MATHEMATICS HG PAPER 1 **NOVEMBER 2004**

1.1.1 Testing of solutions still problematic.
1.1.2 Candidates could not identify the relationship between x and $y - 5$.
Solve it as a new equation.

1.2.1 Well answered.
1.2.2 Fewer candidates multiplied by LCD.
Solution should not be given graphically. Candidates are still confused between 'and' and 'or', thus creating problems with inequality signs.
Teaching of interval notation is recommended.
1.2.3 Few candidates realised that you may multiply the inequality by the positive denominator. $(x - 3)^2$ is positive.

1.3.1 $\Delta \geq 0$ is not sufficient to prove that the roots are rational.
1.3.2 Many candidates stopped at k = -3 and thought that k was the roots.

1.4.2 Setting of the correct equation from a word problem is still a problem. Unrealistic answers should be discarded and should be an indication of incorrect working.

2.1 The $-\frac{1}{2}x$ created problems when manipulating the equation.
In order to use the graph to answer the question, candidates should realise that they first have to manipulate the equation to that of the given graph. The candidates should know that the equation is the intersection of the straight line
y = k and the parabola.
They have to use the sketch graph to decide which arm of the absolute value graph intersects with the parabola.
2.1. h^{-1} should not be confused with a negative exponent.

3. This question showed that candidates have a lack of understanding of the remainder theorem. Poorly answered.

4. Candidates must realize that basic theory may be examined.
4.2 Common mistake: $\log_8 2^2 y = 2 \log_8 2y$
4.3.2 Few candidates knew that $\log \frac{1}{2}$ or $\log_{\frac{1}{2}} x$ is negative. Therefore, they did not change the inequality sign.

4.4 Writing of the correct range is a huge problem.

4.5 Well answered.

5.1 Candidates did not choose integral values and gave both answers.

5.2 Easy question!

5.3 The conditions for a convergent series had to be given.

6.1 Surprisingly well-answered.

6.2 NOTATION!

6.3 Cubing a binomial is a problem.

6.4 Common mistakes:

$x^2 - 1 + x^{-\frac{1}{2}}$ and $x^2 - 1 \,.\, x^{-\frac{1}{2}}$

6.5 Few realised that:

$\frac{d}{dx}[f(x)+3.g(x)] = \frac{d}{dx}f(x)+3\frac{d}{dx}g(x)$

6.6 Worst answered!

f′(2) = 5 is the gradient of the tangent and the curve, g, at the point x = 2.

7.1.2 Many did not put the derivative = 0.

7.1.3 Candidates did not know what was being asked of them.

f ′(*x*) > 0 means that the gradient of the tangent to the function, *f*, is positive.

7.1.4 *y* = k is a horizontal line intersecting the cubic function. (see 2.1.3)

7.2 The difference between the average rate of change and the instantaneous rate of change was confused.

7.3 Generally well-answered.

8. Even though the graph was given, the candidates still could not find the correct inequality: $y \geq \frac{1}{2}x$.

Candidates must be more accurate in shading the feasible region.

The search line in its optimum position was, but many candidates drew any search line.