Classical Math 2 Teacher's Manual, Resource Book, & Resource Book Answer Key

A Note about Errors:
If you find a factual error in any portion of this voluminous work, please contact us
and we will certainly correct it on subsequent printings. Thank You!

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Classical Math 2 Teacher Manual

Forward

Classical Math 2 is a unique program established to teach mathematics to second grade students using the Classical methodology, which has been proven to produce results. It is not based upon some gimmick or clever manipulation, but it was born out of the need for a program that would thoroughly and systematically ground students in mathematics.

By the end of the Second Grade, a student should understand numbers with perfect mastery. They should understand counting and writing numbers, place values, and computation of numbers. *Classical Math 2* addresses this need. In addition, it provides continued instruction in telling time, using measurement, working with money, reading graphs, and much more.

Although many math programs teach the same basic material to elementary students, *Classical Math 2* does it thoroughly. This math program contains constant review of prior concepts. Furthermore, a concept is never taught and then left for a review unit at the end of the school year, but every concept taught is constantly reviewed throughout the course. Also, many of these concepts and lessons are expanded upon and reviewed again. Therefore, in order to accomplish the constant review and, at the same time, present new lessons, the lessons are packed. A first glance at the worksheets tells the complete story. The worksheets are "black". Little space is wasted and cute pictures are missing. *Classical Math 2* is a true mathematical program for the studious.

Each lesson begins with oral exercises in count bys, drills, short timed fact quizzes, and a systematic review of past material. Then the teacher presents the lesson's new objective, utilizing chants, such as the Running Total Chants, Fact Family Chants, and Regrouping Chants, and whole group responses, especially when learning new terms and rules and step-by-step processes, where the student learns the logical order for performing each operation. Sample exercises are then completed working together. Finally, once the lesson has been taught and practiced, another worksheet is provided to review the concept. This second worksheet also gives the student an opportunity to show his understanding and mastery of the new material and the review material.

Classical Math 2 is not only a classical approach to mathematics, but it is also a Christian approach to learning mathematics. The second grade student needs to develop a Christian worldview of mathematics. Beginning with the first lesson of *Classical Math 2*, the teacher can facilitate the child's understanding that God is a God of numbers; and God's holiness, faithfulness, truth, goodness, and beauty are reflected in mathematics. God used numbers and number patterns throughout His creation. God gave us numbers to use, whereby we may know Him, serve Him, and glorify Him. We can number our days, observe mathematical phenomenon in nature, and know the regularity and orderliness of mathematics because God is the creator and sustainer of all. The students need to know that there are absolute truths, correct answers, and 2 + 7 will always equal 9 because God is. God is unchanging, He is the same yesterday, today, and forever, and arithmetic works because of God. After this Christian worldview foundation is laid, then the students can perform mathematics with gusto, to the glory of God.

Therefore, *Classical Math* 2 is a systematic, logical approach to teaching classical, Christian mathematics. It provides, from the first lesson to the last lesson, orderly exercises for the student to completely understand numbers with constant review and rigorous exercises.

Grading

The importance of precision in mathematics cannot be overemphasized. The success of Classical Math 2 rests heavily on requiring precise, accurate work from each student. This, of course, is accomplished through high standards in grading. If a teacher tells her students they must label word problems and then fails to mark an unlabeled problem incorrect, the students have learned that it is not important to heed the instruction of the teacher; it didn't really matter if they followed her instruction. Not only is this poor training for mathematics, it is an inaccurate representation of how God has made the world. It *matters* whether we remember to obey our Lord and Savior! Our God takes "forgetting" very seriously. He doesn't say, "Oh, that's okay." when we forget His countless blessings or neglect His commands. Rather, He, in His great kindness and mercy, corrects, rebukes, chastens, and *teaches* His people. Teachers should respect the wisdom of the Great Teacher and follow His example. It is very common for teachers (and parents) to say, "Well, it is clear that the student understands the concept; he just forgot to…" Perhaps it is something mislabeled, misspelled, illegible, or only halfway done. Perhaps the student forgot to do a section all together. It is far kinder and gracious to the student to have these errors marked as errors than to overlook sloppiness and falsely teach that accuracy and detail do not matter. We want to show grace to our students, and to do so we must recognize that true graciousness prepares students well for the work and requirements they will face in later grades and as adults.

As this curriculum is used, it is important to consistently teach and train the students to carefully follow every instruction. Teach them that a label is required when writing a number sentence in a story problem, and then faithfully mark the problem incorrect if the label is not included. Teach them that the date must include a correctly spelled month and a comma, and mark the problem wrong when these instructions are not followed. Teach them exactly how they must draw the hands on a clock, and mark them incorrect if they do it differently. Train the students rigorously and in a loving manner. Far from being harsh, this will prepare them to receive and master the concepts presented in Classical Math 2.

