

Ready to Homeschool — Six Month Countdown

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WEEK 18: MATHEMATICS

Most people think Mathematics is limited to Arithmetic (the 3rd R) and Euclid's Geometry — maybe true LONG ago. Look at all that now falls under this umbrella:

- Patterns in math AND in nature
- Set Theory and Venn Diagrams
- Adding, subtracting, multiplying, dividing with
 - Natural numbers, Integers, Fractions, Decimals, and Percents
- Ratio and Proportion
- Symmetry (Reflection and Radial) in shapes and in nature
- Combinations and permutations
- Probability and Statistics (including making and interpreting graphs)
- Graphing on a Cartesian Plane
- Using spreadsheets and other digital tools to manage/visualize large sets of data
- Measurement (length, weight or mass, volume) — both Imperial and Metric units
- Number Theory, Factors, and Multiples, including Prime and Composite
- Classifying shapes and proving true theorems about them (geometry)
- Problem Solving = “Quantitative Reasoning” (and the “Unsolvable Problems” of math)
- Exponents and other radicals
- Irrational and Imaginary Numbers
- Logic, Truth Tables, and Tautology
- Computer programming (Computer Science actually has become a “stand-alone” subject)
- Writing and solving expressions involving “unknown variables” (algebra)
- Studying relationships unique to triangles (trigonometry)
- Famous Mathematicians and their contributions to the subject
- Topology and Möbius Strips

Food for thought: L. P. Benezet, (1935-1936) “The Teaching of Arithmetic I, II, III: The Story of an Experiment.” *Journal of the National Education Association.* <http://www.inference.org.uk/sanjoy/benezet/>

Prepare throughout the preschool years — Keep it light, and follow their interests.

Play with manipulatives (see the list on the next page)

Learning to count is extremely helpful. Show them how to group by tens and skip count.

Goals in the early elementary years:

Seeing real-life applications for MATH (any topic)

Teach algorithms for the four operations with positive whole numbers

Introduce fractions and negative numbers — decimals are introduced through money

Practice measuring common objects and learn to read simple graphs

Later elementary/middle school years (Placement tests are very helpful!!)

Master the four operations on all sets of numbers

Introduce Set Theory and Number Theory

Challenge learners with Problem Solving

Introduce Logic, Boolean Operators, and mathematics applications in computer programming

High School/College years

Some students will need it ALL — our future engineers and mathematicians

Some students need to focus on basic math skills for every day life

For Week 19, we will be discussing *You CAN Teach Your Child Successfully* by Ruth Beechick. This is a classic homeschooling “how-to” book with several editions available. Use this link to purchase the book, and I will benefit as an Amazon affiliate: <https://amzn.to/3KIO4Am>

Manipulatives:

(if you purchase through the suggested links, I will benefit as an Amazon affiliate)

Hundreds Chart by hand2mind

A simple laminated chart showing the numbers from 1 to 100. Sometimes the reverse side is blank so that they can practice writing the numbers with a dry erase marker. Very helpful with early addition and subtraction and pattern recognition. A similar game is Chutes and Ladders.

<https://amzn.to/3p3Zh6l>

Abacus by Learning Resources

This tool will help greatly in learning to “regroup” from ones to tens and back again. A similar but smaller tool is the Rekenrek.

Abacus — <https://amzn.to/44q5rhh>

Rekenrek — <https://amzn.to/3LLMKMz>

Counting Bears by Learning Resources

Cute way to sort, weigh, line up and count what you have.

<https://amzn.to/3VpShMY>

Pattern Blocks by hand2mind

These blocks are color coded by shape, but the angles and sides of each block line up perfectly with other blocks to allow easy tessellations. You can buy (or make your own) pictures to fill in as an extra challenge.

<https://amzn.to/44kg70O>

Tangrams by hand2mind

A puzzle and art form from China, this set of seven shapes can be formed into one large square, or rearranged to make countless other shapes. Especially fun when you pair it with a story like *Grandfather Tang's Story* and have the tangrams reflect the changes to the animals in the story.

