beauty&truth MATH

Mathematics in a Charlotte Mason Education

ELEMENTARY ALGEBRA

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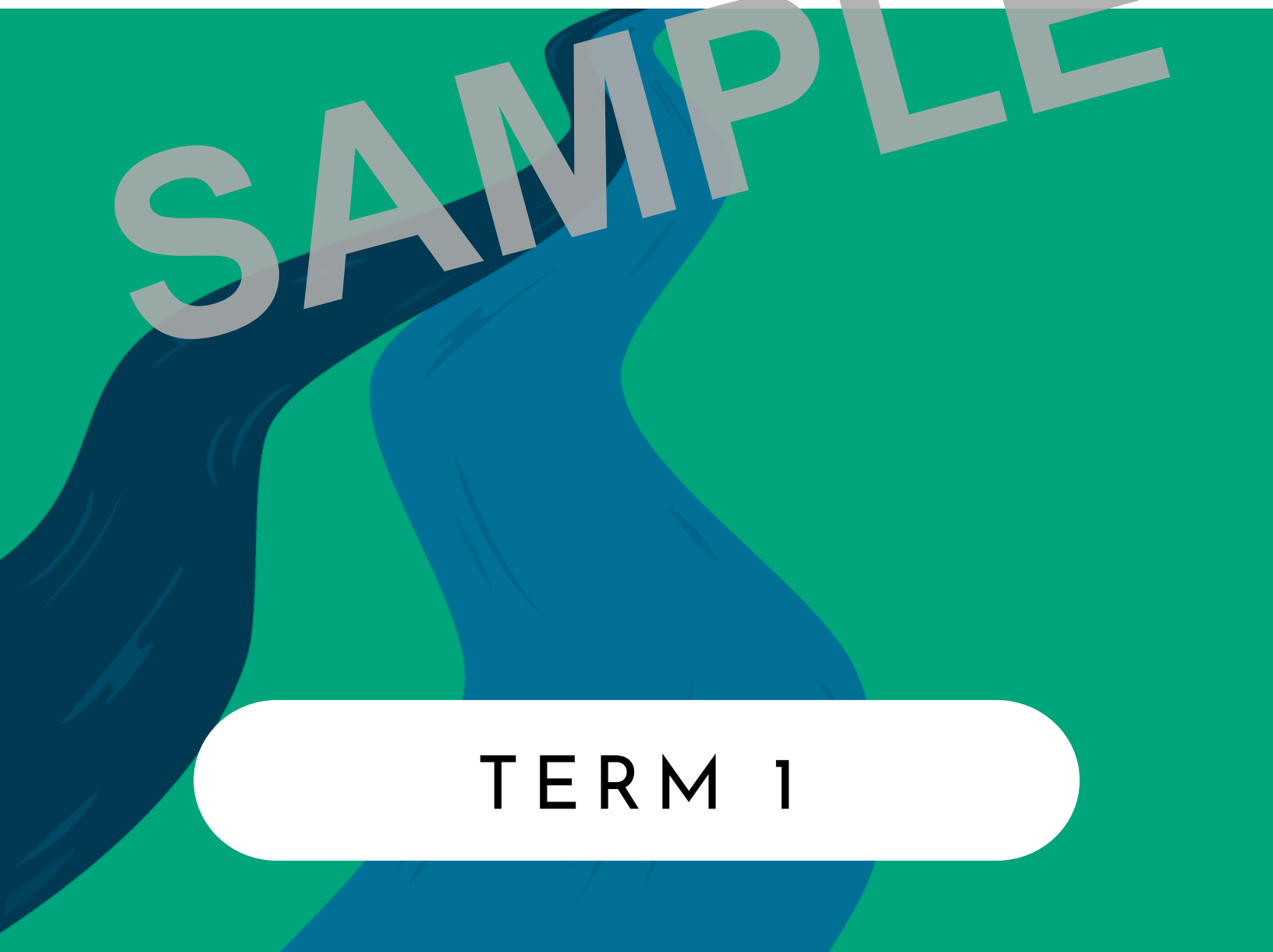

TERM 1

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Beauty & Truth Math

- Mathematics in a Charlotte Mason Education -

ELEMENTARY ALGEBRA

• TERM 1 •

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Complemented by

EXERCISES IN ALGEBRA
by W. S. Beard

TEACHING THE ESSENTIALS OF ARITHMETIC
by Philip Boswood Ballard

A SCHOOL ALGEBRA, PART I
by Henry Sinclair Hall

COMMON-SENSE ALGEBRA FOR JUNIORS
By F. F. Potter & J. W. Rogers

FUNDAMENTAL ARITHMETIC PUPIL'S BOOKS V & VI
By Philip Boswood Ballard

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"Never are the operations of Reason more perfect and more delightful than in mathematics. Here, men do not begin to reason with a notion that causes them to lean to this side or to that. By degrees, absolute truth unfolds itself. We are so made that truth, absolute and certain truth, is a perfect joy to us; and that is the joy that mathematics affords."
(Charlotte Mason, Vol. 4, pp. 62-63)

