COLAW SERIES

SCHOOL ARITHMETIC

FIRST BOOK

WITH ANSWERS

B. F. JOHNSON PUBLISHING Co.
ATLANTA RICHMOND DALLAS

SCHOOL ARITHMETIC

FIRST BOOK

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17-9—J W F & S

PREFACE

THIS book is intended to cover the work usually given in the first four school years.

Part One should be used by the teacher as the basis of oral work suitable for beginners. This work may be repeated as a review after the book has been placed in the hands of the pupil. Part Two covers the work of the third year; Part Three that of the fourth year.

A primary consideration in the selection of the subject matter and in the method of presentation has been the child himself — his interests, his needs, and his capabilities. Constant effort has been made to bring the entire subject into close touch with child life. The course as a whole proceeds by carefully graded steps to develop in the pupil of the primary grades not only accuracy and reasonable speed in computations but also the power to interpret and solve such problems as come within the range of his experience.

Abundant drills and exercises, both oral and written, are intended to fix the basal number-facts in the pupil's mind, and thus secure accuracy and facility in numerical processes. The number of examples and problems given is unusually large and varied. As far as practicable, the supply has been made sufficient to provide all the members of a class with work at the recitation period.

In the preparation of the books of this series the authors desire to acknowledge their grateful appreciation of the assistance of Mrs. M. S. Moffett, principal of the Herndon (Va.) High School and Instructor in Arithmetic, University of Virginia Summer School, and of Miss Natalie Lancaster, head of the

Department of Mathematics, State Normal School, Harrisonburg, Va. Both of these teachers have rendered valuable services in outlining the arrangement, supplying material tested in the schoolroom, and in other ways giving to the books the benefit of their accurate scholarship and excellent judgment.

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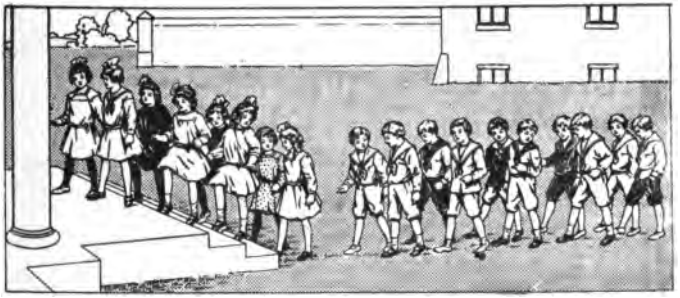
FIRST BOOK

PART ONE.

NUMBERS TO TEN

COUNTING



1. How many children are on the steps of the schoolhouse?

Count the girls in the picture.

How many boys are there?

How many children are on the ground?

Can you count all the children in the picture?

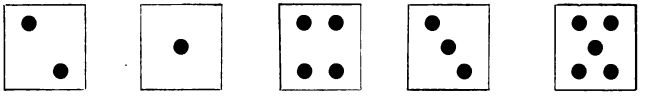
Can you count the children in your class?

Count the windows in your schoolroom.

How many panes of glass are in each window?

Note. Counting games may be used to stimulate interest and effort Pupils may be taught to count by bouncing a ball, playing the game of bean bags, skipping a rope, etc.

OBJECTS, NAMES, AND FIGURES



2 1 4 3 5

2. 1. How many cards do you see?

Draw five marks on the board.

2. How many dots are on the first card?

How many eyes have you?

Take two pieces of chalk to the blackboard. 2 is the figure that says, or stands for, *two*. Make it on the board.

3. How many dots are on the second card? Put one hand on your desk. Write the figure 1.

4. How many dots are on the middle card?

Hold up four fingers.

The figure that says *four* is 4. Write 4 on the board. How many cents do you see? 

5. How many dots are on each of the other cards? How many fingers are on one hand? Write the figures that stand for *three* and *five*.

6. Note carefully:

NAMES	one	two	three	four	five
FIGURES	1	2	3	4	5

NOTE. Drill in this work until the number of objects in a group is readily recognized, and the corresponding figure is associated with the word and objects.

THE NUMBERS ONE AND TWO

1

2

3. 1. How many dots are there on the first card? How many on the second card?

One dot and one dot are how many dots?

One card and one card are how many cards?

How many are one boat and one boat?

One and one are how many? 1 and 1 are ——.

2. Nell has one book and Will has one book. Together they have how many books?

May sees one arrow and Nell sees another. Together they see how many arrows?

3. Take one cent from two cents. How many cents are left?

Take one bow from two bows. How many bows are left?

Two bluebirds less one bluebird are how many bluebirds?

How many squirrels are two squirrels less one squirrel?

Two less one is how many? 2 less 1 is ——.

Hiawatha sees two robins on a tree. If one flies away, how many robins are left?

4. Make the figure that stands for *one*.

Write the name of the figure 2.

THE NUMBER THREE

Three  3

4. 1. How many dots are one dot and two dots? two dots and one dot?

Two leaves and one leaf are how many leaves?

One black cat and two black cats are how many cats?

Two and one are how many? One and two are how many?

2 and 1 are ——. 1 and 2 are ——.

2. Frank has two jack-o'-lanterns and Nell has one. How many have they together?

May has one cake and Fan has two. How many do both have?

3. Take one pumpkin from three pumpkins. How many pumpkins are left?

Three apples less one apple are how many apples?

From three ears of corn take one ear of corn. How many ears of corn are left?

How many are three camp kettles less two camp kettles?

Three less one are how many?

Three less two is how many?

3 less 1 are ——. 3 less 2 is ——.

4. George gathered three bags of chestnuts. If he gave one bag to his sister, how many bags had he left?

Mary picked three roses and gave two of them to her teacher. How many had she left?

ADDING AND SUBTRACTING

5. How many stars are there in the first row? How is this number shown? How many stars in the second row? How is the number shown? How many stars in the third row? How is the number shown?

There are as many stars in the third row as there are in both the others. That is, three stars is the **sum** of one star and two stars.

Finding the sum of two numbers is called **adding**.

The sign + stands for **and**. It is called **plus**.

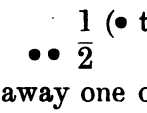
The sign = stands for **are**. It is read **equal** or **equals**.

1 + 1 = 2 is read "1 and 1 are 2," or "1 plus 1 equal 2." Read: 2 + 1 = 3; 1 + 2 = 3.

Add:

1	2	1
1	1	2

6. Note carefully:



3

1 (• taken from upper group).

2

Take away one of the dots from the upper group. How many dots are left?

Since 2 dots and 1 dot are 3 dots, we know that 1 dot from 3 dots leaves 2 dots.

Taking one number from another is called **subtracting**.

The sign $-$ stands for **less**. It is called **minus**. $2-1=1$ is read "2 less 1 is 1," or "2 minus 1 equals 1." Read: $3-2=1$; $3-1=2$.

Subtract:

$$\begin{array}{ccc} 2 & 3 & 3 \\ \underline{1} & \underline{2} & \underline{1} \end{array}$$

REVIEW EXERCISES

7. Complete:

$1+1=$ ——. $\quad 2-1=$ ——.
$2+1=$ ——. $\quad 3-2=$ ——.
$1+2=$ —— $\quad 3-1=$ ——.

8. 1. Jane had 3 dimes, but lost one. How many dimes had she left?

2. Sarah has two pairs of gloves and Ann has one pair. How many pairs do the two have?

3. John ate one apple and had two left. How many had he at first?

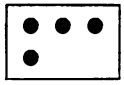
4. William has 2 pennies. How many more will he need to make three?

5. My hat cost three dollars. If I have paid one dollar, how much do I still owe for it?

6. One and what other number make 3? When you take 1 from 3, how many have you left?

7. Count forward to 3; then count backward to one.

THE NUMBER FOUR

Four   4

9. 1. Count the dots on each card. One dot and three dots are how many dots? three dots and one dot? two dots and two dots?

How many are one pear and three pears? three peaches and one peach? two plums and two plums?

Name two numbers whose sum is four. Name two other numbers.

$3+1=$——. $1+3=$——. $2+2=$——.

2. Grace found three eggs in one nest and one egg in another nest. How many eggs did she find?

Will milked one cow and Nell milked three cows. How many cows did both milk?

John spent two cents for candy and two cents for a pencil. How many cents did he spend?

3. Four sheep less one sheep are how many sheep? Four horses less three horses are how many horses? Four ponies less two ponies are how many ponies?

4. Will had four marbles in his pocket. If he lost one, how many had he left?

Four ducks were swimming on the pond. If three flew away, how many remained on the pond?

Make a number story about four hens less two hens.

5. Give results rapidly:

3	2	1	4	4	4
+1	+2	+3	−1	−3	−2

REVIEW EXERCISES

10. Copy the following, using the signs +, =, and −, and write the results.

1 and 2 are——. 1 and 3 are——. 4 less 2 are——.
3 and 1 are——. 2 and 2 are——. 3 less 1 are——.

Read these lines:

1 + 2 = 3.	3 − 1 = 2.	4 − 1 = 3.
1 + 3 = 4.	4 − 2 = 2.	3 − 2 = 1.
2 + 2 = 4.	3 − 1 = 2.	2 + 1 = 3.

State the answers:

2	4	3	4	1	2	4
+1	−2	+1	−3	+3	−1	−1

Copy and complete:

1 + 2 = ( ).	2 + ( ) = 4.	3 = 1 + ( ).
3 + 1 = ( ).	1 + ( ) = 3.	4 = 2 + ( ).
2 + 2 = ( ).	1 + ( ) = 4.	4 = ( ) + 1.

Change these columns to lines and complete:

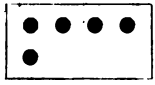
3	3	2	4	4
+1	−1	+2	−2	−1

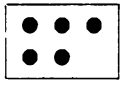
Change these lines to columns and complete:

4 − 1 = ( ).	3 − 2 = ( ).	2 + 1 = ( ).
4 − 2 = ( ).	3 + 1 = ( ).	3 − 1 = ( ).

Pupils should be drilled on such exercises until they recognize results readily.

THE NUMBER FIVE





11. 1. How many dots are in the upper line of the first card? in the lower line? in both lines?

Four dots and one dot are how many dots?

Four and one are how many? $4+1=?$

2. Count the dots in the upper line of the second card; in the lower line; in the whole group.

Three dots and two dots are how many dots? two dots and three dots are how many? three and two? two and three? $3+2=?$ $2+3=?$

3. Cover the dots in the lower line of the first card. How many dots are left? Cover the dots in the lower line of the second card. How many are left?

Five dots less one dot are how many? five dots less four dots? Five dots less two dots are how many? Five dots less three dots are how many?

Five less one are how many? $5-1=?$

Five less three are how many? $5-3=?$

4. Will found five eggs in a nest, but in taking them out he broke two. How many whole eggs did he have left?

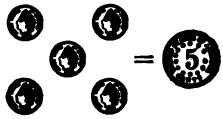
5. Give results rapidly:

2	4	3	5	5	5	5
+3	+1	+1	−3	−2	−4	−1

REVIEW EXERCISES

12. Call results rapidly; copy and complete:

$2+2=(\ )$.	$3+2=(\ )$.	$4-3=(\ )$.
$1+4=(\ )$.	$4-2=(\ )$.	$3-2=(\ )$.
$4+1=(\ )$.	$5-1=(\ )$.	$5-3=(\ )$.
$2+3=(\ )$.	$5-4=(\ )$.	$5-2=(\ )$.



13. 1. How many apples at 1 cent each can you buy for a nickel? Which would you rather have, five cents or a nickel?

