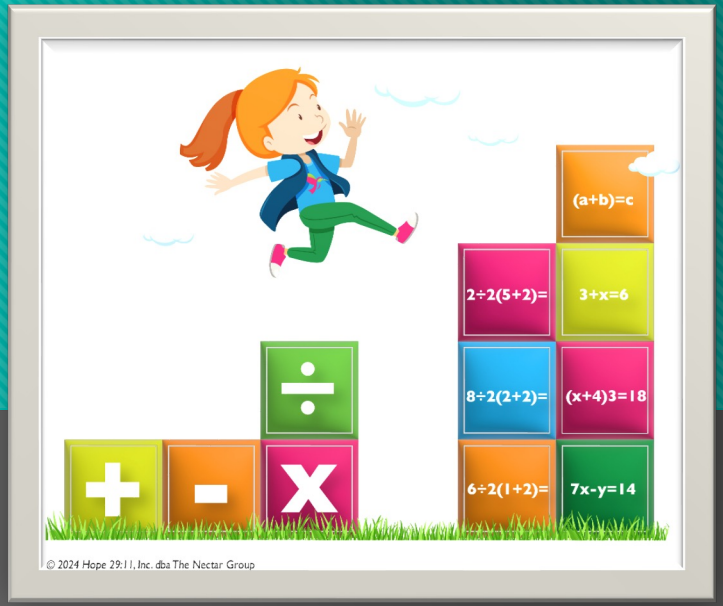
Fractions and Math Facts and Decimals, Oh My! Taming Pesky Math Problems with Brain-Based Strategies and Solutions



Nicole the Math Lady & The Nectar Group

For the Powerpoint presentation:

SCAN ME


Welcome

Who is Nectar?

The Nectar Group is an education company dedicated to helping students overcome learning challenges so that they can reach their full potential. With our assessment-driven process, we use scientific tools to evaluate and pinpoint the root causes of learning difficulties. Then, we create custom solutions utilizing cognitive neuroscience to resolve those root issues.

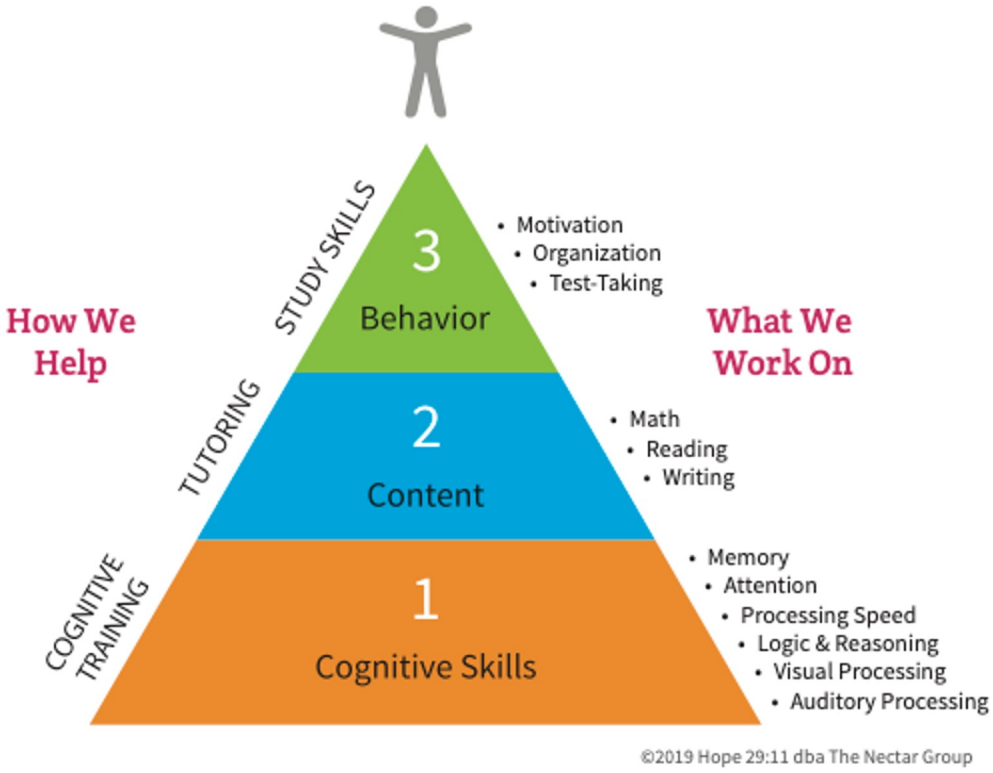
- We optimize learning and take a holistic approach to improving school, work, and life performance by providing:
- Therapeutic interventions that are grounded in neuroscience to treat the causes of learning difficulties for all ages
- K-12 and collegiate level academic tutoring in reading, writing, and math to build solid content and prepare students for college and beyond
- Study skills and executive function coaching to ensure successful student outcomes
- One-to-one educational services via educational consulting, individualized schooling, and homeschool support

- Lesson Videos & Online Grading for Saxon Math
- Serving over 250K students
- I'm also a homeschool parent!

