1086-11-2513 **Eva Goedhart*** (egoedhart@brynmawr.edu). *Solving the Diophantine equation* $nx^2 + 2^\ell 3^m = y^n$. Preliminary report.

Let $n > 3$ be an integer and consider the Diophantine equation

$$nx^2 + 2^\ell 3^m = y^n$$

with the requirements: $\ell, m, m \in \mathbb{N}$, $x, y \in \mathbb{Z}^+$, and $\gcd(nx, y) = 1$.

In 2011, Y. Wang, T. Wang, F. Luca, and G. Soydan demonstrated that the equation has no integer solutions when $m = 0$. Building on their work, I will outline the proof that the equation has no integer solutions for any positive integer values of $\ell$ and $m$. I will also discuss extensions to the result in which I prove $nx^2 + 3^m = y^n$ has no integer solutions for $n \not\equiv 7 \pmod 8$ when $m$ is even and $n \not\equiv 5 \pmod 8$ when $m$ is odd. The proofs depend on the parity of $\ell$ and $m$ and a result of Yu.F. Bilu, G. Hanrot, and P.M. Voutier on defective Lehmer pairs. (Received September 25, 2012)