GRADED ARITHMETICS

BOOK ONE - GRADE II

CHANCELLOR


Tell number stories about
16-4 25-2 29+6 30÷5
80-10 6X3 1X7 80+20
Star in fifths and tenths
Names of Months
October
November
December

CHILDREN'S ARITHMETICS BY GRADES

GLOBE SERIES

FIRST BOOK

NUMBERS

BY

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GLOBE SCHOOL BOOK COMPANY
NEW YORK AND CHICAGO

M. P. 1

"If a child learns how to use the text-book, he learns how to make use of the experience of mankind. The text-book enables the child to do individual work for himself, and helps him to become independent of oral teaching."

W. T. HARRIS, LL.D.
United States Commissioner of Education.

MANHATTAN PRESS
474 WEST BROADWAY
NEW YORK

PREFACE

For boys and girls who know the numbers from one to ten thoroughly, there is here about a year and a half's work.

When should boys and girls begin to study numbers in books? As soon as books can help them forward to the mastery of numbers. This time comes as soon as children can read.

How should boys and girls study numbers? The interrelations of number-facts and of number-principles are such as to make progress very slow and very difficult through their intricate maze. Is there any Ariadne's thread to follow through the labyrinth of numbers?

Is number ratio or counting? Is it comparison, or magnitude, or multitude? Is it a logic of thought, which can be analyzed after the topical style, — addition, subtraction, multiplication, division, rule of three, and so forth, — of which we may complete one part before beginning the next? Shall we learn every discoverable fact about twenty before taking up twenty-one, or every conceivable fact about $\frac{1}{3}$ of $\frac{6}{7}$ of $\frac{2}{9}$ of $\frac{12}{10}$ before taking up liquid measure?

This book is neither "topical" nor "spiral" in plan. Its substance is neither ratio nor counting. Its purpose is to conform numbers in their facts and principles to the usual processes and powers and interests of children's minds. The graded reader has opened the way for the graded arithmetic. Grading all books is part and parcel of the new education, which means to discover and to obey the facts of the child-mind, its methods, nascent periods, and order of growth.

The core of the concentric theory is recognition of the value of finding something that is known even in the mass of the unknown. Let us not hesitate in schoolbooks as we do not hesitate in life to branch out into the new and to return again to the old. Because comparing is the root and numbering is the top, let us not forget reasoning which is the main trunk of arithmetic. The child's knowledge of arithmetic should grow as evenly in all directions as the most careful and the most open-minded education can secure.

Progress in education is largely a matter of progress in power to understand books. Oral instruction may be continued too long as the sole medium for imparting knowledge. This book is rather for reading and study than for the setting of many exercises in writing figures. It calls for oral expression far more than for written work; but it is meant to call most for the quiet, studious effort of the child to think through the number-processes for himself in the light of the instruction of the teacher and of these pages. Many minds, of adults as well as of children, cannot at once comprehend principles and facts explained orally. We often need to see the printed words, and slowly and patiently to think out their truth and meaning for ourselves. We remember with more than twofold certainty what we have verified for ourselves after hearing from others.

The value of numbers in real life is such as to warrant illustrations in the pages of text-books, both in topics, such as the clock, thermometer, calendar, and house address, and in pictures, which add to number the same interest they add to reading. Children are not alone in their frequent inability to realize in imagination a word-picture. Teachers are entirely justified in asking for their endeavor to awaken children to vigorous mental life the attraction of illustrations, and ought to seize every opportunity offered by arithmetic for training them to see, to image, to compare, and to represent the visible realities of the world.

Author and publishers desire to acknowledge the valuable suggestions of Principal W. B. Gunnison, Ph.D., of Erasmus Hall High School, Brooklyn, N.Y., in reviewing the proofs of these pages.

W. E. C.

Bloomfield, N.J.,
March 25, 1901.

SUGGESTIONS TO TEACHERS

1. The preface explains the general purpose of the book.

2. Read the book itself. The purposes of certain special features will appear only when seen in relation to other features.

3. Do not hesitate to use in advance of the order in the book facts which appear later in these pages.

4. While the purpose of number-study is to learn numbers, oral language expression needs to be encouraged. Develop the number-story features of early primary work as much as time permits. The speaking of English sentences tends to promote that rational understanding of number-processes which is the end of Arithmetic as a science.

5. See that the children do study this book, but do not ask them to study quietly over a quarter of an hour at any one time. Children tire quickly and recover even more quickly.

6. Drill for the sake of instant accuracy; but do not follow any drill to the point of over-fatigue. Take great care not to drill upon things not essential.

7. This book is only a collection of suggestions; it is not an encyclopedia of devices. Seek great variety in methods and devices. There are children who will not learn things in our ways. Try to find their ways of understanding number-facts and number-principles. Since historically our decimal system of counting by tens has grown from our having ten fingers, and since the authority of modern mathematical philosophy distinctly asserts the naturalness of counting upon the fingers, such counting should be permitted as a helpful stage in number-progress, but not to the extent of establishing a physical automatism.

8. Every child has peculiar interests. Find them. For number-stories use facts which interest the various children. Remember that children have their "good" and their "bad" days. On their good days children sometimes learn an amazing amount of new matter.

9. A boy or girl may be ready to undertake harder work than this book offers before knowing this book from cover to cover. Yet we should not forget that doing easy things over and over begets confidence, which supports us in our attacks upon new and harder problems.

10. Neatness in writing tends to accuracy in all number-operations.

LESSONS

TELLING NUMBERS AT SIGHT

Number always means number of ones.

How many ones?

How many ones?

How many twos?

Find twos and threes.

How many ones? Find five and one.
How many threes? Look across.
How many twos? Look up and down.

How many twos? Find threes and two.
How many fours? Find five and three.

How many threes? Find two fours and one.
Find six and three. Find seven and two.
Find five and four. Find eight and one.

How many twos?
How many fives?

How many?

Counting adds ones, or puts units together.

Adding finds what new number tells all the ones in other numbers taken together.

Subtracting takes a number from another number.

Multiplying adds one number once or several times to itself.

Dividing finds how many times a number contains another.

COMPARISONS

Count these dots ● ● ● ● ● and crosses X X X. We cannot add dots and crosses together because they are not the same kind of ones or things.

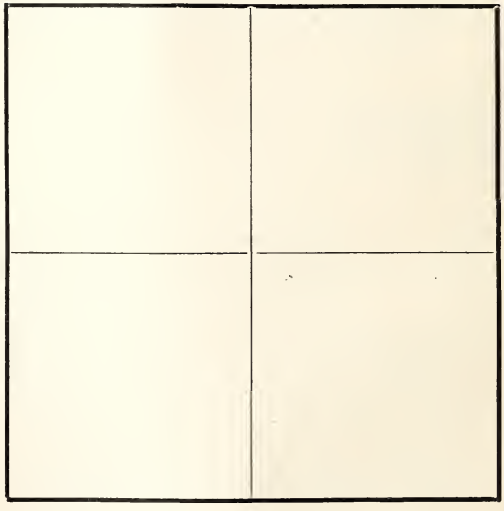
Count these circles ○ ○ ○ ○ and squares □ □ □ □ □. Can we add circles and squares together? Why not?

Number always means number of ones of the same kind.

This picture shows one inch square of paper. Draw one square inch on paper.

EACH SIDE IS ONE INCH LONG

But this picture shows two inches square of paper. Draw one square inch on paper, then on the blackboard. How many square inches do you find in this two-inch square picture?



When Mary would like two pieces of red paper, she should tell how large she wishes the pieces to be.

Telling the size or amount or weight is called *measuring*.

We find How many? by counting; and How much? by measuring.

ALL FACTS OF 1 TO 10, IN REVIEW

Additions:

1+1=2	1+6= 7	2+3=5	2+8=10	3+7=10
1+2=3	1+7= 8	2+4=6	3+3= 6	4+4= 8
1+3=4	1+8= 9	2+5=7	3+4= 7	4+5= 9
1+4=5	1+9=10	2+6=8	3+5= 8	4+6=10
1+5=6	2+2= 4	2+7=9	3+6= 9	5+5=10

Subtractions:

10−9=1	9−8=1	8−6=2	7−4=3	5−3=2
10−8=2	9−7=2	8−5=3	6−5=1	4−3=1
10−7=3	9−6=3	8−4=4	6−4=2	4−2=2
10−6=4	9−5=4	7−6=1	6−3=3	3−2=1
10−5=5	8−7=1	7−5=2	5−4=1	2−1=1

Multiplications:

2×2=4	2×3=6	2×4=8	2×5=10	3×3=9

Divisions:

10÷5=2	8÷4=2	9÷3=3	6÷3=2	4÷2=2

QUESTIONS

1. How many are 5+5?
2. How many are 10−5?
3. How many 5's in 10?
4. How many 2's in 10?
5. How many are 9−6?
6. How many 3's in 9?
7. How many are 8−4?
8. How many 4's in 8?
9. How many are 2+7?
10. How many 3's in 6?

\+ means *and*, − means *less*, × means *times*,

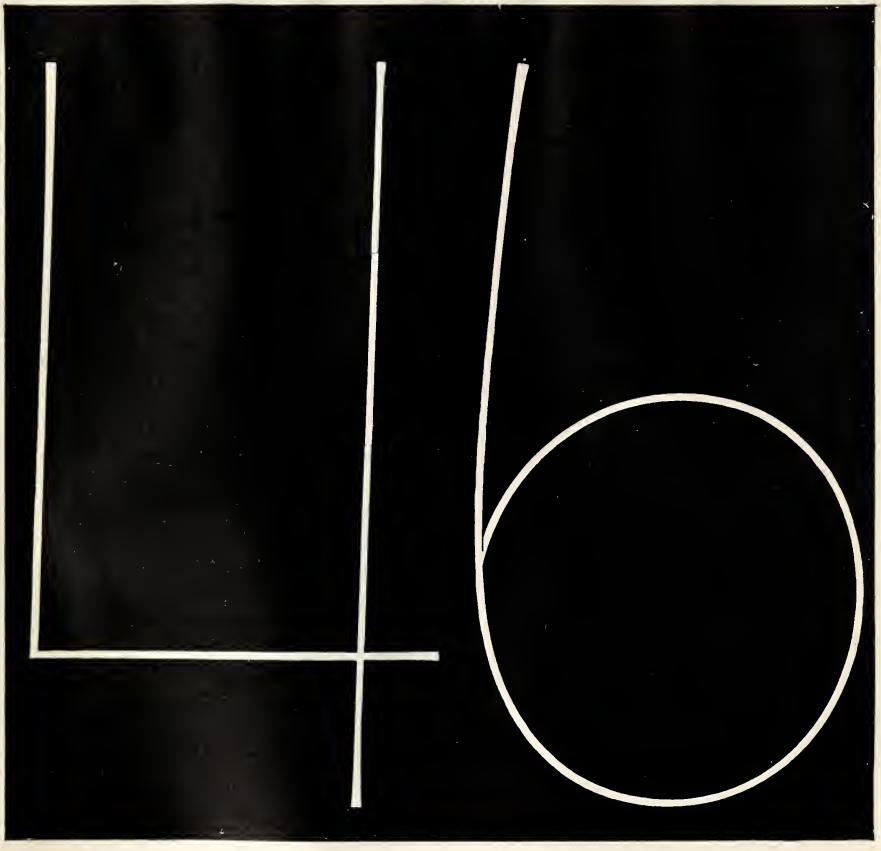
9÷3 means, How many 3's are there in 9?

+, −, ×, and ÷ are called **Signs.**

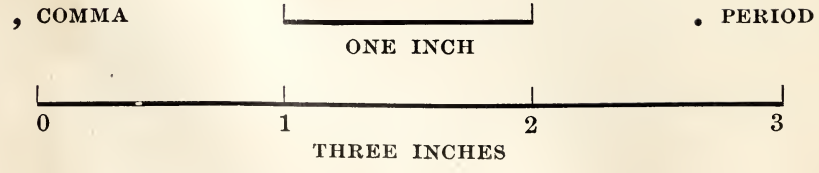
BLACKBOARD

With thumb and fingers, hold the chalk crayon under the palm of the hand, and use free arm movements only.

Blackboard figures should be three inches high.



These figures are three inches high.



Write on the blackboard five times with commas and period: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0.

PAPER WITH PENCIL

Write with a soft lead pencil.

2463571890

Pencil figures should be at least one half inch high like these.

Each side of this square measures one half inch. We call this a half inch square.

There are only ten signs for numbers, and each sign is written by itself. Most children, if asked to try, soon make figures both clear and beautiful.

1. Write 1, 2, 3, 4, 5, 6, 7, 8, 9, 0.
2. Write 0, 9, 8, 7, 6, 5, 4, 3, 2, 1.
3. Write 10, 11, 12, 13, 14, 15, 16, 17, 18, 19.
4. Write 20, 21, 22, 23, 24, 25, 26, 27, 28, 29.
5. Write 30, 31, 32, 33, 34, 35, 36, 37, 38, 39.
6. Write 40, 41, 42, 43, 44, 45, 46, 47, 48, 49.

SPELLING OF THE NUMBER-NAMES

7. 1, one. 2, two. 3, three. 4, four. 5, five. 6, six.

8. 7, seven. 8, eight. 9, nine. 10, ten. 0, cipher or zero.

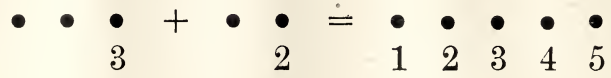
9. 11, eleven. 12, twelve. 13, thirteen. 14, fourteen. 15, fifteen. 16, sixteen.

10. 17, seventeen. 18, eighteen. 19, nineteen. 20, twenty. 30, thirty. 40, forty.

11. 50, fifty. 60, sixty. 70, seventy. 80, eighty. 90, ninety. 100, one hundred.

TEN, 10

We always count by ones. We say that one and one are two, two and one are three, ten and one are eleven, twenty and one are twenty-one. If we would like to add three apples and two apples, we must know that we are counting three ones and two ones; we must know that three and one are four, four and one are five.



Until we reach the number **ten**, each number has one figure as its sign. The sign of one is 1, of five is 5, of nine is 9. But when we reach the number ten, we find a number which has two figures as its sign. The sign of ten is 10. In this sign 10 are the figure 1 and the figure 0, called zero. This 0, or zero, with a figure before it at the left as we look at it, shows that the figure means ten times the number of ones for which it stands when it has no 0, or zero, before it.

10 means 1 ten, 20 means 2 tens, 50 means 5 tens.

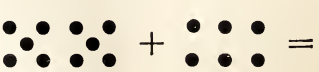
 are 1 ten, or 10, ten.

 are 2 tens, or 20, twenty.

All these dots together are 3 tens, or 30, thirty.

Whenever a number has two figures, the figure to the left of the zero tells how many tens are meant.

Add 1
6  =

Add 10
6  =
sixteen 16

NUMBER-NAMES ABOVE TEN

We call ten and one, eleven; ten and two, twelve. Most number-names for more than twelve things are names made of the single number-names from one to twelve. We call ten and three, thirteen, which is very much like three-ten. Four and ten are fourteen; five and ten, fifteen; six and ten, sixteen; seven and ten, seventeen; eight and ten, eighteen; and nine and ten are nineteen.

Read these numbers: 10, 11, 12, 13, 14, 15, 16, 17, 18, 19.

 are ten.  are two tens.

Two fives we call ten. Two tens we call twenty.

A great many years ago people called two tens, twain tens; then they used to call two twain.

Twenty and one we call twenty-one; twenty and two, twenty-two; twenty and three, twenty-three; then we have twenty-four, twenty-five, twenty-six, twenty-seven, twenty-eight, and twenty-nine.

Give the names for these numbers: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29.

Read these numbers: 25, 24, 26, 28, 22, 27, 21, 29, 20.

Three tens we call thirty. Three tens and one we call thirty-one. Four tens we call forty. Fifty means five tens. Sixty, six tens. Seventy, seven tens. Eighty, eight tens. Ninety means nine tens.

We have another name for ten tens, one hundred.

10 ten	16 sixteen	30 thirty	90 ninety
11 eleven	17 seventeen	40 forty	90 + 1 = 91
12 twelve	18 eighteen	50 fifty	90 + 3 = 93
13 thirteen	19 nineteen	60 sixty	90 + 5 = 95
14 fourteen	20 twenty	70 seventy	90 + 8 = 98
15 fifteen	21 twenty-one	80 eighty	100 one hundred

COUNTING

Count by twos, beginning at 2.

2	4	6	8	10	12	14	16	18	20
22	24	26	28	30	32	34	36	38	40
42	44	46	48	50	52	54	56	58	60
62	64	66	68	70	72	74	76	78	80
82	84	86	88	90	92	94	96	98	100

These are called the **even** numbers. 2 divides each number without a one left.

Count backwards, beginning at 100.

Count by twos, beginning at 1.

1	3	5	7	9	11	13	15	17	19
21	23	25	27	29	31	33	35	37	39
41	43	45	47	49	51	53	55	57	59
61	63	65	67	69	71	73	75	77	79
81	83	85	87	89	91	93	95	97	99

These are called the **odd** numbers. 2 divides no number evenly. One is always left over.

Count backwards, beginning at 99.

Count by threes, beginning at 3: then backwards.

3	6	9	12	15	18	21	24	27	30	33
36	39	42	45	48	51	54	57	60	63	66
69	72	75	78	81	84	87	90	93	96	99

Count by fives, beginning at 5: then backwards.

5	10	15	20	25	30	35	40	45	50
55	60	65	70	75	80	85	90	95	100

Count by sevens, beginning at 7: then backwards.

7	14	21	28	35	42	49
56	63	70	77	84	91	98

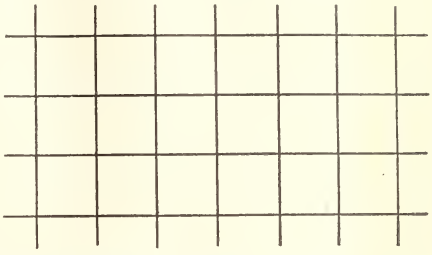
THINGS TO DO

1. Count all the boys in the room, giving them *odd* numbers, and all the girls, giving them *even* numbers. How many are there in all? Can each boy and girl remember the number given to him or to her?

2. Cut out about thirty squares of paper. Write the numbers to thirty, one number on each square.

3. Cut each square into two pieces, and using the other side of the paper, number each of the pieces.

4. Draw lines like these, but longer, so as to make more squares, and number each of the squares. Cut the squares apart.



5. Count the number of panes of glass in all the window sashes of the classroom.

6. Count the number of desks in the room, and then the number of chairs. Write each number for the desks upon a piece of paper, and place it on the desk to which it belongs.

7. Count marbles, shoes, hands, fingers, hats, caps, pencils, splints, blocks, and other objects, as far as one hundred.

8. Read the numbers of the pages of this book as far as one hundred.

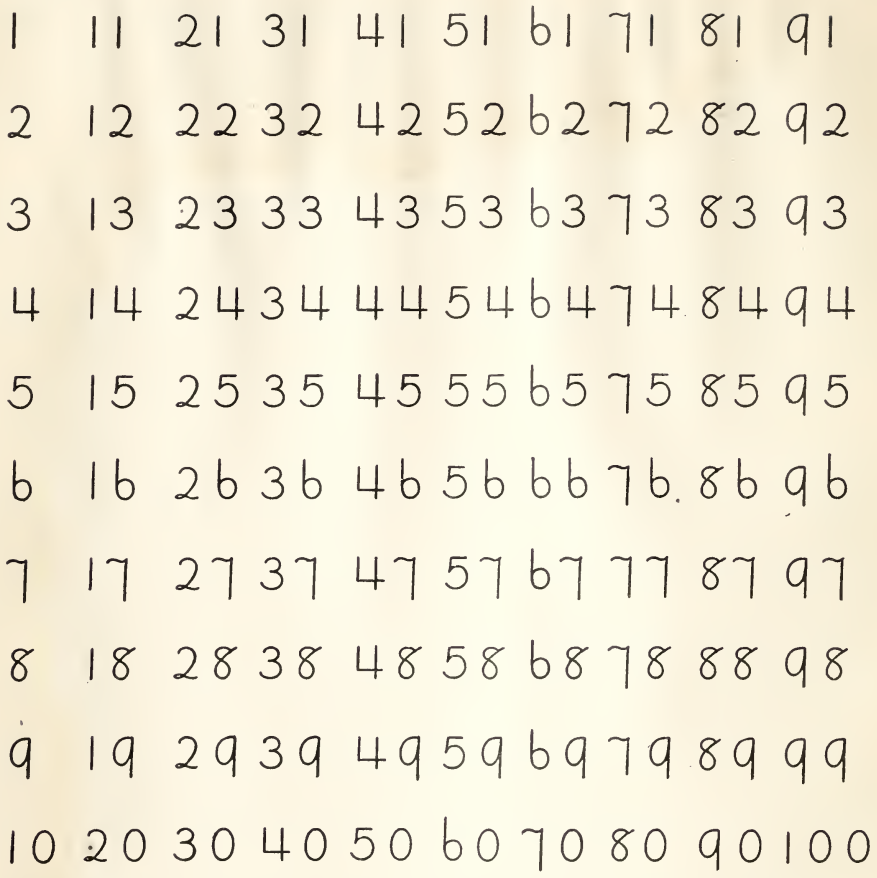
9. Count the number of lines of print upon this page.

10. Write the number of the house where you live.

11. How many chickens, or sparrows, or ducks, or cows, or horses, did you ever count together at one time?

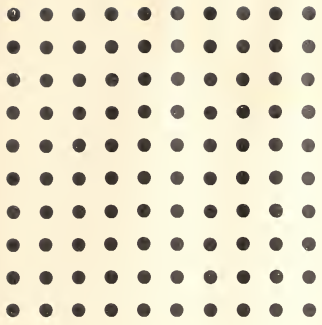
NUMBER TABLE

Write:

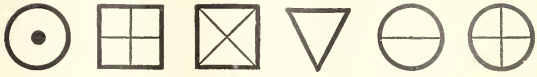


1. Write ten, eleven, twelve, thirteen, fourteen, fifteen.
2. Write sixteen, seventeen, eighteen, nineteen, twenty.
3. Write twenty-one, twenty-two, twenty-three, twenty-four.
   21 22 23 24
4. Write twenty-five, twenty-six, twenty-seven, twenty-eight.
   25 26 27 28
5. Write twenty-nine, thirty, forty, fifty, sixty, seventy.
   29 30 40 50 60 70
6. Write eighty, ninety, one hundred, one hundred one.
   80 90 100 101

THINGS TO DO



We can use instead of dots:
circles like this ○, or
crosses like this ×, or
signs like this +, or
triangles like this △, or
squares like this □, or
any forms, such as these, —



1. Make 100 dots on paper or on blackboard.

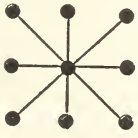
2. Number these dots or squares 1, 2, 3, etc., like this $\underset{1}{\bullet}$ or this $\underset{1}{\square}$.

3. Make lines around every 2 dots like this, 

4. Make lines around every 3 dots,  or 

5. Make lines around every 4 dots, every 5 dots, every 6 dots, every 7 dots, every 8 dots, every 9 dots.

6. Connect every dot with all the dots next to it, like this, —



7. Use red chalk or pencil and mark every alternate dot which has an even number, like this $\underline{\bullet}$ or this ⊙.

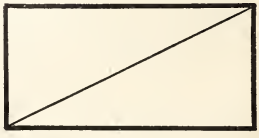
8. Use blue chalk or pencil and mark every alternate dot which has an odd number, like this $\underline{\bullet}$ or this ⊙.

9. Mark with blue, or yellow, or red chalk every third, every fourth, every fifth, every sixth dot, etc.

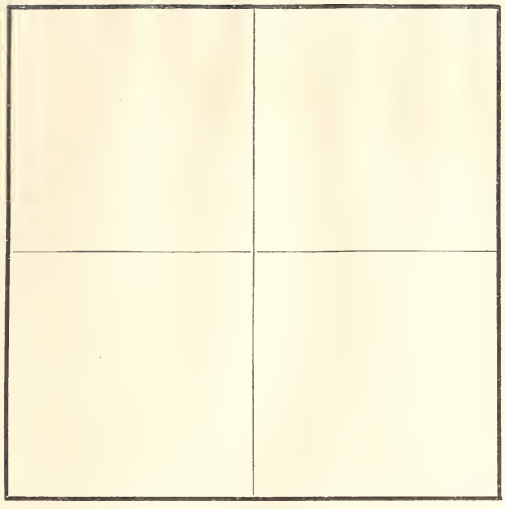
Use new sets of •, or □, or + tables except for 1 and 2.

FORM

With a stick, or a splint, or a pencil, we can represent a line —— across, or | up and down, or  slanting up to the right, or  down to the right. With two sticks we can make a cross  or a T  or an angle like this  or this  or this  Try and see. With three sticks we can make a form like this  It is called a triangle because it has three angles. 

With four sticks each of the same length, we can make squares like this  If we have a pair of sticks of the same length, and another pair of sticks longer than the others, two like these ═══, and two like these ═══, we can make a rectangle like this  If we draw a line through our rectangle to opposite corners,  we have two triangles inside the rectangle. If we have the longer sides twice as long as the shorter sides, then inside our rectangle we have two squares. 

PARTS OF FORMS

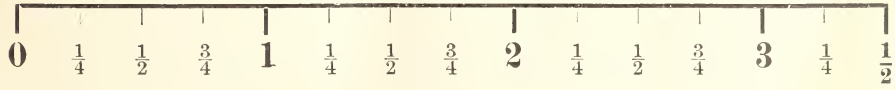


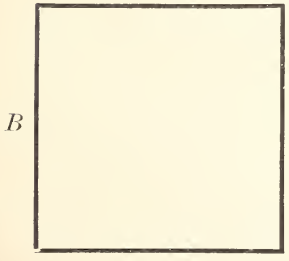
How many little squares do you find in this large square?

