Fifth Edition

Arithmetic
Work-text
4

abeka.
Traditional ARITHMETIC SERIES

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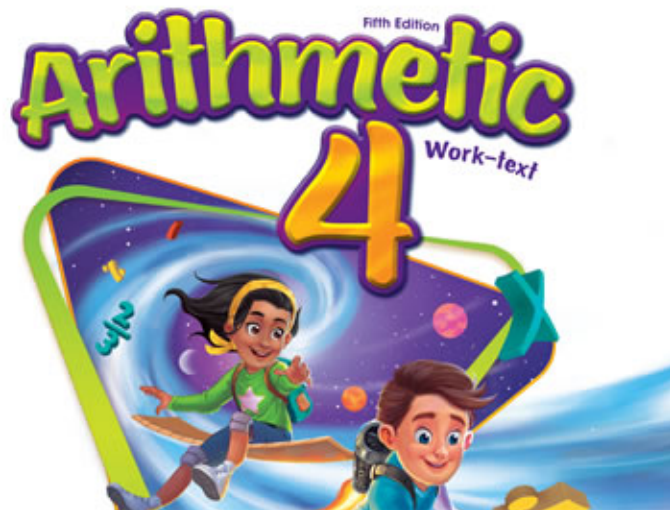*Authors:* Kim Gowans, Rachel Taylor
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About the Text

Arithmetic 4 contains a variety of exercises involving new/review material in each lesson. The work-text includes 170 lessons (excluding tests), correlated homework assignments, and supplementary exercises. The handbook at the end of the book contains facts, examples, and measures which are used throughout the work-text.

Although all new material is presented in the information boxes at the top of the work-text pages, the work-text is not designed to be used without a teacher. Students need to hear a thorough explanation of each concept and see procedures demonstrated step by step by the teacher.

Arithmetic 4 Curriculum Lesson Plans available separately or as part of the Grade 4 Curriculum, and the Teacher Edition provide complete daily plans for teaching, reviewing, and assessing student progress. The Teacher Edition also includes solutions to all exercises in the text, enrichment activities, tips and ideas, and objectives for each page. *Arithmetic 4 Quizzes, Tests, and Speed Drills* is correlated with the work-text.

General Information

Time Allotment

In the Abeka 4th grade curriculum, arithmetic is taught / practiced for 45–50 minutes each day.

Teaching Procedure

Arithmetic 4 Curriculum Lesson Plans gives detailed guidance, helpful teaching tips, and suggestions for teaching each lesson. Arithmetic class generally begins with approximately ten minutes of combination practice, ending with *Rapid Calculation Practice* and a written speed drill. Speed drills are checked, and a bi-weekly speed drill quiz is given.

A systematic oral class review time follows the speed drill, covering recently taught material as well as earlier concepts. After this review time, new concepts are introduced and practiced. The time needed depends on the complexity and familiarity of the concept. Once the new concepts are taught, the teacher guides the class through work-text pages. The Clever Cranium question often ends the lesson. The Clever Cranium is designed to challenge students and encourage critical thinking.

Grading Arithmetic

Arithmetic 4 Quizzes, Tests, and Speed Drills includes bi-weekly tests as well as bi-weekly quizzes and daily speed drills. A bi-weekly speed drill grade is given for process fact quiz. Answers and point values are included in *Arithmetic 4* Quiz, Test, Speed Drill Key.

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Arithmetic 4 Curriculum Lesson Plans provides teachers with daily learning objectives, systematic class review, teacher instruction, critical thinking opportunities, as well as hints for helping reluctant learners / encouraging students needing extra challenges.

Contents

Using *Arithmetic 4* Work-text Teacher Edition

Engage students in arithmetic class as you provide opportunities for each student to "show what he knows." After each skill or concept is introduced, the mastering process begins and then continues with practical application. This skill-building spiral approach takes students from the known to the unknown as they continue to review, apply, and build upon learned concepts throughout the year.

After instruction has been given, students put their knowledge to work by completing the sections of the work-text of that day's page.

This Teacher text / answer key includes student work-text pages with answers, teaching objectives, instructions for guiding students through the pages, as well as tips, ideas, enrichment activities, and teacher helps for personalizing your lessons to meet the needs of your students.