Weighting Grades

Different schools will have varying criteria for grading and homework expectations. Some require that all work be done in class; others allow certain items to be sent home for completion. Some classrooms use a percentage system, while others may use total points or some other arrangement. Examples of possible grading schemes for Classical Math 2 are included below. However your quarter grades are calculated, it is very important to remember that when grading individual assignments a high level of accuracy and attention to detail must be maintained.

Weighting grades is a helpful way to provide a great deal of practice for a student without being too harsh as they work their way through new material. The details should matter, and this should be reflected by a great deal of red on a sheet where a concept is not yet grasped. And yet, we don't want students to flunk or do very poorly simply because they are dealing with new material. The following is one scheme that has proven effective.

Tests 50% This includes the tests that appear every five lessons throughout the curriculum, but it does *not* include timed fact test.

Seatwork 30% Seatwork is any assignment that the student works through on their own in the classroom. The teacher is available to help on these assignments but is not standing at the front of the room telling them what to put in each blank. In Classical Math 2, the B side of the worksheet may occasionally be given as independent seatwork, and towards the end of the year, the techer may also find it appropriate to assign side A as seatwork.

Fact Quizzes 15% This grade is the fact quiz that follows a week or two of practice quizzes. Practice quizzes are not recorded in the grade book; rather the student sees his progress in his own sticker book.

Homework 5% Parents are welcomed and encouraged to help their child find all mistakes on anything that comes home as homework. Because of this, homework is weighted very lightly. In Classical Math 2, the B side of the worksheet could often be sent home as homework.

In this system, each test, seatwork assignment, and fact quiz (not the practice fact quiz) go home with a percentage at the top. This can be quickly calculated by determining the number of possible points, marking off for each error, and then using a percentage sheet to arrive at a total percentage. (A grading wheel or calculator can also be used, but they take a little more time.)

Homework can be calculated with a percentage, but a 0 to 5 grading scale is perhaps the most effective training for the student. This scale allows the teacher to be very picky and precise in grading the assignment, (allowing the student to see exactly where more careful work is needed) without having too harsh an impact on the overall grade of the student. The grading scale works his way.

Perfect score = 5
1-3 errors = 4
4-6 errors = 3
7-9 errors = 2
10- 12 errors = 1
More than 12 = 0
Late assignments: reduce final score by one point for each day late
More than 3 days late = 0
(Example: An assignment that received a 4 but was two days late would receive a 2.)

At the end of the quarter calculate total points possible in the homework category, calculate the points actually earned, and turn it into a percentage grade.

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Table of Contents for Concepts

Those in **Bold** have a **Resource Worksheet**.

Best Fact Quiz Schedule

On every <u>underlined TEST Lesson</u> there should be GRADED fact quizzes of 25 facts in one minute for the facts in bold. Other lessons are for practice.

			<u>Test Lessons</u>			<u>Test Lessons</u>
Fact sheets:		+, - 2		+, - 2	+, - 2	**+, - 2**
	+, - 0, 1	+, - 0,1	**+, - 0, 1**	Dbls. 6-10	+, - 0, 1, 2	**+, - 0, 1, 2**
	Doubles 0-5	Dbls. 0-5	**Dbls. 0-5**	Dbls. 0-10	Dbls. 0-10	**Dbls. 0-10**
Lessons:	1, 2	3, 4	<u>5</u>	6, 7	8, 9	<u>10</u>

Fact sheets:	+, - 2, 3	+, - 2, 3	**+, - 2, 3**	+, - 3, 4	+, - 3, 4	**+, - 3, 4**
	+, - 3	+, - 3	**+, - 3**	+, - 4	+, - 4	**+, - 4**
Lessons:	11, 12	13, 14	<u>15</u>	16, 17	18, 19	<u>20</u>

Fact sheets:	+, - 0-5	+, - 0-5	**+, - 0-5**			
	+, - 4, 5	+, - 4, 5	**+, - 4-5**	+, - 5, 6	+, - 5, 6	**+, - 5, 6**
	+, - 5	+, - 5	**+, - 5**	+, - 6	+, - 6	**+, - 6**
Lessons:	21, 22	23, 24	<u>25</u>	26, 27	28, 29	<u>30</u>

Fact sheets:	+, - 6, 7	+, - 6, 7	**+, - 6, 7**	+, - 7, 8	+, - 7, 8	**+, - 7, 8**
	+, - 7	**+, - 7**	**+, - 7**	+, - 8	+, - 8	**+, - 8**
Lessons:	31, 32	33, 34	<u>35</u>	36, 37	38, 39	<u>40</u>