Goals for today!

1. Understand how both cognitive skills and content knowledge are vital to success in math
2. How to support your child with each cognitive area through brain friendly strategies
3. How to treat the root cause of any cognitive weaknesses
4. How to build stronger math content ongoing!

The Potential Pyramid™



How do we use cognitive skills in solving math problems?

Cognitive Skills	Examples within math:
Working Memory	• Being able to hold information in your mind while you manipulate it or how to hold steps in the procedures while completing
Logic and Reasoning	• Ability to pull information out that isn't explicitly stated (word problems) • How to bring down problems into step by step solution
Visual Processing	• Ability to discriminate between a + and x and recognize form quickly • Ability to manipulate information mentally
Long-Term Memory	• Storage of math facts and equations • Ability to store the scaffolded information required for math (for example first division/ multiplication, then fractions, then ratios and proportions)
Processing Speed	• How quickly our brains can process through information
Attention	• Ability to stay focused for a period of time such as following all steps in multi-step sequences • Our "math stamina"

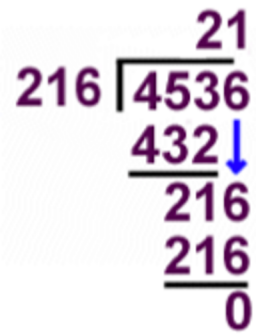
What is dyscalculia?

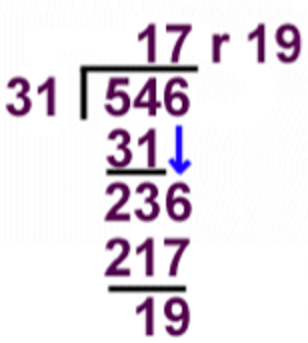
- Symptoms:
- Trouble processing numbers and measuring quantities
- Difficulty understanding the association between and number and the quantity it represents
- Trouble telling time on a clock
- Hard time counting, comparing numbers or amounts
- Challenges with basic mathematical calculations
- Use of fingers to count beyond appropriate age and difficulty counting backward
- Trouble recognizing math symbols and what calculation they refer to

