ARITHMETIC BY GRADES: FOR INDUCTIVE TEACHING, DRILLING AND TESTING. BOOK NUMBER FOUR

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Arithmetic by Grades: For Inductive Teaching, Drilling and Testing. Book Number Four by John T. Prince

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JOHN T. PRINCE

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Trieste

ARITHMETIC BY GRADES

FOR INDUCTIVE TEACHING, DRILLING AND TESTING

BOOK NUMBER FOUR

Whole Numbers Unlimited, Common Fractions to Twelfths, Decimal Fractions to Thousandths, Measurements, Business Transactions, Denominate Numbers

PREPARED UNDER THE DIRECTION OF
JOHN T. PRINCE

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NOTE TO TEACHERS.

THE attention of teachers is called to the following features of this series of books — features which should be kept in mind as the various subjects are presented.

1. The separation of teachers' and pupils' books, whereby pupils may be taught properly and may not be given too great assistance. Suggestions as to methods of teaching and drilling, as well as the illustrative processes, explanations, rules, and definitions which belong to the teacher to develop analytically are put into the Teachers' Manual, while in the pupils' books are presented only such exercises as are needed for practice.

2. The careful gradation of problems, by which pupils acquire inductively a knowledge of arithmetical relations and principles, and skill in arithmetical processes. This is in recognition of the well-known pedagogical principles of proceeding from the known to the unknown, and from the simple to the complex. It is advised that this plan be kept constantly in mind by the teacher, and that whenever a process is not understood or is not readily performed, the pupils should be taken back to processes which are well known and which can be performed readily, and then should be led forward by easy steps until the desired end is reached.

3. Frequent reviews, and such an arrangement of exercises as will enable pupils to have needed practice in the applications of each principle, first by itself, and afterwards in connection with other principles which have been learned.

4. The large amount of oral work, or work which may be done without the aid of figures. Three objects of Mental Arithmetic are sought in these exercises: (*a*) Illustration of principles and a preparation for written work, (*b*) Development of the logical powers, (*c*) Cultivation of ability to work with large numbers by short processes.

5. The great number and variety of problems. The aim has been to give the *largest number* of problems that will be needed for teaching and for drilling in all grades. For this reason, and because the forms of expression are varied, being taken from many sources, there will be no necessity of giving supplementary drill lessons on the blackboard. Blackboard lessons are objectionable not only on account of a waste of the teachers' time and strength, but also on account of the injury done to pupils' eyes in much reading and copying from the blackboard.

6. Practicalness of work in respect to the character of the problems, and the solution of them. Care has been taken to give problems which are most likely to be met in every-day life, and to give them in a practical form. Many of the miscellaneous review problems were made by mechanics, clerks, accountants, etc., with a view of presenting conditions most likely to occur.

7. The introduction of statistics and facts of physics, astronomy, history, geography, etc., thus enabling pupils to gain incidentally much useful information.

8. The use of drill tables and other devices to save the time of teachers.

In addition to the above features, some of which are distinctively new so far as American text-books are concerned, there is the separation of pupils' exercises for practice into small books somewhat on the lines of gradation in City graded schools. By this arrangement there are gained greater convenience of handling and economy of wear than in the use of a large book which is intended to be used for several years by the same pupil.

The first section of this book is given to a review of some work included in Book No. 3. If these exercises are found too difficult for pupils, it would be well for them to review such parts of Book No. 3 as are most needed.

If the pupils have not a thorough knowledge of the relations and operations of numbers to millions gained by the use of objects, it is quite important that such knowledge be acquired before Section II. is begun.

Development exercises with splints, etc., such as are presented in Book No. 3, should be persistently given for several weeks before figures independent of objects are dealt with.

In teaching common fractions to twelfths and in much of the drill work, the use of disks is strongly advised. Drawings also by circles, lines, squares, etc., should be constantly encouraged.

The use of the paper or cardboard square cut into strips, small squares, etc., should be insisted upon until a good idea of the relations and operations of decimals to thousandths is gained.

Besides the apparatus above suggested, there should be constantly at hand the various measures of length and capacity such as the foot rule, yard stick, quart, peck, gallon, etc.

For other suggestions and directions in using this book and for answers to problems, teachers are referred to the Manual for teachers which is designed to accompany all books of the series.

