Why Study Math? - The Polyhedron

This article will launch my new series in the Why Study Math? category. This will be the start of a fascinating series which show that mathematics is more than just a pain in the neck; indeed these essays will permit a fascinating peek into the world of this curiously strange discipline. We start in the land of geometry, where shapes and figures and their many properties drive students to the breaking point of insanity. Each article will feature a specific aspect of a particular branch of mathematics, such as algebra, trigonometry, and calculus; and each will endeavor to shed some light on how these fields are used in the real world. So come on board and enjoy the ride.In the field of geometry, particularly as pertains to the high school geometry course, a student is introduced for the first time to the wonderful world of mathematical proofs. Often times students will be scratching their heads wondering why in the world they would be learning things as proving two triangles congruent or about the different properties of shapes such as trapezoids, parallelograms, or even those solid figures called polyhedrons. What is not understood or even seen is that such shapes play a fundamental role in many areas of science and indeed nature.For example, the helix structure—that winding pattern best typified by a spiral staircase—is the structure most abundant in nature. Watson and Crick, the scientists who won a Nobel Prize for their groundbreaking work with DNA, the genetic material responsible for heredity, showed that the very structure of the DNA molecule exhibited a double helix structure. Running a close second to the helix structure, we have those solids which are formed by regular pentagons and hexagons, those five and six sided figures. Because it is impossible to enclose space (in other words form a “polyhedron ball”) with just hexagons, it is necessary that pentagons be added to the mix. In fact 20 hexagons and 12 pentagons form the recipe for a nice type of polyhedron ball, which has come to be called a truncated icosahedron.The soccer ball is the perfect real-life example of the truncated icosahedron. What is even more, many viruses—those potentially deadly nuisances—exhibit this structure. Viruses have outer shells called capsids that are often in the form of an icosahedron. And for those of you who are not familiar with chemistry, the eponymous buckey ball, is an organic molecule made mostly of carbon, which exhibits the soccer ball structure. In fact, chemists have now discovered a whole family of these “soccer-ball-like” molecules, which are called fullerenes. New and interesting discoveries are being made with these molecules and fascinating applications for their use in diverse fields as medicine and pharmacology are being researched.Thus understanding geometry—shapes, figures, and their related properties—has profound implications for all of us. Just remember this the next time you go to fill a prescription for that drug which is going to kill that buckey-ball shaped virus that is wreaking havoc on your insides. For without understanding the very nature of the shapes of these viruses, chemists and pharmacologists would be at a loss in their attempt to battle these viral parasites. Stay tuned for more in my Why Study Math? series...

About the Author

Gonadotropins may not be available at local pharmacies. These are two specialty pharmacies used by the Duke Fertility.