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PRACTICAL

ARITHMETIC

ON THE

INDUCTIVE PLAN

INCLUDING

ORAL AND WRITTEN EXERCISES

BY

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PREFACE

The edition of the Practical Arithmetic published in 1889 being exhausted, the author has taken advantage of the opportunity offered by the demand for a second edition to thoroughly revise the entire work. The following features of the first edition have fully demonstrated their value, and have been retained.

1. The inductive method of introducing each division of the subject.

2. The introduction of Decimal Fractions in connection with the fundamental processes.

3. The grouping of all those operations which depend upon the principles of Percentage under a few rules which can be easily mastered by the student.

The new features which have been introduced will recommend themselves to the progressive instructor. The most important are the following.

1. Tables for drill in the fundamental processes.

2. A re-arrangement of the Tables of Weights and Measures by which English, French and Turkish Measures of the same kind are presented together, and compared.

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ARITHMETIC

NOTATION AND NUMERATION

Article **1.** **A Unit** is a single thing.

2. **A Number** is a unit or a collection of units.

3. In counting a large number of things it is customary to group them.

To express numbers conveniently, the system of grouping them by tens has been adopted. There are, therefore, single things, or *Units;* groups of *Ten* units, or *Tens;* groups containing *Ten* tens, or *Hundreds;* etc.

4. This method of grouping by tens is called the **Decimal System.**

Decimal is derived from the Latin word *decem*, which means *ten*.

5. Numbers may be expressed by *Words*, by *Figures*, or by *Letters*.

6. **Notation** is a method of **Writing Numbers** by means of figures or letters.

The *Arabic notation* is the method of writing numbers by means of figures. Its name is derived from the Arabs by whom it was introduced into Europe.

The *Roman notation* is the method of writing numbers by means of letters. It takes its name from the ancient Romans by whom ti was used.

7. Numeration is the method of **Reading Numbers.**

ARABIC SYSTEM OF NOTATION

8. In this system ten figures are used.

Figures. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

Names. Zero, One, Two, Three, Four, Five, Six, Seven, Eight, Nine.

Zero is also called *Naught* and *Cipher*.

9. By combining these figures according to certain principles any number can be expressed.

10. Principle. *When figures are written side by side the one at the right expresses Units, the next Tens, the next Hundreds, the next Thousands, etc.*

Thus the figures 7492 express two *Units*, nine *Tens*, four *Hundreds*, and seven *Thousands*. The number is read from left to right, as follows; seven thousand, four hundred, ninety two.

The word *and* is not used between the different denominations.

11. The tens are written and named as follows.

1	ten or 10, ten.	6	tens or 60, sixty.
2	tens or 20, twenty.	7	tens or 70, seventy.
3	tens or 30, thirty.	8	tens or 80, eighty.
4	tens or 40, forty.	9	tens or 90, ninety.
5	tens or 50, fifty.		

The suffix «*ty*» means *ten*. Thus, *forty* means *four tens*, *seventy* means *seven tens*, etc.

12. The numbers between ten and twenty are written and named as follows.

11	eleven.	16	sixteen.
12	twelve.	17	seventeen.
13	thirteen.	18	eighteen.
14	fourteen.	19	nineteen.
15	fifteen.		

The words thirteen, fourteen, fifteen, etc. mean *three* and ten, *four* and ten, *five* and ten, etc.

ORAL EXERCISES

13. In 64, what does the 6 express? What does the 4 express? Read the number.

2. In 87, what does the 8 express? What does the 7 express? Read the number.

3. In 20, what does the 2 express? What does the 0 express? Read the number.

4. In 14, what does the 1 express? What does the 4 express? Read the number.

5. In 946, what does the 9 express? The 4? The 6? Read the number.

6. In 752, what does the 7 express? The 5? The 2? Read the number.

7. In 8134, what does the 8 express? The 1? The 3? The 4? Read the number.

8. In 9753, what does the 9 express? The 7? The 5? The 3? Read the number.

Read the following numbers.

1.	1357	6.	4870	11.	4216	16.	9000
2.	9246	7.	3917	12.	8006	17.	4010
3.	7349	8.	6407	13.	6318	18.	3614
4.	3726	9.	2760	14.	7908	19.	8740
5.	8692	10.	9806	15.	5180	20.	1012

Particular attention should be given to the distinction in pronunciation between *seventy* and *seventeen*, *sixty* and *sixteen*, etc.

WRITTEN EXERCISES.

