When you look at the world around you, you do not suddenly begin to see mathematics. But it is there. From the length of a soccer field to how bouncy a ball should be to the statistics used to determine a winner at the Olympics, math surrounds us on a daily basis; all we need to do is look.

Through literature based on the mathematics found in the world around us, students will get a better understanding of how math “works” and why it is essential to learn. Even students who will not enter a profession directly related to mathematics will continually be faced with mathematics throughout their lifetime. It may be calculating a sale price in the department store or making sure your following distance is safe while driving on the highway, but students will forever be faced with math.

While there is not one specific Virginia Standard of Learning that connects mathematics to the world around us, lessons that develop out of this text set can be used to demonstrate the following mathematics SOLs (not exhaustive):

6.14 The student will identify, classify, and describe the characteristics of plane figures, describing their similarities, differences, and defining properties.

6.17 The student will sketch, construct models of, and classify solid figures (rectangular prism, cone cylinder, and pyramid).

6.21 The student will investigate, describe, and extend numerical and geometric patterns, including triangular numbers, patterns formed by powers of 10, and arithmetic sequences.
7.6 The student will use proportions to solve practical problems, which may include scale drawings, that contain rational numbers (whole numbers, fractions, and decimals) and percents.

7.14 The student will investigate and describe the difference between the probability of an event found through simulation versus the theoretical probability.

7.18 The student will make inferences, conjectures, and predictions based on analysis of a set of data.

8.3 The student will solve practical problems involving rational numbers, percents, ratios, and proportions. Problems will be of varying complexities and will involve real-life data, such as finding a discount and discount process and balancing a checkbook.

8.8 The student will apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures…The student will identify applications of transformations, such as tiling, fabric design, art, and scaling.

Some of the material included in this text set will be read-aloud material that is above a middle school student’s reading level. A teacher would need to use discretion as to which pieces are appropriate for students to read on their own and which pieces need to be used as an in-class, teacher led, reading. There are chapters and sections in the described books that could be shared across the grades so that students build gradually on their understanding of topics presented.

Summary of Text Set Items

The target audience for these readings is composed of seventh and/or eighth grade mathematics students at or above reading level. Students have been identified as “college-bound” and many are in need of a challenge. These are the students who ask, “Why do we need to know this?” not with attitude, but with pure curiosity.
**Millions to Measure** by David M. Schwartz
At first glance, this book is below reading level. It has large animations getting the point across. It is a fun book looking at all the different ways we use measurement in our world and how measurement was made prior to a formal writing system or forms of measurement such as rulers. How did cavemen approximate weight? Using rocks. While the book appears childish (it is written for children ages 5-12), it is very straightforward about how measurement came about presenting the information in a fun, fascinating way.

*Fry Readability: grade 7*

*Bader Analysis:* This readability rating is dead on. It is the perfect book to have fun with a class of 6th-8th graders. Though students will find it odd that you are giving them what appears to be a children’s book, they will soon see why the book brings about more fun and not so much child’s play.

**Coincidences, Chaos, and All That Math Jazz** by Edward Burger & Michael Starbird
This is a fun book that takes a look at luck, surprises, cryptography, patterns, origami, and computers. It talks about probability and odds using the lottery. It also talks about the patterns on a butterfly, why magnets work the way that they do, and why bouncy balls bouncy. There are also connections made to playing cards and the patterns found in fruit and flowers.

*Fry Readability: grade 8.*

*Bader Analysis:* I felt that this readability was correct, but should not be taken as the end-all-be-all. Students in sixth and seventh grade will be able to read this book with little trouble. It can used as independent reading venture for average to advanced eighth graders or a class reading assignment in both sixth or seventh grade.

**Number: the Language of Science** by Tobias Dantzing
This book begins with a fascinating look at fingerprints – not only our personal fingerprints and their individuality, but also mathematical fingerprints throughout our world. It explains the progress from symbols to written language to a universal numbering system. It even takes a look at our “flowing world” and the mathematics that are found in our fluids.

*Fry Readability: grade 8.*

*Bader Analysis:* This readability is a bit under the actual readability of this book. While it could be used in an eighth grade class, it would need to be a class wide project with the teacher leading it. Some advanced eighth graders may be able to read it independently, but I feel that the number would be few.

This book is a lot of fun. It looks at the mathematics of refracted light and includes an activity about putting a straw into a glass of water. It focuses on the visible stars in the sky and tells the reader how to go about finding and identifying them. In Chapter 4, it focuses entirely on Sports and Mathematics looking at freestyle swimming, running track (using Carl Lewis as an example), and baseball statistics. Throughout the book there are activities and suggests for putting mathematics to use in our daily lives, such as how to pick a good light bulb. There is also an entire chapter on math and nature looking at the mathematics of leaves, global warming, and even greenhouse gases.
**Fry Readability: grade 9.**

**Bader Analysis:** Though its readability is ranked higher than 7th and 8th grade, it could easily be read by the student if the student is reading at or above grade level reading ability. Students will find it a fun read and with assistance even average or below-level readers will enjoy it.

**Wild About Math by the Virginia Department of Game and Inland Fisheries**
While this book is a type of workbook, I could not exclude it. This is a collection of narratives and activities designed for the middle school mathematics classroom. It takes actual data about Virginia wildlife such as black bears, eagles, fish, and deer and creates statistics problems. It is a collaborative effort between the Virginia DGIF and middle school teachers from Portsmouth, Chesapeake, and Roanoke. Each section is a narrative about the specific animal the activity is focused on followed by the statistics and how to enter the statistics into your graphing calculator. Students then use box and whisker plots to chart the data and make inferences from it. This book alone addresses twenty different mathematics and science SOLs.

