Worksheet 2-Paper 1

1. Simplify $\frac{a+b}{\frac{1}{a}+\frac{1}{b}}$
2. Express a in terms of the other variables, if $c = \frac{b^2-ac}{b+a}$
3. Express f in terms of the other variables, if $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
4. Express $\frac{-4}{\sqrt{5}-3}$ in the form $\sqrt{5} + a, a \in \mathbb{N}$
5. Solve
   (i) $\frac{1}{x+1} + \frac{4}{2x-1} = \frac{5}{3}$
   (ii) $|3x - 2| = 4$
   (iii) $x = \sqrt{3x + 7} - 1$
   (iv) $2|x + 1| - |x + 3| = 0$
   (v) $4x^3 + 10x^2 - 7x - 3 = 0$
   (vi) $\frac{3x+1}{x-1} \geq 2, x \in \mathbb{R}, x \neq 1$
6. Prove that $\frac{a}{b^2} + \frac{b}{a^2} \geq \frac{1}{a} + \frac{1}{b}$, a, b ϵ $\mathbb{R}$
7. Solve $\frac{2x-5}{3} = 6 - \frac{y}{5}$ and $\frac{3x}{10} + 2 = \frac{3y-5}{2}$
8. Solve $2^{2x+1} - 5(2^x) + 2 = 0$
9. $2^x = 8^{y+1}$ and $3^{x-9} = 9^y$
10. $U_n = 2(3^n) - 5(2^n)$, n is a natural number
    (i) Write down the first 4 terms
    (ii) Verify $U_3 - 5U_2 + 6U_1 = 0$
    (iii) Find U_{n+1} and U_{n+2}
    (iv) Investigate if $U_{n+2} - 5U_{n+1} + 6U_n = 0$
11. $z^4 = -8 - 8\sqrt{3}i$, find all the values of z.
12. Evaluate $\sum_{n=3}^{6} \frac{3}{10}\left(\frac{1}{2}\right)^{n-1}$