2. A top cost 3 cents and a marble 2 cents. How much did both cost?

2 cents + 3 cents = —— cents. $2+3=$ ——.

3. If you buy a two-cent pencil, how much change will you get from a nickel?

5 cents − 2 cents = —— cents. $5-2=$ ——.

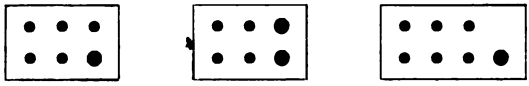
4. How many 2-cent and 1-cent stamps can you buy for a nickel? What other stamps can you buy for a nickel?

5. It is five miles to town. After traveling 3 miles on the way, how far will you be from town?

6. A boy has a tablet, a copybook, and 3 pencils. How many objects has he in all? 1 and 1 and 3 are how many?

7. Make a problem about 5 cents − 3 cents.

THE NUMBERS SIX AND SEVEN



14. 1. How many small dots are on the first card? How many large dots? How many dots are there in all? 5 dots + 1 dot = —— dots.

2. How many small dots are on the second card? How many large dots? 4 dots + 2 dots = —— dots. Count 3 dots in the upper row of this card. Count 3 dots in the lower row. 3 dots + 3 dots = —— dots.

3. Make a number story about 5 rabbits and 1 rabbit; 4 rabbits and 2 rabbits; 3 rabbits and 3 rabbits.

4. Place 6 blocks on your desk; then take 1 block away. How many are left?

6 blocks − 1 block = —— blocks. 6 − 1 = ?

Take 2 blocks from 6 blocks. How many are left?

Take 3 blocks from 6 blocks. How many are left?

5. How many small dots are on the card at the right? How many large dots? How many dots in all? 6 + 1 = ——.

6. Six cents and 1 cent are how many cents? 5 cents and 2 cents? 4 cents and 3 cents? Name three numbers whose sum is 7.

7. Take 1 cent from 7 cents. How many cents are left? Take 2 cents from 7 cents. How many are left?

8. Take 4 from 7; 5 from 7; 6 from 7.

EXERCISES

15. Call results at sight:

5	4	2	6	7	5	3	7
+1	+2	+4	+1	−5	+2	+4	−3

Call results; change to columns and complete:

4+2=( ).	5+( )=7.	7−2=( ).
5+2=( ).	6−1=( ).	7−3=( ).
6+1=( ).	7−6=( ).	7−4=( ).

16. 1. A boy had six 10-cent pieces. After spending two of them, how many had he left?

2. Four boys and 2 girls entered a store. How many children entered the store?

3. Each child had 6 cents. After spending 3 cents apiece, how many cents had each child left?

4. Jane spent 3 cents for sugar cakes and 3 cents for crackers. How many cents did she spend?

5. Make a problem about 6 marbles less 4 marbles.

6. How many school days are there in a week? How many other days? Name the days of the week.

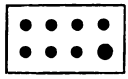
7. Seven boys went to town, but only 4 of them returned. How many of them remained in town?

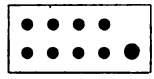
8. John gathers 4 quarts of chestnuts and Frank gathers 3 quarts. How many quarts do both gather?

9. How many cents are 3 cents, 2 cents, and 1 cent?

10. How many books are 1 book, 3 books, and 3 books?

THE NUMBERS EIGHT AND NINE





17. 1. How many small dots are on the first card? How many large dots? How many dots in all?

2. With 8 blocks make two piles with the same number in each. How many blocks in each pile?

Take one block from one pile and place it on the other. Now how many blocks in each pile?

Take one block from the smaller pile and place it on the larger. Now how many blocks in each pile?

3. Count to eight by twos. Count by fours. Give all the ways of making eight by adding two numbers.

4. How many more dots are on the second card than on the first?

5. Eight cents and 1 cent are how many cents? 7 cents and 2 cents? 5 cents and 4 cents? 6 cents and 3 cents?

Give all the ways you can of making 9, using only two numbers each time.

6. Make all the figures from 1 to 9.

7. Call results rapidly:

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

Copy and complete:

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

REVIEW EXERCISES

18. Add:

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

Subtract:

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

19. 1. Grace paid 5 cents for rice and 3 cents for sugar. How many cents did she pay for both?

2. If one boy eats 6 peaches and another boy eats 3, how many do both eat?

3. How many are 8 men less 5 men?

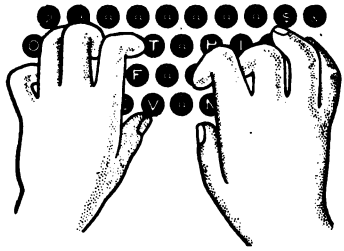
4. A spider has 4 legs on one side of its body, and 4 legs on the other side. How many legs has a spider?

5. The cook has placed 6 rolls in the pan. How many more must she put in to have 8 rolls in the pan?

6. Mary is 6 years old to-day. In how many years will she be nine years old?

7. Five boys are fishing in one pond, and 4 boys in another pond. How many boys are fishing?

THE NUMBER TEN



20. 1. How many fingers and thumbs are on both hands? How many keys are in the upper row?

2. Make ten dots, as shown at the left.

5 dots + 5 dots = —— dots.

3. Make a problem about 9 cents and 1 cent.

4. Count ten by twos; by fives.

5. Take ten splints and tie them in a bundle. How many ones in it? how many tens?

Note that *ten ones* make *one ten*.

Ten cents equal one dime.

21. Each number that you have already learned is written with a single figure. The new number *ten* is written with two figures, thus: 10.

The new figure 0 is called *zero*, or *naught*, and means *none*.

Write the names of the numbers from one to ten Under each name write its figure.

REVIEW EXERCISES

22. Call results rapidly:

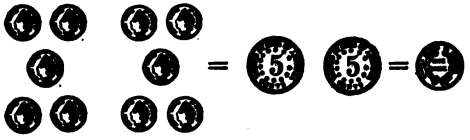
9	8	7	6	5	10	10	10
+1	+2	+3	+4	+5	−7	−5	−2
10	2	10	1	10	10	10	3
−6	+8	−4	+9	−8	−3	−1	+7

Add quickly:

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

Subtract quickly:

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



23. 1. How many pennies (cents) equal one nickel? How many pennies equal 2 nickels or 1 dime?

2. John places 5 books on one shelf and 3 on another. How many does he place on both shelves?

3. Mary is 7 years old. In how many years will she be 9 years old?

4. I have six cents. How many more cents do I need to make a dime?

5. There are eight roses in one vase and 2 in another. How many roses in both vases?

6. Mary has spelled 4 words. How many more must she spell to make 10 words?

7. A large pie costs 10 cents. If you have 5 cents, how many more cents do you need to buy a large pie?

8. Mary counted 6 small clouds in one part of the sky, and 2 clouds in another part. How many clouds did she count?

9. Grace put 5 white beads and 2 blue beads on a string. How many beads did she use?

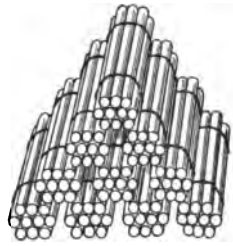
10. Nell sings 5 songs and May sings 4 songs. How many songs do both sing?

11. Two ladies paid a nickel each for car fares. How many nickels were paid for car fares? Two nickels equal how many dimes?

12. A boy buys a 5-cent tablet, a 2-cent pencil, and a 3-cent rule. How many cents does he pay for all?

13. Frank's father gave him a dime. He changed it into pennies. If he lost six of them, how many had he left?

COUNTING BY TENS



24. 1. Here are 10 bundles of splints, 10 in each bundle. How many splints are there in 2 bundles?

One ten and one ten are —— tens, or *twenty*.

2. As already seen, we write one ten thus: 10. We write two tens or twenty thus: 20.

Copy and complete:

Three tens or thirty = 30.
Four tens or forty = ——.
Five tens or fifty = ——.
Six tens or sixty = ——.
Seven tens or seventy = ——.
Eight tens or eighty = ——.
Nine tens or ninety = ——.
Ten tens or one hundred = 100.

3. Twenty means *two tens*. What does thirty mean? forty? fifty? sixty? seventy? eighty? ninety?

4. In the picture at the top, how many splints are there in the 10 bundles? (10 tens equal *one hundred*.) Count to 100 by 10's.

EXERCISES

25. Add:

2 dimes	20 cents	2 tens	20
3 dimes	30 cents	3 tens	30
3 dimes	30 cents	3 tens	30
6 dimes	60 cents	6 tens	60
70 bushels	50 dollars	70 yards	20
30 bushels	50 dollars	20 yards	60

Subtract:

6 dimes	60 cents	6 tens	60
3 dimes	30 cents	3 tens	30
60 dollars	80 feet	90 pecks	100
20 dollars	20 feet	80 pecks	10

Call results rapidly:

$10+10=(\ )$.	$20+20=(\ )$.	$50+30=(\ )$.
$20+10=(\ )$.	$30+20=(\ )$.	$60+30=(\ )$.
$50+10=(\ )$.	$60+20=(\ )$.	$70+30=(\ )$.

26. 1. How many dimes are worth fifty cents?

2. If a book cost three dimes, how many cents did it cost?

3. If I paid four 10-dollar bills for a cow, how many dollars did I pay?

4. If Richard had one dollar and paid six dimes for a ball and bat, how much money had he left?

NUMBERS TO TWENTY

THE NUMBERS ELEVEN AND TWELVE

27. There are eleven dots shown at the left of this page and twelve at the right. Eleven means 1 *ten* and 1 (one). What does twelve mean?

Twelve is how many more than eleven? How many more than ten?

11 **28.** Ten = 1 ten and 0 ones; it is written ten thus: 10. 12

Eleven = 1 ten and 1; it is written 11.

Twelve = 1 ten and 2; it is written 12.

In each case which figure tells the number of ones? Which tells the number of tens?

EXERCISES

29. Call results rapidly; change to columns and complete:

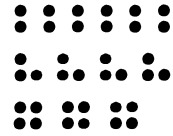
$10+1=$	$8+3=$	$11-4=$	$11-7=$
$7+4=$	$11-3=$	$11-6=$	$11-(\ )=8.$
$5+6=$	$11-5=$	$11-9=$	$7+(\ )=11.$
$9+2=$	$11-2=$	$11-8=$	$4+(\ )=11.$

Call results rapidly; change to lines and complete:

10	12	9	12	4	7	12	12
$+2$	-2	$+3$	-4	$+8$	$+5$	-3	-5

30. How many things make a dozen?

How many twos do you see in twelve?



How many threes do you see?

How many fours do you see?

Copy and complete:

$6+6=(\ )$.	$8+4=(\ )$.	$10+2=(\ )$.
$7+5=(\ )$.	$8+3=(\ )$.	$11+1=(\ )$.

31. 1. How many boys are required for a football team that has 1 fullback, 2 halfbacks, 1 quarterback, 1 center, 2 guards, 2 tackles, and 2 ends?

2. How many boys are needed to play guards, tackles, ends, and halfbacks? How many more boys are required to complete the team?

3. The postage on a three-ounce package of merchandise is 3 cents. What will it cost to register and mail this package, if the registry fee is 8 cents?

