Working With Polynomials:

A. On number sense tests you have to deal with two different types of polynomials.

    1. <u>Quadratic Equation</u>:

        a. A quadratic equation is an equation in this form:

$$ax^2 + bx + c = 0.$$

        b. The sum of the roots is: $-{}^b/_a$

        c. The product of the roots is: ${}^c/_a$

        d. The discriminant is: $b^2 - 4ac$

            1. If the discriminant is positive, there are 2 real roots.

            2. If the discriminant is negative, there are 0 real roots.

            3. If the discriminant is zero, there is only 1 real root.

    2. <u>Polynomial of degree 3</u>:

        a. A polynomial of degree 3 is in this form:

$$ax^3 + bx^2 + cx + d = 0.$$

        b. The sum of the roots is: $-{}^b/_a$

        c. The product of the roots is: $-{}^d/_a$

        d. The sum of the product of the roots is: ${}^c/_a$ (sometimes it might say taken two at a time)

B. Here are some examples how the above information is used.

    Ex [1] The sum of the roots of $3x^2 + 6x - 2 = 0$ is _____.

        a. The sum of the roots is $-{}^b/_a$.

        b. The answer is $-{}^6/_3$ or -2.

    Ex [2] The product of the roots of $x^3 - 6x^2 + 3x - 8 = 0$ is _____.

        a. The product of the roots is $-{}^d/_a$.

        b. The answer is $-{}^{(-8)}/1$ or 8.

    Ex [3] How many real roots does $2x^2 - 3x + 4 = 0$ have? _____.

        a. We substitute using the formula for the discriminant.

        b. $(-3)^2 - 4(2)(4) = 9 - 32 = -23$.

        c. Since the number is negative, the equation has 0 real roots.

        d. The answer is 0.