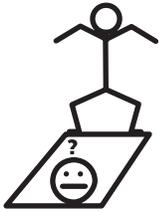


# Brother in the Box



The trouble most students have when first introduced to the concept of the area of a parallelogram is that they want to multiply the base by the "side" of the figure. The purpose for this story is to help them understand why they need to multiply the base by the height.

*When I was a kid, whenever we moved into a new home I would always make something out of the cardboard boxes. It could be a house or a fort or maybe just a series of tunnels. I had a younger brother who always wanted to play in the tunnels that I built. There is a well known law in the universe that when a younger brother asks an older brother to play with something of his, the older brother must say no. However, another well known law in the universe is that younger brothers never listen to older brothers. So when I would see the sides of the boxes rustling, this tipped me off to the fact that he was crawling inside the tunnels against my wishes. At this point, I was bound by these well known laws of the universe to jump on top of the box that my brother was in.*



*When you jump on a cardboard box which is open on opposite ends, the box does not crush inward. Its sides tilt until the box is flat. As the box collapses, the sides remain parallel as do the top and bottom. Does the perimeter of the box change as the box collapses? No. But ask little brother what is happening to the area of the open face of the box. It is obviously getting smaller. If the area of the face is changing while the lengths of the base and side remain constant, then the area cannot be determined by the product of these two lengths.*



*What else is changing then as the area is changing? Ask me while I am standing on top of the box and I'll tell you it's the height, measured from the top of the box, perpendicular to the ground. As my feet get closer and closer to the ground (or my brother's head), the area of the face of the box gets closer and closer to zero, until finally my brother is squashed like a bug and I claim victory. Therefore, the area of the parallelogram is the product of the base and the height.*