3 Tiny Countries

- Factors, common factors, greatest common factor (GCF)
- Measuring to nearest eighth inch/ centimeter
- Reducing fractions
- Proper and improper fractions
- Pictographs, circle graphs
- Least common multiples (LCM)/least common denominator (LCD)
- Add/subtract fractions with uncommon denominators

- Metric prefixes/values
- Reading, writing, comparing decimal values
- Metric units: meter, liter, gram
- Writing decimals as fractions/fractions as decimals
- Add/subtract decimals/annexing zeros
- Money: make/count change
- Story problems with graphs
- Subtracting fractions with borrowing (common denominators)

4 State Fairs

- Graphs: range, mode, median, mean
- Subtracting fractions/mixed numbers with borrowing (uncommon denominators)
- Multiplying fractions/cancellation
- Metric measure conversions
- Multiplying mixed numbers
- Dot plot
- Squared numbers/square roots

- Metric measure equations
- Roman numerals
- Reading/writing large Roman numerals
- Geometry: use protractor to measure and draw angles
- Circles: properties, terms, angles
- Solving for unknown in equations with parentheses
- Comprehensive review lessons

Application
The work-text provides written practice for the concepts which the teacher has taught and the students have practiced together in arithmetic class. The Application is the teacher's lesson plan for guiding students through this important process.

Arithmetic Skills
Each lesson includes a list of arithmetic skills that students will acquire and practice that day on the classwork pages and Clever Cranium.

Handbook
Arranged alphabetically by main topic, the handbook is an easy to use reference of all concepts covered in *Arithmetic 4*. For ease of use, definitions, examples, and corresponding page numbers are included.

Homework
Homework is assigned two to three times each week. Assignments have been designed to continue spiral review built into *Arithmetic 4* as well as to prepare students for upcoming quizzes/tests. All assignments are printed in the Homework section of the work-text. Homework is checked but is not intended to be graded.

Supplementary Exercises
These pages are designed to be helpful to students, parents, and teachers. They can be used in a variety of ways and can encourage student understanding/mastery of concepts.

Clever Cranium encourages students to develop critical thinking skills, logic, and enjoyment of arithmetic applications. It is called Clever Cranium because it stretches the students' thinking abilities, challenges them, and keeps the interest of the advanced students. Often, this section contains concepts that have already been taught, but adds an extra level of challenge/thinking to the concept. Clever Craniums will often work well as collaborative activities or class discussions.

Enrichment Activities include ideas, review games, extended learning opportunities in addition to curriculum/TE. Use these ideas to spark your creativity, take a fresh approach to review, or motivate your students.

Teacher Checkpoints are general teaching methods that can be used by the teacher to enhance the teaching/learning process.

Tips & Ideas are additional ideas that other teachers have found that make some challenging concepts easier for students to understand. These boxes are rich in suggestions/ideas for helping the reluctant learner/students new to your classroom. Use these ideas to save time and make your teaching even more effective.

TE Icons:
- Teaching note
- Teaching tip

Lesson 1

Application

🗨 Throughout Teacher Edition, suggested wording for teacher to use is printed in **bold**.

- **p. 1:** Read directions one section at a time, pacing students through paper.

> Review place value / base 10, using information box / examples.

🗨 Information box / headers are included as an overview of new concept(s). Guide students through page, using information box as a reference. Help students become more independent by encouraging them to refer to the information box when they are unsure of a process / next step.

▶ **Sect. 1:** Call on students to read first number. Ask questions such as the following as students place digits in place-value grid:

- **What is the digit in the ones place?** 5
- **How many tens are in this number?** 9
- **How many hundreds?** 1

🗨 Continue asking questions for second / third numbers, having students complete section.

▶ **Sect. 2:** Refer to information box as you guide students through section.

▶ **Sect. 3:** Call on student to read first number / tell where commas are needed. Ask questions such as the following:

- **What place is the 5 in?** ten thousands
- **How do we write 5 ten thousands?** 50,000 or fifty thousand

Guide students through remaining numbers.

▶ **Sect. 4:** Compare first set of numbers as a class, beginning with ones place. Students complete second set independently. Check work as class, calling on student to give answer / reason.

▶ **Sect. 5:** Dictate the following numbers for students to write:

a. 463,295   **b. 7,635,481**

🗨 When dictating numbers, the word *and* is used only in place of a decimal point.