This square is two inches wide and two inches high.

When things are exactly like each other in size, we call them **equal.** If you find inside of the square *A* four squares each of the same size, then all four parts of *A* are equal parts.

MEASURE MARKED IN INCHES





Is this square as large as the square marked *A*? Is it as large as any part of *A* square?

Measure this square *B*, using a ruler marked with inches; cut a square out of paper of the same size as *B*, and see how many little squares as large as *B* you find in *A* square.

If you find that square *A* is four times as large as the square marked *B*, then it is right to say that *B* is one fourth as large as *A*.

If *A* is four times *B*, then *B* is one fourth of A.

If *A* is $4 \times B$, then *B* is $\frac{1}{4}$ of *A*.

EQUAL PARTS OR FRACTIONS

A *number* is always a number of *ones* of the same kind.

A *fraction* is always one or more of the equal parts of some *one* thing.

Here are four forms, *A*, *B*, *C*, and *D*.

Each is of a different size from the others.

A is divided into five parts. *B* is divided into four parts.

C is divided into two parts. *D* is not divided.

Each part of *A*, each part of *B*, and each part of *C* is the exact size of *D*.

There are 5 *D*'s in *A*. Count and see.

There are 4 *D*'s in *B*, and 2 *D*'s in *C*.

Each part of *A* is equal to every other part. The five parts are equal.

Each part of *B* is equal to every other part. The four parts are equal.

One part of *C* is equal to the other part.

We call equal parts fractions.

Each part of *A* is a fraction of *A*. There are five parts.

Each part of *A* is one part of *A*. We print this, $\frac{1}{5}$.

The 1 above the 5 means that we are taking one part.

The 5 means that there are five equal parts in *A*.

Each part of *B* is a fraction of *B*. There are four parts.

Each part of *B* is one fourth of *B*. We print this, $\frac{1}{4}$.

The 1 above the 4 means that we are taking one part.

The 4 means that there are four equal parts in *B*.

Each part of *C* is a fraction of *C*. There are two parts.

Each part of *C* is one half of *C*. We print this, $\frac{1}{2}$.

REVIEW

Can you tell what number separates the numbers in these questions, 1 to 9, below?

1. 5–8–11–14.
2. 5–9–13–17.
3. 8–12–16–20.
4. 8–13–18–23.
5. 11–17–23–29.
6. 10–17–24–31.
7. 10–20–30–40.
8. 6–15–24–33.
9. 5–13–21–29.

10. Write on the blackboard five times without commas and period:

1 2 3 4 5 6 7 8 9 0 9 8 7 6 5 4 3 2 1

11. Write on the blackboard five times these numbers:

10, 12, 23, 34, 45, 56, 67, 78, 89, 90.

12. Write on the blackboard five times these numbers:

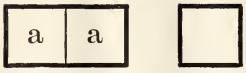
135, 246, 579, 680, 258, 813, 490.

The rectangle is not divided into equal parts.

The rectangle is divided into two equal parts.
Each part is one half the whole rectangle.

The rectangle is now divided into three equal parts.
Each part is one third the whole rectangle.
O is $\frac{1}{2}$, one half, of *M*, for there are 2 *O*'s in *M*.
S is $\frac{1}{3}$, one third, of *M*. Why?

PARTS OF NUMBERS

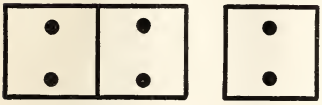


A B

What part of A is a? $B = a$. B is one half of A. A equals 2 B's. $B = \frac{A}{2}$.

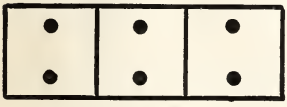
C

What part of C is a? $C = 3$ B's. B is one third of C. $a = \frac{1}{3}$ of C.



A B

How many dots do you find in B? How many dots do you find in A?



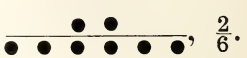
C

$4 = 2 \times 2$. 4 are twice two.

$2 = \frac{1}{2}$ of 4. One half of four is two.

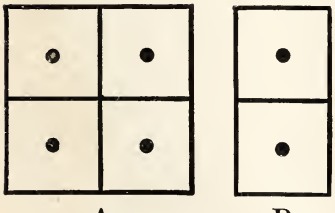
$6 = 2 \times 3$. We find 3 2's in C. $B = \frac{1}{3}$ of C.

$2 = \frac{1}{3}$ of 6. One third of six is two.



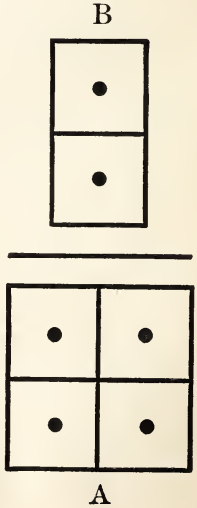
$\frac{2}{6}$.

. These are pictures of the two fractions $\frac{1}{2}$ and $\frac{2}{4}$. We call the picture-fractions $\frac{1}{2}$, one half, when we think that $A = 2\,B$'s. Then B is only $\frac{1}{2}$ of A.



A B

We call the picture-fractions $\frac{2}{4}$, two fourths, when we think that A's 4 dots $= 2 \times B$'s 2 dots. B is $\frac{2}{4}$ of A. $\frac{1}{2}$ is the same amount of value as $\frac{2}{4}$.

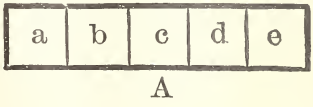


B

A

PARTS

Cut out of paper a square one inch on each side.
Then cut out a rectangle two inches long, one inch high.
The square is one half as large as the rectangle.
Cut the square into two equal parts, one inch by $\frac{1}{2}$ inch.
Cut the rectangle into four equal parts.
Do you see that the 2 parts of the square are $\frac{2}{4}$ of the rectangle?



There are 5 equal parts in A. Each is $\frac{1}{5}$ of A.

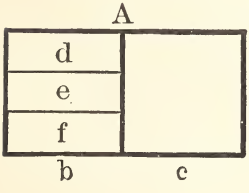
$a + b = 2$ fractions of $A = \frac{2}{5}$ of A.

$a + b + c = 3$ fractions of $A = \frac{3}{5}$ of A.

$a + b + c + d = 4$ fractions of $A = \frac{4}{5}$ of A.

$a + b + c + d + e = 5$ fractions of $A = \frac{5}{5}$ of A.

But as there are only 5 parts in A, $\frac{5}{5}$ of A = all of A = 1 A.



This form-picture is divided into two parts, $b + c$. $b = \frac{1}{2}$ of A. $c = \frac{1}{2}$ of A.

The picture of b is divided into three parts, d, e, f. $d = \frac{1}{3}$ of b. $e = \frac{1}{3}$ of b. $f = \frac{1}{3}$ of b.

If we divide c into three parts, then A will have 6 parts.
If A has 6 parts, then $d = \frac{1}{6}$ of A.
$d = \frac{1}{3}$ of $\frac{1}{2}$ of A, because d is $\frac{1}{3}$ of b, which is $\frac{1}{2}$ of A.

1. $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} = ?$
2. $\frac{1}{6} + \frac{1}{6} + \frac{2}{6} + \frac{2}{6} = ?$
3. $\frac{1}{3} + \frac{1}{6} = ?$
4. $\frac{1}{5} + \frac{2}{5} + \frac{2}{5} = ?$
5. $\frac{1}{2} + \frac{1}{2} = ?$
6. $\frac{1}{3} - \frac{1}{6} = ?$

Cut and fold pieces of paper to show the answers to these six questions.

PARTS OF NUMBERS

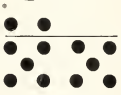
5 names	5 |'s	5 = |||||	1 = $\frac{1}{5}$ of 5
3 names	3 |'s	3 = |||	1 = $\frac{1}{3}$ of 3
4 names	4 |'s	4 = ||||	1 = $\frac{1}{4}$ of 4
2 names	2 |'s	2 = ||	2 = $\frac{1}{2}$ of 2

When we say one fifth of anything, we mean that the thing is divided into fifth parts, into five equal parts, and that we are talking about one of these parts.

When we say one fifth of any number, we mean that the number is divided into fifth parts, into five equal parts, and that we are talking about one of these parts.

Here is a picture of the number ten seen in dots.  There are 2 rows up and down of 5 dots each. The 10 is divided into 2 equal parts of 5 each.

There are also 5 rows across of 2 dots each. The 10 dots are divided into 5 equal parts of 2 dots each.

We can say that • • are $\frac{\text{2 dots}}{10}$  of 10 dots, or $\frac{2}{10}$.

$2 \times 5 = 10$ $\quad 2 = 10 \div 5$ $\quad 2$ is $\frac{1}{5}$ of 10 $\quad 2 = \frac{10}{5}$

We can say that  are $\frac{\text{10}}{\text{10}}$  of 10.

$5 \times 2 = 10$ $\quad 5 = 10 \div 2$ $\quad 5$ is $\frac{1}{2}$ of 10 $\quad 5 = \frac{10}{2}$

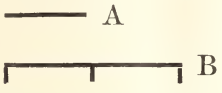
1. Add:	8	4	1	2	1	9	7	4	1	3
	2	5	9	8	7	1	3	6	5	4
2. Add:	2	5	3	2	4	3	4	2	1	5
	7	2	3	2	1	5	3	6	1	4

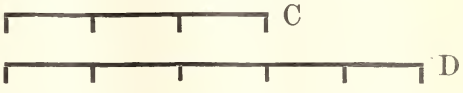
PARTS OF NUMBERS

Sometimes we take things apart. We split a piece of wood into separate pieces; we cut an apple in two; we spend a quarter of a dollar, which is a part of a dollar.

When we make two equal parts of anything, we call each part one half. The figures for one half are $\frac{1}{2}$.

When we make three equal parts, we call each part one third : $\frac{1}{3}$. Each part of four equal parts is one fourth, or one quarter : $\frac{1}{4}$. After these we have one fifth : $\frac{1}{5}$.

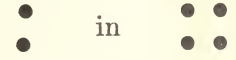




B has 2 A's.	$A = \frac{1}{2}\ B$.	Measure these lines
C has 3 A's.	$A = \frac{1}{3}\ B$.	and see if these stories
D has 5 A's.	$A = \frac{1}{5}\ B$.	are true.

We can take parts of form-pictures.  in

We can take parts of number-pictures.  in

We can take parts of numbers.  in

We can tell parts by figures. 2 in 4

When the parts of anything are equal to each other, then we call the equal parts fractions.

There are ten ones in ten. There are three ones in three.

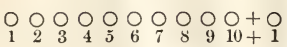
Three are three tenths of ten. $3 = \frac{3}{10}$ of 10. 

1	2	3	4	5	6	7	8	9	10

If each of these tenths of the whole figure is $\frac{1}{4}$ inch long, how long are $\frac{4}{10}$ of it?

ELEVEN, 11

If we have ten things and add one thing to them, the name of the number of all these things together is **eleven**.



10 + 1 are eleven.

Ten and one are eleven.

$$\begin{array}{r} 10 \\ 1 \\ \hline 11 \end{array}$$

We write eleven with the figure 1 twice: 11.

In the figures 11 for eleven, the unit one, 1, has the place of the zero, 0, in the figures 1 and 0, printed like this: 10, for the number ten.

In the number eleven, printed as 11, the second 1 shows that the first 1 stands not for one, 1, unit, but for one ten, or 10. 11 means 1 ten and 1 unit, like this group of dots:

8+3=11 7+4=11 6+5=11 11−5=6

10+1=11 9+1+1=11 5+5+1=11 2+3+5+1=11

11−1=10 11−2= 9 9+2=11 7+2+2=11

With splints and counters, show each of the above facts.

1. John had five cents and Tom had six cents. How many cents did they have together?

2. There were ten boys; one of them had two cents, nine of them had each one cent. How many cents did they have together?

3. Mary had eleven cents. She spent four for apples at one cent each. How many cents were left?

4. Tell number-stories about cents, using these number-facts: 11−1, 5+2+4, 10+1, 9+2, 4+7, 11−6, 8+3.

5. Add:

$$\begin{array}{rrrrr} 10 & 3 & 6 & 9 & 7 \\ \underline{1} & \underline{8} & \underline{5} & \underline{2} & \underline{4} \end{array}$$

6. Subtract:

$$\begin{array}{rrrrr} 11 & 11 & 11 & 11 & 11 \\ \underline{1} & \underline{3} & \underline{5} & \underline{2} & \underline{7} \end{array}$$

MEANING OF SIGNS

The sign of multiplication is $\times$; it means *times*.
The sign of division is $\div$; it means *divided by*.
? asks a question. It is called *the question mark*.

1. When we ask $10 \div 1 = ?$, what does the $\div$ mean?
2. What is the answer to $10 \div 2 = ?$
3. What does this . mean? What is its name?
4. What is the name of this mark ,?
5. What does this mark + mean? And this −?
6. Read these questions in words:

$3 \times 3 = ?$ $11 = 3 \times ?$ and how many over? $6 + 5 = ?$
$11 - 9 = ?$ $8 + ? = 11?$ $11 - 4 = ?$ $3 + 3 + 2 + 1 + ? = 11.$

ELEVEN

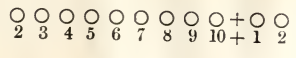
7. Is eleven an odd or an even number? Why?
8. What is the next number after 10? before 10?
9. How many more are 11 than 10 things?
10. George had eleven marbles and Charlie had 8. Which had more than the other? How many more did he have?
11. Take 11 splints. Make 2 squares with them and one triangle.
12. How many triangles can you make with eleven splints? How many splints are left over?
13. Add:

3	2	5	3	6	4	6	5	6
6	3	4	7	4	4	3	5	2

14. Can you remember several numbers when written on the board and then quickly erased? Try and see.

TWELVE, 12

If we have ten things and add two things to them, the name of the number of all these things together is **twelve.**



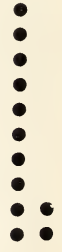
10 + 2 are twelve.

Ten and two are twelve.

$$\begin{array}{r} 10 \\ 2 \\ \hline 12 \end{array}$$

We write twelve with the figures 1 and 2: 12.

In the figures 12 for twelve, the unit two or figure 2 has the place of the zero, 0, in the figures 10, for the number ten. In the number twelve, printed as 12, the figure 2 shows that the figure 1 stands not for one unit, but for one ten or 10.



12 means 1 ten and 2 units, like this group of dots:

In the numbers eleven and twelve, printed 11 and 12, we say that the 1 in each number where it is the first figure, reading from left to right, is in *tens'* place and that the second figure in each number is in *units'* place.

12 things make one dozen.

When we say, "Mary's mother who keeps hens sent Mary with a dozen eggs to sell to the grocer," we mean that Mary carried twelve eggs.

$10 + 2 = 12$ $\quad 9 + 3 = 12$ $\quad 8 + 4 = 12$ $\quad 7 + 5 = 12$

$12 - 6 = 6$ $\quad 12 - 7 = 5$ $\quad 12 - 10 = 2$ $\quad 12 - 9 = 3$

Show each of these facts with counters and dots.

1. Tell number-stories about cents, or eggs, or marbles.

2. Mary has seven dozen eggs and Susan has five dozen. How many dozen have they together?

PENNIES, NICKELS, AND DIMES

1 copper penny is worth 1 cent. The sign, 1 ¢

1 nickel is worth 5 cents. We can write nickel, 5 ¢

1 dime is worth 10 cents. We can write dime, 10 ¢

1. Grace bought half a dozen of cookies at 1¢ apiece. She gave the baker a dime. What change did he give her?

2. I paid a nickel for half a dozen pens. How many cents would a dozen pens have cost?

3. 10 pennies are worth 1 dime. Why? 2 nickels are worth 1 dime. Why?

4. Which would you rather have, a dozen pennies or a dime?

5. It usually costs 5¢ for a man to ride on the street cars, and 3 cents for a boy. How many men can ride for a dime? How many boys can ride for a dozen pennies?

6. Did you ever see a pile of a dozen pennies?

7. Write on the blackboard a story about pennies, nickels, and dimes.

OTHER NUMBERS

2+7=?	5+3=?	6+2=?	7−4=?	3+6=?
3+7=?	7−5=?	9−4=?	9−6=?	10−9=?
7+3=?	9−2=?	1+9=?	9−1=?	7+2=?
6+4=?	10−3=?	4+4=?	7−4=?	8−6=?
9+1=?	10−4=?	4−3=?	5+5=?	10−2=?
9−5=?	10−5=?	4−6=?	10−8=?	2+8=?
10−1=?	8+2=?	1+1=?	5+1=?	5−2=?
7=3+?	10=5+?	3=2+?	10=8+?	5=3+?

DIVIDING AND MULTIPLYING

$12 = 6 + 6$ $\quad 6 \times 2 = 12$ $\quad 12 \div 2 = 6$

Add 6 Subtract 12
6 6

1. How many are $4 + 4 + 4$? $\quad 3 \times 4 = ?$
2. How many are $3 + 3 + 3 + 3$? $\quad 4 \times 3 = ?$
3. In 1 above how many 4's do you count?
4. In 2 above how many 3's do you count?
5. Show 1 and 2 by splints, counters, pennies, or dots.
6. Is it true that $3 \times 4 = 12$ and $4 \times 3 = 12$?

When we find how many fours there are in twelve, we count 4's until we reach 12. $4 + 4$ are 8. $8 + 4$ are 12. There are three fours in twelve. Multiplying, or finding one number times another, is rapidly adding one number to itself. Dividing, or finding how many times one number contains another, is rapidly taking away the same number several times from another number.

$12 \div 4 = 3$. We find three fours in twelve.

NUMBER-STORIES

7. Charlie had twelve apples; and when four boys came to see him, he wanted to give each of them the same number. How many could he give to each?

8. There were two boys who had six marbles each. How many did they have together?

9. Lulu had an afternoon tea-party. Her mother gave her a dozen tea-biscuits. She and Clara and Mabel ate them all; each ate as many as the others. How many did each eat?

MULTIPLYING AND DIVIDING

1. When we ask $5 \times 2 = ?$, what does the $\times$ mean? And what does the $=$ mean? And what does the ? mean?

2. What is the answer to $5 \times 2 = ?$

$1 + 1 = 2$; or there are two 1's in 2;
or $1 \times 2 = 2$; or $2 \times 1 = 2$.

3. $1 + 1 + 1 = 3$; or there are three 1's in 3;
or $1 \times 3 = 3$; or $3 \times 1 = 3$.

4. — is the *dash* or *blank* mark. Can you fill in the words or numbers that are left out as shown by the dashes?

In 5 there are — 1's; or $5 \times 1 = —$.
4 apples at 1¢ apiece will cost — cents.
In 6 there are — 1's; or $6 \times 1 = —$.
In 7 there are — 1's; or $7 \times 1 = —$.

5. $1 + 1 + 1 + 1 = 4$; or four 1's $= 4$; or there are four 1's in 4; or 4 times 1 are 4; or $4 \times 1 = 4$.

$2 + 2 + 2 + 2 = 8$; or 4 2's $= 8$; or there are four 2's in 8.

6.

$2 \times 2 = ?$	$2 \times 5 = ?$	$5 \times 2 = ?$	$5 \div 2 = ?$
$5 \div 3 = ?$	$8 \div 4 = ?$	$4 \times 2 = ?$	$5 \times 2 = ?$
$10 \div 2 = ?$	$10 = 5 \times ?$	$8 = 2 \times ?$	$3 \times ? = 9$
$9 \div 3 = ?$	$9 \div 5 = ? + ?$	$7 \div 3 = ? + ?$	$6 \div 3 = ?$
$12 \div 3 = ?$	$12 \div 5 = ? + ?$	$12 \div 4 = ?$	$11 \div 3 = ? + ?$

A dozen cents less a dime = how many cents?

7. $1 + 1 + 1 = 3$; or three 1's $= 3$; or $3 \times 1 = 3$.
$2 + 2 + 2 = 6$; or three 2's $= 6$; or $3 \times 2 = 6$.
$3 + 3 + 3 = 9$; or three 3's $= 9$; or $3 \times 3 = 9$.

REVIEW

1. Subtract:

	5	7	9	8	10	10	6	10
	2	3	5	6	4	9	3	1

2. Subtract:

	10	8	10	7	8	10	9	6
	3	5	5	2	4	6	4	2

3. Subtract:

	10	9	7	4	6	8	6	8
	8	6	4	3	5	3	1	2

4. Add:

5	6	2	9	1
7	6	10	3	11

5. Subtract:

12	12	12	12	12
7	2	3	6	1

6. Copy and answer:

$8-?=5$	$10=6+?$	$10=3+?$	$7+?=9$	$6-?=2$
$5+?=10$	$10=7+?$	$10=4+?$	$10-7=?$	$10-2=?$
$7=3+?$	$4+?=10$	$3+?=10$	$8+?=10$	$7-1=?$
$1+?=10$	$6+?=8$	$10-?=7$	$10-?=4$	$2-?=5$
$7+?=10$	$9-?=4$	$5-?=2$	$6=?+4$	$10-?=4$

Write in words your answers to these next two questions:

7. Two boys had 5 pennies each. Another boy had 2 pennies. If they had put them all together, and had then divided them equally, how many would each have had?

8. They did not do this, but when still another boy joined them, they bought for one cent apiece as many doughnuts at the bakery as they had cents, and divided the brown doughnuts equally, as many to one as to another. How many doughnuts did each have?

9. Tell stories about $12-6$, $6+6$, $4+4+4$, and 6×2.

DIVIDING

Often we write division-questions in this way $2\overline{)10}$ $\quad 5$ This means just the same as $10 \div 2 = 5$.

We may read $2\overline{)10}$ either 10 divided by 2 are how many? or how many 2's are there in 10?

Here are ten dots  We can show that we may think of them as divided into 5×2 dots or 10 dots $\div$ 5 by drawing lines between every 2 dots  or as divided into 2×5 dots or 10 dots $\div$ 2 by drawing a line between every 5 dots 

Dividing is the opposite of multiplying.

Dividing is taking numbers apart; multiplying is putting numbers together.

SOMETHING TO DO

1. Take 12 splints or counters. Separate them into one bunch of 6 and another bunch of 6. This is dividing 12 splints by 2. How would you divide 12 splints by 6?

2. Take the 2 bunches, each of 6 splints, and put them together. This is multiplying 6 splints by 2. What would you do to multiply 2 splints by 6?

3. $12 \div 3 = ?$ $\quad 12 \div 4 = ?$ $\quad 3 \times 4 = ?$ $\quad 4 \times 3 = ?$

Answer these questions by dots or counters.

4. $2\overline{)4}$ $\quad 2\overline{)6}$ $\quad 2\overline{)8}$ $\quad 2\overline{)10}$ $\quad 2\overline{)12}$ $\quad 3\overline{)6}$ $\quad 3\overline{)9}$ $\quad 3\overline{)12}$ $\quad 4\overline{)8}$ $\quad 4\overline{)12}$

5. A grocer sold half a bushel of onions. What part of the bushel did he have left?

6. One half of 6 splints = how many splints?

DIVIDING WITH A NUMBER OVER

1. Find 3's in 7. $2 \times 3 = 6$ $6 + 1 = 7$ $7 \div 3 = (3 \times 2) + 1$. 7 divided by 3 are 2 and 1 over.

2. Find 4's in 11. $2 \times 4 = 8$ $8 + 3 = 11$ $11 \div 4 = (4 \times 2) + 3$.

3. How much is $12 \div 5$? 12 divided by 5 are 2 and 2 over.

4. $5\overline{)11}$. Five is found in 11 twice and 1 over. $5\overline{)11} + 1$.

5. $7\overline{)12}$ $7\overline{)12} + 5$ 6. $3\overline{)10}$ $2\overline{)9}$ $4\overline{)9}$ $10 \div 6 = ?$

7. $12 \div 10 = ?$ $8 \div 5 = ?$ $9 \div 8 = ?$ $12 \div 9 = ?$

When you see these marks ( ), called *parenthesis* marks, around numbers, they mean that we must do first what the sign inside says: $(3 \times 2) + 2 = ?$ means 3×2, which are 6, then add $2 = ?$ The answer is 8. But the answer to $3 \times (2 + 2)$ is $3 \times 4 = 12$.

REVIEW

8. If I owe you 4¢, and give you a dime, how many cents must you give me back?

9. A piece of ice weighed 10 pounds in the morning. In the evening it weighed 2 pounds less. What was its weight in the evening?

10. Harry bought a bottle of ink for 3¢, a pencil for 1¢. He gave the clerk a nickel. Should the clerk give him any change?

11. Make a story about 3 and 4; about 2 and 5; about 6 less 1; about 3 and 1 and 2; about $12 \div 6$; about $11 \div 5$; $10 \div 4$.

QUESTIONS

1. How many two-cent stamps can we buy for a dime? How many can we buy for a dozen pennies?

2. Frank is 10 years old. His brother is 4 years younger. How old is his brother?

3. Edgar has a dime. Willie has a nickel and 3¢. How many more cents has Edgar than Willie?

4. George earned a nickel on Saturday forenoon and another nickel in the afternoon. On Saturday evening he spent 6¢. How many cents had he left?

5. A post was 10 feet high. 2 feet of it were in the ground. How many feet were above the ground? If Tom is 4 feet tall, how much higher is the post?

6. I buy an orange for 3¢ and hand the fruit-dealer a dime. What change should he give me?

7. There were 10 plum trees in an orchard. 2 of them died. How many lived? How many more would the farmer need to plant so as to have a dozen in all?