Set of 4 tangrams — <https://amzn.to/3VmVtsV>

Grandfather Tang's Story by Ann Tompert — <https://amzn.to/3nlQnAn>

Cuisenaire Rods by Learning Resources

These different colored blocks stair-step their way from one to ten (in centimeters) for help in learning basic addition and subtraction facts, and early measurement concepts (and even fractions for more advanced learners). My kids loved using the train-holder (Deci-Rod Track) to fill up 100 cm.

Set of Cuisenaire Rods — <https://amzn.to/3VnCE8U>

“Deci-Rods Track Only” from Rainbow Resource:

<https://www.rainbowresource.com/product/075332/Deci-Rods-Track-Only.html?>

Manipulatives (continued):

(if you purchase through the suggested links, I will benefit as an Amazon affiliate)

Unifix Cubes by Didax

These cubes snap together so kids can build towers (or other creations) of any length. You can also use these to explore tetrominoes and pentominoes (think Tetris) with older kids for a challenge.

<https://amzn.to/3LW2y0t>

Base Ten Blocks by Torlam

There are many sets that are adequate but this one is plastic, has different colors for each type of piece, and includes a write & wipe mat to help kids learn the regrouping process alongside the algorithm.

<https://amzn.to/423KjC>

Fraction Circles by Didax

I actually prefer to start teaching fractions with the game Pizza Fractions, and then move onto these when they understand a bit more about how to write fractions. It helps illustrate the concept of equivalent fractions, which then makes adding and subtracting fractions easier.

Fraction Circles — <https://amzn.to/3VxYBCn>

Pizza Fractions — <https://amzn.to/3Lumg1H>

Judy Clock by Carson Dellosa

The gears inside mean that moving the minute hand also moves the hour hand. This link is for the LARGE clock, which is great for little hands. You can also buy smaller ones if you have more than one student learning to tell time.

<https://amzn.to/3p2JG6N>

Geoboards by Learning Resources

This is a set of 6 plastic Geoboards — regularly-spaced pegs that rubber bands fit over to make shapes/lines. One side features a 5x5 array, while the other side approximates a circle. It is best to give guidance ahead of time on NOT shooting rubber bands around the room while using this tool.

<https://amzn.to/3oY7c4Q>

Geometric Solid blocks by Learning Resources

These wooden blocks are a fun addition to any building set, but more importantly, they help your child become more familiar with the terms “cylinder” and “prism” and “sphere” as you interact with them and teach the vocabulary.

<https://amzn.to/3VDr7Cr>

Manipulatives (continued):

(if you purchase through the suggested links, I will benefit as an Amazon affiliate)

Balance Scale with gram weights by Learning Resources

You COULD use a digital scale, but this method promotes learning the way to weigh something (maybe sacrificing accuracy a little bit). Have them find random toys and household objects for one side of the balance, and then add Hexagram weights until the scale balances. Add up the amounts of the weights (more math!) to find out how much each item weighs.

Pan balance scale — <https://amzn.to/3LzSn0d>

Hexagram weights — <https://amzn.to/3nrglm3>

Thermometer by Learning Resources

The classroom thermometers that are safe for kids are mercury-free and probably not as accurate or as long-lasting as thermometers with mercury, but it is worth it to avoid the safety concerns. Try measuring the temperature of all sorts of weather, as well as ice and boiling water. For a wider range of temperatures, invest in a different thermometer as they grow.

<https://amzn.to/3p5R9C8>

Dice (standard and polyhedral) by Learning Resources

Besides being fun to play with, dice are helpful in many math games, store-bought OR home-made. I also highly recommend playing Yahtzee now and then to increase math skills.

Standard — <https://amzn.to/3NL0Yzw>

Polyhedral — <https://amzn.to/41YOtEW>

Rulers and/or Tape Measure

Usually every house has a ruler (marked with both inches and centimeters), a yard-stick or meter stick, and a tape measure of some kind. We usually let our kids pick out a ruler from Walmart when we did back-to-school shopping so they could have one that fit their personality.

Graph Paper by Amazon Basics

Not absolutely necessary until the upper grades, but kids everywhere love to draw and color the little squares to make designs or small scale drawings.

