

CHIEF MARKER'S REPORT

SUBJECT:	MATHEMATICS P2
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1. ANALYSIS OF QUESTION BY QUESTION PERFORMANCE

QUESTION 1

- 1.1 This question tested basic statistics.
- 1.2 LO 4 – 11.4.1(b)
- 1.3 Performances varied. Some centres responded very well but many answers show that Statistics are either not properly taught or not taught at all. It was reported in 2009 that many candidates could not handle the 5 number summary. It seems that this was not taken serious by educators. The box and whisker diagram improved (the drawing of it) but the interpretation and application of it need serious attention. Especially with the open-ended questions like 1.3 in this year's paper. The application of the measures of dispersion must be properly taught. Candidates struggled with that in 1.3. Many candidates could not see the link between the 5 number summary and the box and whisker diagram.

QUESTION 2

- 1.1. This question tested graph sketching and interpretation.(ogive)
- 1.2 LO 4 – 11.4(b)
- 1.3 With fairly little practice 2.1 and 2.2 should enable candidates to score full marks.However quite a number failed dismally in their attempts. There is still confusion and uncertainty about the coordinates which should be plotted for the ogive curve. Many used the lower limit or midpoint with the cumulative frequency. The upper limit is plotted against the cumulative frequency. Reading off from the graph still presents a challenge to many candidates. The grounding of the curve is not taught at many schools. Most candidates did not ground the curve.

QUESTION 3

- 1.1 Basic statistical calculations and the interpretations there of were tested.
- 1.2 LO – 4 – 11.4(b)
- 1.3 Simple calculations for the mean and standard deviation are not practised enough. Candidates must practise the calculator skill to obtain the statistical measures such as the mean and standard deviation. The pen and paper method is long and tedious and lends itself to mistakes. Too much time is lost in the process. The application of the knowledge of the standard deviation with the mean need much more practise. Many candidates could not answer 3.3 because of a lack of this mentioned before.

Rounding off on the calculator is still a problem. Many lost a mark in 3.1. The expected answer was 200, 33 (2 decimal places because nothing was indicated. Many gave 200 or 200,3)

QUESTION 4

- 1.1 Scatter plots were tested in this question.
- 1.2 LO – 4 – 11.4(b)
- 1.3 This was a good question on the application of statistical knowledge in everyday life. Many candidates did not spot the line of best fit here. Many candidates did not read the information that was given to answer this question. Candidates fell short where they had to give explanations for answers – as was the case in 4.2; 4.3 and 4.4. The correlation of the bi-variate data was not grasped properly. The calculation to support the answer of 4.2 was mostly incorrect or not done at all. Graph interpretation must be practised regularly.

QUESTION 5

- 1.1 Basic applications on analytical geometry (straight lines) were tested. Candidates were required to use basic formulae and recall knowledge.
- 1.2 LO 3 – 11.3.3
- 1.3 Basic skills such as finding the gradient, midpoint, equation of a line and the distance between two points were well applied by the larger number of the candidates. However, still too many ignore the information sheet supplied with the question paper. Finding the gradient of AD seemed problematic as many candidates either used the wrong coordinates or found another (unnecessary) point to get the gradient. Time is limited in this paper. Many guessed coordinates for D and subsequently got no marks for 5.1.1. The concept of collinear points was not fully grasped by some candidates but over all 5.5 was well attempted. Manipulation of square roots in equations caused problems for many candidates. This is an algebraic skill that needs practise.

QUESTION 6

- 1.1 This question tested knowledge on circles, lines ($//$ & \perp) and tangents. Mastering formulae and proof of geometrical statements were required.
- 1.2 LO 3 – 11.3.3 & LO 3 – 12.3.3 & 12.3.6
- 1.3 Candidates scored some marks in this question but the reverse of the midpoint formula was difficult to handle early in the question. The application of \perp - lines also caused problems for some candidates. Many could not handle the translation in 6.6. The doubling of the radius was not well manipulated to get the new equation.

QUESTION 7

- 1.1 This question tested Transformation Geometry(in the Cartesian plane) i.e. - translations, reflections and scale factors
- 1.2 LO 3 – 11.3.4(b)
- 1.3 Most candidates answered this question well. However, the 3-in-1 combination of the transformation seemed complicated for many. The formulation of the general rule in 7.2 needs serious attention. Many answered 7.1 correct but got the rule entirely wrong. Many drew three separate triangles where as finding the rule first could have saved precious time.
Q. 7.3 was poorly answered. The skill of finding the area of a diagram on a grid is important and should be practised. Candidates must label the diagrams they draw.

QUESTION 8

- 1.1 This question tested more complex transformations – i.e. the rotation of a point through any angle. Solving simultaneous equations were needed in 8.2
- 1.2 LO 3 – 11.3.4
- 1.3 8.1 was the better attempted part of this question. The use of the compound angles in 8.1 was fairly well done but the manipulation of the special trigonometry ratios need attention. Manipulation of the irrational numbers in fractions discredited many candidates because they could simply not do it.

