Playing with forces and motion

"My powers are ordinary. Only my application brings me success." —Isaac Newton

Imagine a world where the math you need to solve a problem does not exist. Isaac Newton lived in such a world but did not let it deter him. Rather, he discovered what we call calculus (independently of Gottfried Leibniz), a discovery driven by his need to explain the workings of gravitation and motion. The world is fortunate that Newton survived his premature birth weight of 3 pounds in the year 1642. We are also grateful that Newton failed at farming, given his obvious gifts for the physical sciences. His penchant for observing, questioning, and explaining is present in his many accomplishments. A scholar with numerous interests, Newton's contributions extend far beyond his three simply stated laws of motion. In addition to physics, Newton dabbled in astronomy, chemistry, theology, and mathematics.

Newton's laws play a foundational role in our students' lives. They govern every day activities such as catching a ball, slamming a locker shut, and sharpening a pencil. Perhaps, because forces and motion are central to our lives, it is easy for students to harbor misconstructions as a result of observations made in daily life. Unfortunately, these misconstructions can lead to inaccurate conclusions that can be difficult to dispel. It would behoove us to remember that students enter our classrooms not as blank slates, but possessing sometimes incomplete or incorrect ideas about how the world works. Correcting these misconceptions cannot be accomplished simply by reading science texts or listening to well-intended lectures. To meet the MS-PS2 performance expectations, which includes disciplinary core ideas related to forces and motion, students must take the path of Newton. They need to confront their misconceptions through lab experiences that require them to observe, apply, and explain. Although it may be unlikely that the next Isaac Newton is sitting in your class, helping every student understand his three laws of motion establishes a foundation for future science classes. Whether your students are creating balloon rockets or observing a bird in flight, they will appreciate—and learn from—opportunities to interact with the laws that govern nature.

Patty McGinnis
Editor, *Science Scope*

Patty McGinnis is a teacher at Arcola Intermediate School in Eagleville, Pennsylvania. You can contact her at *pattymcginnis1@gmail.com* or on Twitter: @patty_mcginnis.