

Second Grade Column Algorithms

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Column Algorithms

Program of Study

What is taught?

In this block, your child will begin to work specifically with written math problems involving ones, tens, and hundreds places (or more if you want to go further), as well as carrying and borrowing. You should also teach her multiplication and long division of up to 5 digit numbers by a single numeral. Of course, it is always necessary to continue with “mental math” each day, since fluency with math facts is essential. Main lesson time should begin with mental math practice, then some movement/rhythm games. Word problems and work in the main lesson book take the majority of the main lesson time. As much as possible, word problems should come from either real-life situations, or be based upon a story. You can use picture books such as [Ox-Cart Man](#) by Donald Hall, or create your own stories (more about this in a bit).

Teacher resources

Refer to the section for grade 1/2 from [Teaching Mathematics](#) by Roy Wilkinson, which tell ways of explaining place value as well as suggestions for combining math problems with a story. This is the time to begin working on **graph paper**, since learning how to properly line up place value in columns is essential. In fact, I was stunned when I visited Germany to find out that the students use graph paper for all class work, even writing, all the way up to high school. If your child still has difficulty lining up place value properly, consider using a different color for each place.

The pages 22-30 from [Teaching Mathematics in Rudolf Steiner Schools](#) by Ron Jarman also have lots of helpful suggestions about teaching this content & practicing math facts.

Even if money is tight, I REALLY recommend that you invest in a set of T.O.P.S. cards (Techniques of Problem Solving) for second grade. They are perfect for reducing your lesson planning, especially if you are juggling teaching children of multiple ages or if your child is ready for some independent work. The cards progress in skill order, so make sure to travel through the deck chronologically, even if you start in the middle. Either let your child work on several cards a day independently (three is plenty) and keep track of her progress on the included chart, or use the cards to inspire your own math stories & related problems (in which case you would only do one per day).

For example, card #1 simply says “There are 6 more tulips behind the rock. How many tulips are there in all?” (Four are shown in the illustration.) You can be inspired by this to tell a story about a little fairy who is excited to wake up and explore the wonderful new Spring day. As she walks around the woods, she sees all different things but what really catches her eye is a group of four beautiful tulips in front of a large rock. As she is admiring the flowers, the fairy hears a rustling sound behind the rock and peeks around. There is a little bunny and 6 more tulips! And the story can go on and on, add in more details, Spring verses, fingerplays or songs if you want, etc.

Reveal the drawing on the blackboard of the rock with four tulips in front and then assign the problem. Have your child copy the drawing and the problem into her main lesson book, then solve it. You can also adapt any of the problems to larger numbers if she needs more of a challenge, or skip to cards later on in the deck (just don't go out of order chronologically). The Teacher's Commentary booklet includes a student record keeping form, answer key, game suggestions, and a Super Solver certificate.

The problem deck cards are designed to provide experience, not just with the mathematical operations, but with four different problem solving skills and strategies essential to both word problems and real-life math situations:

Find the Information
Choose the Operation
Guess and Check
Use Logic

If you find that your child is stumbling with the cards because she needs extra help learning her math facts, I recommend [Putting the Heart Back Into Teaching](#) by Stanford Maher and Yvonne Bleach. Pages 102-113. I love this book but unfortunately it is very hard to find! The pages I already mentioned from the other two books also have notes on learning the times tables but these are more extensive & specific. By the way, this is what they recommend learning when:

first grade –
rhythmic walking
sing 2 and 3 multiples

second grade –
multiples 2, 3, 4, 5, 10
tables 2, 3, 4
form drawing 2, 3, 4

third grade –
multiples 6, 8, 9, 11, 12, 7
form drawing 5, 6
find patterns
all tables

fourth grade –
repeat all
work on speed
recall individual tables e.g. $8 \times 7 = 56$

fifth grade –
speed: time the multiples
add the square table

Putting the Heart Back Into Teaching includes the following helpful sections:

Mental Arithmetic
Multiples and Tables
The Three-fold Being
The Temperaments
Individuality
Group Awareness
The Senses
When and How to do the Various Exercises (excerpted above)
Rhythmic Walking
Movement
Classroom Space and Movement
The Multiples
Singing the Multiples
Finding the Patterns
Form Drawing
The Tables
Games
The Multiple Chart
Using the Fingers as Counters