4. If it is now 5 o'clock, what time will it be in 7 hours?

5. Mary buys one dozen eggs. If she uses 5 eggs for a cake, how many has she left?

6. A gatepost planted 4 feet deep shows 7 feet above the ground. How long is the post?

7. How many months are there in a year? Write their names in order, beginning with January.

8. How many months come after March? after September? between March and September?

9. In what month is your birthday? How many of the months come before that month? How many come after it?

10. A tablet costs 12 cents. If John has 6 cents, how many more cents will he need to buy a tablet?

11. A boy earns 12 cents. He spends 3 cents for candy and the remainder for a book. How much does the book cost?

12. In Ella's sash are 3 yards of ribbon, in Mary's 4 yards, and in Fanny's 5 yards. How many yards in all?

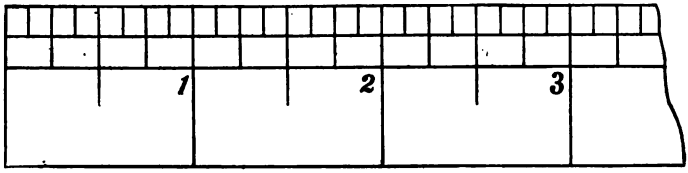
32. Some things to remember:

Jan. stands for January.	Sept. stands for September.
Feb stands for February.	Oct. stands for October.
Apr. stands for April.	Nov. stands for November.
Aug. stands for August.	Dec. stands for December.

Names of other months are usually written in full.

12 things make 1 dozen.	Doz. stands for dozen.
12 months make 1 year.	Yr. stands for year.
¢ or ct. stands for cent.	$ stands for dollar.

MEASURING LENGTH



33. 1. This is a picture of a part of a foot rule. Notice the longest marks that are numbered. Notice the distance between two of these marks.

The length is called *one inch.* The whole rule is *one foot* long.

2. Make and mark a foot rule. Use it to find how many inches long this line is:

3. Without your rule try to draw a line one foot long on the blackboard. Measure the line with your rule to see if it is one foot long.

4. Without your rule try to place two dots on the blackboard one foot apart. Measure with your rule the distance between the dots to see if it is one foot.

5. By using a foot rule find out how tall you are. Find out the height of the tallest member of your class.

6. You may also use your foot rule in drawing straight lines.

Draw on a sheet of paper a line four inches long. An inch lower draw another line four inches long. Rule the sheet of paper with lines an inch apart.

7. How many inches are there on your foot rule? Then how many inches are there in a foot?

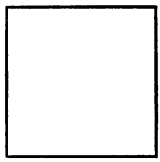
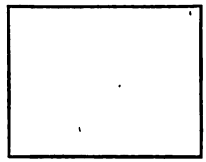
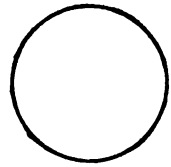
Twelve inches equal one foot.

8. Measure a yardstick with your foot rule, and tell how many feet equal a yard.

Three feet equal one yard.

9. Measure the length and width of your desk.

In. stands for inch, ft. for foot, and yd. for yard.

34. 1. Measure the sides of the first figure. How do they compare?

Draw a figure like the first. It is a square.

Name something that has the shape of a square.

2. The second figure is a rectangle. Compare the length of its sides. Draw a rectangle. Name something that has the shape of a rectangle.

3. The third figure is a circle. Measure the distance across this circle.

4. How many sides has a square? a rectangle? What is the shape of the top of your desk? What is the length of each side?

5. What is the shape of the face of a clock? of a coin?

READING AND WRITING NUMBERS TO 20

35. You have seen that

$10 + 1 =$ eleven, written 11; and that

$10 + 2 =$ twelve, written 12.

Now copy and complete:

$10 + 3 =$ thirteen, written 13.

$10 + 4 =$ ——, written ——.

$10 + 5 =$ ——, written ——.

$10 + 6 =$ ——, written ——.

$10 + 7 =$ ——, written ——.

$10 + 8 =$ ——, written ——.

$10 + 9 =$ ——, written ——.

$10 + 10 =$ ——, written 20.

In each case the right-hand (last) figure shows the number of *ones*. What does the figure next to the last show?

How many *tens* and *ones* in 18?

COMBINATIONS

36. Show with objects that

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

$12 = 9 + 3 = 8 + 4 = 7 + 5 = 6 + 6$;

$13 = 9 + 4 = 7 + 6 = 8 + 5$;

$14 = 9 + 5 = 8 + 6 = 7 + 7$;

$15 = 9 + 6 = 8 + 7$;

$16 = 9 + 7 = 8 + 8$;

$17 = 9 + 8$;

$18 = 9 + 9$.

REVIEW EXERCISES

37. Call results rapidly; change to columns and complete:

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

Call results rapidly:

8	7	9	8	9	7	5	8
$+4$	$+5$	$+6$	$+3$	$+3$	$+8$	$+6$	$+7$
13	14	15	16	17	18	16	17
-4	-7	-6	-9	-8	-9	-6	-9

38. 1. John takes 6 steps in going from the porch to the well, 6 steps in going from the well to the woodshed, and 7 steps from the woodshed to the kitchen. How many steps does he take in all?

2. Harvey ate 7 cakes for breakfast, Frank ate 9, and Elsie ate 3. How many cakes did all three eat?

3. Helen received 19 picture post-cards, and Rachel received 7. How many more did Helen receive than Rachel?

4. Dorothy had 15 cents and paid 8 cents for 4 two-cent stamps. How much money had she left?

5. Sam's fish line is 18 feet long and Fred's line is 6 feet shorter. How long is Fred's line?

6. A girl wishes to have 16 buttons on a dress. If she has sewed on 5 buttons and 4 buttons, how many more has she to sew on?

7. One chicken weighs 4 pounds, another 6 pounds, and another 7 pounds. How much do the three chickens weigh?

8. The cook uses 4 eggs in a sponge cake, 5 eggs in a layer cake, and 10 eggs in a pound cake. How many eggs does she use?

9. A dressmaker uses 15 yards of lace on one dress and 9 yards on another. How many more yards does she use on the first dress than on the second?

10. A man caught 18 fish. If he gave 9 to a friend, how many did he keep?

11. A rope is 20 feet long. If a girl cuts off 7 feet for a jumping-rope, how many feet will be left?

12. A merchant buys 9 yards of silk. How many more yards must he buy to have 16 yards?

13. A boy had 15¢. He paid 6¢ for pencils and 5¢ for a tablet. How much had he left?

14. James has 10¢, Frank has 3¢, and Ralph has 5¢. How much have they together?

15. A grocer had 18 melons. He sold 2, then 4, then 5. How many had he left?

16. Jane spent 20 cents for chestnuts and Nell spent 13 cents. How much more did Jane spend than Nell?

PINTS, QUARTS, AND GALLONS

Pint

Quart

Gallon

39. 1. Which of these measures is the largest? Which is the smallest? Find how many quarts of water are needed to fill the gallon measure. How many quarts in a gallon?

4 quarts equal 1 gallon.

2. Find how many pints of water are needed to fill the quart measure. How many pints in a quart?

2 pints equal 1 quart.

3. How many quart bottles will hold one gallon and one quart of milk?

4. Grace has a quart bucket full of vinegar. How many pint bottles can she fill?

5. A gallon of ink will fill how many quart bottles? Each quart bottle of ink will fill how many pint bottles? A gallon of ink will fill how many pint bottles?

6. If I pour out 2 quarts of water from a gallon bucket of water, how many quarts of water are left in the bucket?

Pt. stands for pint, qt. for quart, and gal. for gallon.

NOTE. Pint, quart, and gallon measures should be used to illustrate problems.

PECK AND BUSHEL

Peck

Bushel

40. 1. Fill a peck measure with corn, and then empty it into a bushel measure. Keep on until the bushel measure is full.

2. How many times did you fill the peck measure? How many times did you empty it into the bushel measure? How many pecks in a bushel?

4 pecks equal 1 bushel.

3. Each of four boys gathered one peck of chestnuts. How many bushels did they gather?

4. How many peck baskets will be required to hold a bushel of peaches? to hold two bushels and 2 pecks of peaches?

5. If I buy 2 bushels of sweet potatoes, how many pecks do I buy?

6. If I buy 1 bushel and 2 pecks of apples, how many pecks of apples do I buy?

7. If a merchant buys 2 bushels and 1 peck of meal, how many pecks of meal does he buy?

8. Make a problem about 1 peck and 1 bushel.

Pk. stands for peck, and bu. for bushel.

TELLING TIME

41. 1. It is noon at 12 o'clock. Look at the clock face and tell how many hours it is from noon till midnight.

To what does the hour hand point at 1 o'clock? the minute hand?

2. What stands for *one* on the clock face? for *two?* for *three?* for *five?* for *ten?*

I stands for 1.	V stands for 5.
II stands for 2.	X stands for 10.
III stands for 3.	IIII or IV stands for 4.

The letters seen on the clock face are such as the Romans used to represent numbers.

3. Four is *one less* than five, or, in counting, *one before* five. Hence the Romans wrote IV for four.

On clock faces four is commonly written IIII.

4. Six is *one more* than five, or, in counting, *one after* five. Hence the Romans wrote VI for six.

What does VII mean? VIII? IX? XI? XII?

5. Write the numbers 1 to 12 in figures and in Roman numerals.

6. If we eat dinner at 12 o'clock and supper at 6 o'clock, how long is it between meals?

7. Look at a nickel and tell what shows the number of cents it is worth.

8. Did you ever see a watch or a clock with the hours marked in figures?

REVIEW AND PRACTICE WORK

ORAL DRILL

42. By this time you have learned the sum of any two numbers of one figure each. Below are given all the combinations — 45 in number — without repeating.

Give the sums at sight:

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

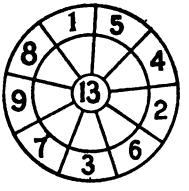
Pupils should be drilled on these combinations until they know each of the sums at sight.

43. Place this diagram on the blackboard. Add the number in the center to each of the others, as indicated; thus, when the teacher points to 8, say or write 13.

1	2	3
4	5	6
7	8	9

After passing around the class a few times, the figure in the center should be changed, and the drill continued.

Subtract the numbers on the rim of the wheel from the number at the hub, and call or write results only.



The numbers at the hub should range from 10 to 19.

EXERCISES

44. Copy and add quickly:

\$7	6 doz.	5 in.	8 tens	80
\$1	1 doz.	4 in.	2 tens	20
6	3	7	4	2
2	6	2	5	8

Copy and subtract quickly:

9 yd.	\$9	10 qt.	10 tens	100
6 yd.	\$4	7 qt.	8 tens	80
8	8	9	9	10
6	7	7	4	7

Copy and complete:

3+2=	3+4=	3+6=	6−2=
2+4=	2+6=	5+4=	8+5=
3+3=	5+3=	7+3=	7−3=
2+5=	4+4=	4+6=	8+6=

5+( )=8.	8−3=	8=2+( ).	( )+8=15.
7+( )=9.	9−2=	9=6+( ).	( )+6=13.
3+( )=7.	7+4=	7=3+( ).	( )−9=6.
6+( )=9.	8−3=	9=7+( ).	( )−8=7.

45. Call results rapidly; change to columns and complete:

11 + 1 = ( ).	12 + 2 = ( ).	13 + 3 = ( ).
11 + 3 = ( ).	12 + 4 = ( ).	13 + 5 = ( ).
11 + 2 = ( ).	12 − 6 = ( ).	13 − 6 = ( ).
11 + 4 = ( ).	12 + 3 = ( ).	14 + 5 = ( ).
11 + 5 = ( ).	12 + 5 = ( ).	14 − 4 = ( ).
11 + 7 = ( ).	12 − 7 = ( ).	14 + 2 = ( ).
11 + 6 = ( ).	13 + 2 = ( ).	14 + 3 = ( ).
11 + 8 = ( ).	13 − 4 = ( ).	15 + 2 = ( ).