Working Memory

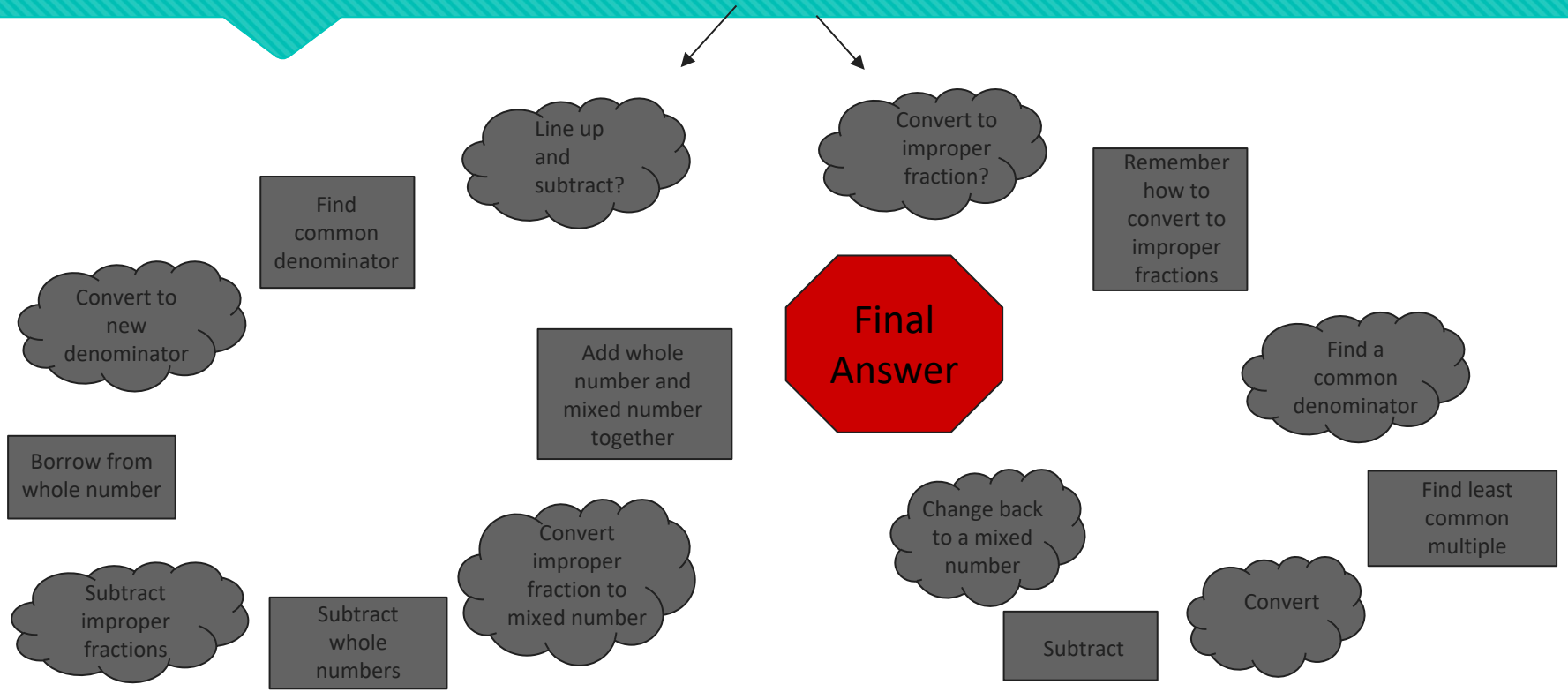
Short-Term Memory

- For any type of math, think of how many steps there are to implement to solve the problem. Can you remember all the steps while also doing the mental math?





$$5\frac{2}{5} - 2\frac{3}{4}$$



Strategies and Supports

- Use “how” or “what” questions”
- Break problem into smaller chunks
- Use tools like mnemonic devices, and songs
- Use changes in voice/tone
- Provide information in multiple ways: visually, verbally and create opportunities to physically work with it or model it
- Providing practice to ensure it transfers to long-term memory