Fact sheets:	+, - 0-5	+, - 0-5	**+, - 0-5**	+, - 6-10	+, - 6-10	**+, - 6-10**
	+, - 8, 9	+, - 8, 9	**+, - 8, 9**	+, - 9, 10	+, - 9, 10	**+, - 9, 10**
	+, - 9	+, - 9	**+, - 9**	+, - 10	+, - 10	**+, - 10**
Lessons:	41, 42	43, 44	<u>45</u>	46, 47	48, 49	<u>50</u>

Fact sheet: +, - 5 minute 100 facts for all these lessons. A grade is taken on lesson 55 and 60.

| Lessons: | 51, 52 | 53, 54 | 55 | 56, 57 | 58, 59 | 60 |

| Fact sheets: | x 0, 1 | x 0, 1 | **x 0, 1, 2** | x 2, 3 | x 2, 3 | **x 2, 3** |
| | x 2 | x 2 | **x 2** | x 3 | x 3 | **x 3** |

| Lessons: | 61, 62 | 63, 64 | 65 | 66, 67 | 68, 69 | 70 |

| Fact sheets: | x 3, 4 | x 2, 3, 4 | **x 2, 3, 4** | x 0-5 | x 0-5 | **x 0-5** |
| | x 4 | x 4 | **x 4** | x 5 | x 5 | **x 5** |

| Lessons: | 71, 72 | 73, 74 | 75 | 76, 77 | 78, 79 | 80 |

| Fact sheets: | x 0-5, 10 | x 0-5, 10 | **x 0-5, 10** | | | |
| | x 10 | x 10 | **x 10** | | | |

Cont. on: x 0-6, 10   x 0-6, 10   **x 0-6, 10**
Cont. on: x 6   x 6   **x 6**
or review +, - 5 minute 100 facts for these lessons,
    or review x 0-5, x 10 along with addition & subtraction

| Lessons: | 81, 82 | 83, 84 | 85 | 86, 87 | 88, 89 | 90 |

Fact sheets:	x 0-7, 10	x 0-8, 10	**x 0-8, 10**	x 0-10	x 0-10	**x 0-10**
	x 7	x 7	**x 7**	x 9	x 9	**x 9**
	x 8	x 8	**x 8**	x 7	x 8	

or review +,- 5 minute 100 facts for the remaining lessons,
or review x 0-5, x10 along with addition and subtraction.

| Lessons: | 91, 92 | 93, 94 | 95 | 96, 97 | 98, 99 | 100 |

Starting Out With a Biblical Worldview of Math

Help your second graders develop a Christian worldview of mathematics. Start with the first lesson and help the students understand that God is a God of numbers. He used numbers and number patterns throughout His creation. The days of the week, the days of the month, and the months of the year all show God's use of numbers. Monocots and dicots, the speed of light, the mass of an object, the snowflake, the distance of planets, and the rings of a tree are examples of God's use of mathematics in nature. Help the students see that God's holiness, faithfulness, truth, goodness, and beauty are reflected in math. Share that God gave us numbers to use, whereby we may know Him, serve Him and glorify Him. Teach the students to number their days, observe mathematical phenomenon in nature, and know the regularity and orderliness of math because God is the creator and sustainer of all. The students need to know that God has absolute truths and this applies to math as in correct answers. 3 + 4 will always equal 7 because God IS. God is unchanging. He is the same yesterday, today, and forever. Help the students understand that math works because of God. After this Christian worldview foundation is laid, be sure to seek and use other opportunities to review and share the Christian worldview of mathematics in subsequent lessons throughout the year.

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Lesson 1a: The Date; Count by 2's, 7's; **Birthday Graph**; Ordinal Numbers; Number Before and After; Weekend; Number Order; Ten's and One's Place Value

Timed Fact Practice: +, - 0, 1   +, - Doubles 0-5

New Concepts
Date: Learn how to write today's date, spelling the month correctly and using the comma. Learn to locate today's date on the calendar.

Count by 2's, 7's: *Make "Count by" number strips for the 2's and 7's. Always start with 0 and step up twelve times the count by number, i.e. 0 2 4 6 8 10 12 14 16 18 20 22 24.*

Before starting the worksheet, chant these count bys several times, going up and down. The whole class should stay together and should be *lustily* chanting the numbers. Permit them to refer to the "Count by" number strips you have made and displayed at the front of the room. After a week or so of writing and chanting these numbers they should have the sequence memorized and can be expected to do it without the help of the number strips. When doing the worksheets, students should do count by's orally while they write the numbers down.

Birthday Graph: Have each student write his name and birthday month on a small square. Put these on a birthday graph. Help the students make observations about the graph; i.e. "There are 3 birthdays in December." or "The most birthdays are in July.". Chant the months of the year.

Ordinal Numbers: Using the months of the year, learn ordinal numbers 1ˢᵗ through the 13ᵗʰ. Teach them that it is the last two letters of the word which are written "fir<u>st</u>" "seco<u>nd</u>", etc.