15 + 3 = ( ).	9 + 3 = ( ).	8 + 9 = ( ).
15 + 4 = ( ).	9 + 5 = ( ).	9 + 9 = ( ).
16 + 3 = ( ).	9 + 4 = ( ).	8 − 5 = ( ).
16 + 2 = ( ).	9 + 6 = ( ).	8 + 8 = ( ).
17 + 2 = ( ).	9 + 7 = ( ).	8 + 7 = ( ).

9 + 2 = ( ).	7 + 5 = ( ).	10 − 2 = ( ).
9 − 7 = ( ).	7 − 4 = ( ).	10 + 8 = ( ).
9 − 6 = ( ).	6 + 5 = ( ).	10 − 3 = ( ).
9 − 4 = ( ).	6 − 3 = ( ).	10 − 7 = ( ).
9 − 5 = ( ).	8 − 2 = ( ).	10 − 6 = ( ).

11 − 2 = ( ).	12 − 2 = ( ).	14 + 4 = ( ).
11 − 8 = ( ).	12 − 3 = ( ).	14 − 5 = ( ).
11 − 4 = ( ).	12 − 8 = ( ).	14 − 9 = ( ).
11 − 6 = ( ).	13 − 9 = ( ).	14 − 6 = ( ).
13 − 8 = ( ).	13 − 5 = ( ).	15 − 8 = ( ).
14 − 8 = ( ).	13 − 7 = ( ).	16 − 8 = ( ).
15 − 6 = ( ).	16 − 9 = ( ).	17 − 9 = ( ).

46. 1. There are 5 boys and 4 girls in a class. How many pupils are there in the class?

2. There are 12 months in the year. If January, February, March, and April are past, how many months remain?

3. We have 2 bushels and 3 pecks of apples. How many pecks have we? $(4 + 4 + 3 = \text{——}.)$

4. If a milkman has 3 quarts of milk, to how many persons can he sell a pint each?

5. A man has 17 miles to travel. When he has gone 8 miles, how far has he yet to go?

6. If I have gathered a gallon and 2 quarts of chestnuts, how many quart bags will I need to hold them?

7. My brother is 17 years old. How old was he 9 years ago?

8. Find the cost of one pound of sugar worth 6 cents and one pound of meal worth 14 cents.

9. How many days are 2 weeks and 4 days?

10. Mary sold eggs at one cent apiece. How much did she get for a dozen and 6 eggs?

11. I want to buy a book for 18 cents. If I have a dime, how many more cents do I need?

12. A farmer has 7 Jerseys and 8 Durhams. How many of both has he?

13. School begins at 9 o'clock in the morning and continues until 3 o'clock in the afternoon. How many hours are there from the opening till the close?

14. A table is 6 feet long and 3 feet wide. What is the number of feet around it?

15. From a dozen and 6 cans of peaches 3 cans were used. How many cans were left?

16. From a coop of 19 chickens 6 were sold and 7 were eaten. How many chickens were left?

17. How many times does the sun rise and set in 1 week?

18. If you have a gallon and 3 quarts of milk and sell 5 quarts, how many quarts have you left?

19. Sixteen ounces equal one pound. Nineteen ounces are how many more than one pound?

20. Draw a line 17 inches long. How many inches longer is it than 1 foot?

21. How many pecks in a bushel? in a bushel and 2 pecks?

22. How many pints in a quart? in a gallon?

23. What measure would you use in measuring the potatoes dug in the garden? the oil contained in a barrel?

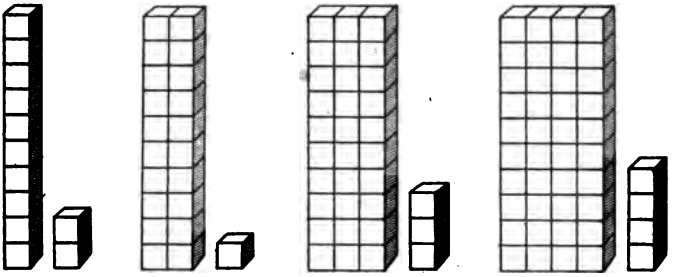
24. A banker has $1-bills, $2-bills, and $5-bills. Name two ways in which he can give change for a $10-bill. Name as many other ways as you can.

25. With your foot rule, find how many feet are in the length of a table 2 yards 1 foot long.

26. Tom has 8 cents and his father gives him 4 cents. How many more does he need to make 20 cents?

NUMBERS TO ONE HUNDRED

READING AND WRITING NUMBERS



47. 1. You have already seen that 12 means 1 ten and 2. You have also learned that 20 means 2 tens and no ones, called *twenty*. From the picture tell what 21 means.

2. If we call two tens and one *twenty-one*, what shall we call two tens and *two*? What shall we call two tens and *three*? two tens and *four*? two tens and *five*? two tens and *six*? two tens and *seven*? two tens and *eight*? two tens and *nine*?

3. What do we call 3 tens? What then is the number made up of 3 tens and 1? (*Thirty-one.*)

4. From the picture tell what the right-hand figure in 33 shows; the left-hand figure. Tell what each figure in 44 shows. Then in which place do we write *ones*? In which place do we write *tens*?

5. What does 23 express? 24? 35? 48?

48. Copy and complete this table:

0	10	20	30	40	50	60	70	80	90
1	11	21	31						
2	12	22							
3	13								
4									
5									
6									
7									
8									
9									

Pupils should complete this table without help. They should then be able to call and write the number names as indicated. For practice, this table should be kept on the blackboard for some time.

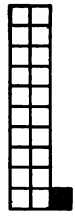
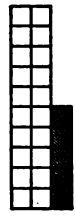
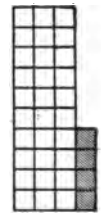
49. How many numbers are in each column? How many columns are there?

Name the numbers in the second column, beginning at the top. Name the numbers in each of the other columns.

What number is written at the left of 25? at the right of it?

Begin at the number 2 and name each number to the right of it. Begin at 5 and read across to 55.

Name the numbers in the table that end in 8; in 4; in 7; in 9.

$10+10+1=21$. $10+10+5=25$. $10+10+10+4=34$.
2 tens $+1=21$. 2 tens $+5=25$. 3 tens $+4=34$.

50. Draw figures like these and divide them into squares to represent 23; 36; 43; 56; 75.

51. Complete:

$20+1=21$.	2 tens $+1=21$.	$25=2$ tens $+5$.
$20+4=$	2 tens $+4=$	$22=$
$20+8=$	2 tens $+8=$	$26=$
$30+3=$	3 tens $+3=$	$32=$
$30+5=$	3 tens $+5=$	$39=$
$40+4=$	4 tens $+4=$	$47=$
$50+0=50$.	5 tens $+0=50$.	$51=50+1$.
$50+5=$	5 tens $+5=$	$55=$
$60+8=$	6 tens $+8=$	$68=$
$70+7=$	7 tens $+7=$	$77=$
$80+8=$	8 tens $+8=$	$88=$
$90+5=$	9 tens $+5=$	$95=$

52. Count backwards from 20 to 0; from 50 to 20.
Count by 2's to 50; then backwards to 2.
Count by 10's to 100; then backwards to 0.
Count by 10's from 1 to 91; from 2 to 92.

ADDING AND SUBTRACTING

53. Name results quickly; copy and complete:

21 + 1 =	21 + 2 =	21 + 3 =	21 + 4 =
31 + 1 =	31 + 2 =	31 + 3 =	31 + 4 =
41 + 1 =	41 + 2 =	41 + 3 =	41 + 4 =
51 + 1 =	51 + 3 =	51 + 3 =	51 + 4 =
71 + 1 =	22 + 2 =	22 + 3 =	22 + 4 =
22 + 5 =	22 + 6 =	22 + 7 =	73 + 6 =
32 + 5 =	32 + 6 =	32 + 7 =	84 + 5 =

If you add 1 to numbers ending in 1, with what figure do the sums end?

If you add 2 to numbers ending in 1, with what figure do the sums end?

If you add 2 to numbers ending in 2, with what figure do the sums end?

If you add 3 to numbers ending in 2, with what figure do the sums end?

If you add 4 to numbers ending in 3, with what figure do the sums end?

If you add 5 to numbers ending in 4, with what figure do the sums end?

54. Add:

24	32	24	32	21	33	33
3	4	4	5	3	4	5
34	26	35	46	44	51	62
2	3	3	2	4	7	6

Add:

22	32	51	42	24	33	71
3	5	6	7	5	6	3

Subtract:

25	37	26	45	47	36	35
3	4	2	3	4	2	3
28	38	48	57	67	77	87
5	5	5	3	3	3	3
59	33	78	26	37	88	49
3	2	4	5	3	2	6

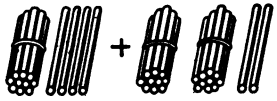
If you add 3 to numbers ending in 5, what is the ending figure?

If you subtract 5 from numbers ending in 8, what is the ending figure? ($8-5=3$; $18-5=$ ——; etc.)

If you subtract 4 from numbers ending in 9, what is the ending figure?

Give results rapidly:

$24+1=$	$26+3=$	$85+4=$	$42+7=$
$34-1=$	$17-3=$	$18-5=$	$79-7=$
$15-2=$	$27+2=$	$44+5=$	$88-5=$
$25+2=$	$77-4=$	$19-6=$	$52+6=$
$16+3=$	$14+4=$	$29-5=$	$62+7=$
$29-6=$	$36-5=$	$82+7=$	$91+8=$
$59-8=$	$62+6=$	$83+5=$	$86+3=$
$27-3=$	$76-4=$	$99-7=$	$97-4=$



14 + 22

55. If we put these splints together, how many tens will we have? how many loose splints?

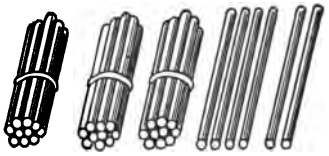
$14 = 1 \text{ ten} + 4$
$22 = 2 \text{ tens} + 2$
$36 = 3 \text{ tens} + 6$

Four and 2 are six. One ten and 2 tens are 3 tens. Where is the 6 written? the 3? Which then is the *ones'* place? the *tens'* place?

WRITTEN EXERCISES

56. Add:

1	2.	3.	4.	5.	6.	7.	8.
24	21	18	15	33	30	26	34
14	15	31	23	14	10	32	33
9.	**10.**	**11.**	**12.**	**13.**	**14.**	**15.**	**16.**
64	45	17	50	73	69	40	26
23	53	42	40	16	20	40	72
17.	**18**	**19.**	**20.**	**21.**	**22.**	**23.**	**24.**
61	42	36	82	25	81	72	63
17	27	53	15	74	18	27	33
25.	**26.**	**27.**	**28.**	**29.**	**30.**	**31.**	**32.**
32	54	67	42	36	60	54	41
36	15	21	27	23	15	33	24
33.	**34.**	**35.**	**36.**	**37.**	**38.**	**39.**	**40**
34	17	24	63	31	28	25	52
25	50	34	25	67	51	34	26



57. Here are 36 splints. How many tens are there? how many ones?

Remove 12 of them (1 ten and 2). How many ones are left? how many tens? how many splints?

36 Two from 6 leaves ——. One ten from 3 tens
12 leaves —— tens. Two tens and 4 ones are ——.
24 Which do we subtract first, the *ones* or the *tens*?

When 12 is subtracted from 36, what is the *remainder?* How does the picture above show this?