CONTENTS.

SECTION I.

Oral Review Exercises.

1. Add: $6+8+5+9+7+4+8+3+9+6+4+3$.
2. Add: $14+15$; $21+18$; $67+12$; $32+17$.
3. Add: $38+22$; $64+26$; $37+23$; $48+22$.
4. Add: $49+30$; $27+33$; $43+38$; $52+39$.
5. Add: $54+41$; $63+45$; $48+43$; $66+43$.
6. Add: $38+39$; $46+58$; $64+38$; $58+42$.
7. From 100 take: 17; 29; 36; 14; 46; 58; 72.
8. From 100 take: 28; 36; 19; 38; 56; 43; 69.
9. Subtract: $90-20$; $94-23$; $86-26$; $57-18$.
10. Subtract: $82-33$; $46-27$; $62-38$; $58-29$.
11. Subtract: $91-64$; $83-46$; $54-36$; $78-39$.
12. Multiply: 12×4; 15×4; 16×3; 18×4; 17×5.
13. Multiply: 15×6; 18×6; 16×7; 15×7; 19×6.
14. Multiply: 18×8; 16×9; 17×9; 19×8; 14×9.
15. Multiply: 21×4; 26×3; 28×4; 28×6; 27×8.
16. Multiply: 36×2; 29×3; 24×3; 48×2; 28×3.
17. Divide: $84\div7$; $39\div13$; $52\div13$; $64\div16$; $96\div16$.
18. Divide: $85\div5$; $63\div3$; $84\div4$; $72\div6$; $96\div4$.
19. Divide: $75\div6$; $83\div6$; $94\div8$; $89\div7$; $93\div3$.
20. Divide: $84\div15$; $96\div18$; $76\div14$; $83\div19$; $68\div15$.
21. Divide: $97\div12$; $78\div15$; $81\div18$; $93\div14$; $74\div19$.
22. Divide: $82\div3$; $69\div4$; $71\div3$; $96\div5$; $99\div6$.
23. Divide: $69\div4$; $83\div6$; $56\div16$; $87\div13$; $79\div18$.
24. Divide: $59\div14$; $73\div17$; $84\div19$; $94\div18$; $99\div19$.

1. $80 \div (16 - 12) - 8 + 14 - 18 \times (26 - 8) = ?$
2. $27 + 34 + 16 + 13 \div (37 - 28) \times (16 + 8) = ?$
3. $3\frac{1}{2} \times 6 + 34 - 27 - 14 \times 8 - 50 = ?$
4. $\$8.30 - \$4.80 + \$0.75 - \$1.25 - \$2.50 = ?$
5. $\$1.50 - \$.70 + \$3.70 - \$2.80 + \$1.20 - \$0.60 = ?$
6. $(74 - 18 + 16) \div (38 - 29) \times (16 - 5) = ?$
7. $100 - 45 + 135 - 65 - 55 + 245 = ?$

8. From 200 take each of the following numbers: 45, 65, 24, 36, 72, 58, 33, 79, 142, 181, 78, 15, 118, 67, 28.

9. At $\$1\frac{1}{4}$ a yd., what will 8 yd. of cloth cost? 12 yd.? 16 yd.? 20 yd.? 40 yd.?

10. How many days in the months of July, August, and September? How many weeks?

11. How many pounds of sugar at 6¢ a pound can I buy for 3 dozen eggs at 18¢ a dozen?

12. If 8 lb. of meat cost 44¢, one pound will cost —¢, and 6 lb. will cost —¢.

13. There are 24 sheets in a quire. In 4 quires there are — sheets.

14. At 12¢ a gal., $2\frac{3}{4}$ gal. of oil will cost — cents.

15. At the rate of 20 lb. for a dollar, 4 lb. will cost — cents.

16. At 3¢ a pt., what will 2 gal. of milk cost?

17. John picked 3 qt. of berries, and James picked $1\frac{1}{4}$ pk. How many quarts did both pick?

18. At the rate of 2 apples for 3¢, how many apples can you buy for 12¢?

19. I buy $8\frac{1}{2}$ lb. of meat at 12¢ a pound, and give in payment a two-dollar bill. What change should I receive?