Visualization Tool for Three-Dimensional Relationships and the Right-Hand Rule

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The need to develop an understanding of spatial relationships in three dimensions is one of the major challenges faced by introductory physics students. It arises, for example, when grappling with three-dimensional coordinate systems and with the vector ("cross-") product, when dealing with the concepts of torque and angular momentum, and perhaps most prominently when studying relationships involving magnetic fields and forces. A variety of so-called "right-hand rules" are important and widely used tools for working with such concepts. They are applicable both to the standard right-handed *x-y-z* coordinate system (where $\hat{x} \times \hat{y} = \hat{z}$), to a wide variety of concepts involving magnetic fields and forces, and to other phenomena in which vector products are involved. In this paper we describe a simple and inexpensive visualization tool that may be used to help learn and work with these important rules.