1096-11-225 **Aseem Mukund Bhagwat*** (bhagwat.aseem@gmail.com), Room N-32, New Hostel, Indian Statistical Institute, 8th Mile, Mysore Road, Bangalore, Karnataka 560059, India. *Polygonal Numbers and Fermat's Last Theorem.* Preliminary report.

We begin with the elementary Diophantine x2 + y2 = z2 in positive integers, which we know has infinite solutions. Fermat's Last Theorem does not let us generalize this for higher powers. But we can generalize this for polygonal numbers; we can in fact prove that there are infinitely many n-gonal numbers which can be represented as a sum of m n-gonal numbers, for all m and n. Now, if we consider the above Diophantine for higher dimensional regular convex polytope numbers(squares above being two dimensional regular convex polytopes), we notice that there are special cases in each dimension where the solutions do not exist. As we see where the solutions exist and where they do not, we gain some new insights into Fermat's Last Theorem. We observe that Fermat's Last Theorem does not simply give us a family of Diophantine equations having no positive integer solutions, but something much more significant. Lastly, based on our insights, we ask a few questions, which if answered, could actually explain in a different way why Fermat's Last Theorem holds! (Received August 31, 2013)