**Fry Readability: grade 9.**

**Flesch-Kincaid Analysis:** Fry’s readability is a bit high. This workbook was written by middle school teachers specifically for middle school students. Words that are related to the scientific names of animals and plants as well as mathematical words increased the readability. Also, because it is well written the sentences are longer. Sixth graders may need to do these activities with assistance, but seventh and eighth graders should have no problem.

**Hiding in the Mirror by Lawrence Krauss**
This text is an odd book and I do not highly recommend it. It does take a look at the mathematics of living in space, the motion of the ocean, gravity, the mathematics in shadows, and mathematics found in some movies.

**Fry Readability: grade 11.**

**Bader Analysis:** Fry’s readability is adequate. This book is too in-depth for middle school students to get much out of it. They will most likely be bored by the narrative leading to them not putting enough into lessons being taught to get anything back from it.

**Sacred Geometry: Deciphering the Code by Stephen Skinner**
This book is absolutely very cool. In Part 2 of the book the author takes a look at the Geometry of Nature looking at day to day life and astronomy and cosmology. In Part 3 the author looks at the Geometry found in the man-made world from the landscape to architecture to art. The beginning of the book looks at math in nature straightforward. There are pictures throughout the narrative keeping the student engaged and interested. From Leonardo da Vinci’s Vitruvian Man to the Old Sarum Cathedral, students will see mathematics where they have never before imagined.

**Fry Readability: grade 12.**

**Bader Analysis:** This readability is a little high, though not totally unfounded. Middle School students should not have too much trouble reading the narratives found in the book, though they made need assistance defining larger and more scientific words. As long as the student has access to help via a teacher, thesaurus, or dictionary they should enjoy what they read and will discover many new ideas that may inspire them in mathematics.
**Sacred Number and the Origins of Civilization** by Richard Heath
While not as interesting as the book above, this text is still intriguing. Students learn about numbers from the sky and ancient theme parks. Students also look at a model of the earth. This text focuses on Life, the Universe, and Everything.

**Fry Readability:** grade 12.
**Bader Analysis:** The Fry readability is not too high, but with assistance advanced seventh graders and average or above eighth graders will be able to grasp concepts and ideas presented in the text.

**The Dance of Time: The Origins of the Calendar** by Michael Judge
Did you know that our modern calendar is highly mathematical? From the constellations and weather, the world’s greatest mathematicians and scientists created our modern day calendar. This text looks at the calendar month-by-month singling out important days throughout the year and giving their mathematical and historical significance. Holidays are also described. Students will never look at a calendar again and will see how important mathematics is in their daily lives. Students may need assistance with the reading of the text, but I feel that the readability ranked it a bit too high. I found it to be appropriate for a middle school student reading at or above grade-level.

**Fry Readability:** grade 12.
**Bader Analysis:** This readability ranking by Fry is too high. It is due to the length of sentences and words. While it should be used as an in class activity in sixth and maybe even seventh graders, eighth graders should not have trouble reading this book independently.

**The Golden Section: Nature’s Greatest Secret** by Scott Olsen
This text looks at Phi (“Phi in the Sky”), the Fibonacci Sequence, and Symmetry. One section called “All that Glitters is Not Gold” takes a look of the mathematics of credit card design and the mathematics in Harry Potter. There is also an entire chapter about the mathematics found in music. Students will need assistance in reading portions of this text, but the links to their daily life will make the time spent in the text interesting and worthwhile.

**Fry Readability:** College.
**Bader Analysis:** Links to students’ daily life will make this text easier to read than its Fry ranking. Though I would not use it as an independent project in sixth grade, it could be broken up for seventh graders with some text being read independently and some read together in class. Eight graders reading on-level or above should not have trouble with this book.

**Readability and how it was determined**

Readability was determined using both the Fry Readability and the Flesch-Kincaid grade level assessment tools. After initial readability was determined, Bader’s Analysis was used to bring about a deeper understanding and clarity pertaining to the readability. I feel that both the Fry Graph and the Flesch-Kincaid selected a readability that was higher than what I would have
determined based on Bader’s analysis, but I went with the initial readability and noted in my description how I felt the text applied to middle school students.

Readability is difficult to determine in texts that are talking about mathematics. Terms used in mathematics and to describe mathematical ideas tend to be on the long side, though not always difficult to pronounce or understand. For example, one of the texts had a single sentence that was one hundred words long (I did not use that sentence). The word “mathematics” is four syllables long itself. Most authors write this word out in formal writing increasing the syllable count immediately.

I did find a great number of more grade-level appropriate books, but could not get my hands on them to use them for this project. These books can be ordered online, but could not be found in any bookstore or library in the Greater Richmond area. For your personal reference, here are those books:

By Time-Life Books, Elizabeth Ward and Neil Kagan

**Repeat After Me: Connecting Patterns in Math and Nature** (2005)

By Martha Boles

By Jenny Simonson

**Patterns in Nature (Math All Around)** (2005)
By Jennifer Rozines Roy and Gregory Roy

By Cora Lee, Gillian O’Reilly, and Virginia Gray

By John A. Adam
Text Set Bibliography


