Messrs. Huynh, Meeks, and Wesby, MthT 430 Fall 2005, proposed a simplification of the proof for the irrationality of $\sqrt{N^2 - 1}$ except in the obvious cases.

**Irrationality of $\sqrt{N^2 - 1}$**

Use the same picture:

![Diagram](image)

In the above picture note that $\Delta EDC \simeq \Delta ABC$, so that

$$\frac{CD}{CB} = \frac{DE}{AB} = \frac{CE}{AC}.$$

Also note that $DE = EB$ since $\Delta ADE \simeq \Delta ABE$ – or use the Pythagorean Theorem.

If $q^2 (N^2 - 1) = p^2$ for natural numbers $q > 1$, $p$, we may construct $\Delta ABC$ with integer sides so that

- $AB = q\sqrt{N^2 - 1}$,
- $AC = qN$,
- $CB = q$.

Then
Thus we have a smaller triangle with integer sides which is similar to the triangle $ABC$. 