Name _____   Date _____

Place Value in Base 10

The **base 10 system** uses 10 digits—*0, 1, 2, 3, 4, 5, 6, 7, 8, 9*—to form every number. Numbers can be written in *standard*, *word*, or *expanded* form.

one hundred sixty-eight million, two hundred forty-three thousand, nine hundred seventy-five = 168,243,975

100,000,000 + 60,000,000 + 8,000,000 + 200,000 + 40,000 + 3,000 + 900 + 70 + 5 = 168,243,975

hundred millions | ten millions | one millions | hundred thousands | ten thousands | one thousands | hundreds | tens | ones

1 6 8 , 2 4 3 , 9 7 5
Millions   Thousands   Units

1 Write each digit in the correct place. For each number, color the digit with the greatest value red and the digit with the least value blue.

	hundred millions	ten millions	millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones
a. 278,195				2	7	8	1	9	5
b. 492,994,259	4	9	2	9	9	4	2	5	9
c. 86,351					8	6	3	5	1

red   red   red   blue

2 Write each number in standard form.

a. six thousand, four hundred eighty-one = _____ 6,481

b. 200,000,000 + 50,000,000 + 1,000,000 + 600,000 + 80,000 + 9,000 + 700 + 30 + 1 =
_____ 251,689,731

3 Add commas between periods. Write the value of the **5** in each number.

a. 2 5 7,4 8 2
_____ fifty thousand

b. 1,5 6 2,9 8 3
_____ five hundred thousand

c. 8 4 6,9 2 5,7 3 0
_____ five thousand

4 Mark the ○ beside the number in each set with the greater value.

a. ● 25,631   b. ○ 467,803
   ○ 22,631   ● 674,308

5 Write the number your teacher says.

a. _____ 463,295

b. _____ 7,635,481

Lesson 1   **1**

Arithmetic Skills

- Applying place-value / base 10 concept to identify value of digits in given numbers
- Applying place value to write numbers
- Analyzing numbers to identify greater / lesser values
- Recalling / writing dictated numbers
- Solving multi-digit addition problems
- Interpreting information to solve story problems
- Applying commutative property to write related addition facts
- Analyzing addends / sums to identify addition pattern
- 🎓 Distinguishing place-value positions from ones place to hundred thousands place.

🎓 **Clever Cranium**   ☑ **Teacher Checkpoint**   ★ **Enrichment Activity**   💡 **Tips & Ideas**

Addition

the mathematical process of combining numbers called *addends* to get a total called the *sum*

Commutative Property of Addition: *addends* may be added in any order without changing the *sum*

```
 97  addend        208
 86  addend         97
+25  addend         86
───              + 25
208  sum          ───
                   208
```

6 Write the correct term beside each number in a. Add and check each problem.

a.
```
  993
  472    addend
 +521    addend
  ───
  993    sum
```

b.
```
 1,604
   376
   541
 + 687
 ─────
 1,604
```

c.
```
 2,548
   902
   859
 + 787
 ─────
 2,548
```

7 Solve the story problem.

On vacation, Carson swam 14 days at the lake and 10 days at the pool. How many days did Carson swim on his vacation? __24__ days

14 + 10 = 24

8 Write the sum. Then use the commutative property to write the twin fact.

a. 6 + 2 = **8**   **2** + **6** = **8**

b. 9 + 5 = **14**   **5** + **9** = **14**

c. 3 + 7 = **10**   **7** + **3** = **10**

d. 7 + 8 = **15**   **8** + **7** = **15**

9 Mark the ○ next to the rule for this table.

In	Out
4	9
7	12
10	15
13	18

○ + 2
● + 5
○ + 7

10 Finish the table using the rule + 7.

In	Out
2	9
4	11
6	13
8	15
10	17

Clever Cranium

Use the clues to find the number. Write the number in the blanks below, and don't forget the commas!

5 , 2   6   8 , 4   0   7

The digit in the **ones place** is the number of days in one week. The digit in the **tens place** is the digit that looks like a doughnut. The digit in the **hundreds place** is the number of sides in a square. The digit in the **thousands place** is how many legs a spider has. The digit in the **ten thousands place** is twice as many points as a triangle has. The digit in the **hundred thousands place** is how many sleeves a jacket has. The digit in the **millions place** is half of ten.

2   *Arithmetic 4*   Lesson 1

Application

- **p. 2:** Read directions one section at a time, pacing students through paper.

  Review addition / commutative property of addition, using information / examples.