Logic and Reasoning

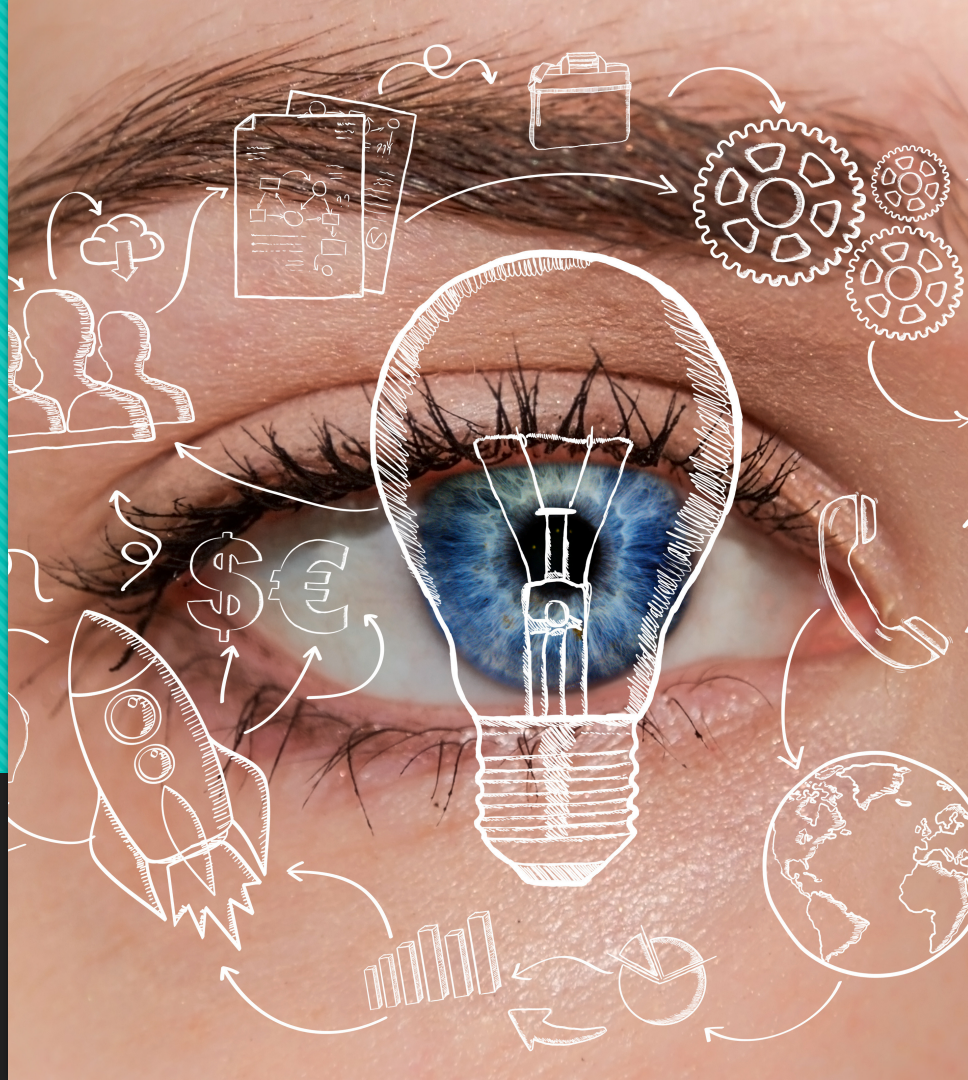
Logic and Reasoning

- In the four containers, there are 17 crayons, 7 crayons, 11 crayons and 5 crayons. If the crayons were rearranged so that each container had the same number of crayons, how many crayons would be in each container?

Teaching Strategies and Accommodations

- See it - Use visual aids/Draw/Diagram it
- Touch it - Use Manipulatives
- Feel it - Act it out
- Use a parallel problem with easier numbers
    - Start a task with your child so that the initial items are done correctly, and then have students use those for a model throughout the rest of the questions
    - Help students "toss out" irrelevant information when solving a problem
    - Think out loud to model the evaluation and thinking process

Visual Processing



Strategies to Support

- Use a whiteboard to allow kids to be able to focus on one problem at a time (eliminate overstimulation or processing of information)
- Allow students to use visual supports (manipulatives, cut out shapes, etc)
- Write instructions in different colors

Long-Term Memory

Long-Term Memory : How gaps affect math

Number and Operations-Fractions

Use equivalent fractions as a strategy to add and subtract fractions.

5.NF.1 • 1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

5.NF.3 • 3. Interpret a fraction as division of the numerator by the denominator (a/b = a divided by b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?

5.NF.4 • 4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

5.NF.6 • 6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.1

5.NF.7b • b. Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for 4 / (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 / (1/5) = 20 because 20 x (1/5) = 4.

5.NF.7c • c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?

5th Grade Fractions

6th Grade Ratios and Proportions

Ratios and Proportional Relationships

Understand ratio concepts and use ratio reasoning to solve problems.

6.RP.1 • 1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."

6.RP.2 • 2. Understand the concept of a unit rate a/b associated with a ratio a:b with b ? 0, and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."

6.RP.3 • 3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

6.RP.3a • a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

6.RP.3b • b. Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?

6.RP.3c • c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

6.RP.3d • d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Teaching Strategies and Accommodations

Repetition, repetition, repetition!

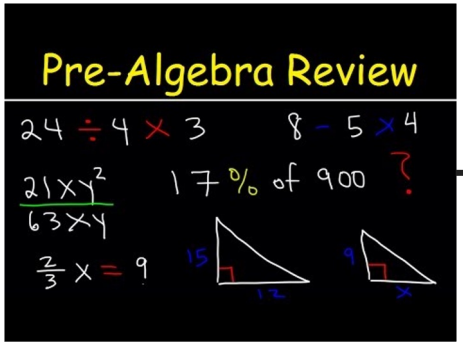
Use visual images and other memory strategies such as mind maps to ensure the brain can visualize

Make math reference cards for how to solve different problems with each step in detail (and COLOR!)

Make sure to come back for review if stepping away from the content for days/ weeks/ months

Two Biggest Gaps

Two Biggest Gaps



Processing Speed

Are you an “Explainerator?”

Processing Speed

Strategies and Supports

- Use fewer words in explanations
- Ask questions they can win
- Don't talk through their silence

- Take your time! The beauty of homeschool is going at their pace
- Be aware that as tasks get longer and become more complex, the demand on short term memory and processing increases, so students need more support with these
- Provide repetition
- Have them teach you back to ensure they got all steps!

Timing and Math

- What is my kiddo's stamina for math?
- What is the right "school year" for my kiddo?
- What are the graduation requirements in my state?
- How can I adjust my expectations? 5 versus 50 times

What “track” is right for your child?