<https://amzn.to/423DB8G>

Protractor and Compass by Mr. Pen

I only chose this particular link because I was impressed by the quality of the compass, which isn't actually necessary until constructions in geometry.

<https://amzn.to/44tsZ4B>

Resources:

(if you purchase through the suggested links, I will benefit as an Amazon affiliate)

Miquon Math by Lore and Peter Rasmussen, and Robert Hightower

This six-volume set is intended for early elementary students, but must be used in order. Cuisenaire rods are essential for this curriculum set. Some workbook pages lack clear directions, so the teacher books are very useful.

<https://amzn.to/3Vtbpd6>

Key To ____ Series by Key Curriculum and McGraw Hill

These stand-alone workbook sets will help middle school students advance their math skills in several areas. Teacher notes and Answer Key are helpful but may be sold separately. I like to have all of these on the shelf to offer challenge or reinforcement as needed.

Key to Fractions, Books 1-4 — <https://amzn.to/3p9Bq5f>

Key to Decimals, Books 1-4 — <https://amzn.to/3ND09Mu>

Key to Percents, Books 1-3 — <https://amzn.to/3oWZYht>

Key to Measurement, Books 1-4 — <https://amzn.to/44vF5uj>

Key to Metric Measurement, Books 1-4 — <https://amzn.to/415izWf>

Key to Algebra, Books 1-10 — <https://amzn.to/3nrjzGb>

Key to Geometry, Books 1-8 — <https://amzn.to/3M3X1Ff>

Saxon Math by John Saxon

John Saxon had a brilliant plan to gradually spiral the math content up through each grade, and to consistently review all previous material during every lesson to aid in long-term retention. It was taken over by Houghton Mifflin Harcourt who continued to sell the “homeschool line” and added a “public school line.” They are similar but not identical. If you are purchasing used, check to make sure that all related books and workbooks are from the same edition, to minimize frustration.

[Sold by several curriculum companies or you can buy it used](#)

DIVE Interactive Education, featuring Dr. Shormann

This is a collection of self-paced e-courses using Saxon textbooks, or Dr. Shormann's own math materials. Science ecourses are also available. Grades 4 and up.

<https://diveintomath.com/>

Singapore Math by Dawn and Jeffery Thomas

A set of workbooks for elementary students adapted from curriculum taught in Singapore schools. Clear, to the point, and leveled so that students can progress gradually.

<https://www.singaporemath.com/>

Resources (continued):

Math U See by Steve Demme/ Demme Learning

The book, workbook, video lessons, and manipulatives are all necessary to be successful with this curriculum. Concepts are simplified and presented visually; the daily workbook assignments are manageable. However, it may not be rigorous enough for future college math majors or engineers.

<https://mathusee.com/>

Life of Fred by Dr. Stanley Schmidt

By telling the bizarre story of a five-year-old math professor, Stanley Schmidt is able to show how math relates to real life. With an early emphasis on set theory and other advanced concepts (made understandable for young readers), these textbooks read more like long stories. Long HILARIOUS stories. I enjoyed these textbooks right along with my kids.

<http://www.polkadotpublishing.com/11catofbooks.html>

Teaching Textbooks

Originally, these were textbooks paired with software CD's — the computer "taught" the math lesson, and then graded the practice set that the student inputted at the computer. The company has upgraded to a streaming service for mobile devices. This approach is helpful for parents who need their kids to be independent with their math lessons (mostly).

<https://www.teachingtextbooks.com/>

Numberphile on YouTube

My son Nathan introduced me to Numberphile while he was in college. I haven't watched all of the videos yet, so I hope you find them appropriate enough for your enjoyment. Short videos feature mathematicians doing what mathematicians love best — drawing you into their world of problems to solve and math activities to explore. This collection proves my point that math is more than just manipulating numbers and drawing shapes.

<https://www.numberphile.com/about>

National Council for Teachers of Mathematics (NCTM)

This is the national organization for professional math teachers. They do a good job of advocating for a robust math curriculum in the schools, but you can read up on their ideas for yourself. Their website also features a page with some "Problems of the Week" to provide a challenge for your kids.

<https://www.nctm.org/>