S 5 TEST 2 Time: 1 hour 30 minutes

1. Rationalise: $\dfrac{1+\sqrt{3}}{\left(\sqrt{3}-1\right)^2}$

2. Using the substitution $y = x^2 - x$ to solve the equation
$x^4 - 2x^3 - 7x^2 + 8x + 12 = 0$.

3. Solve the simultaneous equations $x^2 + y^2 = 25r^2$ and $2y + x = 10r$

giving the answers in terms of r.

4. Solve for x and y: $5^{x+2} + 7^{y+1} = 3468,\ 7^y = 5^x - 76$

5. Solve the simultaneous equations: $\dfrac{x+2}{y-4} + \dfrac{2(y-4)}{x+2} + 3 = 0,\ x - y = 3$.

6. Show that $\log_8 x = \dfrac{2}{3}\log_4 x$, hence, without using tables or calculator, evaluate $\log_8 6$, correct to 3 d.p given $\log_4 3 = 0.7925$.

7. If $2\log_8 N = p,\ \log_2 2N = q,\ q - p = 4$, find N.

8. Given that the roots of the equation $x^2 - 21x + 4 = 0$ are α^2 and β^2 and α and β are both positive, find;

   i) $\alpha\beta$ and $\alpha + \beta$

   ii) the equation whose roots are $\dfrac{1}{\alpha^2}$ and $\dfrac{1}{\beta^2}$.