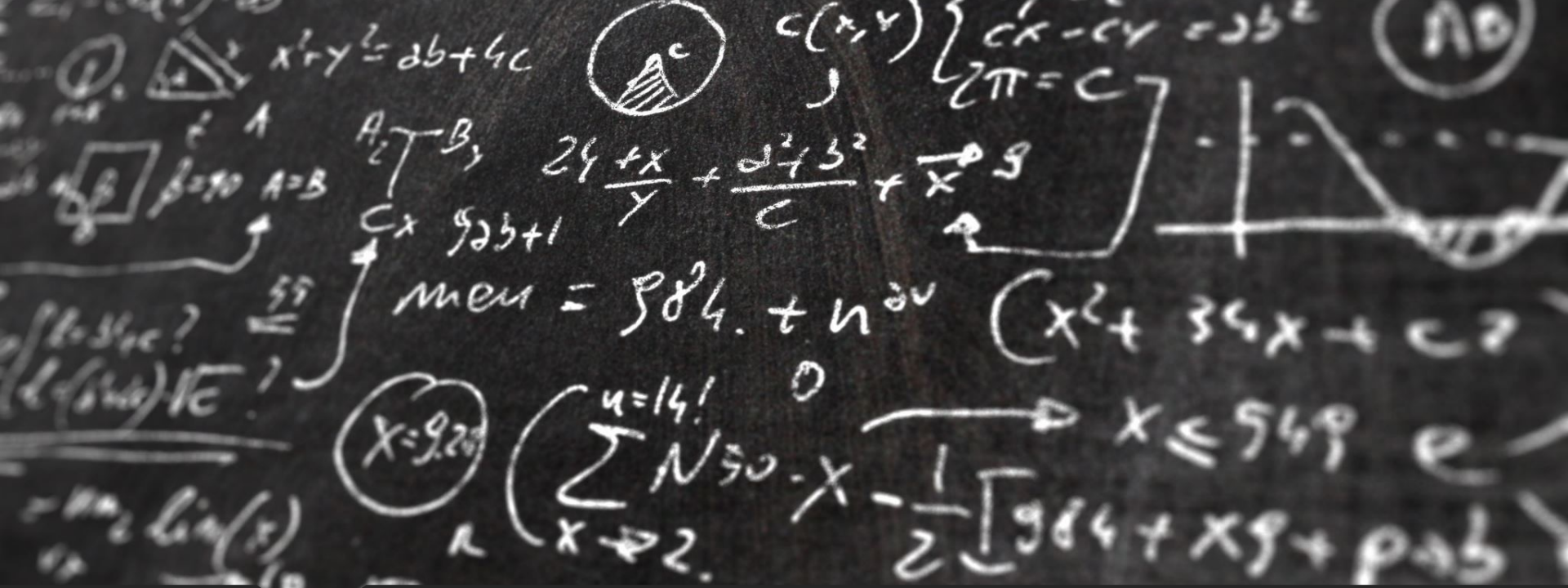
SPEND THE TIME FIGURING OUT THOSE LONG-TERM GOALS SO WE KNOW WHERE BEST TO SPEND THE TIME AND HOW TO SUPPORT THEM

PERMISSION TO GET OFF TRACK

Attention

How do we build stamina?

- Use a focus timer.
- Incorporate problems or math that they feel confident in to build success before tackling new content.
- Incorporate a multitude of different ways to work with content. For example, 5-10 minutes on a lesson, then 5-10 minutes where they work on a practice problem on a whiteboard and with manipulates. Then 5-10 minutes on a game or activity to stretch their math attention.



Math Instruction & Content

Recommended skills by textbook

Mastery Bank Recommended Topics by Textbook

		Recommended skills to have if you will be entering...								
Topic	**Sub Topic**	**Saxon 5/4 or Intermediate 5**	**Saxon 6/5 or Intermediate 5**	**Saxon 7/6 or Course 1**	**Saxon 8/7 or Course 2**	**Algebra 1/2 or Course 3**	**Algebra 1**	**Algebra 2**	**Geometry**	**Advanced Math**
Time	Reading Time on a Clock on the 5 or 10 minute mark	X	X	X	X	X	X	X	X	X
	Reading Time on a Clock	X	X	X	X	X	X	X	X	X
Numbers & Properties	Whole Numbers on a Number Line	X	X	X	X	X	X	X	X	X
	Comparing Whole Numbers	X	X	X	X	X	X	X	X	X
	Properties of Operations (Commutative, Distributive, Associative, Identity)				X	X	X	X	X	X
	Complete the Sequence		X	X	X	X	X	X	X	X
Place Value	The Hundreds Place	X	X	X	X	X	X	X	X	X
	Numbers up to 999	X	X	X	X	X	X	X	X	X
	Numbers up to the Hundred Thousands		X	X	X	X	X	X	X	X
	Numbers up to the Hundred Millions		X	X	X	X	X	X	X	X
Rounding	Rounding Numbers to the Nearest Ten	X	X	X	X	X	X	X	X	X
	Rounding Numbers to the Nearest Hundred		X	X	X	X	X	X	X	X
	Rounding Numbers to the Nearest Thousand		X	X	X	X	X	X	X	X
	Rounding Numbers to the Nearest Million,Billion and Trillions			X	X	X	X	X	X	X
	Estimating Addition and Subtraction Answers		X	X	X	X	X	X	X	X
	Estimating Multiplication and Division Answers		X	X	X	X	X	X	X	X
Addition	Addition with Two Digits - No Regrouping	X	X	X	X	X	X	X	X	X
	Addition with Two Digits - Some Regrouping	X	X	X	X	X	X	X	X	X
	Addition with Three Digits - No Regrouping	X	X	X	X	X	X	X	X	X
	Addition with Three Digits - Some Regrouping	X	X	X	X	X	X	X	X	X
	Addition with More Than Three Digits	X	X	X	X	X	X	X	X	X
Subtraction	Subtraction with Two Digits - No Regrouping	X	X	X	X	X	X	X	X	X
	Subtraction with Two Digits - Some Regrouping	X	X	X	X	X	X	X	X	X
	Subtraction with Three Digits - No Regrouping	X	X	X	X	X	X	X	X	X
	Subtraction with Three Digits - Some Regrouping	X	X	X	X	X	X	X	X	X

