

MATHEMATICS

SUBJECT 9164

PAPER 2

GENERAL COMMENTS

The examination turned out to be unexpectedly challenging to a significant number of candidates. This can probably be attributed to the fact that the paper was slightly different from the usual distribution of questions as portrayed in the past examination papers. Some examiners felt that there were too many items focusing on trigonometry. The absence of items requiring candidates to find inverses of 3×3 matrices as well as solving systems of equations tentatively frustrated some candidates.

It was surprising to notice that most candidates encountered difficulties in describing 2×2 geometrical transformations, which are part of both the O-Level and A-Level syllabi. The consistently difficult questions were question 7, especially 7(b) and question 6 (b) concerning the fourth root of unit. The poor performance of some candidates was probably due to overreliance on past examination paper rather than scrutinizing the contents of the entire syllabus.

Examiners suggested that some items should contain the phrase, "Hence or otherwise" rather than relying respectively on "Hence" which restricts candidates to make use of results from their previous working.

COMMENTS ON INDIVIDUAL QUESTIONS

QUESTION 1

The question was badly done especially part (b). Part (a) was relatively well done. Surprisingly some candidates simply stated the exact value of $\tan 22\frac{1}{2}^\circ$ without any working. Some answers seemed to have been generated using programmable calculators.

QUESTION 2

Moderate performance was witnessed. Quite a good number of candidates carelessly used $n = 1$ when it was clearly stated that the proof was valid for $n \in \mathbb{N}$, $n > 1$. Incomplete assumptions were given, for example, "Assume that $n = k$ " rather than "Assume that statement is true for $n = k$ ". The conclusions were mostly substandard. Examiners were tempted to suspect that the candidates were not fully aware of the principles of proof by induction.

QUESTION 3

A significant number of candidates did not use the McLaren's series of e^x and $\sin x$ in the MF7 (List of Formulae) as stipulated in the question. They actually derived the McLaren's series for e^{-2x} and $\sin 3x$. Good performance was witnessed in this question. Examiners proposed that the use of "Hence or otherwise" could have boosted the candidates' performance.

QUESTION 4

This question was generally well done especially parts (a) and (c). Candidates struggled to tackle part (b) as they encountered difficulties in generating the vector equation of the line of intersection of the two planes. Some candidates only managed to generate the direction vector of the line but failed to find a single point on the line.

QUESTION 5

The question was well done. However, a significant number of candidates failed to describe the 2×2 shear and rotation matrices. Some candidates even ailed to apply the inverse. Examiners rate the question as a good one since it blended relevant concepts in a different way.

QUESTION 6

Part (a) was well done though some candidates encountered challenge sin giving the geometrical relationship between the complex numbers.

Part (b) was very poorly done as most students had problems in calculating the fourth root of unit. Some candidates calculated the 4th root of V rather than the fourth root of unit.

QUESTION 7

Part (a) was well done though some candidates failed to apply the concept of difference of two squares in tackling the first proof.

Part (b) (i) was virtually elusive to most candidates. Examiners felt that the question was poorly constructed as some concepts seemed to be outside the learners' academic boundaries. Examiners agreed that some misconceptions wee inherent in the item.

It was possible that the item intimidated some candidates and ultimately lowered their overall performance in the examination.

QUESTION 8

This question was well tackled. The concepts were within the reach of many average and above average candidates.

QUESTION 9

The candidates' performance was relatively good. A good number of candidates had difficulties in resolving the force P . Some candidates introduced g after failing to realize the distinction between mass and weight. Fiddles were also witnessed and some candidates attempted to illegitimately generate 16,25N.

QUESTION 10

This question was generally well done especially parts (a) and (b). However, most candidates were unable to tackle part (c) because they failed to realize that the acceleration of the kg mass was $-g$ after the 5 kg particle had reached the ground.

QUESTION 11

Part (i) was quite easy to most candidates. Nevertheless the second velocity was elusive to the generality of the candidates as they used a wrong initial velocity.

QUESTION 12

The question was well tackled by most candidates. About 50% of the candidates used the normal approximation to the binomial distribution while the other half directly used the binomial distribution. Some candidates were unable to undertake accurate continuity correction as they used 1,5 instead of 2,5.

QUESTION 13

This question was well done. Most candidates tackled the probability distribution table very well. $E(X)$ was easily calculated by most candidates. However, some candidates had problems in describing the nature of the distribution. Common wrong answers were 'normal', 'discrete' and 'skewed'.

QUESTION 14

This question was well done. Accurate sketch diagrams were seen. A variety of methods was used to tackle 14 (b) which is suggestive of the view that candidates were generally comfortable with the item.

QUESTION 15

This question was fairly well done.

Candidates were generally able to identify the 'geometrical' nature of the questions and the calculation of the sums to infinity.