The use of simultaneous equations in this question compounded the problem. This was one of the worst answered questions in the paper. Candidates struggle with this section of the syllabus. It is suggested that the formula for the clockwise rotation be included in the formula sheet. Educators should also teach the alternative method (the method that leads to the derivation of the formula). A formula does not make sense if it was not proved first.

QUESTION 9

- 1.1 Basic trigonometry was tested in question 9
- 1.2 LO 3 – 10.3.5, LO 3 – 11.3. 5(b) & LO 3 – 12.3. 5(c)
- 1.3 Most candidates attempted this question with much success. Many did not adhere to the restriction of not using a calculator and using a sketch. The use of Pythagoras seems to be very well mastered by most candidates. A small percentage struggled with the reduction formulae. Candidates still struggle with the manipulation of fractions.

QUESTION 10

- 1.1 Trigonometry identities, compound angles and general solutions of trig. equations were tested in q.10
- 1.2 LO 3 – 11.3. 5(a, c) & LO 3 – 11.3. 5(d)
- 1.3 The reduction in 10.1 was done reasonably well although the sign (quadrant) is still a challenge for many. Most marks in 10.1 & 10.2 were scored for reduction and the conversion of the compound angles. Manipulation of both the fractions was poor. The combination of identities, compound angles and special ratios is a real challenge to most candidates. The result was poor marks in this question. Although the new era calculators are helpful with the special ratios, it is still required of candidates to manipulate the simplification without the calculator
eg : $\frac{\sqrt{6} - \sqrt{2}}{2}$ was given and the calculator gives $\sin 15^\circ = \frac{\sqrt{6} - \sqrt{2}}{4}$
Candidates simply write this from the calculator. The same was done for $\sin 75^\circ$ and $\cos 75^\circ$. The result was that candidates lost the marks for the manipulation of these ratios.

The handling of the quadratic equation was very poor. The fraction, factorization, correct quadrant, general solution and $k \in \mathbb{Z}$ were not correctly handled by candidates

QUESTION 11

- 1.1 Solution of triangles and practical applications in 3 dimensions
- 1.2 LO 3 – 11.3.6 & , LO 3 – 12.3.6
- 1.3 This was the worst answered question of the paper. Very few candidates attempted this question. Only the top candidates did it successfully. It was too difficult for candidates to visualise and use the 90° in ΔPAC . Many also failed to see that $CM = 50\text{m}$.

The use of trig rules (sine cos and area) in wrong triangles normally count no marks. This was a general trend in this question.

QUESTION 12

- 1.1 Trigonometry graphs and the solving of trig. Equations were tested.
- 1.2 LO 2 – 10.2.2. , LO 2 – 11.2., LO 2 – 11.2.3 & LO 2 – 12.3. 5(d)
- 1.3 The graph of $f(x) = 2\cos x$ is a straight forward one for Gr. 12. Most candidates who attempted this question scored full marks. The graph of $g(x) = \tan 2x$ on the other hand was not well answered. Many could not handle the $2x$ as well as the asymptotes.
- Too many candidates still try to draw the graphs by making use of a table. The graphs should be smooth curves. Curves must tend towards the asymptotes. Solution of the equation in 12.2 will ultimately be problematic since the simplification leads to a fraction and the use of theory of compound angles. Most candidates struggled in their attempts. Many abandoned their attempts. A small number read the correct answers from the graph and did not score marks as a result.
- Only top candidates scored marks in q12.3. The majority of learners cannot handle the interpretation of the graph – specially where intervals are involved. (s.a. $2\cos x \cdot \tan 2x > 0$)
- Basic skills of trig graphs are not properly mastered – eg – trig graphs are smooth curves; when and how the period changes; how to find the intercepts on the axes; when to move graphs left or right and up or down.

7. ANY ADVICE THAT YOU COULD GIVE TO EDUCATORS TO HELP LEARNERS TO REACH THE EXPECTED LEVELS

- All sections of the work need the necessary attention
- Learners need to spend time sufficient with Mathematics
- Reading skills need to improve – eg if the information of q11 was read properly the question would have been easy to attempt. It is a skill to read the question properly because many candidates eg calculate the distance between two points instead of the gradient.
- Calculator skills must be practised – including rounding off.
- These reports be distributed to the relevant officials and follow ups must be guaranteed at Cass and subject meetings
- A database to be established of schools where un/der qualified teachers are and the Curriculum section intervene.
- Learners need to make the correct subject choices.

8. ANY OTHER COMMENTS

- The second paper is generally perceived as more difficult which causes a mental block for learners. Teachers must make an effort to dispel this.
- Learners need to be skilled in problem solving and reading skills.
- Trigonometry seems to be not taught at many schools.
- Exam tips must be compiled for Mathematics in a booklet and distributed to those schools which show poor results.
- Schools with poor results be allocated mentors.
- Projects like Dinaledi and Star Schools should be more widely introduced.