14. Write the following in figures.

1.	Nineteen.	5.	Sixteen.	9.	Fourteen.
2.	Ninety.	6.	Sixty.	10.	Forty.
3.	Seventeen.	7.	Twelve.	11.	Thirty.
4.	Seventy.	8.	Eleven.	12.	Twenty.

13. One hundred one.
14. One thousand.
15. Seven hundred.
16. Four hundred fifteen.
17. Eight hundred fifty.
18. Six hundred twenty.
19. Seven thousand, nine hundred seventy five.
20. Three thousand, three hundred three.
21. Six thousand, eight hundred ninety.
22. Four thousand, seven hundred nineteen.
23. Nine thousand, six hundred twenty four.
24. Two thousand, four hundred eleven.
25. Eight thousand, five hundred one.
26. One thousand, two hundred ten.

15. From these examples we deduce the following general principles.

Principles. 1. *The value of a figure is increased ten times by removing it one place to the left, and decreased ten times by removing it one place to the right.*

2. *The* 0 *is used to give the other figures their positions.*

16. In reading numbers, a new name is given to the order of units *next higher than hundreds* of any denomination. Thus, the order next higher than hundreds is called *thousands*, the next higher than hundreds of thousands, *millions*, etc. Each denomination, therefore, can have only three orders of units.

17. A *period* is a group of figures containing the *hundreds*, *tens*, and *units* of any denomination.

18. The decimal system of notation is illustrated by the following table.

TABLE

Periods.	6th.	5th.	4th.	3d.	2d.	1st.
Names of Periods.	Quadrillions.	Trillions.	Billions.	Millions.	Thousands.	Units.
Orders.	Hundreds Tens Units	Hundreds Tens Units	Hundreds Tens Units	Hundreds Tens Units	Hundreds Tens Units	Hundreds Tens Units
	70,	894,	560,	701,	500,	619.

WRITTEN EXERCISES.

22. Write the following in figures.

1. Three thousand, one hundred fourteen.
2. Seven thousand, six hundred forty.
3. Sixty eight thousand, nine hundred twenty eight.
4. Ninety one thousand, twenty nine.
5. Seventy two thousand, twenty.
6. Eighty thousand, one.
7. One hundred sixteen thousand, two hundred thirty four.
8. Two hundred forty one thousand, two hundred seven.
9. Three hundred one thousand, one hundred twenty.
10. Eight hundred fifty seven thousand.
11. Four million, five hundred sixty thousand, seventeen.
12. Seven million, seventeen thousand, seventy.
13. Eighty million, eight hundred eighteen thousand, twelve.
14. Nineteen million, four hundred seventy thousand, six hundred ninety.
15. One hundred twenty million, one hundred twelve.
16. Six hundred sixteen million, seven hundred seventy thousand, fourteen.
17. Five hundred fifty five million, seven hundred seventy seven thousand, six hundred sixty nine.

18. Eight billion, seventy million, three hundred eighty five thousand, two hundred six.
19. Thirty two billion, sixty one million, three hundred forty three thousand, four hundred.
20. Four hundred two billion, three hundred forty eight million, two hundred thirteen thousand, twenty.
21. Ninety six trillion, twenty three million, twenty three thousand, twenty three.
22. Seventy five trillion, eight hundred ninety seven thousand, forty.
23. Six hundred thousand, seventy five.
24. Twelve trillion, eight million, seventeen thousand, seventy.
25. Twenty nine quadrillion, seven hundred fifty seven trillion, four hundred eighty billion, thirteen million, sixty thousand, ninety.
26. One billion, one.

NOTATION AND NUMERATION OF TURKISH MONEY

23. The currency of Turkey has a Decimal System of notation, as follows:

100 piasters make 1 lira.

Paras do not follow the decimal system. A method of changing them into decimals of a piaster will be explained later.

24. The Sign of Liras is £T. It is written *before* the number.

Thus, £T. 13 is read, thirteen liras.

In writing liras and piasters, a mark called the decimal point is placed immediately after the liras.

Thus, £T. 24.36 is read, twenty four liras, thirty six piasters.

25. Piasters occupy the first *two places* at the *right* of the decimal point.

If the number of piasters is less than ten, write a cipher in the first place at the right of the decimal point.

Thus, seven liras, six piasters is written, L T. 7.06.

26. Read the following.

£T. 74.27, £T. 12.07, £T. 596, £T. 4.10,
£T. 12.00, £T. 7.50, £T. 1.02, £T. 8.11.