8. Arthur gave a dime for a flag and a top. The top cost 4¢. How much did the flag cost?

9. George gave 3 apples to each of 4 boys. How many did he give in all?

10. Alice had 10 pansies. She gave away 3 of them. How many had she left? If she divided the number left among three friends, giving each two, would she then have any pansies for herself?

11. Her father gave Helen a dime. She bought 5¢ worth of braid. How many cents had she left?

12. Louis spelled 3 words and James spelled 4. How many words did both boys spell?

TWOS

1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23 24

$0 + 2 = 2$	$6 + 2 = 8$	$12 + 2 = 14$	$18 + 2 = 20$
$2 + 2 = 4$	$8 + 2 = 10$	$14 + 2 = 16$	$20 + 2 = 22$
$4 + 2 = 6$	$10 + 2 = 12$	$16 + 2 = 18$	$22 + 2 = 24$

Show by counters that each of these facts is true.

$2 \times 1 = 2$	$2 \times 7 = 14$
$2 \times 2 = 4$	$2 \times 8 = 16$
$2 \times 3 = 6$	$2 \times 9 = 18$
$2 \times 4 = 8$	$2 \times 10 = 20$
$2 \times 5 = 10$	$2 \times 11 = 22$
$2 \times 6 = 12$	$2 \times 12 = 24$

MULTIPLICATION TABLE OF TWOS

We read it either this way, 2 2's are 4, or two times two are four; two 3's are 6, or two times three are six; and so on.

$6 + 6 = 12$ two 6's = six 2's $2 + 2 + 2 + 2 + 2 + 2 = 12$

$10 + 10 = 20$ two 10's = ten 2's

$2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 = 20$

1. Copy the Table of Twos on paper.

2. Count by 2's to 24. Write this counting.

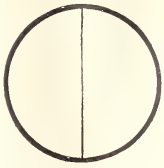
3. Show that two 5's are 10, two 9's are 18, two 12's are 24.

4. Show that two 4's are 8, two 7's are 14, two 11's are 22.

HALVES

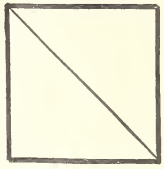
When anything is divided into two equal parts, each part is called a half. Two halves make a whole.

Rectangle in halves



Circle in halves

Triangle in halves



Square in halves

When anything is divided into two equal parts, the parts are called halves.

Draw a line 2 inches long. Divide it into halves.

Draw a square. Divide it into halves.

One half is written ½ in figures.

1. How many halves are there in one dollar?

2. How many halves are there in a pie? If a pie cost 10 cents, how much will half a pie cost?

3. James had one dollar. He spent half a dollar for a ball. How much money had he left?

4. If you bought a cookie and ate half of it, how much of it would be left? Would the part of it left be equal to the part you ate?

5. One orange is what part of two oranges?

6. One basket is what part of two baskets?

7. One half of two cents is how much?

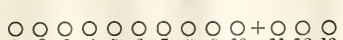
8. One half of four cents is how many cents?

9. George earned ten cents by doing errands. He gave half of the money to his sister. How many cents did he give to her?

10. $\frac{1}{2}$ of 10 cents is how many cents?

THIRTEEN, 13

When we have ten things and add three things to them, the name of the number of all these things together is **thirteen.**



$$\begin{array}{r} 10 \\ 3 \\ \hline 13 \end{array}$$

10 + 3 are thirteen. Ten and three are thirteen.

We write thirteen with the figures 1 and 3, 13. We put 1 in tens' place, and 3 in units' place. 13 means 1 ten and 3 units, like these dots :

12 + 1 = 13. A dozen and one are thirteen.

Thirteen is the first name of a number which is made up with the thought of ten as one part of the name. All names of numbers above thirteen as high as ninety-nine have at least a **t** in them to make us remember ten.

Show by splints that each of these number-facts is true : 11+2=13, 13−4=9, 13−6=7, 8+5=13, 13−10=3.

1. When your fathers and mothers were little boys and girls, thirteen was called the " baker's dozen," because the bakers gave them not twelve but thirteen biscuits or rolls when asked for a dozen. How many more did they give than the bakers give now for a dozen ?

2. A hen sat for three weeks on thirteen eggs and eleven little chickens came out of their shells one day. The day after the other eggs had little chickens peep out. How many chickens came out of their shells the second day ?

3. Tell number-stories about these facts : 10+3, 13−5, 11 + 2, 6 + 7, 13 − 9, 1 + 2 + 3 + 7, 12 + 1.

4. Add :

12	11	9	6	5	
1	2	4	7	8	

5. Subtract :

13	13	13	13	13	
2	4	6	8	10	

1 TO 13

1. One half is a *fraction*.

This  is 2 times this 

INCH HALF INCH

A fraction is one or more of the equal parts of a thing.

2. $\frac{1}{2}$ of $4¢ = ?$ $\frac{1}{2}$ of $4 = ?$ $\frac{1}{2}$ of $9 = ? + ?$

$\frac{1}{2}$ of $12¢ = ?$ $\frac{1}{2}$ of $12 = ?$ $\frac{1}{2}$ of $11 = ? + ?$

$\frac{1}{2}$ of $10 = ?$ $\frac{1}{2}$ of $6 = ?$ $\frac{1}{2}$ of $2 = ?$

$\frac{1}{2}$ of $8 = ?$ $\frac{1}{2}$ of $6¢ = ?$ $\frac{1}{2}$ of $8¢ = ?$

3. $10-2=?$ $7+?=10$ $10-7=?$ $9\div3=?$

$3+?=13$ $11-3=?$ $6+?=10$ $6+?=13$

$10-6=?$ $4+?=10$ $13-4=?$ $10+1=?$

$5+?=12$ $10-5=?$ $8+?=10$ $7\div2=?+?$

$10-8=?$ $4+?=10$ $10-4=?$ $9\div5=?+?$

$9+?=10$ $10-9=?$ $2)\underline{13}$ $3)\underline{13}$ $12\div10=?$

4. Add:

	1	4	3	1	8	5	4	6
	2	1	3	5	1	2	3	2
	3	1	2	2	1	3	4	5
2	2	3	5	2	6	5	3	4
9	4	4	3	2	3	2	9	4
1	1	2	1	2	1	3	1	5
6	5	2	3	1	7	1	2	4
2	3	5	3	1	2	6	5	1
2	2	1	3	1	1	1	1	4

5. What is $\frac{1}{2}$ of 2, of 4, of 6, of 8, of 10, of 12?

FOURTEEN, 14

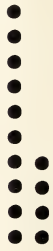
If we have ten things and add four things to them, the name of the number of all these things together is **fourteen**.

○○○○○○○○○○+○○○○
10 4

$$\begin{array}{r} 10 \\ 4 \\ \hline 14 \end{array}$$

$10 + 4 = 14$. Ten and four are fourteen.

We write fourteen with the figures 1 and 4, 14. We put the 1 in tens' place by setting the 3 in units' place. 14 means 1 ten and 4 units, like this group of dots:



$13 + 1 = 14$ $\quad 12 + 2 = 14$

A dozen and two are fourteen.

Of what does the syllable "teen" in fourteen remind us?

Show by splints that each of these number-facts is true:

$11 + 3 = 14$, $\quad 9 + 5 = 14$, $\quad 8 + 6 = 14$, $\quad 7 + 7 = 14$, $14 - 2 = 12$.

NUMBER-STORIES

1. Tom was fourteen years old. His brother was six years old. How many years older was Tom?

2. Mary was seven years old, and Susan was seven, too. How many years had both lived?

3. Willie and his little brother had together fourteen pennies. Willie took eight pennies for himself and gave George the rest. How many did George have?

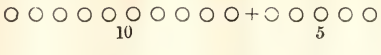
4. Tell number-stories about these number-facts: $14 - 8$, $7 + 7$, $14 - 4$, $9 + 5$, $12 + 2$, $13 - 1$.

5. $14 \div 7 = 2$ $\quad 14 \div 2 = ?$ $\quad 7 \times 2 = 14$ $\quad 2 \times 7 = ?$

Show each of these facts by splints and counters.

FIFTEEN, 15

When we have ten things and add five to them, the name of the number of all of these together is **fifteen.**



We write fifteen with the figures 1 and 5, 15. We put the 1 in the tens' place by setting the 5 in the units' place.

$10 + 5 = 15.$ Ten and five are fifteen.

$$\begin{array}{r} 10 \\ 5 \\ \hline 15 \end{array}$$

$13 + 2 = 15$ $9 + 6 = 15$ $12 + 3 = 15$

Show by splints that each of these number-facts is true: $14 + 1 = 15$, $11 + 4 = 15$, $8 + 7 = 15$, $15 - 5 = 10$, $15 - 7 = 8$, $15 - 9 = 6$.

MONEY

5 cents = 1 nickel.
10 cents = 1 dime.
2 nickels = 1 dime.

1 dime and 1 nickel make 15 cents. 3 nickels = 15 cents.

1. Three boys had three nickels. How many pennies or cents could they get for these nickels all together?

2. Willie had 6 pennies, Johnny 5, and Charlie enough more to make 15 pennies. How many did Charlie have?

3. Mary's father gave her fifteen cents. She spent one nickel for a little china doll, and four cents for a picture card to put in her doll-house. How many cents were left?

4. Louise had a dime, and Sarah a nickel. They spent six cents for car fares, and five cents for cookies. How many pennies did they have then?

REVIEW

1. Add: 11 10 2 9 7 2. Subtract: 14 14 14 14 14
3 4 12 5 7 5 1 6 2 11

3. $15 \div 3 = 5$ $5 \times 3 = 15$ Answer $15 \div 5 =$ $3 \times 5 =$

4. Show each of these facts by splints and counters.

5. Add: 11 12 7 9 14 6. Subtract: 15 15 15 15 15
4 3 8 6 1 3 4 9 10 12

7. Subtract: 8 12 10 9 8 6 5 10 13
5 6 3 2 4 2 3 4 6

8. Subtract: 7 13 10 9 8 3 10 7 12
2 2 6 4 3 1 5 4 5

9. Find $13 \div 2$, $11 \div 2$, $9 \div 2$, $7 \div 2$, $5 \div 2$, $3 \div 2$. Are these odd or even numbers?

10. Willie always had as a present from his father one penny for each year he was old on his birthdays, and one more penny to help him grow. One year his father gave him fourteen pennies. How old was he that birthday?

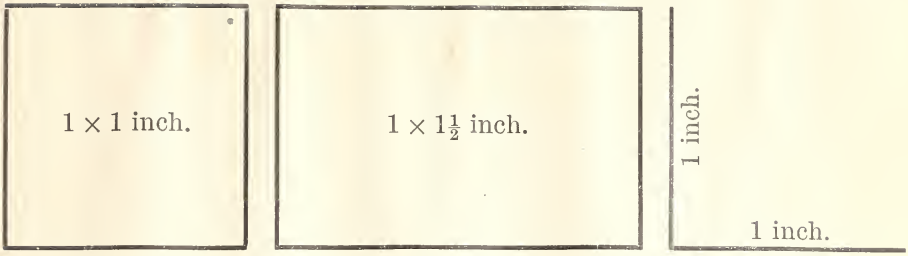
11. Mary found ten eggs when she went to the barn. She broke one, bringing them to the house. But her mother gave her as many more as she needed to make thirteen in all. How many did her mother give her?

12. Write the Multiplication Table of Twos on the blackboard without any copy.

13. Divide each even number from 2 to 24 by 2. Make a division table, beginning it like this:

$2 \div 2 = 1$	$6 \div 2 = 3$	$10 \div 2 =$			
$4 \div 2 = 2$	$8 \div 2 = 4$	$12 \div$			

FORMS AND FRACTIONS

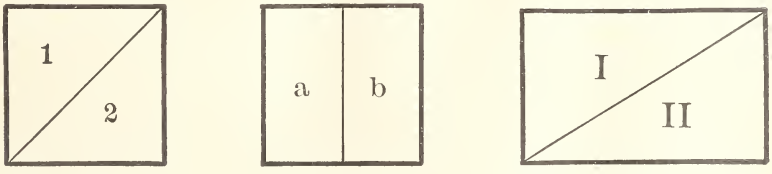


Rectangle. Square. | Rectangle. Oblong. | Right Angle.

A *rectangle* is a form in which each angle is a right angle. A rectangle always has four sides.

A *square* is a rectangle all of whose sides are equal.

An *oblong* is any rectangle that is not a square. The opposite sides of oblongs are always equal.



A B C

1. What is the name of the form *A*? *B*? *C*?
2. What is the name of the form 1? a? I?
3. Point out $\frac{1}{2}$ of *A*. $\frac{1}{2}$ of *B*. $\frac{1}{2}$ of *C*.
4. Point out right angles in *A*, *B*, and *C*.
5. Make an oblong with sides one and two inches long. Divide it into two squares.
6. Make another, and divide it into two triangles.

Each square in 5 and each triangle in 6 is $\frac{1}{2}$ of the oblong.

THREES

3 6 9 12 15 18 21 24 27 30 33 36

$0+3=3$	$3+3=6$	$6+3=9$
$9+3=12$	$12+3=15$	$15+3=18$
$18+3=21$	$21+3=24$	$24+3=27$
$27+3=30$	$30+3=33$	$33+3=36$

Show by splints that each of these facts is true.

$3 \times 1 = 3$	$3 \times 7 = 21$
$3 \times 2 = 6$	$3 \times 8 = 24$
$3 \times 3 = 9$	$3 \times 9 = 27$
$3 \times 4 = 12$	$3 \times 10 = 30$
$3 \times 5 = 15$	$3 \times 11 = 33$
$3 \times 6 = 18$	$3 \times 12 = 36$

MULTIPLICATION TABLE OF THREES

We read this, 3 1's are 3, or three times one are three.

$4+4+4=12$ Three 4's = four 3's $3+3+3+3=12$

Are three 10's 30? $10+10+10=30$ Three 10's = ten 3's

$$3+3+3+3+3+3+3+3+3+3=30$$

1. Copy the Table of Threes on paper.

2. Count by 3's to 36. Write this counting in words, beginning, three, six, nine, and so on.

3. Write the Table on the blackboard without any copy.

4. Make a division table of threes, beginning it like this:

$3 \div 3 = 1$	$9 \div 3 = 3$				
$6 \div 3 = 2$	$12 \div$				

THIRDS

When anything is divided into three parts, each part is called a third. Three thirds equal one whole.

Circle

Rectangle

Square

Square

Into how many parts is the circle divided? the rectangle? each square?

Draw a line three inches long. Divide it into thirds.

One third is written in figures $\frac{1}{3}$.

Two thirds are written in figures $\frac{2}{3}$.

$\frac{3}{3}=1$. Why is this true? Look and see.

1. Eddie bought a cake and ate $\frac{1}{3}$ of it. How much of the cake was left?

2. How many thirds are there in an orange?

3. How many thirds in two oranges? In one orange are three thirds. 2 times $\frac{3}{3}$ are six thirds, $\frac{6}{3}$.

4. $\frac{1}{3}$ of 6 figs = how many figs? There are six times as many thirds in the 6 figs as there are in the one fig. $6 \times \frac{1}{3} = \frac{6}{3}$. $\frac{6}{3} = 2$.

5. What is $\frac{1}{3}$ of 6? $\frac{1}{3}$ of 9? $\frac{1}{3}$ of 12?

6. Which piece is the larger, $\frac{1}{3}$ of a pie or $\frac{1}{2}$ of a pie?

7. How much more does the whole of a cake cost than $\frac{1}{3}$ of it?

8. I started to walk to the depot. After I had walked $\frac{1}{3}$ of the distance, what part of it had I still to walk?

9. If your mother gave you some money and you spent $\frac{2}{3}$ of it, what part of the money would you have left?

TELLING QUANTITIES

We buy and sell butter and cheese by pounds, but we measure potatoes and vinegar by quarts. Do you know how much a quart of anything is? A quart measure for dry things like flour is larger than that for liquids like milk. Six quarts of flour would take just a little more space than seven quarts of milk. A pint of flour, too, takes a little more space than a pint of milk.

2 pints make 1 quart. 2 pts. = 1 qt.

1 pint makes $\frac{1}{2}$ quart. 1 pt. = $\frac{1}{2}$ qt.

1. Mrs. Brown had three quarts of milk, and six hungry children. She gave each $\frac{1}{2}$ pt. in a glass. How many quarts were left?

2. Willie bought a quart of peanuts, and gave one pint to his little brothers. What fraction of the quart did he keep himself?

4 quarts make 1 gallon. 4 qts. = 1 gal.

3. How many quarts are there in three gallons of oil?

4. Susie's mother had one gallon of maple syrup. One morning the family had three pints of maple syrup on the table for buckwheat cakes. How many pints were left in the gallon jug?

8 quarts make 1 peck.

4 pecks make 1 bushel.

8 qts. = 1 pk. 4 pks. = 1 bu. 32 qts. = 1 bu. 64 pts. = 1 bu.

4 qts. = $\frac{1}{2}$ pk. 2 pks. = $\frac{1}{2}$ bu. 16 qts. = $\frac{1}{2}$ bu. 16 pts. = 1 pk.

QUANTITIES

1. Willie bought 2 bushels of corn for his chickens, and fed them for 30 days 2 quarts each day. How many quarts were then left?

2. George bought 8 pecks of oats for his pony, and the grain dealer sent them in a 2-bushel bag, full. Was this correct?

3. A grocer had a barrel of apples. He sold $\frac{2}{3}$ of them. What part of the barrel of apples did he have left?

4. One boy had two thirds of an apple, another boy had one third, and still another had one half of an apple. Tell how many parts of apples they had altogether.

5. Two quarts of walnuts will fill how many cups, if each cup holds half a pint?

6. Fill a gallon measure with water, using a pint measure. How many times do you empty the pint measure?

7. How many quarts are there in 2 pecks? Which has more quarts, a peck or a gallon? Are the quarts the same in size?

8. A peck measure is one half full of oats. How many more quarts will it hold?

9. Henry filled a peck measure one quarter full of sand. How many quarts did he put into the measure? How many more quarts would it have held?

10. How many times must you empty a quart measure full of strawberries in order to fill a peck measure?

11. What part of a bushel of wheat is a peck of wheat?

12. What is the ratio of 1 to 4? If a bushel of oats costs a dollar, what will a peck of oats cost?

13. How many pints are there in 2 quarts? How many pecks are there in 16 quarts?

QUESTIONS

1. How many gallons are there in 8 quarts?

2. How many pints are there in 3 quarts? 5 quarts?

3. How many pints are there in a gallon and a quart?

4. How many quarts are there in a gallon and a quart? in a gallon and a pint?

5. If a pint of milk costs 4 cents, what will a quart cost? If a pint costs 3 cents, what will a gallon cost?

6. If milk is 3 cents a pint, what will a quart and a pint cost? At 3 cents a pint, what will two quarts cost?

7. At 2 cents a pint, how many cents will half a gallon of skimmed milk cost?

8. Fred drinks a pint of milk every day. In how many days does he drink a gallon? At 3 cents a pint, how much will his milk cost for one week?

9. If vinegar is 8¢ a quart, how much will $\frac{1}{2}$ pt. cost?

10. My lamp burns a pint of kerosene every night. How many nights will a gallon last me?

11. A milkman has a gallon of cream. How many pint bottles can he fill from it?

12. Should 7 quarts of milk cost more than 2 gallons, or less? Why?

13. A gallon jar is half full of water. I am going to fill it from a pint measure. How many times must I empty the measure?

14. A grocer had 10 quarts of syrup. He sold a gallon. How much syrup had he left?

15. Two gallons of oil will fill how many quart measures?

16. If you were paid 2 cents a pint for picking berries, how much money would you get for picking 3 quarts?

SIXTEEN, 16

We name ten and six things by the number **sixteen.**

$15+1=16$ $12+4=16$ $10+6=16$ $8+8=16$

We write sixteen with the figures 1 and 6, 16. We put the 1 in tens' place by setting the 6 in units' place.

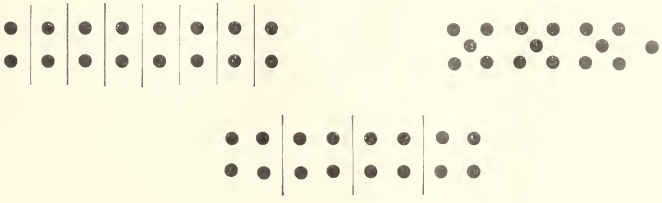
Show by splints that each of these number-facts is true: $10+6=16$, $8+8=16$, $4+12=16$, $9+7=16$, $11+5=16$.

$4+4+4+4=16$. How many 4's are there in 16?

$2+2+2+2+2+2+2+2$. How many 2's are there in 16? $8+8=16$. How many 8's do we find in 16?

$4\times4=16$ $8\times2=16$ $2\times8=16$ $16\div4=4$ $16\div2=8$

Count these dots:



1. If eight girls in your school were sent this afternoon to the grocery by their mothers, each with two pennies to buy a yeast cake, how many pennies would all have together?

2. Four boys spent sixteen cents for fishhooks: each spent as much as the others. How many cents did each spend?

3. Mary had a nickel, Kate a dime, and Annie a penny. How many cents did they have altogether?

SEVENTEEN, 17

We name ten and seven things by the number **seventeen**.

Seven and ten make seventeen. $10+7=17$

$16+1=17$ $15+2=17$ $9+8=17$ $13+4=17$

Show each of these facts by splints and counters.

1. We cannot divide 17 by any smaller number exactly, without remainder.

2. We can divide 16 by 2, by 4, and by 8.

3. We can divide 15 by 3 and by 5.

4. We can divide 14 by 7 and by 2.

5. We cannot divide 13 without remainder.

6. We can divide 12 by 6, by 2, by 3, and by 4.

7. We cannot divide 11 without remainder.

8. We can divide 10 by 5 and by 2.

9. We can divide 9 by 3.

10. We can divide 8 by 4 and by 2.

11. We cannot divide 7 without remainder.

12. We can divide 6 by 2 and by 3.

13. We cannot divide 5 without remainder.

14. We can divide 4 by 2.

There are no multiplication or division facts to learn about

1 or 2 or 3 or 5 or 7 or 11 or 13 or 17 or 19.

About these numbers we learn only addition and subtraction facts.

15. Tell number-stories about 17, using pennies, marbles, eggs, fish, dolls, apples, or whatever interests you, to show these facts: $10+7=17$ $15+2=17$ $17-11=6$ $17-8=9$ $17-3=14$ $17-5=12$

16. Add:

5	6	4	7	3	8	2	1
12	11	13	10	14	9	15	16

EIGHTEEN, 18

We name ten and eight things by the number **eighteen.**

Eight and ten make eighteen. $10+8=18$

$15+3=18$ $16+2=18$ $9+9=18$ $12+6=18$

$18\div2=9$ $18\div9=2$ $9\times2=18$ $2\times9=18$

$18\div6=3$ $18\div3=6$ $6\times3=18$ $3\times6=18$

Show each of these facts by splints and counters.

15 are three 5's. 15 are ten and five.

18 are three 6's. 18 are twelve and six.

There are two 6's in 12. $6\times2=12$. $12\div6=2$.

This group of dots  is 2 times this group 

A DOZEN

A HALF DOZEN

18 are a dozen and a half dozen more.

12 inches make one foot.

18 inches are 12 inches and 6 inches more.

18 inches are a foot and a half foot.

Show these facts on the yardstick or by blackboard picture.

NUMBER-STORIES

1. John's father asked him to get at the store a dozen and a half pens. These cost one cent each. How many cents did John pay?

2. When John came home he found a yardstick and measured the kitten, which was 18 inches long from her nose to the end of her tail. How much was that in feet?

3. Then his mother sent him on an errand to sell a dozen and a half of eggs. The grocer gave him a dime a dozen. How many cents did he bring home?

REVIEWS OF NUMBERS AND FORMS

1. Tell number-stories about these facts:

$16 \div 2 = 8$ $\quad$ $16 - 6 = 10$ $\quad$ $16 \div 4 = 4$

$9 + 7 = 16$ $\quad$ $12 + 4 = 16$ $\quad$ $13 + 3 = 16$

2. Add:

2	5	8	1
14	11	8	15

3. Subtract:

16	16	16	16
6	9	12	15

4. Subtract:

17	17	17	17	17	17	17
4	3	9	6	2	10	1

5. Do what the sign tells:

17	14	16	12	17	17
−7	+3	+1	+5	−2	−9

6. Add:

15	10	9	12
3	8	9	6

7. Subtract:

18	18	18	18
2	4	5	11

8. Divide 18 by 2, by 3, by 6, and by 9.

9. Make stories about:

16−3	18−9	17−10	11+2	13+5	18−10
15+2	18−15	17−14	10+7	15−5	15+3
18−6	17−2	15−4	17−4	16−14	15−11

10. Draw an oblong 2×3 inches. Divide it into halves in several different ways.

11. Draw another oblong of the same size. Divide it into thirds.

12. Draw a triangle with one side of the right angle 2 inches long and the other side 1 inch long.

13. Draw a circle 1 inch in diameter and divide it into halves. A diameter is any straight line through the center of a circle.

NINETEEN, 19

We name ten and nine things by the number **nineteen**.

Nine and ten make nineteen. $10+9=19$

$15+4=19$ $16+3=19$ $12+7=19$ $14+5=19$

$18+1=19$ $5+5+5+4=19$ $4+4+4+4+3=19$

Show each of these facts by splints and counters.

NUMBER-STORIES

1. There were 19 boys in the school yard. 6 of them went home. How many were left?

2. 19 boys came to school early in the morning to play marbles. When they reached the school yard 2 of them found that they had lost their marbles on the way to school. How many had their marbles with them?

3. Nineteen girls were trying to cut paper dolls out of white paper. Fourteen of them made very nice dolls. How many of them were not able to make the dolls?