"How sad that this subject, ethereal as faery and powerful beyond telling, should find no other adjective than 'useful' to justify us in imparting it to our children. Number to the philosophers of old was a touchstone of learning; it was worthy of their greatest respect and deepest thought. Let us take this gift with the others they have given us; this thought of Number as worthy of our best, aesthetically satisfying as an art, beckoning onward as a science, and luring us ever forward towards increasingly enchanting prospects ahead."
(Stephens, Number: A Figure and a Step Onward, p. 4)

"And if our boys and girls can be brought to feel that arithmetic is a game—a noble game—one of the noblest though not one of the most spectacular that the human race has played—and that it is an honour and a privilege to play at it; and if we can keep that feeling alive by the right exercise and the apt stimulus, cunningly applied with a smile and a jest, as becomes so noble a game, the arithmetic lesson will cease to be a dismal grind and become a grand pursuit full of glamour and excitement."
(Ballard, Teaching the Essentials of Arithmetic, p. 34)

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WELCOME

Thank you for purchasing this guide! We are humbled and honored by your support. Please read through this introduction carefully. Understanding our approach is vital to maximizing the benefits of each guide.

THE VISION

Beauty & Truth Math exists to assist students AND teachers in the realm of mathematics in a Charlotte Mason education. It is possible to simply read the lessons and check the answers, without any dialogue between the students and teachers. This falls short of how we envision our lessons being used. We want teachers and students to be engaged and involved partners in the learning process.

These lessons are written TO the students to help them take ownership of their own education. This does NOT eliminate the importance of the teacher's role. Each lesson includes at least one time where the students check in with their teacher. These prompts provide opportunities for the teacher to ask questions, discuss what the students are learning, and monitor progress. Each lesson is an opportunity for building relationships between the teacher, the students, and the Lord. Please make the most of this time by exploring and understanding mathematical ideas together.

We thoroughly believe that math done completely in isolation misses opportunities to make deep connections. Just like a foreign language needs to be communicated and spoken to make connections, math is its own language with its own big ideas that are best learned through discussion.

Both the teacher and students are *living* born persons; our aim is to provide a *living* education. *Living* involves changes and adaptations. These lessons are guides and servants, not masters that must be followed exactly as they are. Please use the Spirit's wisdom when discerning what to modify, skip altogether, push forward on, or slow down on this mathematical journey.

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CONTACTING US

We welcome feedback and questions! For general inquiries, please email us at contact@beautyandtruthmath.com.

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These guides have been a labor of love. Please respect our hard work and do not share any content and links that are not publicly available on our site.

WEBSITE LINKS DISCLAIMER

PLEASE PREVIEW LINKS BEFORE USING! While we have done our best to ensure all sites we link to are appropriate, we do not have any control over changes made to them.

We are thankful for the free resources other sites make available and want to support them whenever possible. As they generate revenue through traffic on their sites, we link directly to their pages.

In many cases, there will be multiple worksheets provided on the pages linked. Most of the time, we will specify which worksheet is needed in the guide. Sometimes, you will need to choose the worksheet. This will be stated in the guide as well.

It is the teacher's final responsibility to ensure the content is age-appropriate for the lessons. Please email us at contact@beautyandtruthmath.com to report broken links.

PILOT YEAR

The Elementary Algebra Guide is being released one term at a time. Since it is in its first year, it is considered a pilot year. This means it may receive some updates before the Full Year Bundle is released in Summer 2023. All updates are free to anyone who has purchased the curriculum.

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READY, SET, GO!

"Putting in the work up front to make the school days run easy."

We have created three folders to easily access the teacher help documents and printables included in this guide. Their unique QR codes and links are included in multiple places in this introduction and are shown here for easy identification.

We will walk you through how to use these linked folders in the following few pages, so please don't worry about viewing them now. This page is simply an introduction to them.

Important Teacher Helps – This folder contains helpful resources to assist and support you as you implement math in a Charlotte Mason education. It includes the following documents:

- A CHARLOTTE MASON MATH EDUCATION lays out a vision for a Charlotte Mason math education.
- TEACHER MANUAL provides tips, instructions, and answers for the teacher to use in each lesson. This document is written to ensure conversations and collaboration occur between the students and teacher.
- ALL ABOUT THE GUIDES is everything you need to know about the guide's setup.
- ADDITIONAL SUPPLEMENTAL RESOURCES provide extra teacher support.