Chart of Grade/ Skills - Nicole

Behavior and Math

Math Anxiety!!!

- What is a child's "job"
- Poor "job performance" = anxiety
- 20% of the population has math anxiety
  - How we talk about math
  - Pressure to solve quickly and accurately
    - What about mistakes?

Anxiety = Poor "Job" Performance

- Fight, Flight, or Freeze
- Flood of Neurochemicals designed to shut down thinking
- Elevated stress hormones damage the brain, especially the hippocampus which regulates memory and emotions (shrinks under extended periods of acute stress)

Results = a cycle of poor performance causes anxiety and chronic stress and the anxiety and chronic stress causes poor performance

Math and Praising Wisely

Process: “I like the way you worked out what to do next” or “great strategy to break that down!”

Effort: “Wow, you worked so hard on that problem! Great persistence”

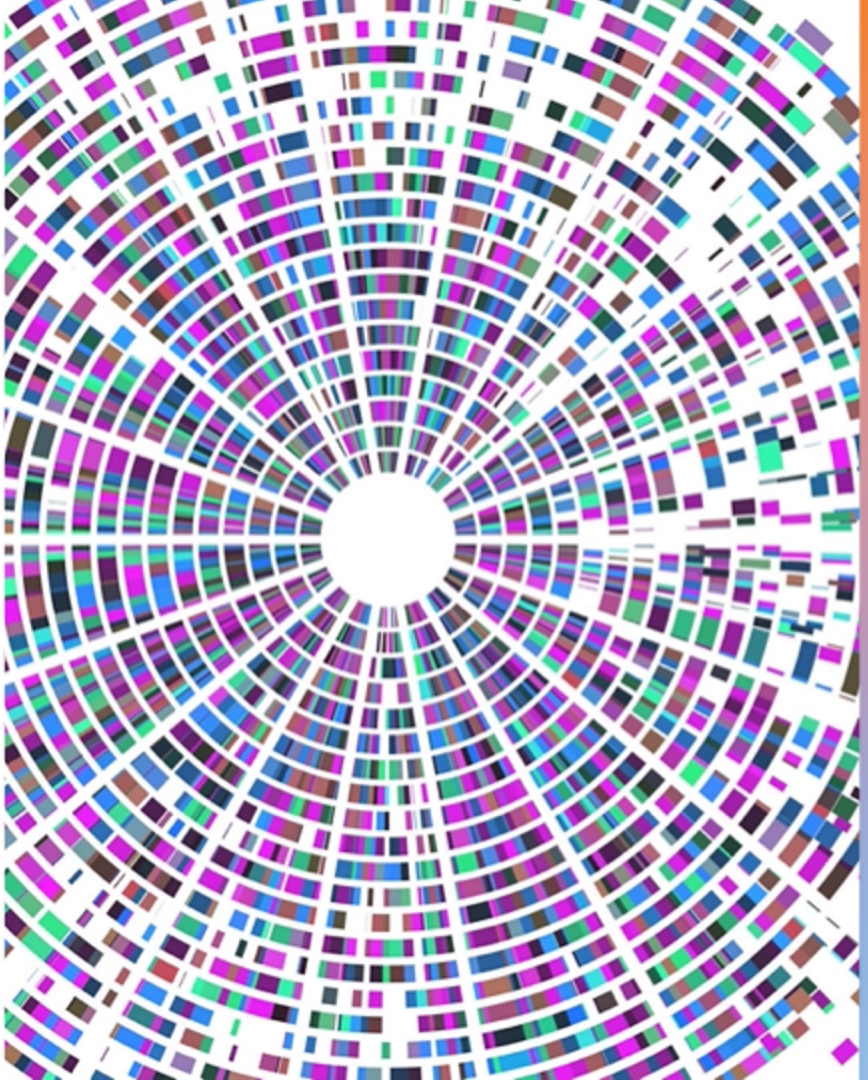
Strategies: “I like that you used ____ strategy, that took some creative problem-solving!”