4. Three times six boys went swimming. One more boy asked his mother if he could go, but she said, "No!" How many boys wanted to go?

5. Eight times two girls walked home from school together in pairs. Three girls walked side by side. How many girls were there in all?

6. Add:
$$\begin{array}{rrr} 12 & 11 & 14 \\ \underline{7} & \underline{8} & \underline{5} \end{array}$$

7. $3+5+6+5=$

8. $10+6+3=$

9. $8+4+3+4=$

10. $12+5+2=$

11. Subtract:
$$\begin{array}{rrrrrrrrr} 19 & 19 & 19 & 19 & 19 & 19 & 19 & 19 & 19 \\ \underline{2} & \underline{4} & \underline{5} & \underline{12} & \underline{13} & \underline{1} & \underline{16} & \underline{8} & \underline{9} \end{array}$$

12. Tell number-stories about the facts in 7, 8, 9, 10, and 11.

PARTITIONS

3 $3=2+1$

5 $5=3+2$ $5=2+2+1$ $5=4+1$

7 $7=5+2$ $7=6+1$ $7=4+3$ $7=3+3+1$

11 $11=7+4$ $11=8+3$ $11=9+2$ $11=6+5$
$11=5+5+1$ $11=3+3+3+1+1$ $11=4+4+3$

13 $13=11+2$ $13=8+5$ $13=9+4$ $13=7+6$
$13=5+5+3$ $13=4+4+4+1$ $13=3+3+3+3+1$
$13=2+2+2+2+2+2+1$ $13=10+3$

17 $17=13+4$ $17=5+5+5+2$ $17=10+7$ $17=15+2$
$17=8+8+1$ $17=4+4+4+4+1$ $17=12+5$
$17=3+3+3+3+3+2$ $17=16+1$ $17=7+7+3$

19 $19=17+2$ $19=5+5+5+4$ $19=16+3$ $19=14+5$
$19=4+4+4+4+3$ $19=3+3+3+3+3+3+1$
$19=9+9+1$ $19=13+6$ $19=11+8$ $19=10+9$

1. Divide 3, 5, 7, 11, 13, 17, and 19 by 2, and show how many ones are left over.

$2)\overline{3}\ 1+1$, because $2\times 1=2$ and $2+1=3$

$2)\overline{17}\ 8+1$, because $2\times 8=16$ and $16+1=17$

2. Divide 5, 7, 11, 13, 17, and 19 by 3.

$3)\overline{13}\ 4+1$, because $3\times 4=12$ and $12+1=13$

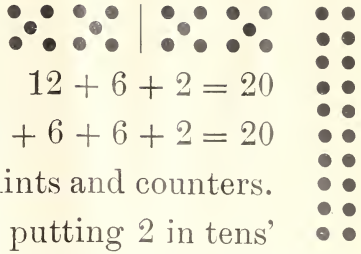
3. Divide 7, 11, 13, 17, and 19 by 5.

$5)\overline{19}\ 3+4$, because $5\times 3=15$ and $15+4=19$

4. Divide 13, 17, and 19 by 7.

$7)\overline{13}\ 1+6$, because $7\times 1=7$ and $7+6=13$

TWENTY, 20

We call two tens **twenty.** 

$10 + 10 = 20$ $15 + 5 = 20$ $12 + 6 + 2 = 20$

$5 + 5 + 5 + 5 = 20$ $6 + 6 + 6 + 2 = 20$

Show each of these facts by splints and counters.

We write twenty in figures by putting 2 in tens' place, and to show that 2 is in tens' place, we set the zero, 0, in units' place. Write 20.

$2 \times 10 = 20$ $4 \times 5 = 20$ $3)\underline{20} + 2$
$\quad\quad 6$

There are six 3's or three 6's in 20 and 2 units over.

We write this: $(3 \times 6) + 2 = 20$ or $(6 \times 3) + 2 = 20$.

We place the marks of parenthesis ( ) around the 6 and 3 to show that 3 multiplies 6, not $6 + 2$. If we wrote $3 \times 6 + 2$, this would mean 3 times 8, for $6 + 2 = 8$.

1. Find how many times 20 contains 3, 7, 9, with how many units over.

2. Draw on the blackboard a square containing 20 square inches.

3. Add:

	1	3	18	15	13	6	4	12	11	10
	19	17	2	5	7	14	16	8	9	10

4. Subtract:

	20	20	20	20	20	20	20	20	20	20
	18	15	10	12	1	3	4	6	7	9

5. How would you divide twenty apples among five boys? among six boys?

6. Can we divide twenty oranges among seven girls so that each may have as many as any other? How many would have only two?

FACTS OF NUMBER, 11 TO 20

All Additions :

10+ 1=11	11+2=13	12+4=16	13+7=20	15+5=20
10+ 2=12	11+3=14	12+5=17	14+1=15	16+1=17
10+ 3=13	11+4=15	12+6=18	14+2=16	16+2=18
10+ 4=14	11+5=16	12+7=19	14+3=17	16+3=19
10+ 5=15	11+6=17	12+8=20	14+4=18	16+4=20
10+ 6=16	11+7=18	13+1=14	14+5=19	17+1=18
10+ 7=17	11+8=19	13+2=15	14+6=20	17+2=19
10+ 8=18	11+9=20	13+3=16	15+1=16	17+3=20
10+ 9=19	12+1=13	13+4=17	15+2=17	18+1=19
10+10=20	12+2=14	13+5=18	15+3=18	18+2=20
11+ 1=12	12+3=15	13+6=19	15+4=19	19+1=20

All Multiplications :

2×6=12	2×8=16	2×10=20	3×5=15	4×4=16
2×7=14	2×9=18	3× 4=12	3×6=18	4×5=20

Copy and answer :

1. $10 \div 5 =$	**9.** $4 \times 4 =$	**17.** $\frac{1}{6}$ of $12 =$
2. $9 \div 3 =$	**10.** $18 \div 2 =$	**18.** $\frac{1}{7}$ of $14 =$
3. $8 \div 4 =$	**11.** $20 \div 5 =$	**19.** $\frac{2}{3}$ of $9 =$
4. $12 \div 6 =$	**12.** $20 \div 10 =$	**20.** $\frac{2}{5}$ of $10 =$
5. $15 \div 5 =$	**13.** $\frac{1}{2}$ of $16 =$	**21.** $\frac{3}{4}$ of $12 =$
6. $16 \div 8 =$	**14.** $\frac{1}{3}$ of $18 =$	**22.** $\frac{3}{5}$ of $15 =$
7. $18 \div 6 =$	**15.** $\frac{1}{4}$ of $20 =$	**23.** $18 - 5 + 6 =$
8. $7 \times 2 =$	**16.** $\frac{1}{5}$ of $15 =$	**24.** $14 + 3 - 10 =$

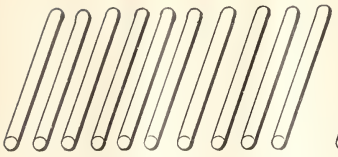
25. Subtract from 20 every number from 10 to 19.

20 20
10 11 and so on.

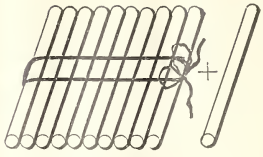
26. $4\overline{)16}$ $2\overline{)18}$ $4\overline{)20}$ $5\overline{)15}$ $5\overline{)20}$ $6\overline{)18}$ $3\overline{)12}$

STUDY
ANSWER

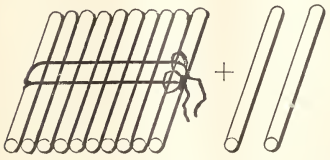
REVIEW OF NUMBERS 1 TO 20



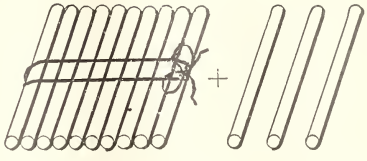
Ten 1's are 10



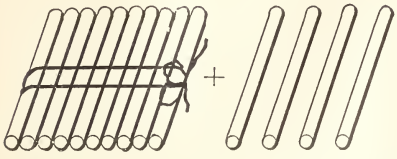
10 + 1 = 11



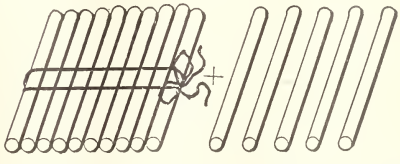
10 + 2 = 12



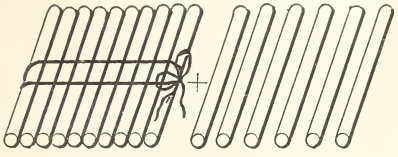
10 + 3 = 13



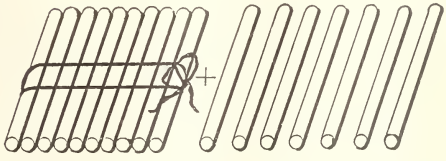
10 + 4 = 14



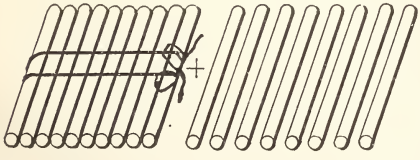
10 + 5 = 15



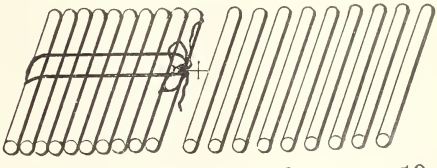
10 + 6 = 16



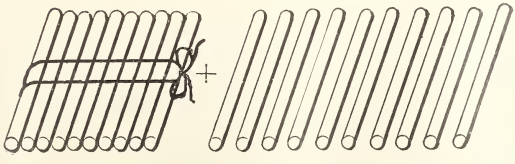
10 + 7 = 17



10 + 8 = 18



10 + 9 = 19

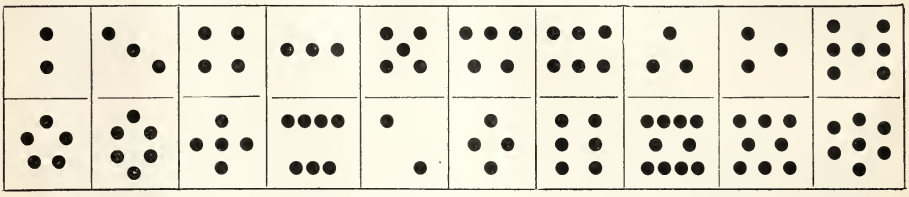


10 + 10 = 20

1–20

The teacher may make sight number cards, using ordinary paper or, better, drawing paper, 4 × 5 in. or 4 × 6 in size. The figures should be as large as those on page 4 for blackboard writing. They may be drawn with brush and diluted ink or with blue pencil. The children may make sets for themselves, either as large as the teacher's set, or much smaller, 2 × 3 in., with figures as large as those on page 5. These sets of sight cards should review all the number facts as high as 20, and drill the pupil in quick recognition of number groups as high as 7 or even 10. The teacher with a set of cards in her hand may call for answers in various ways. The answers are to be remembered instantly and with certainty.

For a set of sight-counting cards :



Cards involving 10 may be written like these :

10+1=	10+2=	10+3=	10+4=	10+5=	10+6=	10+7=	10+8=	10+9=	10+10=
10×2=	$\frac{10}{2}$=	2)10	5)10	10÷2=	10−1=	10−2=	10−3=	10−4=	10− 5=
10−6=	10−7=	10−8=	10−9=	10)10	5+5=	5×2=	2×5=	9+1=	8+ 2=
7+3=	6+4=	18−8=	19−9=	17−7=	16−6=	15−5=	14−4=	13−3=	12− 2=

The variety of possible ways to use the numbers to 20 in combinations producing not more than 20 and using no partition facts or fractions over $\frac{1}{2}$ is too great to permit of complete illustration. Not all the combinations or forms of signs to indicate operations involving 10 are indicated even in these twenty spaces.

DAYS OF THE WEEK

There are seven days in one week. After seven days we begin the names of the days over again. The names of the days are: Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday.

Each day is one seventh of a week. 7 days = 1 week.

At midnight we change the name of the day.

Many, many years ago, when our forefathers lived on the other side of the great Atlantic Ocean, most of them thought that the earth was ruled by beings who live in the sky. So they named each day for some one of these beings. We use their names for the days.

Sunday is named for the Sun in the sky.
Monday is named for the Moon in the sky.
Tuesday is named for Tyr, who leads in battle.
Wednesday is named for Woden, the wise father of all.
Thursday is named for Thor, the thunder.
Friday is named for Freya, the loving wife and mother.
Saturday is named for Saturn, who began the world with time.

ABBREVIATIONS

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.

Yesterday was the day before this day.
To-day is this day we are now living in.
To-morrow will be the day after this day.
Day before yesterday was two days ago.
Day after to-morrow will be two days after this.
A fortnight is two weeks, or fourteen nights or days.

1. What day will be ten days from to-day? What day was ten days ago?

2. Name the days when we go to school.

QUESTIONS

1. A man has a dozen letters to be mailed and only four stamps. How many stamps must he buy?

2. How many cents are 10¢ and 2¢? 10¢ and 4¢? 16¢ and 1¢? 3¢ and 10¢? 14¢ and 5¢? 13¢ and 3¢? 12¢ and 8¢? 13¢ less 5¢? 19¢ less 7¢?

3. Make 12 dots in a row. Make 2 more dots under them. How many dots in all have you made? Add 5 more. How many have you made now?

4. Nine boys have twenty marbles. Four of them have ten marbles altogether. Each of the rest has as many as any of the others. How many marbles has each of these?

5. Count by 2's from 1 to 19 and from 19 back to 1.

6. Count by 3's from 19 backwards to 1.

7. Count by 3's from 1 to 19.

8. Count by 4's from 0 to 20 and from 20 back to 0.

9. Count by 4's from 17 back to 1.

10. Count by 2's from 3 to 19 and from 19 back to 3.

11. Count by 3's from 2 to 20 and from 20 back to 2.

12. Count by 4's from 5 to 17.

13. Count backwards by 5's from 20 to 0.

14. Count backwards by 5's from 19 to 4.

15. Count by 6's from 0 to 18 and back from 18 to 0.

16. Count by 7's to 20, beginning at 3. What is the highest number we reach?

17. Count by 5's to 20, beginning at 4. What is the highest number we reach?

18. Count by 4's to 20, beginning at 2. What is the highest number we reach?

REVIEW

1. Lay 1 bundle of 10 splints. Count out ten loose ones and tie them into a bundle. How many splints are there in the two bundles? Write the number 20. What does the zero mean? Have you any loose splints when you show 20 in bundles of ten splints?

2. How many figures do you write for eleven? for twelve? for thirteen? for twenty?

3. In all these numbers, what does the figure on the left show? What does the figure on the right show?

4. While Mary was feeding 7 birds 4 more birds came. Then how many birds were there?

5. There are 9 cups in 1 row, and 4 cups in another row. How many cups are there in both rows?

6. 10 pencils and 2 pencils are how many pencils?

7. Jennie had a dime and 2¢. She spent $\frac{1}{2}$ of her money. How many cents did she have left?

8. How many marbles must you put with 9 marbles in order to have 14 marbles?

9. I have four dollars. How many more dollars must I get in order to have fifteen dollars?

10. Edwin had 13 marbles. He lost 5. How many had he left?

11. Make 2 triangles. Under them make 2 squares. How many sides are there in the triangles? How many sides in the square? How many sides altogether in all the squares and triangles?

12. An orchard has 10 apple trees and 4 pear trees. How many trees are there in the orchard?

13. Henry has ten cents. How many more cents must he get in order to have 14¢?

QUESTIONS

1. Write the numbers made up of:

One 10 and 7 units. One 10 and 3 units. One 10 and 6 units. One 10 and 5 units. One 10 and 8 units. One 10 and 2 units. One 10 and 1 unit. One 10 and 4 units. One 10 and 9 units. One 10. Two 10's.

Seven units. Three units. Eight units. Six units. Five units. Nine units.

2. A farmer had 19 animals in a field. 8 of them were sheep and the rest were cows. How many cows were there in the field?

3. Ella has 11¢ and Maud has 17¢. How many more cents has Maud than Ella?

4. Alice had 19 splints in her hand. She put 7 of them on her desk. How many splints did she keep in her hand?

5. I had 20¢ and lost 6¢. How many cents had I left?

6. Mrs. Smith paid $16 for a jacket and $4 for a hat. How many dollars did she spend?

7. A farmer had 19 chickens. He sold 5 of them. How many were left?

8. There were 20 barrels of flour in a store. 6 of them were sold. How many were left?

9. One ladder has 19 rungs. Another ladder has 14 rungs. What number tells the difference in rungs between the ladders?

10. I paid 3¢ for a pencil and 16¢ for paper. How many cents did I spend?

11. Emma had 20¢. She paid 2 nickels in car fares. How much money had she left?

12. 12 lemon pies and 7 peach pies are how many pies?

SUBTRACTING

1. John had 10 cents, and spent 7 cents for a whistle. He had three cents left.

2. Mary had 16 paper dolls, and gave away 11. She kept 5 for herself.

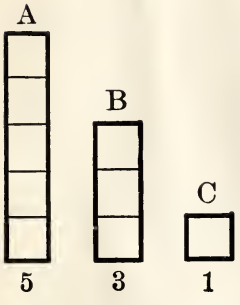
Give each boy and girl one combination to tell or write a story about.

3 – 2	5 – 3	5 – 1	3 – 1	12 – 6
4 – 3	9 – 4	6 – 2	9 – 6	7 – 6
3 – 1	2 – 2	9 – 5	12 – 8	13 – 9
8 – 5	7 – 4	6 – 6	9 – 8	5 – 5
8 – 4	15 – 9	16 – 7	11 – 5	4 – 2
12 – 9	11 – 8	7 – 7	4 – 1	6 – 3
10 – 3	3 – 3	1 – 1	8 – 7	9 – 4
9 – 8	13 – 8	17 – 9	9 – 9	20 – 6
11 – 4	8 – 3	10 – 1	20 – 1	14 – 5
4 – 4	15 – 6	9 – 3	13 – 7	20 – 8
6 – 1	12 – 5	13 – 5	14 – 8	16 – 9
6 – 5	13 – 6	10 – 8	11 – 3	13 – 4
10 – 9	7 – 1	8 – 8	18 – 9	10 – 3
7 – 3	5 – 2	20 – 2	11 – 9	14 – 6
7 – 5	8 – 1	10 – 4	10 – 7	10 – 5
5 – 4	2 – 1	12 – 4	20 – 3	15 – 8
9 – 1	11 – 2	14 – 7	17 – 8	12 – 7
7 – 2	18 – 8	20 – 7	20 – 9	20 – 5
9 – 2	14 – 9	20 – 4	11 – 7	16 – 8
10 – 6	12 – 3	11 – 6	10 – 10	15 – 7

3. Write out the answers to the questions in each column: $3 - 2 = 1$, $5 - 3 = 2$.

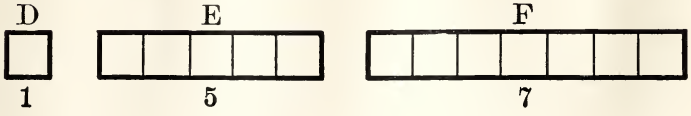
4. Tell the answers, taking turns around the class.

RATIOS

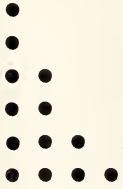


A is $5 \times C$. B is $3 \times C$.
C is $\frac{1}{5}$ of A. C is $\frac{1}{3}$ of B.

We say that 5 is the *ratio* of A to C; and that 3 is the *ratio* of B to C. Ratio means how large anything is compared with anything else. We say that $\frac{1}{5}$ is the ratio of C to A; and that $\frac{1}{3}$ is the ratio of C to B. This means that C is $\frac{1}{5}$ of A and $\frac{1}{3}$ of B.



What is the ratio of F to D? of E to D? of D to E? of D to F? of D to $E + F$?



The ratio of 6 to 1 is 6.
The ratio of 4 to 1 is 4.
The ratio of 2 to 1 is 2.

The ratio of 1 to 2 is $\frac{1}{2}$. Why?
The ratio of 1 to 4 is $\frac{1}{4}$. Why?
The ratio of 1 to 6 is $\frac{1}{6}$. Why?

In the forms A, B, and C the ratio of B to A is $\frac{3}{5}$, because B is $\frac{3}{5}$ of A. The ratio of A to B is $\frac{5}{3}$, because A is $(\frac{3}{3} + \frac{2}{3})$ of B.

The ratio of 4 to 6 things is $\frac{4}{6}$, because 1 is $\frac{1}{6}$ of 6 and there are 4×1 thing in 4 things. The ratio of 6 to 4 is $\frac{6}{4}$, because 1 is $\frac{1}{4}$ of 4 and there are 6×1 thing in 6 things.

1. What is the ratio of 1 to 7? of 7 to 1? of 2 to 7? of 7 to 2? of 3 to 7? of 7 to 3? of 3 to 10? of 10 to 3?

2. Find the ratio of 4 to 8, 16, 12, 2, 20.

QUESTIONS

1. I have 3 black chicks and 5 times as many white ones. How many white chicks have I?

2. How many figs are 3 times 4 figs? 5 times 3 figs?

3. 4 pictures cost $5 apiece. How many dollars did they all cost?

4. A roll of braid costs 16¢. What will be the price of one quarter of the roll?

5. Helen had 12¢. She gave $\frac{1}{4}$ of her money to her sister Alice. How many cents did she give to Alice?

6. If Charles can ride 20 miles in 1 hour on his wheel, how far can he ride in a quarter of an hour?

7. If you bought $\frac{1}{4}$ of a dozen of bananas, how many bananas would you have? how many if you bought $\frac{2}{4}$ of a dozen? how many if you bought $\frac{1}{2}$ of a dozen?

8. A man walks 4 miles an hour. How far does he walk in 4 hours? in 5 hours? in $4\frac{1}{2}$ hours?

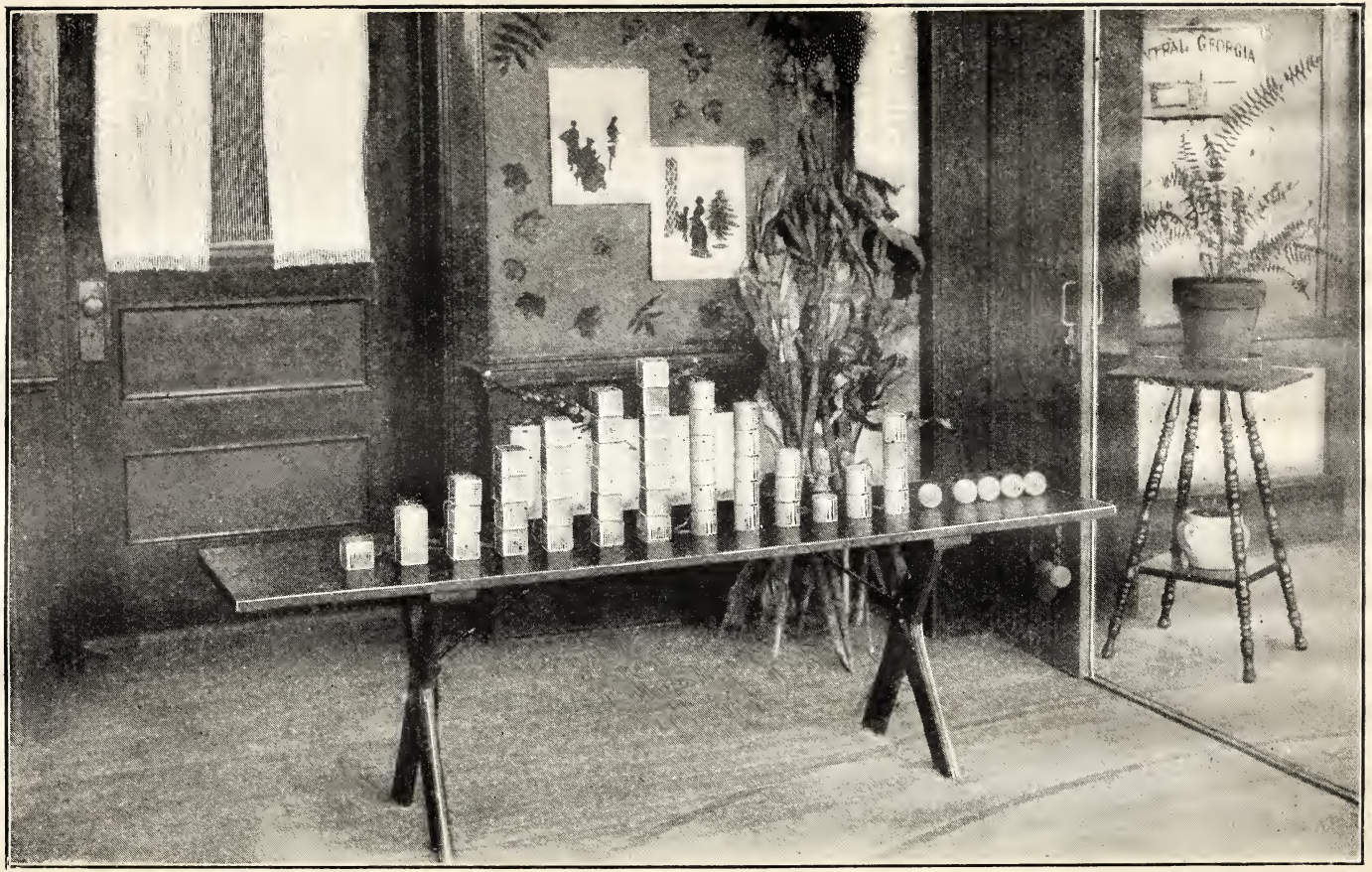
9. Edgar had 6¢. Arthur has 3 times as much money as Edgar. How many cents has Arthur?

