+''.
They write ''sin'' or ''cos'' in the place of'' sinθ'' or'' cosθ''.

e)   Any other comments useful to teachers, subject advisors, teacher development etc.

- ➤ The department should realize that proper teaching and learning take place in the primary school. The real problem is in junior classes and when a learner automatically promoted or condoned to Grade 12, it will be too late to rectify.

- ➤ Qualified Maths teachers must be appointed in High schools to teach in Grade 10, 11 and 12.

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