▸ **Sect. 6:** Guide students in completing / checking first problem. As needed, students use information box for reference to label parts of addition problem for problem a. Students complete section independently as you assist individuals.

⌇ As time permits, check work as a class for all problems worked independently.

▸ **Sect. 7:** Call on student to read story problem. Have student very briefly repeat / explain story in his own words.

⌇ Asking students to "retell" the story problem helps them focus on understanding the context. You may want to have students tell the "story" without using the numbers. Example: Carson went swimming in the lake and in the pool. The problem asks how many days he went swimming in both.

Ask following questions:

– **What do we need to combine in this story to solve the problem?** number of days at the lake / number of days at the pool

– **Because we are combining amounts, what process must we use to solve this problem?** addition Call on student to give addition problem / solution, 14 + 10 = 24 days.

⌇ These early, very simple story problems are designed to help students develop analytical skills necessary for solving more complex / multi-step problems in the future. Although your students are certainly able to solve more difficult addition problems, they will greatly benefit by focusing on analyzing context / identifying process using simpler problems.

▸ **Sect. 8:** Point out that the commutative property in addition is what students have learned as fact twins in earlier years. Students complete section independently.

Students use place value knowledge (or refer to information box on p. 1) to complete / find mystery number. Call on student to write number on board / read number.

⌇ *Clever Cranium* is an enjoyable part of many lessons as it helps students develop thinking skills. Decide when this section works best in your schedule, and do it then. Some of the questions / activities are designed to challenge and develop critical thinking skills. Often, this section contains concepts that will be introduced in future lessons, helping the students to begin thinking in the right direction. Other questions will challenge students to use their mathematical knowledge in a fun way. Allow students to volunteer answers / reasons as you encourage them to think through questions.

▸ **Sect. 9–10:** Students will enjoy thinking of table as a "process machine." When a number goes in, a process occurs, and a new number comes out. Each "process machine" has a "rule" or process. Students study In / Out numbers in Sect. 9 to determine what the "rule" or process is. Students complete Sect. 10 independently as you assist individuals.

- Walk around room, marking papers / checking to see how students did.

Lesson 101

Application

- **p. 181:** Call on students to read directions one section at a time. Pace students through paper.

> Review adding mixed numbers with uncommon denominators, using information / example to illustrate.

- **Sect. 1:** Students complete section independently. Check work, calling on students to give mixed / whole number answer.
- **Sect. 2:** Students work independently. Call on students to explain / give answers.
- **Sect. 3:** Work first problem(s) as a class. You may want to copy / demonstrate on board as students work at desks. Continue working as a class until you feel your class has good comprehension of concept. Students work independently as you assist individuals.

  💬 Emphasize importance of writing whole numbers along with new fraction (common denominator). This habit will help students make fewer mistakes as problems become more complex.

- **Sect. 4:** Students complete section independently. Check work as a class.

Name _____   Date _____

Adding Mixed Numbers with Uncommon Denominators

Fractions in mixed numbers must have a common denominator before they can be added.

Step 1: Find the LCD of the denominators.

Step 2: Change all denominators to the LCD and make equivalent fractions. *Be sure to bring whole numbers over as they are written.*

Step 3: Add as usual.

Step 4: If there is an improper fraction in the sum, change it to a mixed number, adding the whole number to the sum. Reduce the remaining fraction to lowest terms if necessary.

$$7\frac{3}{8} = 7\frac{3}{8}$$
$$+4\frac{2}{4} = +4\frac{4}{8}$$
$$\overline{\quad 11\frac{7}{8}}$$

1 Change each improper fraction to a mixed or whole number.

a. $\frac{7}{6} = 1\frac{1}{6}$ b. $\frac{3}{2} = 1\frac{1}{2}$ c. $\frac{16}{8} = 2$ d. $\frac{9}{4} = 2\frac{1}{4}$

2 Write the numerator that makes the fractions equivalent.

a. $\frac{3}{4} = \frac{18}{24}$ b. $\frac{2}{5} = \frac{6}{15}$ c. $\frac{8}{9} = \frac{64}{72}$ d. $\frac{4}{7} = \frac{36}{63}$ e. $\frac{1}{2} = \frac{7}{14}$
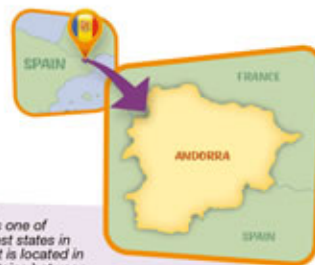
3 Write the sum.

