29. if $a + ib = 0$ where $i = \sqrt{-1}$, then $a = b = 0$
30. if $a + ib = x + iy$, where $i = \sqrt{-1}$, then $a = x$ and $b = y$
31. The roots of the quadratic equation $ax^2 + bx + c = 0;\ a \neq 0$ are $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

    The solution set of the equation is $\left\{ \dfrac{-b + \sqrt{\Delta}}{2a}, \dfrac{-b - \sqrt{\Delta}}{2a} \right\}$

    where $\Delta =$ discriminant $= b^2 - 4ac$
32. The roots are real and distinct if $\Delta > 0$.
33. The roots are real and coincident if $\Delta = 0$.
34. The roots are non-real if $\Delta < 0$.
35. If α and β are the roots of the equation $ax^2 + bx + c = 0, a \neq 0$ then
    i) $\alpha + \beta = \dfrac{-b}{a} = -\dfrac{\text{coeff. of } x}{\text{coeff. of } x^2}$
    ii) $\alpha \cdot \beta = \dfrac{c}{a} = \dfrac{\text{constant term}}{\text{coeff. of } x^2}$
36. The quadratic equation whose roots are α and β is $(x - \alpha)(x - \beta) = 0$

    i.e. $x^2 - (\alpha + \beta)x + \alpha\beta = 0$

    i.e. $x^2 - Sx + P = 0$ where $S =$Sum of the roots and $P =$Product of the roots.
37. For an arithmetic progression (A.P.) whose first term is (a) and the common difference is (d).
    i) n^{th} term$= t_n = a + (n-1)d$
    ii) The sum of the first (n) terms $= S_n = \dfrac{n}{2}(a + l) = \dfrac{n}{2}\{2a + (n-1)d\}$

        where $l =$last term$= a + (n-1)d$.
38. For a geometric progression (G.P.) whose first term is (a) and common ratio is (γ),
    i) n^{th} term$= t_n = a\gamma^{n-1}$.
    ii) The sum of the first (n) terms:

$$\begin{aligned} S_n &= \frac{a(1-\gamma^n)}{1-\gamma} && \text{if} \gamma < 1 \\ &= \frac{a(\gamma^n - 1)}{\gamma - 1} && \text{if } \gamma > 1 \\ &= na && \text{if } \gamma = 1 \end{aligned}.$$

39. For any sequence $\{t_n\}, S_n - S_{n-1} = t_n$ where $S_n =$Sum of the first (n) terms.
40. $\sum\limits_{\gamma=1}^{n} \gamma = 1 + 2 + 3 + \cdots + n = \dfrac{n}{2}(n+1)$.
41. $\sum\limits_{\gamma=1}^{n} \gamma^2 = 1^2 + 2^2 + 3^2 + \cdots + n^2 = \dfrac{n}{6}(n+1)(2n+1)$.