# Going beyond Elementary Algebraic Identities: The Expectation of a Gifted Child, an Indian Scenario

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**Abstract :** A gifted child is one who gives evidence of creativity, good memory, rapid learning. In mathematics, a teacher often comes across some gifted children and they exhibit the following characteristics: unusual alertness, enjoying solving problems, getting bored on repetitions, self-taught, going beyond what teacher taught, ask probing questions, connecting unconnected concepts, vivid imagination, readiness for research work, perseverance of a topic. There are two main areas of research carried out on them: 1)identifying gifted children, 2) interacting and channelizing them. A lack of appropriate recognition will lead the gifted child demotivated. One of the main findings is if proper attention and nourishment are not given then it leads a gifted child to become depressed, underachieving, fail to reach their full potential and sometimes develop negative attitude towards school and study. After identifying them, a mathematics teacher has to develop them into a fall fledged achiever. The responsibility of the teacher is enormous. The teacher has to be resourceful and patient. But interacting with them one finds a lot of surprises and awesomeness. The elementary algebraic identities like $(a+b)(a-b)=a^2-b^2$, expansion of like $(a+b)^2(a-b)^2$ and others are taught to students, of age group 13-15 in India. An average child will be satisfied with a single proof and immediate application of these identities. But a gifted child expects more from the teacher and at one stage after a little training will surpass the teacher also. In this short paper, the author shares his experience regarding teaching algebraic identities to gifted children. The following problem was given to a set of 10 gifted children of the specified age group: If a natural number 'n' to expressed as the sum of the two squares, will 2n also be expressed as the sum of two squares? An investigation has been done on what multiples of n satisfying the criterion. The attempts of the gifted children were consolidated and conclusion was drawn. A second problem was given to them as: can two natural numbers be found such that the difference of their square is 3? After a successful solution, more situations were analysed. As a third question, the finding of the sign of an algebraic expression in three variables was analysed. As an example: if a,b,c are real and unequal what will be sign of $a^2+4b^2+9c^2-4ab-12bc-6ca$? Apart from an expression as a perfect square what other methods can be employed to prove an algebraic expression as positive negative or non negative has been analysed. Expressions like $4x^2+2y^2+13y^2-2xy-4yz-6zx$ were given, and the children were asked to find the sign of the expression for all real values of x,y and z. In all investigations, only basic algebraic identities were used. As a next probe, a divisibility problem was initiated. When a,b,c are natural numbers such that a+b+c is at least 6, and if a+b+c is divisible by 6 then will 6 divide $a^3+b^3+c^3$? The gifted children solved it in two different ways.