a. $97\frac{8}{9} = 97\frac{8}{9}$
$+62\frac{2}{3} = +62\frac{6}{9}$
$\overline{159\frac{14}{9}} (1\frac{5}{9}) = 160\frac{5}{9}$

b. $29\frac{3}{5} = 29\frac{6}{10}$
$+37\frac{2}{10} = +37\frac{2}{10}$
$\overline{66\frac{8}{10}} = 66\frac{4}{5}$

c. $99\frac{3}{4} = 99\frac{3}{4}$
$+42\frac{1}{2} = +42\frac{2}{4}$
$\overline{141\frac{5}{4}} (1\frac{1}{4}) = 142\frac{1}{4}$

4 Draw lines to match.

a. deca $\frac{1}{10}$
b. deci $\frac{1}{100}$
c. kilo $\frac{1}{1,000}$
d. hecto   10
e. milli   100
f. centi   1,000

Andorra is one of the smallest states in Europe. It is located in the mountains between France and Spain.

SPAIN   FRANCE
ANDORRA
SPAIN

Lesson 101   **181**

Arithmetic Skills

- Converting improper fractions to mixed / whole numbers
- Rewriting fractions with uncommon denominators as equivalent fractions using multiplication
- Adding mixed numbers with uncommon denominators

- Associating metric prefixes with values
- Comparing / interpreting data on multiple circle graphs
- Interpreting data to solve multi-step story problem
- ☛ Interpreting data to solve perimeter story problem

Palau Population by Age
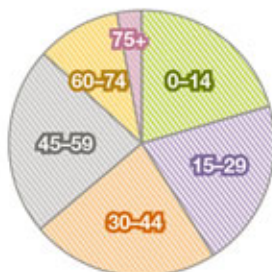
Andorra Population by Age

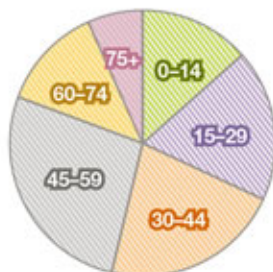**5** Compare the circle graphs above to answer each question.

a. Which country has the smaller group of people your age? **Andorra**

b. Which two age groups together make up about one-half of both countries' populations?

30–44 years old and **45–59** years old

c. Which age group is the smallest part of the people in either country? **75+**

d. Which country has the larger group of people 15–29 years old? **Palau**

6 Solve the story problem.

Last summer, Miss Johnson harvested 4 dozen cucumbers. She used 31 of them to make dill pickles and shared the rest with her neighbor. How many cucumbers did Miss Johnson give her neighbor? **17 cucumbers**

Clever Cranium

The perimeter of Miss Johnson's garden is 80 ft. If her garden is 10 ft. wide, how long is her garden?

30 ft. long

10 ft.

? ft.

Workspace

$4 \times 12 = 48$

$48 - 31 = 17$

One possible solution shown.

$P = (2 \times l) + (2 \times w)$

80 ft. $= (2 \times l) + (2 \times 10)$
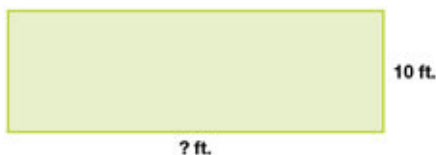
80 ft. $= (2 \times l) + 20$

$80 - 20 = 60$

$60 \div 2 = 30$ ft.

Lesson 101

Application

- **p. 182:** Call on students to read directions one section at a time. Pace students through paper.

  ▸ **Sect. 5:** Guide class discussion, explaining circle graphs. **Each graph represents the entire population of a small country. The sections show how many of each age group lives in the country.** Students use graphs to answer questions. As time permits, ask more comprehension questions about graphs.

  ▸ **Sect. 6:** Students read story problem, determine question/information given, solve problem in workspace/write answer, including label, in blank. To check work, call on student to explain process/answer.

This problem works well as a small group, collaborative opportunity. Guide students in using given information/diagram to determine answer. Because there are multiple strategies to correctly solve problem, call on several individuals/groups to explain solutions they used.

- Walk around room, marking papers/checking to see how students did.

Use **graphs on work-text pages** to encourage critical thinking not only by asking students comprehension questions but also by allowing students to study graphs/ask their own comprehension questions.

L101