

**A MENTAL ARITHMETIC UPON  
THE INDUCTIVE PLAN; BEING AN  
ADVANCED INTELLECTUAL  
COURSE; DESIGNED FOR  
SCHOOLS AND ACADEMIES**

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A Mental Arithmetic upon the Inductive Plan; Being an Advanced Intellectual Course;  
Designed for Schools and Academies by Benjamin Greenleaf

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**BENJAMIN GREENLEAF**

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AUTHOR OF THE "NATIONAL ARITHMETIC," ETC.

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## PREFACE.

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THE object of this book is to furnish a properly graded course of higher Mental Arithmetic. It has therefore been the constant aim of the author, in its preparation, to unfold inductively the science of numbers in such a series of progressive intellectual exercises, as should awaken latent thought, encourage originality, give activity to invention, and develop the powers of discriminating justly, reasoning exactly, and of applying readily results to practical purposes.

The advanced exercises in the fundamental processes of the science, given toward the end of the book, constitute a feature peculiar to this work. These will be found useful, it is believed, as an intellectual drill, and also exceedingly valuable for preparing the learner to dispense with written operations in business life, to a far greater extent than has heretofore been deemed practicable.

In the notes, aid is furnished the pupil more by hints and suggestions, than by full and formal solutions, which, if too numerous, might discourage sufficiently persevering effort, and the all-important habit of self-reliance. Should, however, additional assistance appear to be required, in any case, intelligent teachers will, doubtless, feel it to be their particular province to furnish, in their own manner, the necessary explanations and illustrations.

BRADFORD, MASS., *September, 1857.*

## ARITHMETICAL SIGNS.

A *sign* is a symbol employed to indicate the relations of quantities, or operations to be performed upon them.

1. The sign of *equality*, two short horizontal lines,  $=$ , is read *equal*, or *equal to*, and denotes that the quantities between which it is placed are equal the one to the other ; as 12 inches  $=$  1 foot.

2. The sign of *addition*, an erect cross,  $+$ , is read *plus*, and, or *added to*, and denotes that the quantities between which it is placed are to be added together ; as  $4 + 6$  equals 10.

3. The sign of *subtraction*, a short horizontal line,  $-$ , is read *minus*, or *less*, and denotes that the quantity on the right of it is to be subtracted from that on the left ; as  $8 - 6$  equals 2.

4. The sign of *multiplication*, an inclined cross,  $\times$ , is read *times*, or *multiplied by*, and denotes that the quantities between which it is placed are to be multiplied together ; as  $5 \times 4$  equals 20.

5. The sign of *division*, a horizontal line between two dots,  $\div$ , is read *divided by*, and denotes that the quantity on the left is to be divided by that on the right ; as  $18 \div 2$  equals 9.

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## SUGGESTIONS TO TEACHERS.

This book should not be used by the class during recitation. Each question should be repeated by the pupil after the teacher, and the required solution given promptly.

No form of solution should be allowed to pass, unless it is neatly expressed, and is *entirely accurate*.

Classes in an advanced course of written arithmetic, and in algebra, that have not had a suitable preliminary training in mental arithmetic, may be greatly benefited by going through the more difficult intellectual exercises of this book, in connection with those branches.



## MENTAL ARITHMETIC.

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### LESSON I.

1. John had 1 peach, and his father gave him 1 more; how many peaches then had he?
2. Susan has 2 books, and Mary has 1 book; how many books have they both?
3. If you had 2 cherries, and I should give you 2 more, how many cherries would you then have?
4. Lucy found 2 pins, and Sarah found 3 pins; how many did both find?
5. If you should recite 2 lessons to-day, and 4 more to-morrow, how many would you recite in all?
6. A lemon cost 2 cents, and an orange cost 5 cents; how many cents did both cost?
7. Gave for a pencil 2 cents, and for some paper 6 cents; what was the cost of both?
8. On one bush there are 2 roses, and on another there are 7 roses; how many on both bushes?
9. 2 boys and 8 boys are how many boys?
10. A farmer sold a lamb for 2 dollars, and a calf for 9 dollars; how many dollars did he get for both?
11. Alfred caught 3 birds, and Jason caught 1 bird; how many birds did they both catch?
12. James has 8 marbles, and Charles has 2 marbles; how many marbles have they both?
13. A man sold a pig for 3 dollars, and a sheep for 3 dollars; how many dollars did he receive for both?

14. Mary has 3 books, and Margaret has 4 books; how many books have they both?

15. 3 hats and 5 hats are how many hats?

16. Edward gave 3 cents for a postage stamp, and 5 cents for a box of wafers; how much did both cost?

17. Eliza is 3 years old, and Laura is 6; what is the sum of their ages?

18. A farmer has 3 cows in one field, and 7 in another; how many has he in both?

19. In a class there are 3 girls and 8 boys; how many are there in the class?

20. A boy found under one apple-tree 3 apples, and under another 9 apples; how many did he find in all?

21. If you have 4 chestnuts in one hand, and 1 chestnut in the other, how many have you in both hands?

22. Susan had 4 merit marks, and obtained 2 more; how many then had she?

23. George found 4 eggs in one nest, and 3 eggs in another; how many did he find in both?

24. A man bought a cord of wood for 4 dollars, and half a ton of coal for 4 dollars; how much did both cost him?

25. A lady paid 4 cents for a skein of silk, and 5 cents for a spool of cotton; how much did she pay for both?

26. Ella gave 4 cents for candy, and 6 cents for nuts; how much did she give for both?

27. Lucy, having given to a beggar 4 cents, found she then had left 7 cents; how many cents had she at first?

28. Alfred bought a hook for 4 cents, and a line for 8 cents; how much did both cost?

29. A farmer sold 4 cows, and then had 9 left; how many cows had he at first?

LESSON II.

1. 1 and 1 are how many?
2. 2 and 1 are how many?
3. 2 and 2 are how many?
4. 2 and 3 are how many?
5. 2 and 4 are how many?
6. 2 and 5 are how many?
7. 2 and 6 are how many?
8. 2 and 7 are how many?
9. 2 and 8 are how many?
10. 2 and 9 are how many?
11. 3 and 3 are how many?
12. 3 and 4 are how many?
13. 3 and 5 are how many?
14. 3 and 6 are how many?
15. 3 and 7 are how many?
16. 3 and 8 are how many?
17. 3 and 9 are how many?
18. 4 and 4 are how many?
19. 4 and 5 are how many?
20. 4 and 6 are how many?
21. 4 and 7 are how many?
22. 4 and 8 are how many?
23. 4 and 9 are how many?
24. Abby found 5 pins, and Jane found 1 more; how many did they both find?
25. Ellen had 5 chickens, and her father gave her 2 more; how many did she then have?
26. Mary gave 5 cents for tape, and 3 cents for thread; how much did she give for both?
27. George bought 5 marbles, and had 4 given him; how many then had he?
28. John gave to one school-mate 5 nuts, and to another the same number; how many did he give to both?