Of course, the addition and subtraction facts need to be learned too. You might want to stick some practice with this in with your card problems; here is one example you can do the day after you do the first card from the deck ($4 + 6 = 10$). Take some small felt balls (to represent the tulips) and a napkin holder or something else to represent the rock, and create a little display in your classroom. Move the rock through the field of tulips so a different number are hidden each time, then repeat the addition facts to 10.

chant out loud

$$1 + (9 \text{ are hidden}) = 10$$

move the napkin holder

then say

$$2 + (8 \text{ are hidden}) = 10$$

move the napkin holder

$$3 + (7 \text{ are hidden}) = 10$$

and so on

In this way it is part of the previous day's problem and builds upon it.

For subtraction try walking them on an invisible number line. For example, take a basket and put ten tennis balls in it. Have her take one step backwards, set down a ball, and say 10 minus 1 is 9. Then another step backwards and say 10 minus 2 is 8. Etc.

End of year assessment

Without a doubt, the two pages from Teaching Mathematics in Rudolf Steiner Schools (pp.44-45) are the most useful to help you with assessment. This is the section which gives an end of the year test for second grade math. Try to work towards your child being able to do these types of problems independently by the end of this school year.

Booklist

Picture books which involve or inspire word problems, such as
Ox-Cart Man

Donald Hall

Examples from real life!

Graph paper

Colored pencils (optional)

Main lesson book

Blackboard and colored chalk

Teaching Mathematics
(pages 7-23)

Roy Wilkinson

Teaching Mathematics in Rudolf Steiner Schools
(pages 22-30, pages 44-45)

Ron Jarman

Putting the Heart Back Into Teaching
(pages 102-113)

Maher & Bleach

Techniques of Problem Solving: Deck 2
<http://www.amazon.com/Techniques-Problem-Solving-Level-2/dp/0866511202?tag2=waldorfcu-20>

Column Algorithms

Journaling Page

Week One:

Column Algorithms

Journaling Page

Week Two:

Column Algorithms

Journaling Page

Week Three:

Column Algorithms

Journaling Page

Week Four:

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Planning Page

Date:

Today we will practice _____ math facts.

Movement/rhythm

Math problem #1

Story ideas

Math problem #2

Story ideas

Math problem #3

Story ideas

Materials list

Notes for Tomorrow

Column Algorithms

Assessment

Math facts:

- Addition and subtraction facts (up to 20)
- Multiplication and division facts (up to 100)

Computation skills:

- Vertical multi-digit addition and subtraction problems
- Addition problems with carrying
- Subtraction problems with borrowing
- Division problems with remainders
- Multiplication of multi-digit numbers by one digit
- Long division of multi-digit numbers by one digit

Study skills:

- Keeping track of place digit columns by using graph paper
- Finding the essential information in a word problem and ignoring the unnecessary information
- Choosing the necessary operation to solve a problem
- Double-checking your work by working the problem in the opposite way (3 plus 18 = 21, double-check by seeing if 21 minus 18 = 3)
- Using math sense to determine when an answer is most likely incorrect (3 plus 18 = 12 cannot be correct because 12 is less than 18 and when you add two numbers together the final answer is larger than each of them)
- Using the "guess and check" strategy in problem solving
- Using logic in problem solving

If you are required to give your child a grade from your state system, or you'd like to be able to compare her achievement in each block at a glance, you can assign a four point scale to each of these aspects (math facts, computation skills, study skills):

- 4 points – exceptional; absolutely above and beyond
- 3 points – quite satisfactory
- 2 points – somewhat less than satisfactory
- 1 point – completely dismal

Such a rubric would correspond to the following traditional grades:

Grade	Equivalent Grade Point	Equivalent Percentages
A+	12	90-100
A	11	85-89
A-	10	80-84
B+	9	77-79
B	8	73-76
B-	7	70-72
C+	6	67-69
C	5	63-66
C-	4	60-62
D+	3	57-59
D	2	53-56
D-	1	50-52
F	0	0-49