Turkish money is also sometimes written and read entirely in piasters.

Thus, the first amount given above may be written without the decimal point, and read 7427 piasters; the second 1207 piasters; the fourth 410 piasters, and the fifth 1200 piasters.

27. We therefore have the following.

Rule. *To change liras to piasters, move the decimal point two places to the right.*

To change piasters to liras, move the decimal point two places to the left.

Note. — Every whole number is supposed to have a decimal point after its right hand figure. Thus, 7426 piasters is supposed to have a decimal point after the 6, and, to change it to liras, this point is moved two places to the left, making it read L T. 74.26 or, seventy four liras, twenty six piasters.

28. Read the following.

1.	£T.	13.30	7.	£T.	201.15	13.	£T. 76824.
2.	»	75.17	8.	»	319.40	14.	» 768.24
3.	»	80.19	9.	»	777.17	15.	» 3960.00
4.	»	20.45	10.	»	1000.	16.	» 39.60
5.	»	16.60	11.	»	2001.04	17.	» 3.96
6.	»	79.12	12.	»	919.09	18.	» 1.01

29. Write the following.

1. Sixty nine liras, thirty four piasters.
2. Sixteen liras, six piasters.
3. Nineteen liras, ninety piasters.
4. One thousand five hundred liras.
5. Seventy five piasters.
6. Eighty liras, eight piasters.
7. Two hundred fifty liras, fifty piasters.
8. Four liras, one piaster.
9. Fifty four liras, twelve piasters.
10. Eleven liras, eight piasters.
11. Five hundred sixty four piasters.
12. Three thousand, seven hundred seventy six piasters. Change it to liras.
13. Eleven thousand, six hundred fifty four piasters. Change it to liras.
14. Sixteen liras. Change it to piasters.
15. Forty seven liras. Change it to piasters.
16. One thousand. six hundred piasters. Change it to liras.
17. Seven thousand, six hundred forty nine piasters. Change it to liras.

120. If there are ciphers at the right of the divisor, cut them off by a line, and also cut off the same number of figures from the right of the dividend. Divide the remaining figures of the dividend by the remaining figures of the divisor, and annex the figures cut off from the dividend to the last remainder for a complete remainder.

Or, cut off the ciphers from the divisor, and move the decimal point in the dividend as many places toward the left as there were ciphers cut off. Then divide as in division of decimals until a sufficient number of decimal figures have been obtained in the quotient.

Divide:

74. 4826 by 700

PROCESS

4826	700
42	6 Ans.
626 Rem.	

75. 743825 by 240.
76. 397852 by 4800.
77. 493827 by 64000.
78. 328374 by 83000.
79. 657483 by 96000.
80. 89253647 by 890.
81. 74635298 by 8700.
82. 69587948 by 6940.
83. 66372285 by 9400.
84. 48396200 by 6400.
85. 91827364 by 4860.
86. 65748392 by 8900.
87. 64729563 by 6830.
88. 70000008 by 3400.
89. 59483626 by 4790000.
90. 37485920 by 8760000.
91. 58769368 by 1000.

121. To divide by 10, 100, 1000, etc., move the decimal point as many places toward the left as there are ciphers in the divisor.

Divide:

92. 736 by 10.
93. 29574 by 100.
94. 74 by 10000.
95. 4.75 by 1000.

96. 2.864 by 100000.
97. 8693857 by 100000.
98. 6.5 by 1000.
99. 928374 by 100.
100. 7 by 1000000.
101. 496 by 1000.

102. How many okes of tea at 48 piasters an oke can be bought for 4656 piasters? How many kilogrammes at 2.75 fr. each for 236.50 fr.

103. Mount Everest in Asia is 29100 feet high. There are 3.2808992 feet in a meter. How many meters high is it?

104. The earth is 91500000 miles from the sun. How many seconds does it take light to come from the sun to the earth, if it travels 185000 miles per second? How many minutes?

105. By what must 316128 be divided to give 356 for a quotient?

106. In a certain example, the multiplicand was 634278, and the product 14588394. What was the multiplier?

107. If the dividend be 6481, the quotient 72 and the remainder 73, what is the divisor?

108. By what must 87 be multiplied to produce 83868?

109. The product of three numbers is 16777216, and the product of two of them is 131072. What is the other number?

110. If the product of the divisor by the quotient be 19782, and the remainder 31, what is the dividend?