10. If we use 3 crayons a day in this room, how long will 18 crayons last us?

11. If a man worked only half the working days in a week, how many days would he be idle? How many days would he be at work?

12. If you walk 1 mile every school day, how many miles do you walk in a week? If the walk is 1 mile each way, how many miles do you walk in a week, when you stay at school for noon-recess?

13. During Christmas week I was at home only 2 days. How many days was I away from home?


CENTRAL GEORGIA

RATIOS

1. Do you see 4 balls or spheres together? Is there 1 ball near them? Do you see the 3 balls hanging from the door? How many balls do you see in all?

2. Do you see five piles of cylinders and one single cylinder? Count the number of cylinders in each pile.

3. Do you see six piles of cubes? Count the number of cubes in each pile. Do you see one cube separate from the rest?

4. Point to 1 cube and 7 cubes. 1 cube $\times$ 7 = 7 cubes. 7 cubes $\div$ 1 = 7. The ratio or number relation of 7 cubes to 1 cube is 7. The ratio or number relation of 1 cube to 7 cubes is $\frac{1}{7}$, one seventh.

5. Point to 2 cubes and 6 cubes. 2 cubes $\times$ 3 = 6 cubes. 6 cubes $\div$ 2 = 3. The ratio of 6 cubes to 2 cubes is 3. The ratio of 2 cubes to 6 cubes is $\frac{1}{3}$, one third.

6. Point to 1 sphere and to 8 spheres. 1 sphere $\times$ 8 = 8 spheres. 8 spheres $\div$ 1 = 8. The ratio of 8 spheres to 1 sphere is 8. The ratio of 1 sphere to 8 spheres is $\frac{1}{8}$, one eighth.

7. Point to 4 cubes and 6 cubes. The ratio of 4 cubes to 6 cubes is $\frac{4}{6}$, four sixths. The ratio of 6 cubes to 4 cubes is $\frac{6}{4}$, six fourths.

8. Point to 2 cubes, to 4 cubes, to 3 cubes, and to 6 cubes.

9. How much higher is the pile of 4 cubes than the pile of 2 cubes?

10. How much higher is the pile of 6 cubes than the pile of 3 cubes?

11. How high is the pile of 2 cubes compared with the pile of 4 cubes?

12. How high is the pile of 3 cubes compared with the pile of 6 cubes?

FOURS

4 8 12 16 20 24 28 32 36 40 44 48

$0+4=4$	$4+4=8$	$8+4=12$
$24+4=28$	$28+4=32$	$32+4=36$
$12+4=16$	$16+4=20$	$20+4=24$
$36+4=40$	$40+4=44$	$44+4=48$

Show by splints that each of these facts is true.

$4\times1=4$	$4\times7=28$
$4\times2=8$	$4\times8=32$
$4\times3=12$	$4\times9=36$
$4\times4=16$	$4\times10=40$
$4\times5=20$	$4\times11=44$
$4\times6=24$	$4\times12=48$

MULTIPLICATION TABLE OF FOURS

We read this, 4 1's are 4, or four times one are four.

$5+5+5+5=20$ 4 5's=5 4's $4+4+4+4+4=20$

Are 4 8's 32? $8+8+8+8=32$

4 8's = 8 4's $4+4+4+4+4+4+4+4=32$

1. Copy the Table of Fours on paper. 2. Learn Fours.

3. Show that 4 1's=4, 4 4's=16, 4 7's=28, 4 2's=8, 4 6's=24, 4 9's=36, 4 3's=12, 4 10's=40, 4 11's=44.

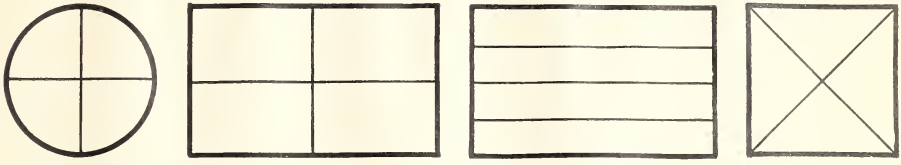
4. Write the Table on the blackboard without any copy.

5. Make a division table of fours, beginning it like this:

$4\div4=1$	$12\div4=3$	$20\div$			
$8\div4=2$	$16\div4=4$				

FOURTHS OR QUARTERS

When anything is divided into four parts, each part is called a fourth or a quarter. Four fourths or four quarters make one whole. $4 \times \frac{1}{4} = 1$.



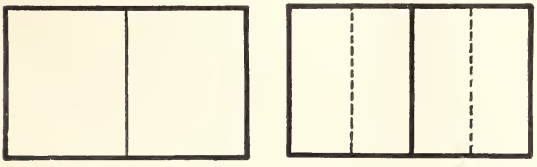
Circle Rectangle Rectangle Square

Into how many parts is the circle divided? Each rectangle?

Into how many parts is the square divided?

How many fourths are there in each of these forms?

$\frac{4}{4} = 1$. Four quarters are one. One half of four is 2. $4 \div 2 = 2$. One half of four fourths is two fourths. $\frac{1}{2}$ of $\frac{4}{4} = \frac{2}{4}$; $\frac{2}{2} = 1$; $\frac{3}{3} = 1$; $\frac{4}{4} = 1$; $\frac{1}{2} = \frac{2}{4}$. Read each of these facts in words.



1. Make three rectangles, each one inch high by two inches long. Cut one rectangle into halves. Cut the second rectangle into fourths. Place the halves upon the third rectangle, and the fourths upon the halves. Are the two halves equal to the four fourths? Are the two halves and the four fourths equal to the third rectangle?

2. Willie had a quarter of a dollar, his aunt gave him half a dollar. How many quarters of a dollar did he have then? How many fourths of a dollar?

3. A barrel of flour contains how many fourths of a barrel? If $\frac{2}{4}$ of the flour are taken out of the barrel, how much of the flour is left in the barrel?

TELLING WEIGHTS

Did you ever buy anything at a store? Did you ever notice how much heavier 5 pounds of sugar are than 2 pounds of coffee? Did you ever lift a piece of iron weighing just one pound?

We buy some things by their weight or heaviness.

One pound is the standard measure of weight, just as a foot is for length, an hour for time, and a quart for quantity or amount.

16 ounces (oz.) make 1 pound (lb.).

1 oz. $= \frac{1}{16}$ lb. 1 lb. $= 16$ oz. $\frac{1}{2}$ lb. $= 8$ oz.

1. Name five things sold by weight.

2. If a pound of meat costs 20¢, what will $\frac{1}{2}$ of a pound cost?

3. A melon weighs 20 ounces. How many more ounces than 1 pound does it weigh?

4. What is the ratio of 4 ounces to 16 ounces?

5. If a pound of candy costs 20¢, how much will a quarter of a pound cost? How much will $\frac{3}{4}$ of a pound cost?

6. If Mr. Brown and his family use 3 pounds of sugar in 4 days, how many ounces do they use in 1 day?

7. How many ounce weights are equal to a quarter of a pound weight?

8. If a quarter of a pound of coffee costs 9¢, how many cents will a pound cost?

9. At 16¢ a pound, what will half a pound of crackers cost?

10. When pepper is 6¢ an ounce, can you buy half a pound of pepper for half a dollar?

REVIEWS

1. Can you see that the 2 cubes in the picture on page 68 are $\frac{2}{3}$ of the 3 cubes, and that the 3 cubes are $\frac{3}{2}$ of the 2 cubes?

2. Make all the comparisons you can of these cylinders, cubes, and spheres. You are finding ratios.

3. Draw on paper forms, and write on paper dots, to show these ratios: 6, 3, 2, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{6}$.

4. Make forms on the blackboard to show these ratios: 6, $\frac{1}{6}$, 2, $\frac{1}{2}$, 3, $\frac{1}{3}$.

5. Which is the last day of the week? The first day? The second day? The fourth day? The sixth day? The seventh day? The fifth day?

6. A man worked on Thursday, Friday, and Saturday. He was paid two dollars for every day he worked. How many dollars did he get?

7. Arthur and Fred ate $\frac{3}{4}$ of a cake. They gave the rest away. What part of the cake did they give away?

8. Hattie had $\frac{3}{4}$ of a dollar. She spent $\frac{1}{2}$ of a dollar for a doll. How much money had she left?

9. Fred gave $\frac{1}{4}$ of his orange to Willie, and another $\frac{1}{4}$ to Frank. He ate another $\frac{1}{4}$. How much of the orange did he have left?

10. John was sent to the grocery to buy 2 ounces of pepper, 1 pound of coffee, $\frac{1}{2}$ pound of tea, $\frac{1}{4}$ pound of cinnamon, and 3 pounds of sugar. How many pounds did he carry home to his mother?

11. Mary had 25 cents with which to buy 4 lbs. of sugar at 5¢ a pound, and $\frac{1}{4}$ lb. of chocolate cream candy at 20¢ a pound. Did she have enough money to buy these things?

NUMBERS TWENTY-ONE TO TWENTY-FIVE

21

Twenty things and one thing we call by the number *twenty-one*.

$10+10+1=21$ $\quad 20+1=21$ $\quad 16+5=21$

$15+6=21$ $\quad 10+11=21$ $\quad 12+9=21$ $\quad 18+3=21$

We write the two in tens' place and the 1 in units' place.

22

Twenty and two we call *twenty-two*.

$10+10+2=22$ $\quad 20+2=22$ $\quad 16+6=22$

$15+7=22$ $\quad 10+12=22$ $\quad 18+4=22$

$14+8=22$ $\quad 2\times 11=22$ $\quad 22\div 11=2$

23

Twenty and three we call *twenty-three*.

$10+10+3=23$ $\quad 20+3=23$ $\quad 16+7=23$

$15+8=23$ $\quad 10+13=23$ $\quad 18+5=23$

$14+9=23$ $\quad 23=(4\times 5)+3$ $\quad 23=(6\times 3)+5$

24

Twenty and four we call *twenty-four*.

$10+10+4=24$ $\quad 20+4=24$ $\quad 16+8=24$

$15+9=24$ $\quad 10+14=24$ $\quad 18+6=24$

$14+10=24$ $\quad 6\times 4=24$ $\quad 12\times 2=24$

25

Twenty and five we call *twenty-five*.

 5 5's are 25.

$10+10+5=25$ $\quad 5\times 5=25$ $\quad 25\div 5=5$ $\quad 24+1=25$

$(6\times 4)+1=25$ $\quad (3\times 7)+4=25$ $\quad (8\times 3)+1=25$

NUMBERS TWENTY-SIX TO TWENTY-NINE

26

Twenty things and six things we call by the number *twenty-six.*

$10+10+6=26$	$20+6=26$	$16+10=26$
$15+11=26$	$12+14=26$	$18+8=26$
$19+7=26$	$26=(5\times5)+1$	$26=(8\times3)+2$

27

Twenty and seven we call *twenty-seven.*

$10+10+7=27$	$20+7=27$	$16+11=27$
$15+12=27$	$10+17=27$	$18+9=27$
$14+13=27$	$9\times3=27$	$(6\times4)+3=27$

28

Twenty and eight we call *twenty-eight.*

$10+10+8=28$	$20+8=28$	$16+12=28$
$15+13=28$	$14+14=28$	$18+10=28$
$19+9=28$	$7\times4=28$	$(5\times5)+3=28$

29

Twenty and nine we call *twenty-nine.*

$10+10+9=29$	$20+9=29$	$16+13=29$
$15+14=29$	$18+11=29$	$19+10=29$
$(7\times4)+1=29$	$(2\times10)+9=29$	$(8\times3)+5=29$

1. Tell number-stories about all the facts on pages 66 and 67.

2. Copy on the blackboard the facts on pages 66 and 67.

3. Show all the facts on pages 66 and 67 with splints, pennies, and counters.

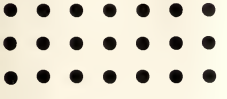
21 TO 29

Twenty-one 21	Twenty-two 22	Twenty-three 23
Twenty-four 24	Twenty-five 25	Twenty-six 26
Twenty-seven 27	Twenty-eight 28	Twenty-nine 29

1. How many 10's are there in 21? What is left over?

2. How many 10's are there in 24? What are left over?

3. How many 10's and how many units, or ones, are there in 23? in 22? in 27? in 26? in 25? in 28? in 29?

4.  How many rows of 7 dots are there? of 3 dots? How many dots are there in all?

5. $3 \times 7 = ?$ $7+7+7=?$ $3+3+3+3+3+3+3=?$ How many 7's in 21? What is $\frac{1}{7}$ of 21? What is $\frac{1}{3}$ of 21? How many 3's in 21? $7 \times 3 = ?$ $7)\underline{21}$ $3)\underline{21}$

$ is the sign for a dollar of money.

6. A dealer sold 7 hats at $3 each? How many dollars did he get?

7. There were 21 apples in a barrel. I took out $\frac{1}{3}$ of them. How many apples did I take out?

8. Ethel gave 2 dimes and a cent for 3 yards of braid. What was the price of the braid a yard?

9. $17 + 7 = ?$ If we wish to do so, we can find the answer by these steps:

$17 + 3 = 20$ $\quad 7 - 3 = 4$ $\quad 20 + 4 = 24$

10. $18 + 6 = ?$ $\quad 18 + 2 = 20$ $\quad 6 - 2 = 4$ $\quad 20 + 4 = 24$

11. Add:

8	7	6	2	8	7	9	5	4
6	3	2	7	3	2	2	5	3
4	5	2	14	3	2	6	4	5
2	4	11	1	5	1	3	8	10
5	4	3	1	3	9	4	1	3

QUESTIONS

One quarter of a dollar = 25¢

1. Etta bought 8 lead pencils at 3¢ apiece. She gave the clerk a quarter. What change should she get?

2. Mrs. Brown bought 3 pounds of currants at 8¢ a pound. She gave the clerk 2 dimes and a nickel. What change should she get?

3. At 3¢ a yard, how much will 7 yards of braid cost? at 4¢ a yard? at 5¢? at 6¢?

4. Mr. Jones divided 18 boxes of figs equally among 6 children. How many boxes did each child get?

5. Irene had 9¢. She spent $\frac{1}{3}$ of her money, and gave another $\frac{1}{3}$ to her brother. What part of her money had she left? How many cents had she left?

6. A farmer sold half a bushel of pears to one man and a fourth of a bushel to another man. How many fourths in all did he sell?

7. How many quarters of a dollar make a dollar? a dollar and a quarter? a dollar and a half? a dollar and three quarters? two dollars?

8. Two halves of a pie were each cut into two equal parts. Henry ate one of those parts. What part of the whole pie was left?

9. Mary bought a yard of ribbon, and used $\frac{2}{3}$ of it. What part of the yard of ribbon was left?

10. Willie is twice as old as Charles. Willie is 14 years old. How old is Charles?

11. In an orchard there are 15 peach trees and 12 pear trees. How many trees are there in the orchard?

12. In a can there are 2 gallons of milk. How many pints are there?

20 AND 25

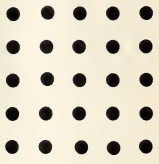
1. $2 \times 10 = ?$ $10 \times 2 = ?$ $20 \div 10 = ?$ $20 \div 2 = ?$

2. What is $\frac{1}{2}$ of 20? $\frac{1}{10}$ of 20? $\frac{2}{10}$ of 20? $\frac{3}{10}$ of 20? $\frac{4}{10}$ of 20? $\frac{6}{10}$ of 20? $\frac{8}{10}$ of 20? $\frac{9}{10}$ of 20?

3. What is the ratio of 20 to 10? of 10 to 20?

4. Edna bought a yard of lace for 18¢. She gave the clerk 2 dimes. What change should he give her?

5. How many dots are there in each of these rows? How many rows are there? How many dots are there in all?



6. $5 \times 5 = ?$ How many 5's are there in 25? How many 5's are there in 20?

7. What is the ratio of 25 to 5? of 20 to 5? of 5 to 20? of 5 to 25?

8. $25 \div 5 = ?$ $20 \div 5 = ?$ $10 \div 5 = ?$

9. At 5¢ each, how many cents will 5 oranges cost?

10. How many nickels equal a quarter of a dollar?

11. $7 + 8 + 10 - 5 = ?$ $25 - 5 - 5 - 5 = ?$

12. $1 + 17 - 10 - 5 + 2 = ?$ $23 - 3 - 5 + 4 + 1 = ?$

13. $16 + 4 + 5 - 6 - 4 = ?$ $24 - 3 - 2 + 6 = ?$

14. If one table costs $5, how many dollars will 2 tables cost? How many $5 in $10?

15. What is the cost of 5 hats at $4 each?

16. Ella has 25¢. How many paper dolls at 2¢ apiece can she buy?

17. How much money will she have left, after buying all the dolls she can at that price?

18. Multiply 1, 3, 7, 2, 9, 8, 4, 6, 5, 10, 12, 11, by 2.

19. Multiply 1, 4, 7, 9, 6, 8, 5, 3, 2, by 3.

20. Multiply 5, 2, 1, 4, 3, by 5.

QUESTIONS

1. $3+4+4+3=?$ $\quad$ $28-8-5-5=?$

$18-8-5-5=?$ $\quad$ $29-1-7-1=?$

$29-8+1-2-10-4-1=?$

$28-8+1+2+2-4-1=?$

$20-10+2-3+4-1+5-3=?$

$22-20+4+10-2-3+1-7=?$

$1+7+9+3+9-8-1-5-4-3=?$

2. Add:

5	3	2	3	9	5	7	5
11	1	6	7	1	4	2	8
1	4	2	4	4	3	3	6
2	7	1	2	3	6	6	7
1	2	5	1	6	5	1	3

3. Count from:

0 by 3's to 27	0 by 4's to 28	0 by 8's to 24
0 by 6's to 24	0 by 7's to 28	0 by 11's to 22
0 by 9's to 27	0 by 10's to 20	0 by 12's to 24
1 by 3's to 26	1 by 6's to 25	2 by 4's to 28
1 by 5's to 26	4 by 3's to 25	1 by 7's to 29
3 by 2's to 29	6 by 3's to 27	5 by 6's to 29
2 by 7's to 23	5 by 2's to 29	2 by 5's to 27
3 by 4's to 27		

4. How many:

2's in 8? 10? 16? 20? 14? 12? 24? 22?

3's in 9? 27? 18? 12? 24? 15? 21?

4's in 12? 24? 16? 20? 28?

5's in 10? 25? 15? 20?

6's in 18? 24? 12?

7's in 21? 14? 28?

8's in 24? 16? 8?

9's in 27? 18? 9?

10's in 20? 10?

11's in 22?

12's in 24?

1 TO 29

Copy and add by rows and columns:

1.

2	3	1	3	2	3
6	4	9	2	3	5
2	3	1	2	4	3
5	4	3	2	6	6
4	5	2	3	2	1
1	2	3	6	1	4
1	2	1	2	3	1

2.

3	3	1	4	6	2
2	5	7	2	3	4
4	1	2	6	1	5
2	7	3	1	2	1
1	1	1	8	5	2
8	7	6	5	1	2
2	3	5	2	5	4

Copy and complete:

3.	**4.**	**5.**	**6.**
$12 = \ ? \times 6$	$8 = ? \times 4$	$18 = ? \times 9$	$22 = 11 \times ?$
$14 = \ ? \times 7$	$28 = ? \times 7$	$15 = 5 \times ?$	$25 = \ 5 \times ?$
$10 = \ ? \times 5$	$12 = 4 \times ?$	$9 = 3 \times ?$	$16 = \ ? \times 4$
$20 = \ 5 \times ?$	$14 = ? \times 7$	$6 = 2 \times ?$	$18 = \ 2 \times ?$
$10 = \ 2 \times ?$	$12 = 3 \times ?$	$14 = 2 \times ?$	$18 = \ ? \times 6$
$20 = 10 \times ?$	$28 = 4 \times ?$	$27 = 3 \times ?$	$24 = \ ? \times 8$

7. $9 - 1 + 2 - 3 - 4 + 6 + 8 - 10 = —.$
$27 - 6 - 1 - 10 + 2 - 8 + 4 - 2 = —.$
$19 + 1 - 2 - \ 8 - 8 + 8 - 9 + 1 = —.$

8. $24 - 12 - 6 - 3 - 2 + 1 - 2 = —.$
$19 - 8 - 10 + 7 + 6 - 3 - 6 = —.$
$23 - 17 + 6 - 10 + 2 + 2 + 2 = —.$

9. $28 - 8 - 4 - 3 - 3 - 3 - 3 = —.$
$26 - 6 - 5 - 4 - 3 - 2 - 1 = —.$
$29 - 9 - 8 + 12 - 4 - 10 - 10 = —.$

10. Try these questions: $(25 \div 5) + 3 = ?$
$(5 \times 2) + 6 = ?$ $2 + (3 \times 6) = 10 \times ?$

REVIEW

We found that of the numbers below 20, these cannot be evenly divided by any other number,—1, 2, 3, 5, 7, 11, 13, 17, 19. Of the numbers 20 to 29, these cannot be divided by any other number,—23, 29. By "evenly divided" we mean that the number can be divided with no units left over.

QUESTIONS

1. A table is 4 feet in length. A bench is 4 times as long. How long is the bench?

2. George is 27 years old. James is 6 years younger. How old is James?

3. If a gallon of water weighs 10 pounds, how many pounds will ten gallons of water weigh? How many pounds will half a gallon weigh? How many pounds will 1 quart weigh?

4. How many ounces are there in half a pound of meat?

5.	6.	7.	8.	9.
$2 \times 9 = ?$	$2 \times 11 = ?$	$2 \times 3 = ?$	$2 \times 7 = ?$	$5 \times 5 = ?$
$2 \times 4 = ?$	$2 \times 8 = ?$	$2 \times 6 = ?$	$2 \times 10 = ?$	$6 \times 4 = ?$
$2 \times 2 = ?$	$2 \times 5 = ?$	$2 \times 12 = ?$	$3 \times 8 = ?$	$2 \times 5 = ?$
$6 \times 3 = ?$	$4 \times 5 = ?$	$3 \times 5 = ?$	$9 \times 2 = ?$	$2 \times 7 = ?$
$5 \times 5 = ?$	$2 \times 3 = ?$	$5 \times 2 = ?$	$4 \times 4 = ?$	$2 \times 2 = ?$
$3 \times 3 = ?$	$6 \times 4 = ?$	$2 \times 2 = ?$	$5 \times 4 = ?$	$3 \times 1 = ?$
$4 \times 7 = ?$	$3 \times 7 = ?$	$3 \times 2 = ?$	$2 \times 9 = ?$	$4 \times 6 = ?$
$4 \times 3 = ?$	$8 \times 2 = ?$	$2 \times 8 = ?$	$6 \times 2 = ?$	$3 \times 3 = ?$
$5 \times 3 = ?$	$3 \times 3 = ?$	$2 \times 5 = ?$	$7 \times 3 = ?$	$4 \times 2 = ?$
$8 \times 3 = ?$	$7 \times 2 = ?$	$2 \times 4 = ?$	$3 \times 4 = ?$	$4 \times 4 = ?$
$3 \times 6 = ?$	$7 \times 4 = ?$	$3 \times 9 = ?$	$2 \times 2 = ?$	$5 \times 3 = ?$

THE NUMBERS THIRTY TO NINETY-NINE

We call three tens **thirty** and four tens **forty.**

$10 + 10 + 10 = 30.$

$20 + 10 = 30.$

We write thirty with 3 in tens' place and 0 in units' place.

$10+10+10+10=40.$

$2 \times 20 = 40.$

We write forty with 4 in tens' place and 0 in units' place.

TABLE OF TENS, ADDING UNITS

● ● ● ● ● ● ● ● ● ●	**10**	+	●		=	**11**
● ● ● ● ● ● ● ● ● ●	**20**	+	● ●		=	**22**
● ● ● ● ● ● ● ● ● ●	**30**	+	● ● ●		=	**33**
● ● ● ● ● ● ● ● ● ●	**40**	+	● ● ● ●		=	**44**
● ● ● ● ● ● ● ● ● ●	**50**	+	● ● ● ● ●		=	**55**
● ● ● ● ● ● ● ● ● ●	**60**	+	● ● ● ● ● ●		=	**66**
● ● ● ● ● ● ● ● ● ●	**70**	+	● ● ● ● ● ● ●		=	**77**
● ● ● ● ● ● ● ● ● ●	**80**	+	● ● ● ● ● ● ● ●		=	**88**
● ● ● ● ● ● ● ● ● ●	**90**	+	● ● ● ● ● ● ● ● ●		=	**99**
● ● ● ● ● ● ● ● ●	**99**	+	●		=	**100**

We write nine, 9; ten, 10; nineteen, 19; twenty, 20; twenty-nine, 29; thirty, 30. Then we write forty, 40; fifty, 50; sixty, 60; seventy, 70; eighty, 80; ninety, 90; but after ninety-nine, 99, we write one hundred, 100.

1 ten is written 10; 2 tens are written 20; 3 tens, 30; 4 tens, 40; 5 tens, 50; 6 tens, 60; 7 tens, 70; 8 tens, 80; 9 tens, 90; but 10 tens are written 100.

QUESTIONS

1. If 20 barrels of apples cost $40, how much will 1 barrel cost?

2. Charles had 47¢. He paid 5¢ for car fare. How many cents had he left?

3. A grocer had 66 eggs. He sold half a dozen. How many eggs did he have left?

4. At 50¢ a dozen, how many oranges can you buy for 100¢, or $1?

5. I bought 9 rocking-chairs at $10 each, and 1 table for $8. How much money did I spend?

6. Mrs. Smith bought 3 pounds of coffee for 30¢ a pound, and 1 cake of soap for 5¢. She gave the clerk a dollar bill. What change should she get?