Cardstock Printables – This folder contains all resources that need to be printed on cardstock, as these will be used with your students multiple times throughout the lessons.

Printables – This folder contains all of the consumable printables for your students. Sometimes, you will need several copies.

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GET READY!

- **SEE** the **Materials Needed** section in this guide to determine what materials you have and still need to purchase.

- **PRINT** the TEACHER MANUAL document in the **Important Teacher Helps** folder.

- **PRINT ALL OF THE DOCUMENTS** in the **Cardstock Printables** folder. The students will use these documents multiple times, so we recommend using cardstock paper.

- **PRINT AT LEAST THE FIRST TWO WEEKS** of materials in the **Printables** folder. In the **Materials Needed**, we list how many copies you need for the entire term. Feel free to print all of them ahead of time or print them only a week or two in advance. You can find these documents listed under the Special Materials Needed sections for each lesson.

- **DECIDE** if you will print the guide or use it on a screen.

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GET SET!

- **READ THROUGH THE FOLLOWING <u>IMPORTANT TEACHER HELPS</u>:**
  - A CHARLOTTE MASON MATH EDUCATION
  - ALL ABOUT THE GUIDES (FOR THE TEACHER)
  - ALL ABOUT THE GUIDES (FOR THE STUDENT)
    - The lessons in this guide are written TO the students so they MUST read this document BEFORE the first lesson.

- **PREPARE your materials.** There is no one right way to do this! The following list is simply a compilation of ideas Beauty & Truth Math users have found helpful.
  - **Create a student math notebook for each student.**
    - You can use a grid spiral notebook or a 3-ring binder with grid paper. In general, we recommend ¼" squares. Some students may need larger squares based on their writing ability.
    - The students will need at least two pockets or a folder to store the cardstock printables and printables in.
    - Multiple math streams may be combined in the math notebook as long as each stream has its own section.
  - **Create a place for the Cardstock Printables & Printables.**
    - These can be stored in a folder in the math notebook or in an accordion file folder. The goal is to keep them accessible for the students and in good condition since they will use them often.
  - **Put together a teacher math notebook for yourself.**
    - Create sections for your personal calendar, the teacher manual, notes, etc.

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GO!

Any author of math textbooks or guides will tell you that we write in order to accommodate as many students as possible, and we provide more than is needed. You have complete freedom not only to modify the lessons but also to adjust the number of problems assigned to meet the needs of your students.

Each week you will need to do the following:

- Look over the instructions for the upcoming lesson in the teacher manual.
- Take the Beauty & Truth Math Guide Vow – I do solemnly promise that I will remember and implement the following statements:
    - I have permission from Charlotte Mason and the authors of these lessons to adjust or modify any lesson, at any time, to provide a living education to my unique, born persons.
    - I have permission from Charlotte Mason and the authors of these lessons to assign fewer problems than written in the lessons to provide a living education to my unique, born persons.
    - I have permission from Charlotte Mason and the authors of these lessons to assign more problems than written in the lessons to provide a living education to my unique, born persons.

      "...the educator has to deal with a self-acting, self-developing being, and his business is to guide, and assist in, the production of the latent good in that being, the dissipation of the latent evil, the preparation of the child to take his place in the world at his best, with every capacity for good that is in him developed into a power." (Mason, Vol. 1, p. 9)

- Pray for joy and wisdom as you set out each day exploring mathematical truths with your students. Now dive right into using the lessons, confident that the Lord is with you and for you!

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TABLE OF CONTENTS

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ALL ABOUT THE TERM

SEEING THE BIG PICTURE

There is NOT a one size fits all way to teach math using the Charlotte Mason method. Our guides are one option for students and teachers to use. We have created them to be adaptable to each unique student, both in the big picture and in the guides' details.

We have designed our curriculum to imitate the math streams used in Charlotte Mason's schools. Students have several options for the tracks and combinations of these streams. For more information, see our **Scope & Sequence** page on our website.

Additionally, **The Guides' Big Ideas** page on our website shows the main ideas throughout the years.

TERM OVERVIEW

This is the first term of Elementary Algebra. During this term, students learn about variables and integers. Lessons are written to occur once a week. In Elementary Algebra, the lessons are written to the student to help them own their self-education.

While the lessons are written to the student, the teacher still plays a vital role in the education process. At least once a lesson, the students will check in with the teacher about their progress. The Important Teacher Helps folder includes the Teacher Manual document that the teacher must use during each lesson to ensure it's successfully completed.