Focus: “Look at how well you knocked out your math with such strong focus today!”

Perseverance: “You worked really hard learning how to do _____, look at how well you did on the mastery checkpoint! All that hard work and learning from your mistakes paid off.”

Improvement: ”Look at all the growth you just showed from the last time we did this! What amazing improvement!”

How to ”Solve” Math Problems for your child!



Assessments to Flush Out Math Challenges

- Cognitive:
  - Woodcock Johnson Test of Cognitive Abilities to flush out any weaknesses to strengthen on the cognitive level first

- Content:
  - Placement Tests:
    - Saxon
    - Singapore
    - Math-U-See
  - Diagnostic Test for Gaps:
    - ADAM/DOMA
    - Woodcock Johnson Test of Achievement (math battery)

Rainbow Resource
Math Comparison Chart

MATH CURRICULUM COMPARISON CHART

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	MATH Programs	Grades														Religious Content		Price Range		
		PK	K	1	2	3	4	5	6	7	8	9	10	11	12	Christian	N/Secular	$	$$	$$$
1.	Saxon K-3 *		•	•	•	•											•			•
2.	Saxon 3-12 *					•	•	•	•	•	•	•	•	•	•		•		•	
3.	Bob Jones		•	•	•	•	•	•	•	•	•	•	•	•	•	•				•
4.	AOP Horizons Math *		•	•	•	•	•	•	•	•	•						•		•	
5.	AOP LIFEPAC Math *		•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	
6.	AOP Monarch / Switched-On Schoolhouse					•	•	•	•	•	•	•	•	•	•	•			•	
7.	Math-U-See *	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•			•
8.	Abeka Math	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	
9.	Primary Math 2022 (Singapore)		•	•	•	•	•	•									•		•	
10.	Primary Math (US) (Singapore) *		•	•	•	•	•	•	•								•		•	
11.	Primary Math Standards Edition (SE) (Singapore) *		•	•	•	•	•	•	•								•		•	
12.	Primary Math Common Core (CC) (Singapore)		•	•	•	•	•	•									•		•	
13.	Math in Focus (Singapore) *		•	•	•	•	•	•	•	•	•						•			•
14.	Calvert Math		•	•	•												•		•	
15.	Exploring Creation with Mathematics (Apologia)			•	•	•										•			•	
16.	Good & Beautiful Simply Math		•	•	•	•	•	•	•							•		•		
17.	Shaping Maths (Singapore)			•	•	•	•	•	•	•							•			•
18.	Christian Light Math			•	•	•	•	•	•	•	•	•	•	•	•	•			•	
19.	Life of Fred			•	•	•	•	•	•	•	•	•	•	•	•	•		•		
20.	A+ Tutorsoft Math			•	•	•	•	•	•	•	•	•					•		•	
21.	Starline Press Math					•	•	•	•	•	•	•	•	•	•		•			•
22.	ShillerMath	•	•	•	•	•	•	•	•	•	•						•		•	
23.	enVision Math (2017/2018)		•	•	•	•	•	•	•	•	•	•	•	•			•			•
24.	Purposeful Design Math (2nd Ed.)		•	•	•	•	•	•	•							•				•
25.	Making Math Meaningful		•	•	•	•	•	•	•	•	•					•		•		
26.	RightStart Mathematics *		•	•	•	•	•	•	•	•							•			•
27.	MCP Mathematics		•	•	•	•	•	•	•								•	•		
28.	Conventional (Spunky Donkey) / Study Time Math			•	•	•	•	•	•	•	•					•		•		
29.	Liberty Mathematics		•	•	•											•		•		
30.	Miquon Math			•	•	•											•	•		
31.	Math Mammoth (Light Blue series) *			•	•	•	•	•	•	•	•						•	•		
32.	Ray's Arithmetic			•	•	•	•	•	•	•	•						•	•		
33.	Ray's for Today			•	•	•	•	•	•	•	•						•		•	
34.	Rod & Staff Mathematics			•	•	•	•	•	•	•	•					•		•		
35.	Jump Math			•	•	•	•	•	•	•	•						•	•		
36.	ThemeVille Math *			•	•	•	•	•									•		•	
37.	Beast Academy (from Art of Problem Solving) *				•	•	•	•									•			•
38.	Strayer-Upton Practical Arithmetic					•	•	•	•	•	•						•	•		
39.	Art of Problem Solving *								•	•	•	•	•	•	•		•		•	
40.	Paradigm Accelerated									•	•						•		•	
41.	Principles of Mathematics/Algebra 2										•	•		•	•	•			•	
42.	A Fresh Approach											•	•	•	•		•		•	
43.	Jacobs Math												•	•			•			•
44.	Foerster Math (Math Without Borders)												•	•	•		•			•
45.	VideoText												•	•	•		•			•
46.	Math Lessons for a Living Education		•	•	•	•	•	•	•							•		•		
47.	Mathematical Reasoning	•	•	•	•	•	•	•	•	•	•	•					•	•		
48.	Developmental Math		•	•	•	•	•	•	•	•	•						•	•		
49.	Math Power Basics											•	•	•	•		•	•		