7. At 20¢ a dozen, what will be the cost of 4 dozens of eggs?

8. Ella bought 2 pounds of meat at 20¢ a pound. What change should she get out of a fifty-cent piece which she gave in payment?

9. A rug cost thirty dollars and a bookcase forty dollars. What was the cost of both articles?

10. If a train goes 30 miles in an hour, how many miles will it go in three hours?

11. I had 57¢ and spent 6¢. What had I left?

12. If a bushel of peas weighs 60 pounds, how many pounds does half a bushel weigh? How many pounds does a bushel and a half weigh?

13. A yard of silk cost $1. How many cents will half a yard cost?

14. George had 80¢. He spent $\frac{1}{4}$ of his money. How many cents did he spend?

REVIEW

1. Count forwards to 100, beginning at 1.

2. Count backwards to 1, beginning at 100.

3. Make tables of tens, adding various numbers of units.

4. Count to one hundred in writing, using words, not figures.

5. How many times are 2 contained in 10, 12, 24, 20, 16?

6. How many times are 3 contained in 9, 27, 15, 21, 18?

7. How many times are 4 contained in 16, 24, 20, 8, 12?

8. How many times are 5 contained in 10, 20, 15, 25?

9. How many times are 6 contained in 24, 12, 18?

10.	11.	12.	13.	14.
$12 \div 2 = ?$	$6 \div 3 = ?$	$24 \div 2 = ?$	$24 \div 3 = ?$	$24 \div 12 = ?$
$24 \div 4 = ?$	$15 \div 5 = ?$	$18 \div 3 = ?$	$12 \div 4 = ?$	$18 \div 2 = ?$
$20 \div 4 = ?$	$6 \div 3 = ?$	$8 \div 2 = ?$	$22 \div 11 = ?$	$16 \div 6 = ?$
$24 \div 6 = ?$	$10 \div 2 = ?$	$16 \div 2 = ?$	$25 \div 5 = ?$	$18 \div 6 = ?$
$21 \div 7 = ?$	$12 \div 3 = ?$	$28 \div 7 = ?$	$27 \div 9 = ?$	$20 \div 10 = ?$
$12 \div 1 = ?$	$10 \div 5 = ?$	$21 \div 3 = ?$	$22 \div 2 = ?$	$12 \div 12 = ?$
$24 \div 8 = ?$	$27 \div 3 = ?$	$28 \div 4 = ?$	$14 \div 7 = ?$	$20 \div 2 = ?$

15. Mr. Brown is 37 years old, and his son Fred is 6 years old. How many years older than Fred is his father?

16. Charles wants to buy a ball that costs 15¢. He has a dime. How many more cents does he need to buy the ball?

17. A teacher had 16 pens. She gave 10 of them to her pupils. How many pens did she keep?

18. From a ribbon 17 inches in length 13 inches were cut off. How many inches were left?

SUBTRACTING

$$\begin{array}{r} 73 \\ 28 \\ \hline 45 \end{array}$$

Lay out 73 splints, 7 bundles of ten, and 3 loose splints. Untie 1 bundle, leaving 6 bundles tied. Add the untied 10 to the 3 loose splints, making 13 splints. Take 8 away from 13, 5 are left. Take 2 bundles away from the 6 bundles, 4 are left. 4 bundles of 10 splints and 5 loose splints are 45 splints. (4 tens and 5 units are 45.)

$$\begin{array}{r} 91 \\ 36 \\ \hline 55 \end{array}$$

We cannot take 6 units from 5 units. We take 1 ten from the 9 tens, leaving 8 tens. 1 ten added to the 1 unit makes 11 units. 6 units from 11 units leave 5 units. We write the 5 in units' place below the line. 3 tens from 8 tens leave 5 tens. We write the 5 in tens' place below the line.

91	73	43	91	23	72	55	93	45	80
26	38	28	46	19	53	27	46	26	34
95	100	66	89	74	40	70	60	38	27
37	25	17	39	29	11	26	19	29	22
98	64	83	44	77	81	82	53	75	46
45	28	29	26	58	62	37	36	38	18

1. A peach orchard yielded 95 bushels of peaches. 68 bushels were sold. How many bushels were not sold?

2. In a school there were 87 pupils. 49 were boys. How many were girls?

3. A man had $75. He paid $41 for a bicycle and $18 for a suit of clothes. How many dollars had he left?

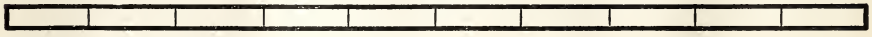
4. There are 27 sheep in one pen and 22 in another. How many sheep in both pens? 19 of them were sold. How many sheep were left?

FRACTIONS

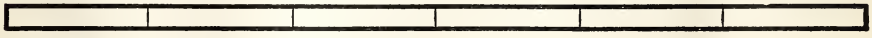
$\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{10}$, $\frac{1}{12}$ are fractions. So also are $\frac{2}{3}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{4}{5}$, $\frac{2}{6}$, $\frac{3}{6}$, $\frac{4}{6}$, $\frac{5}{6}$, $\frac{2}{10}$, $\frac{3}{10}$, $\frac{4}{10}$, $\frac{5}{10}$, $\frac{6}{10}$, $\frac{7}{10}$, $\frac{8}{10}$, $\frac{9}{10}$. Read these.

When fractions are written in figures, the number below the line tells into how many parts the thing is divided, and the number above the line tells how many parts we are talking about. $\frac{5}{12}$ means that there are 12 equal parts, and we are taking 5 of them.

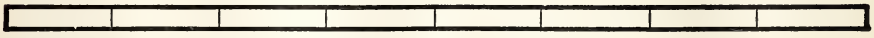
Point out halves and quarters.



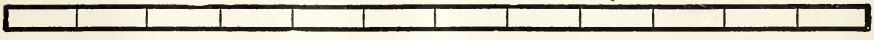
Point out fifths and tenths.



Point out thirds and sixths.



Point out halves, quarters and eighths.



Point out halves, thirds, fourths and twelfths.

Point out sevenths.

Point out thirds and ninths.

Point out twentieths, tenths and fifths.

1. Draw on the blackboard forms of figures showing halves, thirds, quarters, fifths, sixths, sevenths, eighths, ninths, tenths, twelfths, twentieths, and fortieths.

2. Tell why the larger the number of parts of anything the smaller each part is.

3. What is $\frac{1}{2}$ of $\frac{1}{2}$? $\frac{1}{2}$ of $\frac{1}{3}$? $\frac{1}{3}$ of $\frac{1}{2}$? $\frac{1}{4}$ of $\frac{1}{2}$? $\frac{1}{2}$ of $\frac{1}{4}$? $\frac{1}{5}$ of $\frac{1}{2}$? $\frac{1}{2}$ of $\frac{1}{5}$? $\frac{1}{4}$ of $\frac{1}{5}$? $\frac{1}{5}$ of $\frac{1}{4}$? $\frac{1}{3}$ of $\frac{1}{3}$? $\frac{1}{2}$ of $\frac{1}{6}$? $\frac{1}{2}$ of $\frac{2}{6}$? $\frac{1}{2}$ of $\frac{3}{6}$? $\frac{2}{3}$ of $\frac{1}{2}$? $\frac{2}{3}$ of $\frac{1}{4}$?

4. Fold or cut paper to show the facts on this page.

FRACTIONS

The equal parts of numbers are called *fractions*.

Fold or cut paper to show these facts.

1. $\frac{1}{2}$ of $6 = \frac{6}{2}$. Six halves are three wholes or units, because two halves equal one whole, and six are three times two. $\frac{6}{2} = 3$. $\frac{1}{2}$ of $6 = 3$. $\frac{1}{2} \times 6 = \frac{6}{2} = 3$.

2. $\frac{1}{2}$ of $8 = \frac{8}{2}$. $\frac{8}{2} = 4$. $\frac{1}{2}$ of $8 = 4$. $\frac{1}{2} \times 8 = 4$.

3. $\frac{1}{3}$ of $6 = \frac{6}{3}$. Six thirds are two wholes, or units, because three thirds equal one whole, and six are two times three. $\frac{6}{3} = 2$. $\frac{1}{3}$ of $6 = 2$. $\frac{1}{3} \times 6 = \frac{6}{3} = 2$.

4. $\frac{1}{3}$ of $9 = \frac{9}{3}$. $\frac{9}{3} = 3$. $\frac{1}{3}$ of $9 = 3$. $\frac{1}{3} \times 9 = 3$.

5. $\frac{1}{2}$ of $10 = ?$ **6.** $\frac{1}{2}$ of $12 = ?$ **7.** $\frac{1}{2}$ of $14 = ?$

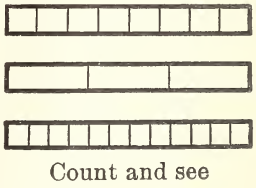
8. $\frac{1}{2}$ of $16 = ?$ **9.** $\frac{1}{3}$ of $12 = ?$ **10.** $\frac{1}{3}$ of $15 = ?$

11. $\frac{1}{3}$ of $18 = ?$ **12.** $\frac{1}{3}$ of $21 = ?$

13. $\frac{2}{3}$ of $9 = ?$ $\frac{2}{3} \times 9 = \frac{18}{3}$ because 9 times two thirds are 18 thirds. $\frac{18}{3} = 6$, because $18 \div 3 = 6$.

14. $\frac{2}{3}$ of $12 = ?$ $\frac{2}{3} \times 12 = \frac{24}{3} = 8$.

15. $\frac{1}{4}$ of $8 = ?$ $\frac{1}{4} \times 8 = \frac{8}{4} = 2$.



Count and see

16. Find $\frac{3}{4}$ of 8, $\frac{3}{4}$ of 12, $\frac{3}{4}$ of 16, $\frac{3}{4}$ of 20.

17. Find $\frac{2}{5}$ of 10, $\frac{2}{5}$ of 15, $\frac{2}{5}$ of 20, $\frac{2}{5}$ of 25.

18. Find $\frac{3}{5}$ of 15, $\frac{4}{5}$ of 20, $\frac{3}{5}$ of 30, $\frac{2}{5}$ of 40.

19. What are $\frac{2}{3}$ of 18? 15? 6? 9? 21? 24? 27? 30?

20. Find $\frac{4}{5}$ of 20, 10, 15, 5, 25, 30, 35, 40.

21. Find $\frac{2}{6}$, $\frac{4}{6}$, and $\frac{5}{6}$ of 18, 6, 12, 24, 30, 36, 42, 48.

22. Find $\frac{2}{7}$, $\frac{3}{7}$, $\frac{4}{7}$, $\frac{5}{7}$, and $\frac{6}{7}$ of 14, 7, 21, 28.

23. What are $\frac{2}{8}$, $\frac{3}{8}$, $\frac{4}{8}$, $\frac{5}{8}$, $\frac{6}{8}$, and $\frac{7}{8}$ of 16, 8, 24, 32, 40?

QUESTIONS

1. If a bushel of corn cost 80¢, what will 8 quarts cost? What will a peck cost?

2. If a quart of onions cost 9¢, how many cents will 3 quarts cost?

3. How many dimes equal 90¢?

4. A man bought 2 rugs at $9 apiece. What change should he get back, if he gave the clerk a twenty-dollar bill?

5. 45¢ was divided equally among 9 children. How many cents did each child get?

6. In 2 hours Fred can ride 30 miles on his wheel. How many miles can he ride in 1 hour? in 3 hours?

7. In a school of 84 children there were 12 over 9 years of age. How many children were under 9 years? What fraction tells the number of children over 9 years old?

8. Mr. Brown put into his pocketbook 6 ten-dollar bills, 3 five-dollar bills, and 4 two-dollar bills. How many dollars did he put into the pocketbook?

9. What is the ratio of 10 to 5?

10. If 5 oranges cost 20¢, how many cents will 10 oranges cost?

11. What is the ratio of 6 to 2?

12. If 2 pencils cost 8¢, what will 6 pencils cost?

13. Henry has 60¢ in nickels. How many car rides can he take at 5¢ a ride?

14. A baker sold 12 loaves of bread a 4¢ a loaf and a dozen of cookies for 8¢. How much money did he get?

15. Emma bought 3 paper dolls for 10¢, and Laura bought 2 skeins of thread for a nickel. How many cents did both girls spend?

QUESTIONS

1. $\frac{2}{4}$ of 8 = ? $\frac{1}{2}$ of 8 = ? $\frac{1}{2}$ of 20 = ? $\frac{2}{4}$ of 20 = ?
$\frac{1}{2}$ of 44 = ? $\frac{2}{4}$ of 44 = ? $\frac{1}{2}$ of 28 = ? $\frac{2}{4}$ of 28 = ?

2. One half equals how many fourths?

3. What is the ratio of 4 to 28? of 28 to 4?

4. Compare 4 with 36. 4 is $\frac{1}{9}$ of 36. Hence the ratio of 4 to 36 is $\frac{1}{9}$. What is the ratio of 36 to 4?

5. What is the ratio of 24 to 4? of 24 to 6? of 24 to 12?

6. Give the ratio of 4 to:

8, 32, 16, 40, 48, 44, 24, 20, 12, 4.

7. Give the ratio of each of those numbers to 4.

8. If a hat costs $4, what will a dozen hats cost?

9. Divide 24 pears equally among 6 boys. How many pears will each boy get?

10. There were 2 dozen eggs in a basket. One third of them were used for breakfast. How many were left?

11. James had 28¢. He spent $\frac{1}{4}$ of his money. How many cents had he left?

12. 3 tops cost 18¢. What was the price of one top?

13. Eddie bought 9 apples at 2¢ each. How many cents did he pay for them?

14. Katie got 4 spools of thread at 3¢ apiece. How many cents did she pay for the 4 spools?

15. George has 3 nickels. How many cents has he?

16. Alice had 14 cherries. She gave $\frac{1}{7}$ of them to Lucy. How many cherries did Lucy get?

17. It is 18 miles from Brooklyn to Garden City. I walked $\frac{1}{6}$ of that distance. How many miles did I walk? How many miles would be $\frac{2}{6}$ of the distance?

QUESTIONS

1. How many pints are there in $\frac{1}{5}$ of 5 gallons?

2. If syrup is 80¢ a gallon, how many cents must be paid for a pint?

3. What is the ratio of 2 to 6? 2 is what part of 6?

4. If 6 boxes of candy weigh 3 pounds, what will 2 boxes weigh?

5. What will 12 yards of cloth cost at $4 a yard?

6. When 8 pounds of sugar cost 40¢, 1 pound of sugar will cost $\frac{1}{8}$ of 40¢, or ——.

7. What is the ratio of 18 to 6? of 24 to 8?

8. When 7 yards of silk cost $21, a yard will cost $\frac{1}{7}$ of $21, or —— dollars. 4 yards will cost 4 × —— dollars, or —— dollars.

9. If 9 bushels of apples cost $18, 1 bushel will cost $\frac{1}{9}$ of $18, or —— dollars. 4 bushels will cost 4 × —— dollars.

10. If a dozen oranges cost 60¢, what will be the cost of 1 orange? of 3 oranges? of 5 oranges?

11. When 5 pounds of meat cost 45¢, what will 1 pound cost? 2 pounds?

12. When 5 quarts of milk cost 35¢, what will 2 quarts cost?

13. If 4 lemons cost 8¢, what will 1 lemon cost? 2 lemons? What will a dozen lemons cost? A half dozen?

14. If a newspaper costs 2¢, how many cents will 7 newspapers cost?

15. A man had 18 oranges. He divided them equally among 6 children. How many oranges did each child receive?

TELLING LENGTHS

12 inches make 1 foot.

12 in. = 1 ft.

in. stands for inch or inches. ft. stands for foot or feet.

3 feet make 1 yard.

3 ft. = 1 yd.

Be sure to place a period after in. for inch, ft. for foot, and yd. for yard.

A foot-rule shows twelve inches.

A yard-stick shows three feet.

A foot is a very common unit of measure. We buy boards at the lumber yard by the foot.

A yard is almost as common a unit of measure. We buy goods for dresses and suits by the yard.

An inch is the unit of measure for small things. We tell how wide and how long a photograph is by inches.

1. Measure 2 inches on a piece of paper with a ruler.

2. Cut squares 2 inches on each side.

3. Measure the size of the first picture in this book.

4. What is the size of your desk? Your teacher's desk?

5. Ask your mother how many yards of cloth she needs to make a dress. Measure that number of yards on the blackboard.

Size means, How long is it? and, How wide is it? sometimes also, How thick is it?

QUESTIONS

1. A bushel basket is half full of potatoes. How many more pecks of potatoes will it hold?

2. How many quarts are there in a bushel of chestnuts? in a bushel of corn? in a bushel of apples?

3. If a bushel of wheat weighs 60 pounds, how many pounds does a peck of wheat weigh?

4. 8 quarts are what part of a bushel? 2 pecks make what part of a bushel?

5. If 2 bushels of apples cost four dollars, what will 2 pecks cost?

6. How many bushels are there in 64 quarts?

7. How many bushels are there in 72 quarts?

8. Arthur gathered half a bushel of chestnuts. To how many boys can he give a quart each, after he has sold a peck of the nuts?

9. How many quarts are there in a bushel? in half a bushel? How many quarts are there in a quarter of a bushel? How many quarts in 2 quarters of a bushel? in $\frac{3}{4}$ of a bushel?

10. If you had $\frac{1}{8}$ of a bushel of berries, how many quarts would you have?

11. If a pint of walnuts costs 6 cents, what will 4 quarts cost? What will half a peck cost?

12. A dish holds 3 pints of berries. How many quarts will 6 such dishes hold?

13. At 9¢ a qt., what will a pk. of cranberries cost?

14. At 5 cents a quart, what will 1 peck of beans cost?

15. How many pecks are there in 9 bushels? in 6 bushels? in 3 bushels? in 5 bushels?

REVIEW

1. What are $\frac{2}{9}$ of 18? $\frac{3}{9}$? $\frac{4}{9}$? $\frac{5}{9}$? $\frac{6}{9}$? $\frac{9}{9}$?

2. What part of 9 is 1? $\frac{8}{9}$ of 9 = ? $\frac{1}{2}$ of 10 = ?

3. $\frac{5}{10}$ of 10 = ? $\frac{1}{2}$ of 20 = ? $\frac{5}{10}$ of 20 = ? $\frac{5}{10}$ of 100 = ?

4. A string was 12 yds. 1 ft. long. 2 yds. 1 ft. were cut off. How many yards were left? how many feet?

5. A tank contained 38 gallons of water. 62 gallons more were poured in. Then 47 gallons were pumped out. How many gallons were left?

6. A milkman has 7 cans, each holding 12 gallons of milk. He sells 48 gallons. How many gallons has he left?

7. James earned 40¢ in one week, and Arthur earned 55¢. How many cents did both boys earn?

8. If James spent 29¢, and Arthur spent 36¢, how many cents did each boy have left?

9. A man having $56 bought a suit of clothes for $28. What part of his money did he spend? How many dollars did he have left?

10. At 6¢ a quart, how much money will 6 pints of milk cost? 9 pints? 3 gallons?

11. At 4¢ a pint, how many pints of berries can you buy for 20¢? for 80¢

12. How many inches long is your shoe? How long are your skates?

13. How many feet or inches wide is the ring you use for marbles?

14. If a bushel of peaches costs four dollars, how much will a peck cost?

15. What will a bushel of potatoes cost at 20¢ a peck?

QUESTIONS

1. How many inches are there in a quarter of a yard? in $\frac{3}{4}$ of a yard? in $\frac{1}{2}$ of a yard?

2. Harriet bought a yard of ribbon and divided it equally, for dress trimming, among her six dolls. How many inches of ribbon did she cut off for each doll?

3. If you drew a line a foot long and divided it into 12 equal parts, what would be the name of any of those parts?

4. George drew a triangle that was $\frac{1}{4}$ of a foot on each side. How many inches was it around the triangle?

5. How many inches are there in $\frac{1}{6}$ of a foot?

6. How many inches is it around a desk top 2 feet long and 18 inches wide?

7. A ribbon was 3 feet in length. How many inches long was it?

8. If it takes 7 yards of lace to trim a dress, how many yards will it take to trim 9 dresses?

9. A log of walnut was 30 feet long, $\frac{1}{3}$ of it was cut off. How many feet were cut off?

10. Mrs. Smith bought 10 yards of silk at $1 a yard. She used $\frac{1}{2}$ of the silk. How many yards were left? What was the value of the piece of silk she used?

11. A bench is 12 feet long and 16 feet wide. How many yards is it half way around the bench?

12. How many feet are there in 28 inches? How many inches over?

13. A square room has sides 5 yards and 1 foot long. How many feet is it around the room?

14. A string 1 foot long is to be cut into inch pieces. How many times must it be cut?

QUESTIONS

1. Draw a rectangle 2 inches wide and 4 inches long. Divide it into 1-inch squares. How many squares are there in the oblong?

2. A room is 3 yards and 1 foot wide. How many steps will a boy take in crossing the room if he steps 2 feet at each step?

3. Measure the distance between 2 windows in your room. Measure the length and the width of the room.

4. In a room the distance between a door and a window was measured and found to be 3 yards and 1 foot. How many feet were there in that distance?

5. Louise bought a roll of braid, and, on measuring it, found that there were 9 feet in the roll. How many yards were there in it?

6. Mrs. Smith bought 9 yards of silk. She used $\frac{1}{3}$ of it. How many feet were in the piece she used?

7. Draw a square with sides 3 inches long. Mark the inches on its sides. Divide the square into 9 smaller squares.

8. Draw a rectangle 1 inch wide and 4 inches long. How many 1-inch squares can you make in it?

9. On the board make 2 dots, 1 foot apart, guessing the distance. Measure the distance between the dots.

10. Judge a distance of 1 yard, making the distance by putting 2 dots on the board. Measure the distance guessed.

11. Draw a line that you think is 3 inches long. Measure it.

12. Draw a square that you judge to be $\frac{1}{2}$ of a foot in length. Measure the square.

HUNDREDS

We call ten tens one hundred.

$10 \times 10 = 100$ $99 + 1 = 100$ $50 + 50 = 100$

We write one hundred in figures, 100. We put the 1 in hundreds' place by setting two zeros, 00, at the right to show that the 1 is neither in units' place nor in tens' place.

We call twenty tens two hundred, and write two hundred in figures with a 2 in hundreds' place.

$100 + 100 = 200$ $20 \times 10 = 200$

Two hundred and one hundred are three hundred.

$100 + 100 + 100 = 300$ $200 + 100 = 300$

Four hundred, 400. Five hundred, 500.

Six hundred, 600. Seven hundred, 700.

Eight hundred, 800. Nine hundred, 900.

Above one hundred we count units and tens as we do below one hundred.

We write one hundred eleven in figures, 111.

We write six hundred ninety-two in figures, 692.

1. $90 + 11 = 101$. $11 = 10 + 1$. Nine tens and one ten make ten tens. Ten tens are one hundred. The unit we set in units' place.

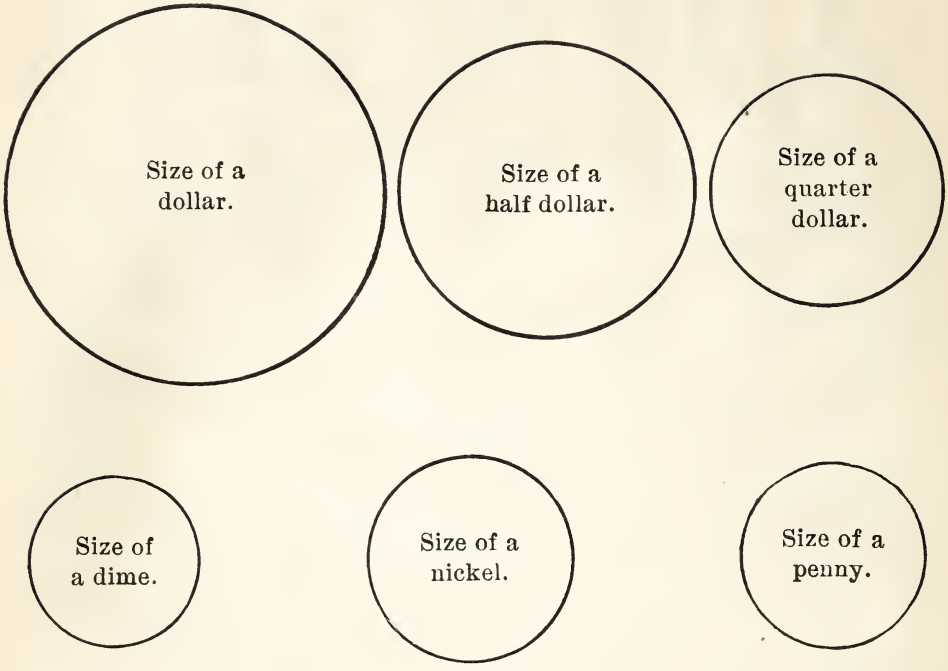
2. $84 + 20 = 104$. $84 = 80 + 4$. Eight tens and two tens make ten tens. Ten tens are one hundred. The four we set in units' place.

3. $70 + 42 = 112$. $42 = 30 + 10 + 2$.

ADDITION

24	27	19	36	28	49	36	42
10	14	21	17	12	14	21	3
31	36	18	37	34	6	9	55
13	24	31	44	51	46	21	24
12	11	19	6	22	11	13	14
40	16	8	22	38	9	16	12
17	16	11	18	31	27	14	18
13	19	31	22	48	33	15	13
60	34	29	33	17	6	16	19
14	29	35	14	24	17	14	101
31	40	7	24	16	20	31	2
22	18	22	14	12	31	19	13
60	11	13	6	8	19	20	17
8	13	19	26	13	11	20	17
12	20	31	10	21	23	8	24
5	2	4	19	21	28	21	23
14	8	14	22	27	14	12	8
3	2	3	2	1	20	3	1
41	33	10	66	31	25	3	7
11	27	16	10	13	13	41	2
19	3	21	5	14	12	4	3
7	2	37	3	27	21	21	5
2	5	12	14	10	17	3	66
7	12	46	16	26	18	15	14
19	12	21	17	9	8	17	60
32	6	10	5	30	2	20	0
100	8	17	2	15	37	31	72
18	7	6	38	10	21	19	8

METAL MONEY



One dollar is equal to one hundred pennies, or cents.