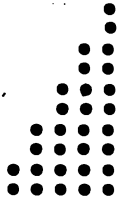
WRITTEN EXERCISES

58. Subtract and test:

1.	2.	3.	4.	5.	6.	7.	8.
27	44	56	63	58	76	69	75
14	12	24	21	33	25	36	50
9.	**10.**	**11.**	**12.**	**13.**	**14.**	**15.**	**16.**
68	56	36	86	69	74	85	95
25	43	24	52	25	25	20	54
17.	**18.**	**19.**	**20.**	**21.**	**22.**	**23.**	**24.**
86	77	68	98	48	76	99	97
41	34	58	23	18	41	44	60

COUNTING BY TWOS AND THREES

59.



$= 2 \qquad = 1 \times 2 = 2$

$= 2 + 2 \qquad = 2 \times 2 = 4$

$= 2 + 2 + 2 \qquad = 3 \times 2 = 6$

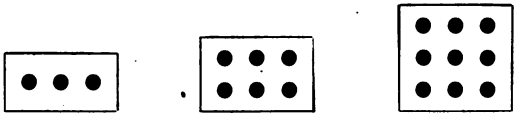
$= 2 + 2 + 2 + 2 \qquad = 4 \times 2 = 8$

$= 2 + 2 + 2 + 2 + 2 = 5 \times 2 = 10$

60. The sign × stands for the word **times**. 2×2 means 2 *times* 2 or two 2's.

Copy and complete:

$2 \times 2 = (\ )$.	$5 \times 2 = (\ )$.	$5 \times (\ ) = 10$.
$3 \times 2 = (\ )$.	$4 \times (\ ) = 8$.	$(\ ) \times 2 = 6$.
$4 \times 2 = (\ )$.	$3 \times (\ ) = 6$.	$(\ ) \times 2 = 8$.



61. 1. How many dots are there on the card at the left? how many 3's?

How many 3's do you see on the second card? on the third?

Two 3's are how many? $2 \times 3 = (\ )$.

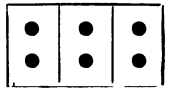
Three 3's are how many? $3 \times 3 = (\ )$.

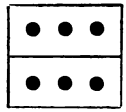
2. How many feet are there in a yard? in two yards? in 3 yards?

2×3 ft. $= (\ )$. $\qquad 3 \times 3$ ft. $= (\ )$.

$2 \times 3 = (\ )$. $\qquad 3 \times 3 = (\ )$.

3. An orange costs 3 cents. How much must I pay for 3 oranges?





62. 1. How many dots are there on the card at the left? How many are on the other card?

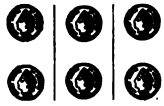
How many *twos* on the card at the left?

How many *threes* on the other card?

Are 3 2's as many as 2 3's?

Read $3 \times 2 = 2 \times 3$, and show with splints that this is true.

2. Call the dots on the first card *cents*. How many of them will pay for a 2-cent stamp? What will 3 two-cent stamps cost? $3 \times 2¢ =$ ——.



63. 1. Here are 6 cents. How many 2-cent stamps can I buy with them? how many 3-cent stamps?

How many 2 cents do you see in 6 cents? how many 3 cents?

How many times must 2 cents be taken to make 6 cents? (3 times.)

Then $6¢$ divided by $2¢ = 3$. This may be written,

$$6¢ \div 2¢ = 3.$$

It means that $2¢$ are found in $6¢$ three times.

The sign $\div$ stands for **divided by**.

2. Here are 8 tops. To how many boys can I give 2 tops each?

8 tops ÷ 2 tops = ( ). 8 ÷ 2 = ( ).

If I divide the tops into two equal parts, how many tops will be in each group?

8 tops ÷ 2 = 4 tops. 8 ÷ 2 = ( ).

3. How many 2's in 4? in 6? in 8? in 10?

4. How many 3's in 6? in 9?

5. How many 2-inch lengths can you lay off on your foot rule? how many 3-inch lengths?

12 ÷ 2 = 6; 12 ÷ 3 = 4.

64. 1. Count by 2's to 12. How many 2's in 12?

2 + 2 + 2 + 2 + 2 + 2 (or 6 2's) = 12.

How many 2's in 20? in 14? in 16? in 18?

2. Numbers that can be counted by 2's can be divided by 2, and are called **even numbers**. All other numbers are called **odd numbers**.

Did you ever play the game of "odd or even"? How is it played?

3. Write the even numbers to 10. Can you tell in what figures even numbers always end?

Write the odd numbers to 9. In what figures do odd numbers end?

Is 13 even or odd? 15? 14? 18? 17?

4. Count by 3's to 30.

How many 3's in 12? $3+3+3+3$ (or 4 3's) $=12$.

How many 3's in 30? in 15? in 18? in 24? in 21? in 27?

5. Compare 6×2 and 4×3. State your conclusion.

Compare 9×2 and 6×3.

65. Copy and complete:

$2 \times 2 =$	$7 \times 2 =$	$3 \times 3 =$	$8 \times 3 =$
$3 \times 2 =$	$8 \times 2 =$	$4 \times 3 =$	$9 \times 3 =$
$4 \times 2 =$	$9 \times 2 =$	$5 \times 3 =$	$10 \times 3 =$
$5 \times 2 =$	$10 \times 2 =$	$6 \times 3 =$	$2 \times (\ ) = 20.$
$6 \times 2 =$	$2 \times 3 =$	$7 \times 3 =$	$3 \times (\ ) = 30.$
$4 \div 2 =$	$14 \div 2 =$	$12 \div 3 =$	$8 \div (\ ) = 4.$
$6 \div 2 =$	$16 \div 2 =$	$15 \div 3 =$	$9 \div (\ ) = 3.$
$8 \div 2 =$	$18 \div 2 =$	$18 \div 3 =$	$18 \div (\ ) = 6.$
$10 \div 2 =$	$6 \div 3 =$	$21 \div 3 =$	$16 \div (\ ) = 8.$
$12 \div 2 =$	$9 \div 3 =$	$24 \div 4 =$	$12 \div (\ ) = 6.$

66. 1. At 3¢ a pint, how much will a quart of milk cost? How much will a gallon cost?

2. How many quart bottles will it take to hold 16 pints?

3. How many 2-cent tops can you buy for 2 dimes?

4. How many pecks are there in 3 bushels?

5. In a game of baseball 9 persons play on each side. How many players are there in the game?

6. Divide 18 peaches among 3 girls. How many peaches does each receive?

7. One sash of a window has 2 rows of panes, and 3 panes in a row. How many panes are there in the sash?

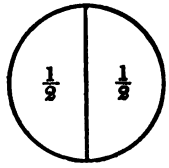
8. A rule 12 inches long is how many inches longer than one 6 inches long? how many times as long?

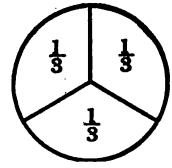
9. Mrs. Jones divided 30 chickens equally among her three boys. How many did each receive?

10. How many 2-cent papers will cost as much as a 10-cent magazine?

11. What must be added to 16 to make it odd? What must be added to any even number to make it odd?

FRACTIONAL PARTS





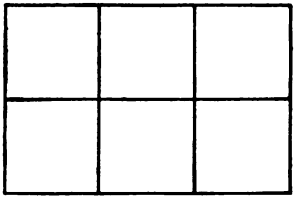
67. 1. Into how many equal parts is the circle at the left divided? What is one part called? Into how many equal parts is the circle at the right divided? What is one part called?

One half is written $\frac{1}{2}$; one third is written $\frac{1}{3}$.

2. To divide anything into halves is to divide it into *two* equal parts; to divide anything into thirds is to divide it into *three* equal parts.

68. 1. Draw a rectangle 3 inches long and 2 inches wide.

Draw a horizontal line across it, as shown in the picture. Then draw two vertical lines, as shown.



How many squares are there in the upper row? How many rows are there? How many squares are in the rectangle? ($2 \times 3 =$ ——.)

How many squares are there in the left-hand column? How many columns are there? How many squares do you find in this way? ($3 \times 2 =$ ——.)

2. What part of the whole rectangle is the upper row of squares? the lower row?

3. What part of the rectangle is each of the vertical rows? What part of the rectangle are two vertical rows?

To find one half of a number divide it by 2; to find one third of a number divide it by 3.

ORAL EXERCISES

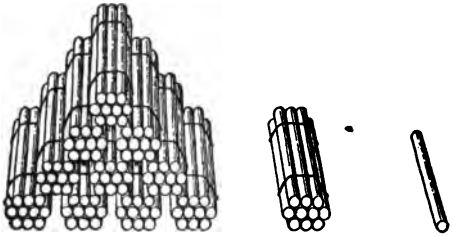
69. Find:

$\frac{1}{2}$ of 8.	$\frac{1}{2}$ of 18.	$\frac{1}{3}$ of 12.
$\frac{1}{2}$ of 10.	$\frac{1}{2}$ of 20.	$\frac{1}{3}$ of 15.
$\frac{1}{2}$ of 12.	$\frac{1}{2}$ of 24.	$\frac{1}{3}$ of 18.
$\frac{1}{2}$ of 14.	$\frac{1}{3}$ of 3.	$\frac{1}{3}$ of 21.
$\frac{1}{2}$ of 16.	$\frac{1}{3}$ of 9.	$\frac{1}{3}$ of 24.

PART TWO

NUMBERS TO THOUSANDS

HUNDREDS



Hundred Ten One

70. 1. How many ones make 1 ten? How many tens make 1 hundred?

2. Show me 10 tens with splints. Put a band around them. How many are in the bundle?

Make another bundle of 100. How many are in both bundles? how many hundreds?

One hundred and 3 hundreds are —— hundreds.

Four hundreds and 5 hundreds are —— hundreds.

3. How many cents make a dime? How many dimes make a dollar? How many cents make a dollar?

One hundred cents make a dollar

4. How many cents are there in $5? in $7?

5. In what place, counting from the right, do we write the *tens* of a number? In what place do we write the *hundreds?*

71. Supply the figures needed:

One hundred is written 100.
Two hundred is written 200.
Three hundred is written ——.
Four hundred is written ——.
Five hundred is written ——.
Six hundred is written ——.
Seven hundred is written ——.
Eight hundred is written ——.
Nine hundred is written ——.
Ten hundred is written 1000.

1000 is usually read "one thousand."

Read and write in words: 300, 500, 800, 700, 900.

72. Copy and complete:

10 tens make 100.
20 tens make ——.
30 tens make ——.
40 tens make ——.
50 tens make ——.
60 tens make ——.
80 tens make ——.
70 tens make ——.
90 tens make ——.
100 tens make ——.

HUNDREDS, TENS, AND ONES

Hundreds	Tens	Ones
1	0	0

Hundreds	Tens	Ones
1	0	1

Hundreds	Tens	Ones
1	2	4

73. 1. In writing *ten* in figures, why do we put 0 in the ones' place?

In writing *one hundred* in figures we put 0's in two places. Why? How many figures do we use?

2. How do you write in figures 1 ten and 1? How should 1 hundred and 1 ten be written?

One hundred and one ten is written 110.

One hundred and two tens is written 120.

3. Write in figures:

One hundred and 3 tens. Two hundred and 1 ten.
One hundred and 5 tens. Three hundred and 5 tens.
One hundred and 9 tens. Five hundred and 8 tens.

74. 1. One hundred and two tens, or 120, is read "*one hundred twenty.*"

How should 150 be read? 250? 360? 510? 840?

Never use the word **and** *in reading a whole number.*

2. Count by 10's from 100 to 300, and write the numbers as you count.

75. 1. In writing 1 hundred and 1, or 1 more than 100, what do we write in the ones' place? in the tens' place?

2. In writing 124, what do we write in the ones' place? in the tens' place? in the hundreds' place?

76. Numbers from 100 to 1000 are written after the following manner:

One hundred, 100. Two hundred one, 201.
One hundred one, 101. Two hundred twelve, 212.
One hundred two, 102. Two hundred forty-six, 246.
Nine hundred ninety-nine, 999.
One thousand, 1000.