This chart was co-created by Barbara Rainbow Resource Curriculum Consultants. It is intended to be a comparative tool based on our own understanding of these programs and is not necessarily validated or published elsewhere. Opinions and suggestions are "ours," not absolutes.

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Placement tests are available on our website for programs marked with an (*).
Find them at: **https://www.rainbowresource.com/rSearch.jhtm?keyword=math+placement+tests**

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	Approach			Manipulatives			Teacher Involvement			CCSS Aligned	Notes
	Spiral	Sequential	Conceptual/Topical	Req	Opt	RRC kit	Low	Med	High		
1.	•			•		•			•		Scripted teacher manuals.
2.	•				•		•				Teaching tutorials available separately.
3.	•								•		Paper manipulatives included.
4.	•				•	•			•		Grades 4-8 contain some religious content.
5.		•						•			
6.		•					•				Monarch is online only. SOS is computer-based.
7.		•		•				•			Mastery-based. Optional songs some Christian content.
8.	•			•				•			
9.		•		•				•			Digital manipulatives. Online components.
10.		•			•			•			
11.		•			•			•			Aligned to 1997 CA Standards. 2008 Ed.
12.		•			•			•		•	
13.		•		•		•		•		•	
14.		•			•			•			
15.		•			•				•		Projects included with each lesson.
16.	•			•				•			K-3: parent taught & includes manipulatives; AK online.
17.		•			•			•		•	2013. Singaporean money. Metric. Online component.
18.	•							•			Suggested manipulatives for lower grades.
19.		•					•				Brief Christian references in elementary levels.
20.		•					•				Computer-based.
21.		•					•				
22.		•		•					•		Discovery, Montessori approach.
23.		•					•			•	Digital component.
24.		•			•	•			•		E-book option for teacher edition.
25.			•	•					•		
26.	•	•		•					•	•	
27.		•						•			Modified Sequential.
28.	•							•			Optional manipulatives for Spunky.
29.		•					•				Consumable workbooks.
30.			•	•					•		Uses Cuisenaire rods.
31.		•			•		•				B & W or color versions available.
32.		•						•			
33.		•			•			•			
34.		•						•			
35.		•							•	•	
36.	•			•				•			Manipulatives used at all levels.
37.			•				•				Recommended for gifted students.
38.		•						•			No Teacher Guide.
39.		•					•				Recommended for gifted students.
40.		•					•				
41.		•					•				
42.		•					•				
43.		•					•				Teaching tutorials available separately.
44.		•					•				MWB Teaching tutorials available separately.
45.		•					•				DVD or online format..
46.			•	•					•		Extra practice (L1-3). Teaching Companion avail.
47.	•						•				
48.		•			•		•				Skill-based levels.
49.		•					•				Written at 4th grade level / for struggling students.

This chart was co-created by Barbara Rainbow Resource Curriculum Consultants. It is intended to be a comparative tool based on our own understanding of these programs and is not necessarily validated or published elsewhere. Opinions and suggestions are "ours," not absolutes.

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TREATING COGNITIVE WEAKNESSES - NEUROPLASTICITY

Cognitive Training

- Cognitive assessment to pinpoint specific cognitive strengths and weaknesses
- One-to-one intensive coaching that targets cognitive deficits
  - Works by stressing a weak area through mental exercise, encouraging the brain to build new neural networks
  - Neurons that fire together, wire together! (Hebb's Law)
  - Corrective measure that improves the primary underlying causes of dyslexia: weak cognitive skills (Auditory Processing, Processing Speed, Visual Processing)

Next Steps

Come visit us at our booths!

→

Visit our websites for more info and resources!