MATHEMATICS PAPER 1 NOVEMBER 2009

Question 1

1.1.1 Generally well answered . There was, however, a general lack of ability to factorise a trinomial at this late stage of some candidates' school mathematics career and this is a serious matter of concern.

1.1.2 Generally well answered. Candidates wrote down the formula incorrectly. The roots were calculated incorrectly when using a calculator as candidates typed in $5 + \sqrt{37} \div 2$, instead of using brackets.

1.1.3 Candidates could factorise the quadratic, but found it difficult to write down the final solution. Dividing or multiplying the inequality, **without** changing the sign of the inequality, was a common error. Many candidates could not interpret their graphs of the solution.

1.2 Well answered.

1.3 Poorly done. Candidates found it difficult to apply the laws of exponents and surds. Many candidates squared the expression to eliminate the surd

1.4 Expansion of the surds was poorly done.

Question 2

2.1.1 Candidates generally understood the difference between the two sequences. Many, however, did not see that 2.1.1 was linear and 2.1.2 was exponential. Copying the formula from the formula sheet was problematic as candidates confused *i* and *n*.

2.1.2 Simplifying was a problem.

2.2 Very poorly handled. Many candidates could not construct the argument. Some candidates started with 1; 1; 1; 1; 1 ……. and made deductions about r and d.

Question 3

3.1 The meaning and interpretation of the $\sum$ notation needs attention. Many candidates calculated the first term, setting t= 1 instead of t=0.

3.2 Most candidates found the sum of 99 terms instead of 100 terms. Many candidates determined the sum to three terms owing to the ambiguity of the question.

Question 4

4.1 Some candidates misunderstood the question in trying to reconcile first difference with a quadratic sequence. Hence most of these candidates found the quadratic general term in this question.

4.2 Many candidates answered this question poorly. Many calculated T_{35} and T_{36} and then subtracted the answers.

4.3 Well answered.

4.4 Very badly answered. Once again candidates found it difficult to construct a mathematical argument to make the final conclusion.

Question 5

The whole question was badly answered.

5.1 Many candidates calculated the increase in the 7th year instead of the 17th year. Candidates struggled to distinguish between the **increase** in height as opposed to the **actual** height.

Some candidates took $T_{17} = 18\left(\frac{8}{9}\right)^{16}$. Another common mistake was substituting a = 150.

5.3 Candidates failed to see the relationship between the maximum height and S_{∞}

Question 6

6.1 Candidates made mistakes in eliminating the denominator after setting the equations equal. Candidates need guidance in proving whether a point(s) lie(s)/does/do not lie on a given function.

6.2 Many candidates did not realise that there was an axis of symmetry in a hyperbola.

6.3 Not well answered. Candidates found it difficult to express this function in the form y = …….. or could not find the inverse.

6.4 Very few candidates answered this question. The simplification of $g\left(\frac{1}{x}\right)$ was problematic. Substitution into the functions was badly done. Very few candidates could simplify the complex fractions.

Question 7

7.1 Well answered, but there was a problem with notation.

7.2 Candidates could not see the symmetry, and therefore used their calculators.

7.3 Many candidates were unsure as to whether to multiply or divide by 3. Many had answers as $\frac{180^0}{3}$ or $\frac{270^0}{3}$

7.4 Poorly answered. Few candidates answered this question correctly.

Question 8

8.1 The notion of *range* and *domain* in the case of the log graphs seemed to be neglected. Many candidates had answers y = …….

8.2 Few candidates could write down the equation of the inverse. Switching between the log and exponential form needs attention.

8.3 Very poorly answered. Owing to the error(s) made in 8.2, it was difficult to obtain an equation for the asymptote in this question.

8.4 Many candidates did not realise that transformation of the original graph had to be used to obtain the answer(s). Many of them described the drawing of the graphs especially in 8.4.2. Many candidates also drew graphs using tables.

8.5 Poorly answered. Many candidates did not realise that the domain has to include $x > 0$ for a log function.

Question 9

9.1 Fairly well answered amidst the presence of the log. Many candidates, however, switched the values of A and P. It was not recognised that $n < 0$ cannot be a possible solution.

9.2 Confusion in constructing the relevant equation(s) to solve the financial mathematics problem. This question was well attempted by many candidates. In addition, many candidates used the incorrect formula for the given situation. Many centres used the simple interest formula to solve the more complex problems.

There is still confusion as to whether to use the present value formula and the future value formula or to construct a solution using either one.

Many candidates did not see the link between 9.2.1 and 9.2.2.

9.2.4 Many candidates neglected to calculate the total payments in each case. Instead they found the difference in the monthly payments.

Question 10

10.1 Well answered. Still many notation errors.

10.2 The fractional term i.e. $-\frac{1}{2x^3}$ was poorly done.

Question 11

11.1 Candidates confused x-intercepts with turning points as many of them calculated the turning points in this question.

11.2 In differentiating, candidates still neglected to set $f'(x) = 0$.

11.3 Well answered. However, many candidates sketched parabolas which were consistent with their calculations in 11.1 and 11.2

11.4 Well answered. Some candidates still had a bad understanding of point of inflection.

11.5 Poorly answered. Candidates did not apply the transformation.

Question 12

12.1 Many candidates used t=8 instead of t=0 as "start" of the journey.

12.2 Very poorly answered. The concept of *rate of change* was poorly understood. Some candidates calculated s(4) and not the rate.

12.3. Very poorly answered. Candidates confused speed/velocity of the car in a horizontal direction with *rate of change of height*.

12.4 Very poorly answered. Candidates did not realise that this was a change in rate, i.e. the second derivative had to be set to zero.

Question 13

13.1 Badly answered. Candidates found it difficult to resolve the graph into its inequalities.

13.2 Well answered. Many candidates did not write the objective function as an equation.

13.3 Point indicated on the graph, but the co-ordinates were omitted. Candidates found it fairly easy to read off the corresponding value(s).

13.4 Very badly answered. It seems that candidates did not understand the question. Confusion arose with the maximisation of P = mx + c which was obtained as P= 30x + 40y in 13.2.

General comments

1.1 Many average candidates "bombed out" from Q5 – Q9. Candidates who performed fairly well in the common mock papers struggled with this paper. These were the questions answered the worst in this paper (Q5 – Q9).

1.2 The paper was, in general, very challenging for average candidates. It was more difficult than the model question papers that were received. At two specific centres 31 candidates out of a possible 70 scored no marks for Q5 – 9.

1.3 Question 6.4 was too much work for too few marks. Many a candidate did long calculations without success.

1.4 Misinterpretation in 5.1 could have been avoided if 17^{th} instead of “seventeenth” had been used. Some second or third language candidates saw this as “7^{th}”.

1.5 Candidates need guidance in proving whether a point(s) lie(s)/does/do not lie on a given function.