77. Read:

25	117	42	90	81	280
325	502	130	290	781	470
216	423	207	484	810	765
437	666	336	306	898	921
450	607	341	533	787	908

Read any other number to 1000, as called for.

78. Write in figures:

Forty-one.	Eleven.
Two hundred one.	Five hundred eleven.
Six hundred sixty-four.	Three hundred thirty-six.
Eighty-nine.	Ninety.
Four hundred eighty-nine.	Six hundred five.
Two hundred thirty.	Nine hundred ninety.

79. 1. One thousand one is written 1001.

Two thousand fifty is written 2050.

Three thousand one hundred twenty-five is written 3125.

2. Read:

1234	1002	3450	4000	9906
2345	1010	4507	6076	9999

3. Write in figures:

Two thousand twenty-four. Four thousand five.

Five thousand three hundred. Six thousand forty.

Seven thousand six hundred and seventy-five.

NOTE. Before passing on, pupils should be able to read or write with ease any number of four figures.

ADDITION

80. Putting two or more numbers together to find their sum is called **addition**.

We usually add in columns from bottom to top. But to test your work, you should also add from top to bottom and compare results.

In adding, you should think and call results only. Thus, in the example at the right, from bottom to top, the order would be 7, 12, 14; from top to bottom, it would be 2, 7, 14.

$$\begin{array}{r} 2 \\ 5 \\ 7 \\ \hline 14 \end{array}$$

ORAL EXERCISES

81. Add each column and test:

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

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

15.	16.	17.	18.	19.	20.	21.
33	65	32	23	42	41	92
5	4	6	4	7	8	6

22.	23.	24.	25.	26.	27.	28.
20	52	60	44	70	37	10
30	20	10	30	22	20	80

82. 1. A man paid a barber 25¢ for cutting his hair and 10¢ for a shave. How much did he pay for both?

2. A farmer drove 14 miles to town and then drove home. How far did he drive?

3. Helen's father gave her 50¢ and her mother gave her a quarter. How much did both give her?

4. William earned 40¢ on Friday and 30¢ on Saturday. How much did he earn in both days?

5. Robert had 40¢, Mack had 30¢, and Clyde had 10¢. How much had all three?

6. John traded a knife worth 45¢ and 2 nickels to Walter for another knife of equal value. How much was Walter's knife worth?

7. If there are 40 pupils in the first grade, 30 in the second, and 25 in the third, how many pupils are there in the three grades?

8. If a baseball team played 10 games in April, 20 in May, and 25 in June, how many games did it play in the three months?

9. A street-car conductor collected 20 fares on one trip, 30 on another, and 50 on another. How many fares did he collect in all?

10. A newsboy sold 24 morning papers and 50 evening papers. How many papers did he sell?

11. A boy paid 30¢ for a rubber ball, 20¢ for a bat, and 40¢ for a mitt. How much did he pay for all three?

WRITTEN EXERCISES

83. 1. Find the sum of 23, 42, and 14.

23 4, 2, and 3 are ——.
42 1 ten, 4 tens, and 2 tens are —— tens.
14 The sum is —— tens and ——, or ——.
79

Find the sums and test:

2.	3.	4.	5.	6.	7.	8.	9.
12	14	11	20	30	25	13	21
24	31	42	45	27	40	35	16
51	23	45	13	32	14	40	31

10.	11.	12.	13.	14.	15.	16.	17.
23	27	14	22	32	30	26	34
31	42	54	26	25	20	11	64
24	30	21	11	31	13	2	10

Add:

18.	19.	20.	21.	22.
323	316	525	443	409
462	231	331	526	360

23.	24.	25.	26.	27.
253	402	540	535	680
344	376	145	362	110

28.	29.	30.	31.	32.
102	330	603	400	555
546	660	205	361	444

33.	34.	35.	36.	37.
313	581	234	635	144
414	208	425	364	624

38.	39.	40.	41.	42.
641	364	300	721	356
232	200	600	175	233

43.	44.	45.	46.	47.
123	321	450	$1.25	$5.25
254	213	540	2.50	2.70

In adding and subtracting dollars and cents, the sign $ is placed before the first number and the result only. A point is placed between dollars and cents.

84. 1. A pair of shoes cost $3.50 and a hat $4.50. How much do both cost?

They cost the sum of $3.50 and $4.50, or $ ——.

2. There are 256 pages in one book and 221 pages in another. How many pages in both books?

In both books there is the sum of 256 pages and 221 pages.

3. Ruth puts 125 stitches in one seam and 143 stitches in another. How many stitches does she put in both seams?

4. On one page of a book there are 250 words, on a second page 220 words, and on a third page 102 words. How many words on the three pages?

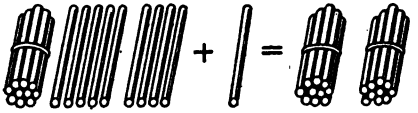
5. A baseball cost $1.25, a bat $1.00, and a mitt $3.50. How much do all cost?

6. In one woodpile are 204 sticks of wood, in a second 532 sticks, and in a third 161 sticks. How many sticks are in the three woodpiles?

7. A bricklayer placed 324 bricks in one pavement, 432 bricks in another, and 133 bricks in a third. How many bricks did he place in the three pavements?

8. A blacksmith used 401 nails in one week, 164 nails in a second week, and 434 nails in a third week. How many nails did he use in the three weeks?

9. A man sold a horse for $225, a cow for $103, and a pig for $12. How much did he receive for all?



85. Take 19 splints. Make a bundle of 10. How many do you need to make another ten?

$19 = 1 \text{ ten} + 9$ $\qquad$ $29 = 20 + 9$

$1 = \quad + 1$ $\qquad$ $1 = \quad + 1$

$20 = 2 \text{ tens} + 0$ $\qquad$ $30 = 30 + 0$

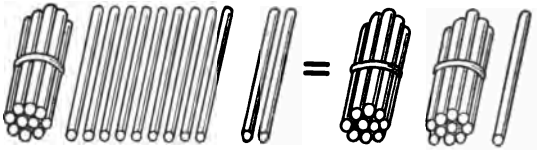
Add:

49	59	79	89	69	99
1	1	1	1	1	1

What number must be put with 18 to make 20? with 28 to make 30? with 38 to make 40?

Add:

28	78	58	88	68	98
2	2	2	2	2	2



86. Nineteen splints and 2 splints are how many splints? Take 1 splint from the two and put it with the nine. You now have —— tens and one, or ——.

How many are 29 and 2? 39 and 2? 49 and 2?

ORAL EXERCISES

87. Add rapidly:

19	29	49	59	69	79	89
2	2	2	2	2	2	2
39	49	59	79	69	99	89
4	4	4	3	3	3	3

Name results rapidly:

8 + 4.	7 + 6.	8 + 5.	9 + 7.
18 + 4.	17 + 6.	18 + 5.	19 + 7.
28 + 4.	37 + 6.	38 + 5.	49 + 7.
58 + 4.	87 + 6.	68 + 5.	89 + 7.
88 + 4.	77 + 6.	88 + 5.	69 + 7.

1. Add 5 to 16, 26, 36, 46, 56, 66, 76, 86.

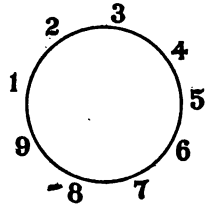
2. If you add 4 to numbers ending in 6, with what figure do the sums end? if you add 6? if you add 7? if you add 8? if you add 9?

3. If you add 7 to numbers ending in 7, with what figure do the sums end? if you add 8? if you add 9?

88. Add, calling results only:

6	26	46	66	17	37	57	87
4	4	4	4	5	5	5	5
27	37	57	77	18	28	58	68
4	4	4	4	5	5	5	5
8	18	28	48	57	37	67	87
7	7	7	7	8	8	8	8
9	29	39	38	48	68	88	78
8	8	8	9	9	9	9	9

89. Write the figures from 1 to 9 on the blackboard in a circle, as shown. Point to the figures in order, and call the sums rapidly once around: thus, "1, 3, 6, 10," etc., to 45. Then go twice around the circle.



Again begin at 9, and go the other way, first once and then twice around. Later, begin at any figure and go in either direction.

NOTE. This drill may occupy a portion of each recitation period until speed and accuracy are secured.

Attention and interest may be increased by using the drill as a class exercise, in which all take part, each pupil calling a result in turn.

WRITTEN EXERCISES

90. 1. Find the sum of 35 and 27.

35	Write 35 and 27 as shown. $7+5=12$, or 1 ten	35
27	and 2, as shown at the left. 2 tens + 3 tens = 5 tens.	27
12	A second addition gives 6 tens and 2, or 62, as the	62
5	sum of 35 and 27.	
62		

In practice we avoid two additions by setting down the 2 and adding the 1 ten to the 2 tens and 3 tens, as shown at the right. This is called "carrying."

Copy and add:

2.	3.	4.	5.	6.	7.	8.	9.
25	35	27	64	48	57	68	24
56	48	16	18	32	25	17	68

10.	11.	12.	13.	14.	15.	16.	17.
63	42	74	31	28	36	42	54
28	39	17	49	64	58	39	39

Add and test:

18.	19.	20.	21.	22.	23.	24.	25.
15	14	11	10	15	23	26	54
26	57	66	48	23	42	38	27
58	27	18	37	47	18	14	19

Change to columns; add and test:

26. $25+45$.	29. $33+49$.	32. $26+35+18$.
27. $81+19$.	30. $62+28$.	33. $35+18+26$.
28. $46+17$.	31. $71+29$.	34. $31+17+46$.

Add and test:

35.	36.	37.	38.	39.	40.
450	344	107	110	111	100
125	512	246	345	333	671
324	43	642	543	555	132

Add:

41.	42.	43.	44.	45.
243	423	621	537	375
432	715	216	283	823
517	324	261	165	516

46.	47.	48.	49.	50.
706	127	218	425	320
293	443	155	683	478
152	344	673	134	326

51.	52.	53.	54.	55.
444	825	629	312	524
236	335	231	838	255
143	175	388	269	337

56. 14, 47, and 132.
57. 31, 14, and 239.
58. 25, 37, and 436.
59. 532, 41, and 9.
60. 223, 9, and 51.
61. 652, 8, and 17.

91. 1. Mr. Jones has 58 sheep in one field and 37 in another. How many sheep has he?

2. If a room is 18 feet long and 16 feet wide, how many feet is it around the room? Can you draw a plan of the room?

3. After paying 10¢ for a fishing pole, 25¢ for lines, and 10¢ for hooks, I had 55¢ left. How much had I at first?

4. Annie has a half dollar, a quarter, a dime, 2 nickels, and 5 pennies. How much has she in all?

5. How many pecks in 1 bu., $\frac{1}{2}$ bu., and $\frac{1}{4}$ bu.?

6. I open my book at page 134. There are 122 pages after that page. How much pages are there in the book?

7. Clifton is 12 years old, and his father is 29 years old. How old is his father? What is the sum of Clifton's age and his father's age?

8. The number of days in each month is as follows:

January	31	May	31	September	30
February	28*	June	30	October	31
March	31	July	31	November	30
April	30	August	31	December	31

*29 days in leap years.

How many days are there in the three spring months, March, April, and May?