$ is the sign for one dollar, or 100 cents.

A half dollar is half 100 cents, or 50 cents.

A dime is one tenth of one dollar. $100 \div 10 = 10$.

A dime is worth ten pennies.

A quarter dollar is equal to a fourth, or quarter, of 100 cents, or 25 cents. ¢ is the sign for cents.

The coins for dollars, half dollars, quarter dollars, and dimes are made of nearly pure silver metal by *Our Country*. That is one important thing Our Country, whose flag we know so well, does for us.

A nickel is equal to five pennies, or 5¢.

The penny is one cent, one hundredth part of one dollar.

$\$1 = 100¢$. $100¢ \div 100 = 1$ c. = one penny.

Nickels are made of nickel metal. Pennies are made of copper.

NUMBER–STORIES

1. Mary and Tom are at the grocery. They have three quarters to spend. Mother wishes them to ask the grocer for three pounds of sugar, half a pound of tea, and a dozen eggs. Mr. Grocerman tells them that sugar is five cents a pound, tea is forty cents a pound, and eggs are twenty-five cents a dozen. Tom will carry the things home in the basket. Why does the grocer weigh the sugar? When Mary takes the "change," or money he gives back to her with the packages and the eggs, how many cents does she have to take home to mother?

3 quarters = three 25¢ pieces of silver. $3 \times 25¢ = 75¢$.

3 pounds of sugar at 5¢ a pound cost three times 5¢. $3 \times 5¢ = 15¢$.

$\frac{1}{2}$ pound of tea at 40¢ a pound costs one half of 40¢. $\frac{1}{2}$ of $40¢ = 20¢$. The eggs cost 25¢.

$$15¢ + 20¢ + 25¢ = 60¢ \qquad 75¢ - 60¢ = 15¢$$

Mary has fifteen cents to take back to her mother.

Do you see now why we have to learn about numbers?

2. Tell a number-story about Charlie and Susan. They have fifty cents. They wish to buy two pounds of sugar at five cents a pound, a loaf of bread at eight cents, and a pound of butter at twenty-eight cents. How much will they have left?

3. Make up a story about Willie and Jennie, who have one hundred cents. They ask Mr. Grocerman for half a dozen eggs, two pounds of butter, and three large loaves of bread. He asks them twenty-eight cents a dozen for his very best eggs and twenty-eight cents a pound for table butter and ten cents for large loaves of bread. They gave him a silver dollar. Was this right?

QUESTIONS

1. What is the ratio of 12 to 6? of 6 to 12? of 36 to 6? of 24 to 6? of 72 to 6? of 48 to 6? of 54 to 6? of 18 to 6? of 30 to 6? of 42 to 6? of 6 to 18? of 6 to 24? of 6 to 42? of 6 to 36? of 6 to 48? of 6 to 54? of 6 to 72?

2. If 6 dozen apples cost 72¢, how many cents will 1 dozen cost?

3. How many minutes past the hour is it when the minute hand points to III? 15 minutes are what part of an hour? 30 minutes are what part of an hour?

4. A farm of 72 acres is one sixth woodland. How many acres are woodland?

5. A table is 48 inches long and 36 inches wide. How many inches is it around the table?

6. What will 6 apples cost, if 4 dozen cost 96¢?

7. The price of a sofa was $66. It was reduced $\frac{1}{3}$ in price and was then sold. What was the selling price?

8. A woman had 5 ten-dollar bills and 3 two-dollar bills. She bought 8 yards of velvet at $6 a yard and 1 yard of silk for $3. How many dollars did she spend? How many dollars did she have left?

9. A grocer paid $60 for 30 barrels of apples. What was the cost a barrel? He sold the apples for $90. How much did he get a barrel? How much did he gain on each barrel? How much did he gain on the 30 barrels?

10. A pail holds 12 quarts. How much will it cost to fill it with milk at 6¢ a quart? After $\frac{5}{6}$ of the milk is used, how many pints are left?

11. In one day Mr. Smith rode 80 miles on his wheel. He rode $\frac{1}{8}$ of the distance in half an hour. How many miles did he ride in that time?

READING AND WRITING HUNDREDS

Hundreds	Tens	Units
7	0	0
	7	0
		7
7	7	7

Hundreds	Tens	Units
4	0	0
	2	0
		2
4	2	2

Hundreds	Tens	Units
4	0	0
	5	0
		1
4	5	1

Hundreds	Tens	Units
9	0	0
	8	0
		7
9	8	7

1. Read the numbers: 299, 643, 110, 444, 770, 801, 999.

2. How many more hundreds has 897 than 153? how many more tens has 897? how many more units?

3. Tell how many hundreds, how many tens, and how many units there are in:

393	406	744	985	112	630	808	299	681
515	600	401	642	371	755	433	691	717
350	404	199	878	555	802	576	603	979
611	225	111	226	414	901	584	717	205
660	218	922	660	832	961	321	201	1000

4. Write by figures:

One hundred twenty-five.
One hundred ninety-nine.
One hundred six.
Two hundred forty-six.
Two hundred eighteen.
Two hundred two.
Three hundred eleven.
Three hundred thirteen.
Four hundred twenty-eight.
Four hundred eighty-one.
Four hundred ninety.
Five hundred five.
Five hundred fifty-five.
Six hundred ninety.
Six hundred eight.
Seven hundred seventeen.
Seven hundred seven.
Eight hundred forty-eight.
Eight hundred thirty-six.
Nine hundred twenty-one.
Nine hundred fifty.
Nine hundred ninety-one.

REVIEW OF HUNDREDS

1. Write these numbers in figures: 7 hundreds. 7 hundreds 2 tens 8 units. 3 hundreds 6 tens 7 units. 4 hundreds 1 ten 1 unit. 8 hundreds 5 tens 5 units. 2 hundreds 3 tens 2 units. 1 hundred 4 tens 3 units. 5 hundreds 7 tens 4 units. 9 hundreds 8 tens 6 units. 3 hundreds 1 unit. 6 hundreds 5 tens 2 units.

2.

$220 = 110 + ?$	$345 = 140 + ?$	$725 + ? = 930$
$425 = 200 + ?$	$250 = 40 + ?$	$525 + ? = 835$
$630 = 220 + ?$	$610 + ? = 820$	$330 + ? = 640$
$535 = 130 + ?$	$115 + ? = 720$	$835 + ? = 940$
$840 = 235 + ?$	$200 + ? = 325$	$749 + ? = 957$

3. How many 10's are there in 200? 300? 400? 500? 600? 700? 800? 900? 1000?

2 tens $\times$ 5 = ?	5 $\times$ 2 tens = ?	2 tens $\times$ 6 = ?
6 tens $\times$ 2 = ?	4 $\times$ 4 tens = ?	4 tens $\times$ 4 = ?
5 tens $\times$ 5 = ?	6 tens $\times$ 8 = ?	5 $\times$ 5 tens = ?
8 $\times$ 6 tens = ?	3 tens $\times$ 9 = ?	3 $\times$ 9 tens = ?
4 tens $\times$ 8 = ?	6 tens $\times$ 6 = ?	8 tens $\times$ 4 = ?
6 tens $\times$ 6 = ?	7 tens $\times$ 2 = ?	7 $\times$ 2 tens = ?

4. How many figures are needed to express units, or ones? to express tens? to express hundreds?

5. Write a 10's Table to 1000, in ten parts, 1 to 100, 101 to 200, 201 to 300, 301 to 400, 401 to 500, 501 to 600, 601 to 700, 701 to 800, 801 to 900, 901 to 1000.

HOUSE NUMBERS

In towns and cities the streets are named, and the houses and lots on the streets are numbered. One side of the street has odd numbers, and the other side has even numbers. If there is room between houses for more houses, then these lots, sometimes called vacant lots, are numbered.

Has your house a number, and your street a name?

If you live in the open country where there is plenty of room, and people do not need names for their roads and numbers for their houses, probably you know where some townspeople have their houses or stores.

The name of the street and the number of the house are part of the **address**. Mr. William Jones, 165 Main Street.

Sometimes when there are very many streets, the streets have numbers for names. When we wish to write a letter to a person living in a different place from our own town or city, we write on the envelope what the place is where we wish the letter to go.

Master Charles Marshall,
149 Sixth Street,
Atlanta,
Georgia.

If houses were not numbered in large towns and cities, it would take a great deal of time to find people in them.

1. Write your house address or that of some friend.

2. Exchange your paper with its address for that of the boy or girl in front of or behind you. Read that, and copy it. Exchange across the aisle.

3. Has your schoolhouse any address?

4. Where is your town or city hall? Your post office?

THOUSANDS

We call ten hundreds **thousands.**

$10 \times 100 = 1000$ $999 + 1 = 1000$ $500 + 500 = 1000$

We write one thousand in figures, 1000. We put the 1 in thousands' place by setting three zeros, 000, at the right to show that the 1 is neither in units' place nor in tens' place nor in hundreds' place.

We call twenty hundreds two thousand; and write two thousand in figures with a 2 in thousands' place.

$1000 + 1000 =$ 2000 $20 \times 100 = 2000$

Two thousand and one thousand are three thousand.

$1000 + 1000 + 1000 =$ 3000 $2000 + 1000 = 3000$

We write four thousand 4000, five thousand 5000, six thousand 6000, seven thousand 7000, eight thousand 8000, nine thousand 9000.

Ten tens we call one hundred. Ten hundreds we call one thousand. Ten thousands we call ten thousands. One hundred thousand we call one hundred thousand.

We write one hundred 100. We may write one thousand 1000. The comma is to help us see that there are 3 zeros, and to read thousands quickly. We write ten thousand 10000. We write one hundred thousand 100,000. It is not necessary to use a comma.

1. $900 + 101 = 1001$. $101 = 100 + 1$. Nine hundreds and one hundred are ten hundreds or one thousand.

2. $700 + 420 = 1120$. $420 = 300 + 120$. Seven hundreds and three hundreds are one thousand. The twelve tens we write as one hundred twenty.

THOUSANDS

1. One thousand one, 1001. One thousand nine, 1009.
One thousand ten, 1010. One thousand eighteen, 1018.
One thousand one hundred eighteen, 1118.
Two thousand seven hundred four, 2704.
Three thousand thirty-six, 3036.
Five thousand six hundred sixty, 5660.
Seven thousand seven hundred seventy-seven, 7777.
Eight thousand one hundred one, 8101.
Eight thousand eight hundred fifteen, 8815.
Nine thousand four hundred ninety-seven, 9497.

2. Read: 1246, 9223, 4780, 6111, 4644, 8707, 3136, 4598, 9610, 7000, 3688, 2080, 6202, 7100, 8004, 9110, 7333, 9909, 4707, 8118, 7656, 8771, 4919, 7223, 2743, 4339, 4716, 3188, 7007, 3010.

3. Write by figures: one thousand two hundred sixteen; three thousand seven hundred twenty-eight; nine thousand four hundred sixty-three; seven thousand seven hundred; eight thousand nine hundred seventy; two thousand seventy-five; four thousand four; six thousand six hundred sixty-six; nine thousand ten; eight thousand; three thousand one hundred forty-four; five thousand eight hundred eighty-one.

4. Write in words: 7414, 3602, 8433, 1014, 5005, 2110, 6116, 9711, 4419, 2829, 1990, 3333, 5208.

5. Give the number of thousands, of tens, and of ones in each of the numbers in 2 and 4.

6. Count by hundreds from 1000 to 2000.

7. Count by thousands from 2000 to 9000.

8. What is the greatest number that can be expressed by three figures? by four figures?

FIVES AND TENS

5 10 15 20 25 30 35 40 45 50 55 60

$0+5=5$	$5+5=10$	$10+5=15$
$15+5=20$	$20+5=25$	$25+5=30$
$30+5=35$	$35+5=40$	$40+5=45$
$45+5=50$	$50+5=55$	$55+5=60$

$5\times1=5$	$5\times7=35$
$5\times2=10$	$5\times8=40$
$5\times3=15$	$5\times9=45$
$5\times4=20$	$5\times10=50$
$5\times5=25$	$5\times11=55$
$5\times6=30$	$5\times12=60$

Multiplication Table of Fives

Make a division table, beginning it like this:

$5\div5=1$	$15\div5$				
$10\div5=2$	$20\div$				

$10\times1=10$	$10\times7=70$
$10\times2=20$	$10\times8=80$
$10\times3=30$	$10\times9=90$
$10\times4=40$	$10\times10=100$
$10\times5=50$	$10\times11=110$
$10\times6=60$	$10\times12=120$

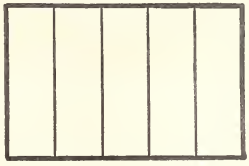
Multiplication Table of Tens

FIFTHS AND TENTHS

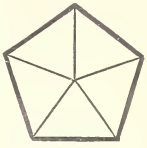
When anything is divided into five equal parts, we call each part one fifth. Five fifths make one whole.

Circle

Square

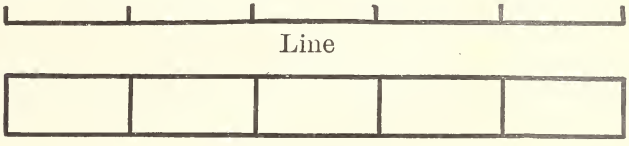


Rectangle



Pentagon

Star



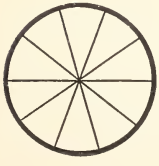
Line

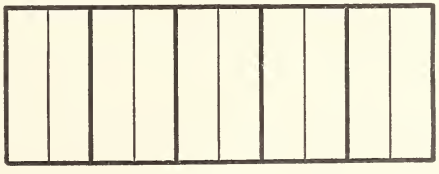
Rectangle

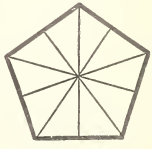
Into how many equal parts is each of these forms divided?

1. Point out two fifths of each of these forms; three fifths; four fifths.
2. Make drawings like these forms on paper but larger.
3. Make drawings like these forms on the blackboard.

When anything is divided into tenths, it has ten equal parts. Ten tenths make one whole.

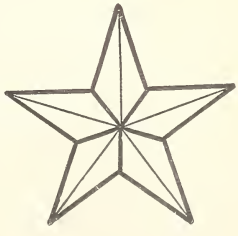






Into how many parts is each of these forms divided? Count and show the parts.

Make drawings like these forms both on paper and on blackboard.



SIXES AND TWELVES

6 12 18 24 30 36 42 48 54 60 66 72 78 84 90 96

0 + 6 = 6	6 + 6 = 12	12 + 6 = 18	18 + 6 = 24
24 + 6 = 30	30 + 6 = 36	36 + 6 = 42	42 + 6 = 48
48 + 6 = 54	54 + 6 = 60	60 + 6 = 66	66 + 6 = 72

6 × 1 = 6	6 × 7 = 42
6 × 2 = 12	6 × 8 = 48
6 × 3 = 18	6 × 9 = 54
6 × 4 = 24	6 × 10 = 60
6 × 5 = 30	6 × 11 = 66
6 × 6 = 36	6 × 12 = 72

Multiplication Table of Sixes

12 24 36 48 60 72 84 96 108 120 132 144

0 + 12 = 12	12 + 12 = 24	24 + 12 = 36	36 + 12 = 48
48 + 12 = 60	60 + 12 = 72	72 + 12 = 84	84 + 12 = 96
96 + 12 = 108	108 + 12 = 120	120 + 12 = 132	132 + 12 = 144

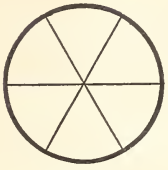
Make up bundles of splints, each with twelve splints, and show that these facts are true.

12 × 1 = 12	12 × 7 = 84
12 × 2 = 24	12 × 8 = 96
12 × 3 = 36	12 × 9 = 108
12 × 4 = 48	12 × 10 = 120
12 × 5 = 60	12 × 11 = 132
12 × 6 = 72	12 × 12 = 144

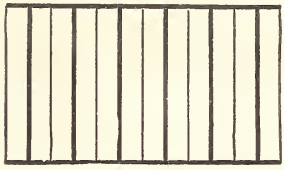
Multiplication Table of Twelves or Dozens

SIXTHS AND TWELFTHS

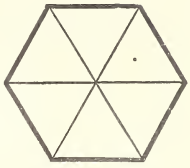
When anything is divided into six equal parts, we call the parts sixths. Six sixths make one whole.



Circle



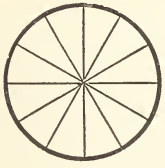
Rectangle



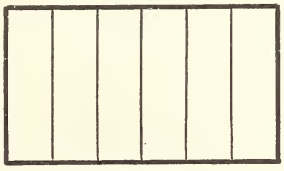
Hexagon

1. Show that each of these forms is divided into halves.
2. Show that each is divided into thirds; into sixths.
3. Make larger drawings of each of these forms on paper; on the blackboard.

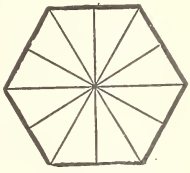
When anything is divided into twelve equal parts, we call the parts twelfths. Twelve twelfths make one whole.



Circle



Rectangle



Hexagon

1. Show the various halves in the circle and hexagon.
2. Show thirds of each of these forms.
3. Show fourths of each.
4. Show sixths of each.
5. Make larger drawings of each of these forms on paper; on the blackboard.
6. $\frac{6}{6} = 1$; $\frac{12}{12} = 1$; $\frac{3}{3} = 1$; $\frac{4}{4} = 1$. Read of these facts.
7. Which is larger, $\frac{1}{3}$ or $\frac{1}{6}$? Why? $\frac{1}{6}$ or $\frac{1}{12}$? Why?
8. Cut out forms to show the answers to 6 and to 7.
9. Which is larger, $\frac{1}{6}$ or $\frac{2}{12}$? $\frac{2}{6}$ or $\frac{1}{3}$? $\frac{1}{3}$ or $\frac{4}{12}$?

DIVISION TABLES

Make a division table, beginning it like this:

$10 \div 10 = 1$	$30 \div 10 = 3$				
$20 \div 10 = 2$	$40 \div$				

Make a division table, beginning it like this:

$6 \div 6 = 1$	$18 \div 6 =$				
$12 \div 6 = 2$	$24 \div$				

Make a division table, beginning it like this:

$12 \div 12 = 1$	$36 \div 12 = 3$				
$24 \div 12 = 2$	$48 \div 12 =$				

QUESTIONS

1. How many school days are there in 4 weeks? How many working days?

2. How many hours are there in a quarter of a day?

3. Which is the greater fraction, $\frac{1}{4}$ or $\frac{1}{5}$?

4. A cake is cut into sevenths. Another cake of equal size is cut into tenths. Would one of these sevenths be a larger or smaller piece of cake than a tenth?

5. How many 10's are there in 96? how many units?

6. If a can of peaches cost 25¢, how many cans will \$1 buy? 75¢?

7. What is the ratio of 6 to 48?

8. If 2 yards of tape cost 24¢, what will 1 yard cost? what will $\frac{1}{4}$ of a yard cost?

9. A strip of carpeting is $\frac{3}{4}$ of a yard wide. How many inches wide is the carpeting?

QUESTIONS

1. If you had a fifty-cent piece, a dime, and 2 nickels, how many cents would you have? How many more cents would you need to make a dollar?

2. A dealer paid $96 a dozen for lamps. What was the cost of 1 lamp?

3. A girl bought 8 yd. of braid at 6¢ a yd. She gave the clerk a 50¢ coin. What change should she get?

4. How many nickels are equal to 40¢?

5. How many cents are there in a dollar?

6. If a blank book cost 7¢, how many blank books can you buy with 3 dimes? How many cents would you have left after paying for the books?

7. Louis bought half a dozen little flags at 12¢ apiece. He gave the clerk a half dollar and a silver quarter. What change should the clerk give Louis?

8. A boy works in a garden at 10¢ an hour. How many hours must he work in order to earn $1?

9. What is the ratio of 6 to 12? of 9 to 27?

10. If a dozen oranges cost 50¢, how much will half a dozen cost? two dozen?

11. A man bought a pound of cheese for 15¢. He ate $\frac{1}{5}$ of it. What was the value of the part he ate?

12. At $6 a ton, how many tons of coal can you buy for $27? What will half a ton cost?

13. What is the ratio of 18 to 36? of 36 to 18?

14. If 36 crates of peaches cost $40, what will 18 crates cost? How many crates would $80 buy?

15. Mrs. Brown bought 9 yards of sheeting at 7¢ a yard and 3 yards of calico at 5¢ a yard. She gave the clerk a dollar bill. What change should she get?

REVIEW

1. $700+420=1120$. $420=400+20$. Seven hundred and four hundred are eleven hundred. We write twenty in tens' place.

2. Add:

	950	800	700	800	900	850	880	990
	100	250	600	750	950	600	900	400

3. Write in figures two thousand three hundred fifty-six, four thousand nine hundred ninety, six thousand two hundred sixty-two, eight thousand eight hundred.

4. Which is larger, $\frac{2}{10}$ or $\frac{1}{5}$? $\frac{4}{10}$ or $\frac{2}{5}$? $\frac{6}{10}$ or $\frac{3}{5}$? $\frac{8}{10}$ or $\frac{4}{5}$? Show the answers by drawing forms.

5. Can you tell which is larger, one tenth or one twentieth of anything? Do you see that equal parts grow smaller as the number-names grow higher? Ten is higher than four, but one tenth is smaller than one fourth. Why?

6. Compare $\frac{1}{3}$ and $\frac{1}{4}$ by drawings. $\frac{1}{4}$ and $\frac{1}{6}$. $\frac{1}{2}$ and $\frac{1}{12}$.

7. Compare $\frac{2}{3}$ and $\frac{3}{4}$. How much larger is the $\frac{3}{4}$? Show your answer by a rectangle divided into twelfths.

8. What is the ratio of 8 to 16? of 12 to 24?

9. If 16 pounds of oatmeal cost 40¢, what will 8 pounds cost? 12 pounds?

10. Mr. Brown bought 4 dozen pears. 3 of the pears were bad. The goods ones were divided equally among 9 children. How many pears did each child get?

11. From a door to a window the distance is 2 yards and 1 foot. How many feet is the distance?

12. Carrie bought a yard and a quarter of red ribbon and $\frac{3}{4}$ of a yard of white ribbon. How many yards in all did she buy?

QUESTIONS

1. Divide each of these numbers by 6, by 3, and by 2: 18, 12, 42, 36, 54, 48, 6, 84, 96, 72, 24, 60, 30, 66, 90, 78.

2. Find $\frac{1}{6}$, $\frac{2}{6}$, $\frac{3}{6}$, $\frac{4}{6}$, and $\frac{5}{6}$ of each of the following numbers: 60, 30, 36, 72, 18, 54, 48, 42, 24, 84, 96.

3. $\frac{2}{6}$ of $30 = ?$ $\frac{1}{3}$ of $30 = ?$ Then $\frac{2}{6}$ = what other fraction? Show by a drawing.

4. $\frac{3}{6}$ of $18 = ?$ $\frac{1}{2}$ of $18 = ?$ Then $\frac{3}{6}$ = what other fraction? Show by a drawing.

5. $\frac{1}{3}$ of $12 = ?$ $\frac{2}{3}$ of $12 = ?$ $\frac{1}{6}$ of $12 = ?$ $\frac{4}{6}$ of $12 = ?$ Then $\frac{2}{3}$ = what other fraction?

6. How many sixths of a number equal one third of the number? How many sixths equal one half?

7. How many fourths and sixths are in two?

8. $\frac{1}{3}$ of $18 = ?$ $\frac{2}{6}$ of $18 = ?$ $\frac{2}{3}$ of $18 = ?$ $\frac{4}{6}$ of $18 = ?$

9. Two thirds of 18 equal how many sixths of 18?

10. Two thirds of 30 equal how many sixths of 30?

11. $\frac{1}{2}$ of $24 = ?$ $\frac{3}{6}$ of $24 = ?$ One half of 24 equals how many sixths of 24?

12. $\frac{2}{3}$ of $36 = ?$ $\frac{4}{6}$ of $36 = ?$ How many thirds of 36 equal four sixths of 36?

13. One half of 24 equals how many sixths of 48?

14. One third of 42 equals how many sixths of 42?

15. One half of 54 equals how many sixths of 54?

16. One third of 54 equals how many sixths of 54?

17. $\frac{1}{3}$ of $60 = ?$ $\frac{2}{6}$ of $60 = ?$ $\frac{1}{2}$ of $60 = ?$ $\frac{3}{6}$ of $60 = ?$

18. Draw illustrations to show $\frac{5}{6}$, $\frac{3}{8}$, $\frac{7}{9}$, $\frac{5}{12}$.

DATES

There are always seven days in every week. There are always at least four weeks or twenty-eight days in every month. There are twelve months in every year. A hundred years make one century. We are living in the twentieth century, because it is more than 1900 years since Jesus Christ was born. When we write letters we put three facts at the top, called the date. We tell the year, the month, and the day of the month: sometimes we tell also the day of the week. We may write the date, January 1, 1900, or Tuesday, Jan. 1, 1900. The calendar tells us how to know the month, the day of the month, the year, and the day of the week.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

This calendar is true for any month when the first day of the month falls on Sunday and when the month has 31 days. This calendar represents December, 1901, and March, 1903. If the 31st day were omitted, it would represent June, 1902, and November, 1903, also.