Number Before and Number After: Use a calendar or a hundred's chart to teach number before and number after.

<u>Weekend</u>: Chant "Saturday and Sunday are the weekend days."

<u>Number Order</u>: Teach the students to check over their work to be sure that no number is written twice or skipped.

<u>Place Value</u>: Demonstrate one's place and ten's place on the board.

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Lesson 1b: Weekdays, Count by 5's, 10's

Teaching Tip: Have the days of the week written out somewhere in the classroom where the students can see them. Require that students always spell these correctly, and mark the answer incorrect if it is misspelled.

New Concepts

<u>Weekdays</u>: Use the calendar to learn weekdays. Weekdays are the days we go to work and to school. Always chant these in order, starting with Monday. Chant "Weekdays are workdays, Monday, Tuesday, Wednesday, Thursday, Friday."

<u>Count by 5's, 10's</u>: *Make "Count by" number strips for the 5's and 10's and display them.* Use a hundreds chart or demonstrate counting by 5's and 10's on the board.

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Lesson 2a: **Hour clock;** Running Total Chant; Double Addition Facts; Days of the Week

Timed Fact Practice: **+, - 0, 1**   **+, - Doubles 0 - 5**

Oral Practice and Review
Review Calendar; Days of the Week, Weekdays, Weekends, Months of the Year
Count by 2's, 5's, 10's, 7's (forward and backward)

New Concepts
<u>Hour clock</u>: Learn hour hand and minute hand. The short hand is the hour hand, the shorter word. The hour hand points to the number, but it does not touch the number. The hour hand tells the hour. The long hand is the minute hand, the longer word. The minute hand can touch the numbers. The minute hand tells the minutes of each hour. As you point to the hands chant "Short hand, short word, hour is short. (Shout) Use the numbers." And then chant "Long hand, long word, minute is long. (Shout) Count by fives."

Teach the correct way to the draw hands. (Use no arrows, start pencil stroke by number and draw in towards the center; the minute hand starts at the very outer edge of clock; the hour hand starts a little ways away from number. Teach students to draw the minute hand first, then the hour hand.)

<u>Running Total Chant:</u> The "Running Total Chant" is the way we add, keeping a running total of all the addends until we get to the final sum. So when we chant we say the first digit only. The rest of what we say in the chant are "totals."

2 + 4 sounds like "2, 6, the answer is 6."
2 + 4 + 5 sounds like "2, 6, 11, the answer is 11."

This is not how we chant addition: "2 plus 4 is 6." or "2 plus 4 is 6 and 6 plus 5 is 11." This is not teaching the students to quickly compute arithmetic problems.

For the first problem in number 6 (5 + 5), the students will chant: "5, 10!", and as they write the 10, they say "The answer is *ten*!" The next problem (2 + 2) is "2, 4!". As they write the four, they say "The answer is *four*!" Diligently teach your students the Running Total Chant. It will prepare students for mentally computing longer math problems.

Double + Facts: Learn that sum is the answer in an addition problem. Practice double facts on the board. Some students will need to see these conceptually, using tiles stacked next to each other. Use flash cards to review.

Days of the Week: Make a poster chart listing the days of the week. Have the students learn to spell the days of the week correctly and write them in order. Students may refer to the chart at the front of the room to help with spelling. Chant the days of the week, starting with Sunday. Our Lord Jesus Christ arose from the dead on the first day of the week.

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Lesson 2b: Count Backwards

New Concepts
Count backwards: Use number strips to review count by's. Practice them backwards and then write them. Always have students check their work by counting back through both ways, i.e., 14, 12, 10, 8, 6, 4, 2, 0-0, 2, 4, 6, 8, 10, 12, 14. When doing the worksheets, students should do count by's orally, staying together while they write the numbers down.

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Lesson 3a: Continuing and Repeating Patterns; Running Total Chant for Subtraction; Addition Terms; Addition Story Problem Setup

Timed Fact Practice: +, - 2   +, - 0, 1   +, - Doubles 0 - 5

Oral Practice and Review
Count by 2's, 5's, 7's, 10's, (forward and backward)
Practice Hour Clock, Review Minute and Hour Hand Chant and How to Draw each Correctly

New Concepts
Continuing and Repeating Patterns: Learn the difference between a continuing pattern and a repeating pattern. 2, 4, 6, 8, ... is a continuing pattern. ABABAB... is a repeating pattern. Give several examples on the board and have the students identify them.

Running Total Chant for Subtraction: We use the "Running Total Chant" for subtraction problems too. This prepares the students for mentally computing subtraction problems quickly. The students chant the minuend and then mentally subtract the subtrahend without saying it. They chant the difference, which is the answer.

8 - 2 sounds like "8, 6, the answer is 6."
9 - 5 sounds like "9, 4, the answer is 4."