9. Name the three summer months, and find the number of days in all three.

10. How many days are there in the last three months of the year? in the last six months?

11. Edith paid 35 cents for a book, 15 cents for paper, and 3 cents for a ruler. How much did they all cost?

12. A Christmas tree held 13 dolls, 27 balls, 37 flags, and 17 bags. How many articles were there in all?

13. Mr. Gay's wagon cost $42. If his buggy cost $29 more than the wagon, how much did the buggy cost?

14. A farmer filled his three measures (bushel, half bushel, and peck) with grain. How many pecks had he in the three?

15. A grocer sold to one customer a gallon of molasses, to another a quart, and to another a pint. How many pints did he sell to all three?

16. May has 324 buttons on her charm string, Grace 526 buttons on hers, and Lulu 147 buttons on hers. How many buttons are there on all the strings?

17. In one town Santa Claus gave dolls to 245 girls, drums to 187 boys, books to 316 ladies, and neckties to 232 men. How many presents did he give?

18. Grace shelled 204 peanuts, Frank 312 peanuts, and Howard 425 peanuts. How many peanuts did the three children shell?

19. There are 91 envelopes in one box, 98 envelopes in another, and 144 in a third. How many envelopes in the three boxes?

20. Class A uses 195 sheets of drawing paper, class B 253 sheets, and class C 346 sheets. How many sheets do the three classes use?

SUBTRACTION

92. You have learned how to take one number from another to find their *difference.* This process is called **subtraction.**

93. Give differences as quickly as possible:

16	26	36	46	18	28	38	48
5	5	5	5	6	6	6	6
18	27	68	47	59	85	98	87
8	4	3	6	7	5	7	3

94. Consider the following problem and solution:

$25¢$ The result ($15¢$) is correct, since $10¢ + 15¢ = 25¢$. Hence, to test subtraction, see whether *the answer added to the smaller number gives the larger number.*

$-10¢$

$15¢$

In subtraction the larger number is called the **minuend** and the smaller is called the **subtrahend.**

Note the following subtractions, and test:

	12	15	16	18
EXAMPLES:	−5	−7	−9	−9
	7	8	7	9
	5	7	9	9
TESTS:	+7	+8	+7	+9
	12	15	16	18

In practice it is not necessary to write out the test. You need only see if the answer added to the smaller number gives the larger.

EXERCISES

95. Subtract, stating the test:

1.	2.	3.	4.	5.	6.	7.
17	16	16	17	16	15	18
8	8	7	9	9	8	9
8.	**9.**	**10.**	**11.**	**12.**	**13.**	**14.**
30	40	50	70	80	60	90
20	20	30	40	50	50	50
15.	**16.**	**17.**	**18.**	**19.**	**20.**	**21.**
24	46	76	65	48	67	96
12	14	32	21	23	52	63
22.	**23.**	**24.**	**25.**	**26.**	**27.**	**28.**
86	65	63	68	59	75	95
52	43	42	25	26	35	30
29.	**30.**	**31.**	**32.**	**33.**	**34.**	**35.**
77	68	79	89	84	78	99
42	41	49	23	28	62	60

96. 1. Charles earned 45¢ on Saturday and spent 30¢ on Monday. How much money had he left?

2. Marvin worked 4 hours Saturday. How many hours out of the 24 did that leave for play and sleep?

3. Owen had a fish line 36 feet long, and cut off 15 feet of it. How many feet were left?

4. Marshall had in his bank 40¢ in dimes, 30¢ in nickels, and 10¢ in pennies. How much money did he need to make a dollar?

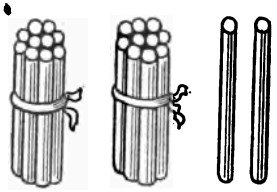
5. A man had $75 in bank and drew out $22. How much had he left in bank?

6. A postmaster handled 50 letters from Richmond and 90 from Washington. How many more did he handle from Washington than from Richmond? How many did he handle from both cities?

7. A grocer bought 20 bushels of apples. After selling $\frac{1}{2}$ of them, how many bushels were left?

8. When asked how many chestnuts he had, James said that if he had 25 more, he would have 75. How many had he?

9. Amie is 12 years younger than her brother. When he was 28 years old, how old was Amie?



97. Arrange 22 splints (2 tens and 2), as shown. How many can you take away without taking any from a bundle? If you wish to take 5 splints away, how many must you take from one of the tens? How many of the tens will be left? One ten and 7 are ——.

$$\begin{array}{rl} 22 = & 2 \text{ tens} + 2 \\ 5 = & \underline{\qquad\quad 5} \\ 17 = & \end{array} \qquad \begin{array}{r} = 1 \text{ ten} + 12 \\ \underline{\qquad\quad 5} \\ 1 \text{ ten} + \ 7 \end{array}$$

How many are 23 less 5? 31 less 7?

ORAL EXERCISES

98. Call the differences at sight:

12	22	32	42	12	22	32	42
5	5	5	5	6	6	6	6
22	32	42	52	72	62	92	82
4	4	4	4	5	5	5	5
21	41	52	72	25	45	37	57
3	3	3	3	8	8	8	8

1. If you subtract 5 from a number ending in 9, what is the last figure of the answer? if you subtract 7?

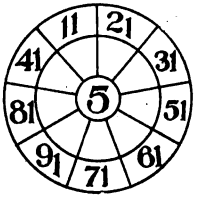
2. If you subtract 6 from a number ending in 5, what is the last figure of the answer? if you subtract 7? if you subtract 8?

3. Subtract 5 from 23, 33, 43, 83, 93, calling results only.

4. Subtract 6 from 11, 21, 31, 41, 51.

5. Subtract by 4's from 40 to 0.

After you have placed this diagram on the blackboard, subtract the number at the hub from the numbers in the rim of the wheel, as indicated by the teacher. Call or write results only.



NOTE. After passing around the class a few times, the figure at the hub and the last figure in the numbers at the rim should be changed, and the drill continued.

WRITTEN EXERCISES

99. Subtract and test:

1.	2.	3.	4.	5.
337	344	456	763	976
214	112	124	521	825
6.	**7.**	**8.**	**9.**	**10.**
458	869	675	968	656
333	536	350	325	443
11.	**12.**	**13.**	**14.**	**15.**
736	886	969	675	985
224	252	525	425	320
16.	**17.**	**18.**	**19.**	**20.**
595	686	777	868	798
454	241	334	458	323

21. If a florist has 987 bulbs and sells 745 of them, how many has he left?

He has left 987 bulbs − 745 bulbs, or —— bulbs.

22. A man earned $975 a year and spent $843. How much did he save?

He saved $975 − $843, or $ ——.

23. A man wishes to buy a lot worth $758. If he has $564, how much more money does he need to buy the lot?

24. From a crop of 840 bushels of apples, a farmer sells 730 bushels. How many bushels does he keep?

25. Two horses cost $759. If one cost $436, how much did the other cost?

100. Subtract 16 from 31.

31	$31 = 30 + 1 = 20 + 11$
16	$16 = 10 + 6 = 10 + \ 6$
15	$15 = \quad\ 10 + \ 5$

Since we cannot take 6 from 1, we add 1 of the 3 tens to the 1, thus getting 11. Then 6 from 11 leaves 5, and 1 ten from the 2 remaining tens leaves 1 ten.

We may reach the same result by saying, or thinking, "6 from 11 leaves 5; 2 from 3 leaves 1." This method adds 10 to each of the numbers before subtracting.

Pupils should follow one or the other method, rather than change from one to the other.

In practice the work appears as at the left.

WRITTEN EXERCISES

101. Copy, subtract, and test:

1.	2.	3.	4.	5.	6.	7.	8.
60	91	40	53	63	94	84	93
29	16	25	15	35	28	39	48
9.	**10.**	**11.**	**12.**	**13.**	**14.**	**15.**	**16.**
44	55	64	45	74	80	100	100
38	37	26	28	25	51	50	80
17.	**18.**	**19.**	**20.**	**21.**	**22.**	**23.**	**24.**
27	31	42	51	64	72	80	73
19	12	13	15	18	19	15	19
25.	**26.**	**27.**	**28.**	**29.**	**30.**	**31.**	**32.**
37	42	64	83	43	35	36	45
28	17	28	26	15	19	17	29

33.	34.	35.	36.	37.	38.	39.	40.
54	55	80	70	91	35	45	82
35	9	26	33	33	29	28	19

Change to columns, find the values, and test:

41. $42 - 15$.
42. $61 - 24$.
43. $83 - 15$.
44. $92 - 65$.
45. $52 - 15$.
46. $44 - 19$.
47. $67 - 28$.
48. $83 - 38$.
49. $91 - 56$.
50. $63 - 16$.
51. $63 - 38$.
52. $74 - 49$.

Subtract:

53.	54.	55.	56.	57.	58.
275	875	850	462	999	909
125	430	320	241	250	504

59.	60.	61.	62.	63.
\$ 7.55	125 lb.	440 yd.	175 gal.	250 ft.
\$ 5.25	100 lb.	220 yd.	125 gal.	120 ft.

Subtract and test:

64.	65.	66.	67.	68.	69.
360	491	540	753	663	894
129	216	225	415	335	528

70.	71.	72.	73.	74.	75.
384	993	744	655	964	545
139	448	438	237	626	328

102. 1. Julia bought a doll for 24¢ and gave the clerk a half dollar. How much change did she get?

2. How much must you add to 24 to make 51?

3. What number subtracted from 32 leaves 24?

4. A man paid $94 for a horse and cart. If he paid $18 for the cart, how much did the horse cost?

5. If your mother had 2 dozen eggs and used all of them except a half dozen, how many did she use?

6. A barrel of oil contained 53 gallons, but 15 gallons leaked out. How many gallons were left?

7. Walter weighs 95 lb. and Warren 88 lb. How many more pounds does Walter weigh than Warren?

8. A man bought a horse for $250 and sold him for $210. How much did he lose?

9. A farmer raised 275 bushels of wheat and sold 150 bushels of it. How many bushels had he left?

10. Thomas solved 83 problems out of 100. How many did he miss?

11. A train started on a "run" of 430 miles. After going 220 miles, it broke down. How far was the accident from the end of the "run"?

12. Jessie has a half dollar, a quarter, a dime, a nickel, and a penny in her bank; Anne has 2 quarters, 2 dimes, 2 nickels, and 2 pennies. Which has the more money? how much more?

13. There are 348 houses on Main Street and 195 on Third Street. How many more houses on Main Street than on Third Street?