The names of the months are: January, February, March, April, May, June, July, August, September, October, November, December.

The year has 365 days, except "leap year," which has 366 days. Leap year comes every four years; then February gains another day.

Thirty days hath September,
April, June, and November,
All the rest have thirty-one,
Excepting February alone.
Twenty-eight are all its store
Till leap year gives it one day more.

Until the year 2400 every year we can divide by 4 will be leap year. We usually call thirty days a month unless we know the exact month in question.

THE CALENDAR

1. Get a calendar for the present year. On what week day did the first day of this month fall? On what week day will the first days of all the rest of the months of the year fall? On what week day did the first days of the past months fall?

2. Can you find what months of each year usually have the same days of the months on the same days of the week? Why is this not true in leap year?

3. Tell the names of the longest months.

4. How many days are there in seven weeks? in three weeks? in eleven weeks?

5. How many weeks are there in thirty-five days? in forty-nine days? in eighty-four days?

6. Which is the longer time, six weeks or two months? ten weeks or three months? one hundred days or three months?

7. Make a rectangle upon a sheet of paper seven inches long, five inches high. Mark the inch spaces on it on each side. Draw lines across and up and down so as to make thirty-five squares, one inch on each side.

8. Cut out thirty-one squares; number them from 1 to 31.

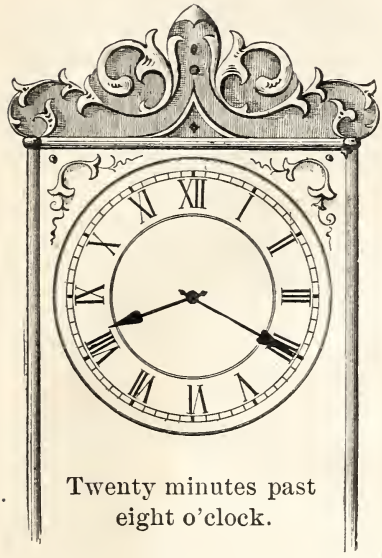
9. Place these squares on the sheet of paper to show the present month. Write at the top of the calendar, S for Sunday, M for Monday, T for Tuesday, W for Wednesday, T for Thursday, F for Friday, S for Saturday.

10. Make a large monthly calendar on the blackboard.

11. Make with the squares, as in 1 above, a calendar for the next month; the last month.

12. Make February of this year; of the next leap year.

TELLING TIME



Twenty minutes past eight o'clock.

There are 24 hours in every day. The first hour begins halfway between sunset and sunrise, when the night is darkest. We call the end of one day and the beginning of the next day *midnight.* Then we count 12 hours, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12. When it is twelve o'clock in the daytime, it is just halfway between sunrise and sunset. Then we begin over again, and count 1, 2, 3, to 12, when it is midnight again.

Noon means 12 o'clock in the daytime.

Midnight means 12 o'clock in the night.

On the clock face we find Roman figures.

1	one	I	7	seven	VII
2	two	II	8	eight	VIII
3	three	III	9	nine	IX
4	four	IIII	10	ten	X
5	five	V	11	eleven	XI
6	six	VI	12	twelve	XII

I = 1; V = 5; X = 10. I after V means V + I. I before X means X − I.

On the clock face we do not find any figures to tell us about the minutes.

Key to clock face.

60 minutes make 1 hour.

12 hours make 1 half day.

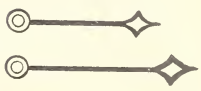
24 hours make 1 day.

Sign for morning hours, A.M.

Sign for afternoon and evening hours, P.M.

TELLING TIME

1 hour o'clock is the same place as 5 minutes. There are two hands on every clock, the hour hand and the minute hand.



The hour hand is always shorter than the minute hand.

When we studied the fives' table, we found that $5 \times 12 = 60$. There are 60 minutes in every hour, and 12 hours in every day.

The hour hand goes from XII to I in one hour, but the minute hand goes all the way around from XII past I, II, III, and so on to XII every hour. The minute hand goes twelve times as fast as the hour hand.

There are twelve numbers on the clock face to mark 60 minutes. Each number means in minutes just 5 times as much as it does in hours, on the clock.

I means in hours 1, but in minutes it means 5, $5 \times 1 = 5$.
II means in hours 2, but in minutes it means 10.
III means in hours 3, but in minutes it means 15.
IIII means in hours 4, but in minutes it means 20.
V means in hours 5, but in minutes it means 25.
VI means in hours 6, but in minutes it means 30.
VII means in hours 7, but in minutes it means 35.

When the minute hand points to more than 30, we usually read the number of minutes before the next hour.

6 o'clock and 35 minutes we usually call 25 minutes before 7. 60 minutes less 35 minutes are 25 minutes.

Railroads read this time 6 hours 35 minutes.

VIII means in hours 8, but in minutes it means 40.

6 hours 40 minutes are twenty minutes before 7 hours.

IX means in hours 9, but in minutes it means 45.
X means in hours 10, but in minutes it means 50.
XI means in hours 11, but in minutes it means 55.
XII means 12 hours, or 60 minutes, or 0 (no) minutes.

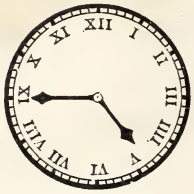
TELLING TIME

We say, "It is two o'clock." This means "It is two hours of the clock." When it is 2 o'clock, we find the minute hand at XII hours or 60 or 0 minutes.

2 o'clock

10:20 o'clock

twenty minutes after ten

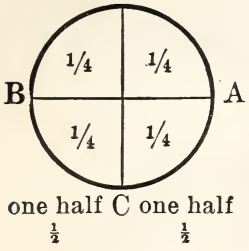


4:45 o'clock

quarter of five o'clock

7 o'clock

This circle is divided into quarters. When the minute hand reaches 15 minutes after XII or 60, we say it is quarter past whatever hour the hour hand is nearest. *A* is at III or 15 minutes. When the minute hand reaches 45 minutes after XII or 15 minutes ($60 - 45 = 15$) before XII, we say it is quarter before the hour the hour hand is nearest: that is, the hour toward which the hour hand is traveling. When the minute hand is at VI or 30 minutes, we say it is half past. $30 = 60 \div 2$. $30 = \frac{1}{2}$ of 60.



1. Where should the hands be to show quarter past 9; quarter to 11; half past 9; quarter to 12; quarter past 10; half past 8; half past 3; half past 7; quarter to 12; quarter past 1; quarter past 6; half past 5?

2. Where is each hand at quarter past 12? at quarter past 2? at quarter to 3? at half past 4? at half past 6? at quarter to 9? at half past 11? at quarter to 8? at half past 3? at 10 minutes after 10?

TELLING TIME

1. Make a large clock face on thick paper or cardboard, or on the blackboard.

2. Draw the hands to show 5 minutes past 9 o'clock, 10 minutes past 10 o'clock, 15 minutes past 11 o'clock, 20 minutes past 12 o'clock, 25 minutes past 1 o'clock.

3. Draw the hands to show 25 minutes of 3 o'clock, 20 minutes of 4 o'clock, 15 minutes of 5 o'clock, 10 minutes of 6 o'clock, 5 minutes of 7 o'clock, and 8 o'clock.

4. Draw quarter past nine o'clock, half past ten o'clock, quarter of eleven o'clock, and six o'clock.

5. Draw each one of the hours one o'clock, two, three, four, five, six, seven, eight, nine, ten, eleven.

6. Make out of cardboard a clock face, and hands out of cardboard or wood, and set the time to suit your own ideas. Make all the different times o'clock in **2**, **3**, **4**, and **5** above.

7. Draw a picture of the clock in your schoolroom. What time does it tell? Perhaps it took you quite a long time to draw that picture. Draw another, telling what time it is now. How many minutes apart are the two times on the two clocks?

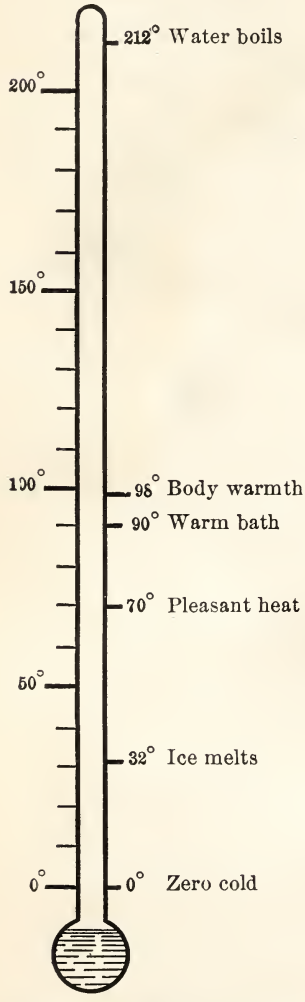
8. School begins at —— o'clock. Recess is at —— o'clock. Recess is over at —— o'clock. The morning session ends at —— o'clock. Draw four clock faces to show these times.

9. Do you have a daily program at school? When did this lesson begin? When will it end? Make clock faces to show these times. Show the times for other lessons.

10. Make clock faces showing the time when you get up in the morning, when you eat breakfast and other meals, and when you go to bed at night.

TELLING HEAT AND COLD

In the winter, when the fire goes out, we feel cold. In the summer we are often very warm. Sometimes in winter the fire is very hot, and our rooms are too warm. It is hot near bonfires or the fire in the blacksmith's shop. It is warmer in the sunshine than in the shade. We call the warmth or coldness of the air, the *temperature*.



Fahrenheit thermometer. The spaces are called *degrees*. This means equal parts of space. The sign for degree is °.

We have thermometers to tell us how warm or how cold it is. Thermometer is from *thermo*, heat, and *meter*, measure. Inside the glass of the thermometer is a liquid heavier than water. This is a metal called quicksilver or mercury. It looks like silver, but it flows quickly. Did you ever see little balls of quicksilver run across a table? This quicksilver needs more room and goes up the tube of the glass, when it is warm, but gets smaller and goes down in the glass when it is cold. If the glass is put in water with broken ice in it, the quicksilver goes to 32°. If we hold the bulb or thick end tight in one hand, the quicksilver goes nearly to 98°. In boiling water the quicksilver marks 212°. Hot weather is when the air is as warm as our bodies, 98°.

We like to have the air in our rooms at 70°; but in winter, to make the air pleasant at that temperature or warmth, we must have water vapor in it. That is why we put water on our stoves or in our furnaces, or let steam out of the steampipes into our rooms.

Cold air has only a little water vapor in it. When we warm the cold air, it needs more moisture to make it pleasant to breathe.

TELLING HEAT AND COLD

1. How many degrees do you find between melting ice and body warmth? $98° - 32° =$

2. How many degrees do you find between melting ice and the warm bath? $90° - 32° =$

3. Would you like to go swimming in a river full of floating blocks of ice? Why not?

4. Do you like to drink ice water when warm? Why?

5. We like to go swimming in salt sea water at 68°. How many degrees is that colder than our bodies?

6. In lakes there are often springs of cold water at 45°. Swimmers often have chills called "cramps" in fresh water because of these springs. Why? $98° - 45° =$

7. Cool water, 55°, is very pleasant and good to drink in summer when our bodies become very warm in the hot air. How much cooler is the water than our bodies if our temperature is 99°?

8. When we are sick, we usually have fever. Over 100° may be a fever. If our body warmth is 104°, our doctor is very anxious. How many degrees too warm is this? $104° - 98° =$

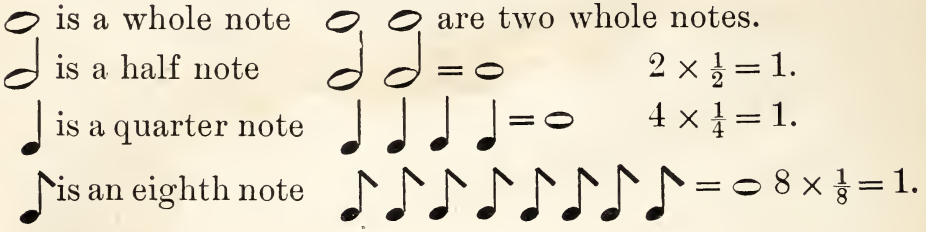
9. Sometimes we have a chill. If our body warmth falls three degrees, 3°, how warm are we? $98° - 3° =$

10. The temperature inside the mouth is 98° or 99°; that of ice cream is usually 32°. Why does it seem so cold?

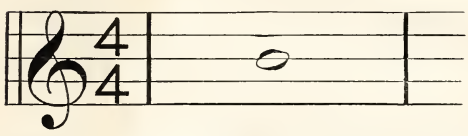
11. We warm the air with our body warmth. When the wind blows, it takes the warm air away from the skin fast. This is why we get just as cold in a strong wind when the air is 50° as we do on a quiet day when it is 32°. Compare $98° - 50° =$ and $98° - 32° =$

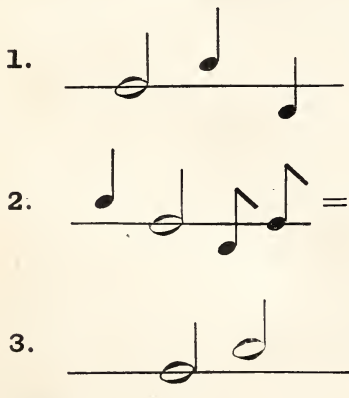
MUSIC FRACTIONS

In music we have equal parts or fractions of time. A whole note is the musical unit of time.



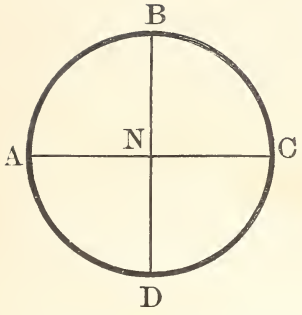
The space between the two vertical bars in this drawing is one measure. One whole note would take all the time in this measure. Two half notes would take all the time. Two quarter notes and one half note would also take all the time.



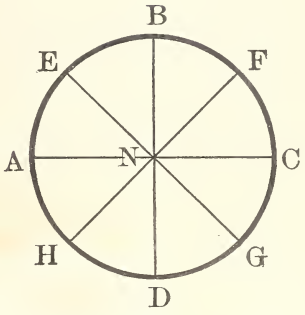


1. $\frac{1}{2} + \frac{1}{4} + \frac{1}{4} = 1.$
2. $\frac{1}{4} + \frac{1}{2} + \frac{1}{8} + \frac{1}{8} = 1.$
3. $\frac{1}{2} + \frac{1}{2} = 1.$
4. $\frac{1}{8} + \frac{1}{4} + \frac{1}{4} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = 1.$
5. $\frac{1}{8} + \frac{1}{8} + \frac{1}{4} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = 1.$

TELLING ANGLES



A circle with 4 quarters and 4 right angles.



A circle with 8 eighths and many different angles.

AC is a diameter. It divides the circle into halves because it is a straight line through the center of the circle.

BD is a diameter. It divides each of the circle's halves into two equal parts: $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{4}$.

These are angles:

Angles are formed by the meetings of lines. *ANB* is an angle. Trace it.

Two diameters crossing each other so as to divide a circle into quarters make right angles with each other.

We say that *BN* is perpendicular to *AN* because it forms the right angle *ANB*.

We call angles smaller than right angles *acute* angles. *ANE* is an acute angle. Point out other acute angles.

We call angles larger than right angles *obtuse* angles. *ANF* is an obtuse angle. Point it out.

We call this a *horizontal* line: ———.

And this we call a *vertical* line: |.

ABCD is the *perimeter* or *circumference* of the circle.

QUESTIONS

1. What is the ratio of 5 to 50? of 5 to 5? of 5 to 25? of 5 to 40? of 5 to 55? of 15 to 5? of 35 to 5? of 45 to 5? of 10 to 5? of 20 to 5?

2. What part of 30 is 5? 6? 12? 18? 24?

3. A mason can build a wall in 30 days. What part of it can he build in 5 days? in 6 days? in 18 days? in 12 days? in 24 days?

4. George can ride 50 miles in 5 hours on his wheel. What part of that distance can he ride in 1 hour? in 3 hours? in 4 hours?

5. How many feet are there in 25 inches? in 30 inches? in 60 inches?

6. Esther bought 9 yards of braid at 5¢ a yard. She gave the clerk a fifty-cent piece. What change should she get?

7. How much money will 5 gallons of kerosene cost at 12¢ a gallon?

8. Walter paid 40¢ for 2 quarts of molasses. How much would a pint cost at the same rate?

9. At 11¢ a quart, how many quarts of berries can you buy for 55¢?

10. Mr. Brown wishes to divide 40¢ equally among his four children. How many cents must he give to each child?

11. In a pond there were 36 lilies. A boy picked 9 of them. What part of the whole number of lilies did he pick?

12. A florist had 44 roses. $\frac{1}{11}$ of them were white, $\frac{2}{11}$ were red, and the rest were yellow. How many roses were white? How many were red? How many were yellow?

REVIEW

1. With a thermometer take the temperature out of doors at 8.30 A.M., at 12 M., and at 3 P.M. Tell the differences. Do this for five school days.

2. Take the temperature in the schoolroom every hour all day.

3. Draw pictures of thermometers, showing the quicksilver at 98°, at 32°, at zero, at 212°, at 70°, at 90°, at 100°.

4. Draw pictures of thermometers, telling when ice melts, when water boils, when the heat is pleasant, how warm the body is when one is well, when one has a fever, when one has a chill, how warm a bath should be, and how low the mercury is when it is very, very cold, below zero.

5. Why are some music notes called whole notes? half notes? quarter notes? eighth notes?

6. What time is it at noon? When does 12 o'clock come next?

7. How many hours do we spend in school each day?

8. Where are the hands on the clock face at the times when you go to school morning and afternoon?

9. Edgar raised 48 quarts of strawberries. He sold $\frac{1}{12}$ of them early in the season and $\frac{5}{12}$ of them later on. How many quarts did he sell at his first sale? How many quarts are $\frac{5}{12}$ of 48 quarts? $\frac{6}{12}$ of 48 quarts? $\frac{1}{2}$ of 48 quarts?

10. A bin contains 32 bushels of corn. The owner took out $\frac{1}{4}$ to be ground into meal and $\frac{1}{4}$ for food for his horses. How many bushels in all did he take out?

11. Which is the largest angle, an acute, a right, or an obtuse angle?

REVIEWS OF NUMBER TABLES

Counting by 3's.

1	2	**3**	4	5	**6**	7	8	**9**	10
11	**12**	13	14	**15**	16	17	**18**	19	20
21	22	23	**24**	25	26	**27**	28	29	**30**
31	32	**33**	34	35	**36**	37	38	**39**	40
41	**42**	43	44	**45**	46	47	**48**	49	50
51	52	53	**54**	55	56	**57**	58	59	**60**
61	62	**63**	64	65	**66**	67	68	**69**	70
71	**72**	73	74	**75**	76	77	**78**	79	80
81	82	83	**84**	85	86	**87**	88	89	**90**
91	92	**93**	94	95	**96**	97	98	**99**	100

Counting by 6's.

1	2	3	4	5	**6**	7	8	9	10
11	**12**	13	14	15	16	17	**18**	19	20
21	22	23	**24**	25	26	27	28	29	**30**
31	32	33	34	35	**36**	37	38	39	40
41	**42**	43	44	45	46	47	**48**	49	50
51	52	53	**54**	55	56	57	58	59	**60**
61	62	63	64	65	**66**	67	68	69	70
71	**72**	73	74	75	76	77	**78**	79	80
81	82	83	**84**	85	86	87	88	89	**90**
91	92	93	94	95	**96**	97	98	99	100

Counting by 4's.

1	2	3	**4**	5	6	7	**8**	9	10
11	**12**	13	14	15	**16**	17	18	19	**20**
21	22	23	**24**	25	26	27	**28**	29	30
31	**32**	33	34	35	**36**	37	38	39	**40**
41	42	43	**44**	45	46	47	**48**	49	50
51	**52**	53	54	55	**56**	57	58	59	**60**
61	62	63	**64**	65	66	67	**68**	69	70
71	**72**	73	74	75	**76**	77	78	79	**80**
81	82	83	**84**	85	86	87	**88**	89	90
91	**92**	93	94	95	**96**	97	98	99	**100**

Counting by 8's.

1	2	3	4	5	6	7	**8**	9	10
11	12	13	14	15	**16**	17	18	19	20
21	22	23	**24**	25	26	27	28	29	30
31	**32**	33	34	35	36	37	38	39	**40**
41	42	43	44	45	46	47	**48**	49	50
51	52	53	54	55	**56**	57	58	59	60
61	62	63	**64**	65	66	67	68	69	70
71	**72**	73	74	75	76	77	78	79	**80**
81	82	83	84	85	86	87	**88**	89	90
91	92	93	94	95	**96**	97	98	99	100

Counting by 5's.

1	2	3	4	**5**	6	7	8	9	**10**
11	12	13	14	**15**	16	17	18	19	**20**
21	22	23	24	**25**	26	27	28	29	**30**
31	32	33	34	**35**	36	37	38	39	**40**
41	42	43	44	**45**	46	47	48	49	**50**
51	52	53	54	**55**	56	57	58	59	**60**
61	62	63	64	**65**	66	67	68	69	**70**
71	72	73	74	**75**	76	77	78	79	**80**
81	82	83	84	**85**	86	87	88	89	**90**
91	92	93	94	**95**	96	97	98	99	**100**

Counting by 7's.

1	2	3	4	5	6	**7**	8	9	10
11	12	13	**14**	15	16	17	18	19	20
21	22	23	24	25	26	27	**28**	29	30
31	32	33	34	**35**	36	37	38	39	40
41	**42**	43	44	45	46	47	48	**49**	50
51	52	53	54	55	**56**	57	58	59	60
61	62	**63**	64	65	66	67	68	69	**70**
71	72	73	74	75	76	**77**	78	79	80
81	82	83	**84**	85	86	87	88	89	90
91	92	93	94	95	96	97	**98**	99	100

The 10's are always at the ends of the rows.

NUMBER TABLES 1 TO 144

Counting by 9's.

1	2	3	4	5	6	7	8	**9**	10	11	12
13	14	15	16	17	**18**	19	20	21	22	23	24
25	26	**27**	28	29	30	31	32	33	34	35	**36**
37	38	39	40	41	42	43	44	**45**	46	47	48
49	50	51	52	53	**54**	55	56	57	58	59	60
61	62	**63**	64	65	66	67	68	69	70	71	**72**
73	74	75	76	77	78	79	80	**81**	82	83	84
85	86	87	88	89	**90**	91	92	93	94	95	96
97	98	**99**	100	101	102	103	104	105	106	107	**108**
109	110	111	112	113	114	115	116	**117**	118	119	120
121	122	123	124	125	**126**	127	128	129	130	131	132
133	134	**135**	136	137	138	139	140	141	142	143	**144**

Notice that the 2 figures in each number which contains 9 always add together 9, except 99. $9 + 9 = 18$, $1 + 8 = 9$. Notice also that the unit figure of each larger multiple of 9 is always 1 less. 18, 27, 36, and so on.

Counting by 11's.

1	2	3	4	5	6	7	8	9	10	**11**	12
13	14	15	16	17	18	19	20	21	**22**	23	24
25	26	27	28	29	30	31	32	**33**	34	35	36
37	38	39	40	41	42	43	**44**	45	46	47	48
49	50	51	52	53	54	**55**	56	57	58	59	60
61	62	63	64	65	**66**	67	68	69	70	71	72
73	74	75	76	**77**	78	79	80	81	82	83	84
85	86	87	**88**	89	90	91	92	93	94	95	96
97	98	**99**	100	101	102	103	104	105	106	107	108
109	**110**	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	**132**
133	134	135	136	137	138	139	140	141	142	**143**	144

Notice that from 1 to 100 the 2 figures in each multiple of 11 are always the same, and that above 100 the number of tens always increases 1, 110, 121, and so on, and the number of units always increases 1, 121, 132, 143.

1. Copy these Number Tables in red and blue pencil on paper, or in red and blue chalk on the blackboard.

2. Read these Tables in class, explaining them.

ORAL

1. Count by fours to one hundred.
2. How many are $15-4+8+9+3-10-2-7\times 2=?$
3. How many dimes are there in half a dollar?
4. How much is $\frac{1}{2}$ of $\frac{1}{3}$? $\frac{1}{3}$ of $\frac{1}{3}$? $\frac{1}{5}$ of $\frac{1}{2}$?
5. Is $\frac{1}{3}$ more or less than $\frac{1}{2}$? $\frac{1}{6}$ than $\frac{1}{9}$? $\frac{1}{5}$ than $\frac{1}{3}$? Why?
6. Give the multiplication table of threes.
7. How many pints are there in a gallon? in a peck?
8. Measure the size of the schoolroom in feet.
9. Read the calendar for to-day.
10. Tell a number-story about 24 cents, 4 boys, and two dozen apples that cost a dime a dozen.

WRITTEN

1. Add:

15	31	44
7	10	16
12	9	8

2. Subtract:

46	92	74
17	14	65

3. Write the Number Table of One Hundred, showing very plainly every number containing 7.
4. Draw a clock face, showing 5.20 o'clock.
5. Draw a rectangle divided into sixths.
6. Write in words 2671, 4203, 3031, 1850.
7. Answer $5+(4\times 2)=?$ $(3\times 3)+9=?$ $(18\div 6)+7=?$
8. John had one dollar. He spent a quarter for a cap, forty cents for a bantam hen, and a nickel for chestnuts. How much money did he have left?
9. What is the ratio of 6 to 9? of 12 to 4? of $\frac{1}{2}$ to $\frac{1}{8}$?
10. Write the address of your house and the day of the month and week.