The **maximum** lesson time for students in Elementary Algebra is 30 minutes.

EVERY DAY & SPECIAL MATERIALS

We assume students will always have their pencil, math notebook with grid paper, and a colored pen to grade their assignments. Any additional materials beyond these items are listed in the Special Materials Needed sections.

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CARDSTOCK PRINTABLES VS. PRINTABLES

The teacher must prepare all cardstock printables before the term begins. The cardstock printables are listed as special materials, but links are not provided. Links for the Printables Folder are always provided in the special materials.

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MATERIALS NEEDED

- 50 Two-Color Counters
- Ruler

Cardstock Printables

- All About Integers
- Burger Joint Menu
- The Self-Education Guide

Printables

- Exploring Integers

Our Favorites provides links to the Strayer-Upton Book Series as well as other recommendations that may be helpful to you in preparing and organizing your materials.

Everyday Materials

- Grid Spiral Notebook or 3-Ring Binder with Grid Paper
  - We recommend ¼" squares. The students will need to write one number/square so please choose accordingly.
- 1-2 Tabs or Sticky Notes
  - Create a "Key Terms" section in the back of the math notebook.
  - Mark where the student is in the answer key if you print the guide.
- Pencil
- Colored Pen (Preferably red or green)
- Folder or Binder Pockets
  - Store the printables in these.

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• Variables, Ls. 1 •

EA. T1. W3

SUBJECT
Elementary Algebra

RESOURCES USED
Fundamental Arithmetic Pupil's Book V (Ballard)

OBJECTIVES
Students will be able to define what a variable is and explain some nuances in how algebraic expressions are written.

SPECIAL MATERIALS NEEDED
Burger Joint Menu

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📋 REVIEW
Using your Burger Joint Menu, write the following ticket orders, and find their cost in your math notebook. Show all your work for both of them.

A. Three french fries and two milkshakes.
B. Two orders of cheeseburgers with french fries, along with a milkshake.
C. Rewrite $2(w + x) - 3y$ so that the 2 is distributed to the letters it applies to.

PART A
You've been doing a lot of work with letters and numbers during the last couple lessons. How are you feeling about them?

We will continue to practice using letters throughout the rest of the school year. If you find these problems hard, be encouraged that you have plenty of time to master them!

Look at the Burger Joint Menu. Right now, the cheeseburger costs $2.50. What do you think the owner will have to do if the cost of ground beef and cheese go up?

Did you say raise the price? If so, you are correct! Food prices are rising, so the owner is trying to decide the best course of action. Help out by finding the cost of three cheeseburgers (3C) in your math notebook given the following scenarios.

1. The cheeseburger prices remain at $2.50.
2. The price increases by a dollar to $3.50.
3. The price is doubled to $5.

Check your answers.

Did you write the z with a horizontal line? Did you substitute the values using parentheses and include the dollar sign in your answer? If not, make a mental note to remember to do so next time.

Letters that represent different numbers are called **variables**. They are called this because their values can **vary**, as you've just shown with the different cheeseburger prices. How's that for a clever name?

In the Key Terms section of your notebook, write "Variable" and define it in your own words. Include a couple of examples.

PART B

Last lesson, we discussed how we use parentheses instead of the multiplication symbol "x" to avoid confusion with the variable x. To further avoid confusion, the letter "z" is written with a horizontal line through the middle of it. This ensures it will not be confused with the number 2 when it is written by hand. Here's what it looks like:

It's time for more practice in your math notebook! Find the following algebraic expressions, given x = 7, y = 5, and z = 2. Show all your work.

4. 5x
5. 10y - 6z
6. x + 10y - 5z

Go, **check your answers**. See if you can remember all the pieces you need to include when you grade your answers.

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PART C

Looking at the problems you just solved, answer the following in your math notebook.

7. What does problem 4 represent if x is the cost of a child ticket for a concert?
8. What does problem 5 represent if y is the cost of an adult ticket for a concert and z represents the senior discount applied to some of the adult tickets?

Check your answers. If these questions were hard, that's ok! These were challenging problems and you will have lots of time to practice interpreting algebraic expressions.

ADDITIONAL PRACTICE

Check in with your teacher. As time allows, complete the following in your math notebook.

9. It's math jeopardy time! Make up a situation that could represent 6b + 10g.

Find the following algebraic expressions, given x = 7, y = 5, and z = 2.

10. xy
11. 5x + xy
12. 5x + xy + 2z

✔ TEACHER CHECK-IN

- Discuss any problems you missed in today's lesson.
- What special thing do we do to easily distinguish between a "z" and a "2" when writing them down?
- Share your definition of a variable from the Key Terms section of your math notebook.

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