14. A bin will hold 621 bu. of wheat. If 178 bu. are in the bin, how many bushels are needed to fill it?

15. Make a problem in subtraction and solve it.

MULTIPLICATION AND DIVISION TABLES

REVIEW OF TWOS AND THREES

103. Copy and memorize the following:

TABLE OF 2's

$2 \times 2 = 4$	$4 \div 2 = 2$	$\frac{1}{2}$ of $4 = 2$
$3 \times 2 = 6$	$6 \div 2 = 3$	$\frac{1}{2}$ of $6 = 3$
$4 \times 2 = 8$	$8 \div 2 = 4$	$\frac{1}{2}$ of $8 = 4$
$5 \times 2 = 10$	$10 \div 2 = 5$	$\frac{1}{2}$ of $10 = 5$
$6 \times 2 = 12$	$12 \div 2 = 6$	$\frac{1}{2}$ of $12 = 6$
$7 \times 2 = 14$	$14 \div 2 = 7$	$\frac{1}{2}$ of $14 = 7$
$8 \times 2 = 16$	$16 \div 2 = 8$	$\frac{1}{2}$ of $16 = 8$
$9 \times 2 = 18$	$18 \div 2 = 9$	$\frac{1}{2}$ of $18 = 9$
$10 \times 2 = 20$	$20 \div 2 = 10$	$\frac{1}{2}$ of $20 = 10$

TABLE OF 3's

$2 \times 3 = 6$	$6 \div 3 = 2$	$\frac{1}{3}$ of $6 = 2$
$3 \times 3 = 9$	$9 \div 3 = 3$	$\frac{1}{3}$ of $9 = 3$
$4 \times 3 = 12$	$12 \div 3 = 4$	$\frac{1}{3}$ of $12 = 4$
$5 \times 3 = 15$	$15 \div 3 = 5$	$\frac{1}{3}$ of $15 = 5$
$6 \times 3 = 18$	$18 \div 3 = 6$	$\frac{1}{3}$ of $18 = 6$
$7 \times 3 = 21$	$21 \div 3 = 7$	$\frac{1}{3}$ of $21 = 7$
$8 \times 3 = 24$	$24 \div 3 = 8$	$\frac{1}{3}$ of $24 = 8$
$9 \times 3 = 27$	$27 \div 3 = 9$	$\frac{1}{3}$ of $27 = 9$
$10 \times 3 = 30$	$30 \div 3 = 10$	$\frac{1}{3}$ of $30 = 10$

Copy and complete:

$11 \times 2 =$	$22 \div 2 =$	$\frac{1}{2}$ of $22 =$
$12 \times 2 =$	$24 \div 2 =$	$\frac{1}{2}$ of $24 =$
$11 \times 3 =$	$33 \div 3 =$	$\frac{1}{3}$ of $33 =$
$12 \times 3 =$	$36 \div 3 =$	$\frac{1}{3}$ of $36 =$

ORAL EXERCISES

104. 1. At 2 cents each, how much will four apples cost?

4 apples will cost 4 times 2 cents, or —— cents.

2. A boy has 3 marbles in each of 4 pockets. How many marbles has he?

3. To how many girls can I give 3 pins each, if I have 15 pins?

You can give to as many girls as the number of times 3 pins is contained in 15 pins, or —— girls.

4. At \$2 a yard how many yards of silk can be bought for \$12?

5. A pound of raisins costs 16 cents. How much does $\frac{1}{2}$ pound cost?

If raisins cost 16 cents a pound, $\frac{1}{2}$ pound will cost $\frac{1}{2}$ of 16 cents, or —— cents.

6. If 3 oranges fill one bag, how many bags will 27 oranges fill?

7. If 21 apples are divided equally among 3 boys, what part of the apples will each boy receive? How many apples will each boy receive?

8. How many 2's in 18? 22? 14? 10? 16? 24?

9. How many 3's in 12? 15? 24? 27? 21? 30?

MULTIPLICATION

WRITTEN EXERCISES

105. 1. Multiply 32 by 3.

32	32	**Multiplicand**
32	3	**Multiplier**
32	96	**Product**
96		

The answer may be found by addition, as shown at the left.

A shorter method by multiplication is shown at the right, where we say, or think, "3 times 2 are 6," and write the 6 under ones; then "3 times 3 are 9," and write the 9 under tens.

What is the number multiplied called? the number by which we multiply? the result?

Multiply:

2.	3.	4.	5.	6.
24	43	21	40*	23
2	2	3	2	3

* $2 \times 0 = 0$.

7.	8.	9.	10.	11.
32	33	34	22	44
2	3	2	3	2

12.	13.	14.	15.	16.
234	231	344	221	233
2	2	2	3	3

17.	18.	19.	20.	21.
3221	3112	5321	3443	3022
3	2	3	2	3

22. Multiply 46 by 2.

$$\begin{array}{r} 46 = 40 + 6 \\ \underline{2 \qquad\quad 2} \\ 92 = 80 + 12 = 92 \end{array}$$

In practice it is unnecessary to show the steps. Hence the work appears as at the left, where we say, or think, "2 times 6 are 12," set down the 2 under the ones, and "carry" the 1 ten, which is to be added to the product of tens. Then "2 times 4 are 8 (tens)," add the 1 ten carried, and set down 9 (tens), as shown.

23. Multiply 658 by 3.

$$\begin{array}{r} 658 \\ \underline{3} \\ 24 = 3 \times 8 \\ 150 = 3 \times 50 \\ \underline{1800 = 3 \times 600} \\ 1974 \end{array} \qquad \begin{array}{r} 658 \\ \underline{3} \\ 1974 \end{array}$$

At the left the ones, tens, and hundreds are multiplied separately, and the results are added.

At the right we proceed as follows:

$3 \times 8 = 24$. We write the 4 under the 8 and "carry" 2 tens. Then 3×5 tens $= 15$ tens. 15 tens + 2 tens = 17 tens, or 1 hundred and 7 tens. We write the 7 tens under the 5 tens, and "carry" the 1 hundred. Then 3×6 hundreds $= 18$ hundreds. 18 hundreds + 1 hundred = 19 hundreds, which we write as shown.

In practice the pupil need only think: "3 times 8 are 24" (writing 4); "3 times 5 are 15, and 2 are 17" (writing 7); "3 times 6 are 18; 18 and 1 are 19" (writing 19).

Multiply:

24.	**25.**	**26.**	**27.**	**28.**	**29.**
45	35	36	75	28	99
2	3	2	2	3	2

30.	31.	32.	33.	34.	35.
57	78	69	86	77	89
2	3	2	3	3	2

36.	37.	38.	39.	40.	41.
126	315	247	141	250	318
2	2	2	3	3	3

42.	43.	44.	45.	46.	47.
235	173	236	555	628	897
2	3	3	2	3	2

48.	49.	50.	51.	52.	53.
765	326	439	738	796	899
3	2	3	2	3	2

106. 1. If one cow costs $135, what will 2 such cows cost?

2. Jane puts 239 chestnuts in each of 3 bags. How many does she put in the 3 bags?

3. In making Christmas candies, Emily put 239 mints on each of 3 pans. How many mints did she put on all the pans?

4. Each of two boys hulls 339 walnuts. How many walnuts do both hull?

5. A grocer sends 3 letters to each of 285 customers. How many letters does he send to all?

6. If a certain school uses 469 arithmetics, how many arithmetics will two such schools use?

7. Mary gave to each of her two cousins $5.50. How much did she give to both cousins?

DIVISION

WRITTEN EXERCISES

107. 1. Divide 48 into 2 equal parts; that is, find $\frac{1}{2}$ of 48.

$48 = 4 \text{ tens} + 8 = 40 + 8$. **Divisor** $2)\overline{48}$ **Dividend**

$\overline{24}$ **Quotient**

$2)\overline{40+8}$

$20+4=24$ $\frac{1}{2}$ of 4 tens is 2 tens, and $\frac{1}{2}$ of 8 is 4. Hence $\frac{1}{2}$ of $48 = 24$.

In practice, we say "2 in 4 two times (writing 2 under 4 tens); 2 in 8 four times (writing 4 under 8)." The work appears as at the right.

What is the number divided called? the number by which we divide? What is the result called?

2. How many 3's are there in 39?

$3)\overline{30+9}$ In three tens there are 10 threes. In 9 ones there are 3 threes. Then how many 3's in 39? $3)\overline{39}$

$10+3=13$ $\overline{13}$

Find the values of:

3. $\frac{1}{2}$ of \$42.
4. $\frac{1}{3}$ of \$36.
5. $\frac{1}{2}$ of \$84.
6. $\frac{1}{3}$ of 99 ft.
7. $\frac{1}{2}$ of 64 in.
8. $\frac{1}{4}$ of 88 ¢.
9. $\frac{1}{2}$ of 624.
10. $\frac{1}{3}$ of 966.
11. $\frac{1}{2}$ of 468.

Find how many

12. 2's in 26.
13. 2's in 42.
14. 2's in 68.
15. 2's in 84.
16. 3's in 63.
17. 3's in 66.
18. 3's in 39.
19. 3's in 96.
20. 2's in 488.
21. 2's in 888.
22. 3's in 696.
23. 3's in 663.

Divide:

24.	25.	26.	27.	28.
2)866	2)444	3)696	2)486	3)396
29.	**30.**	**31.**	**32.**	**33.**
3)9633	2)4224	3)6366	2)4848	3)9999

108. 1. Since 3 times \$5 is \$15, we know that \$15 divided by 3 gives \$5 as a result.

2. How does the dividend compare with the product of the divisor and quotient? $3 \times \$5 =$ ——.

The product of the divisor and quotient equals the dividend.

3. In division the work is correct if the product of the divisor and quotient equals the dividend. Apply the test to the examples below.

WRITTEN EXERCISES

109. Divide and test:

1.	2.	3.	4.	5.
2)468	2)482	2)864	3)366	3)369
6.	**7.**	**8.**	**9.**	**10.**
2)884	2)480	2)464	3)696	2)800
11.	**12.**	**13.**	**14.**	**15.**
2)936	3)693	2)488	3)639	2)8000
16.	**17.**	**18.**	**19.**	**20.**
2)4888	2)4488	2)8888	3)999	3)9666

21. Find $\frac{1}{3}$ of 75.

$3)\underline{75}$
25

$\frac{1}{3}$ of 7 tens = 2 tens, and 1 ten remains undivided. This one ten and 5 = 15. $\frac{1}{3}$ of 15 = 5. The work is shown at the left.

TEST: $3 \times 25 = 75$.

22. Divide 7956 by 2.

$2)\underline{7956}$
3978

7 thousands ÷ 2 = 3 thousands, and 1 thousand remains undivided. This 1 thousand (10 hundreds) + 9 hundreds = 19 hundreds. 19 hundreds ÷ 2 = 9 hundreds, and 1 hundred remains undivided. 1 hundred + 5 tens = 15 tens. 15 tens ÷ 2 = 7 tens, and 1 ten remains undivided. 1 ten + 6 = 16. 16 ÷ 2 = 8. The work is shown at the left.

23. Divide 225 by 3.

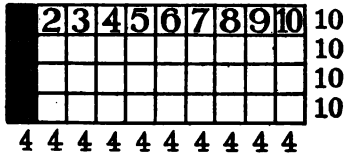
$3)\underline{225}$
75

Since 2 hundreds do not contain 3, we divide 22 tens by 3 and get 7 tens, and 1 ten remains. We write the 7 tens in the tens' column. Then 1 ten, or 10, added to 5 make 15. 15 ÷ 3 = 5.

Divide and test:

24.	**25.**	**26.**	**27.**	**28.**
$2)\underline{436}$	$2)\underline{112}$	$2)\underline{256}$	$2)\underline{178}$	$2)\underline{292}$
29.	**30.**	**31.**	**32.**	**33.**
$2)\underline{378}$	$2)\underline{454}$	$2)\underline{634}$	$2)\underline{806}$	$2)\underline{402}$
34.	**35.**	**36.**	**37.**	**38.**
$3)\underline{198}$	$3)\underline{195}$	$3)\underline{354}$	$3)\underline{642}$	$3)\underline{975}$
39.	**40.**	**41.**	**42.**	**43.**
$3)\underline{825}$	$3)\underline{435}$	$2)\underline{896}$	$2)\underline{668}$	$3)\underline{906}$

COUNTING BY FOURS



110. 1. How many rows of squares are shown in this rectangle? How many columns are there?

2. How many squares are there in one column? in 2 columns? (2 × 4 squares = —— squares.)

3. How many squares are there in 3 columns? in 4 columns? in 5 columns? in 6 columns? in 7 columns? in 8 columns? in 9 columns? in 10 columns?

In each case the answer may be obtained by addition. Thus, in 5 columns there are 4 squares + 4 squares + 4 squares + 4 squares + 4 squares, or 20 squares. This may be written

$$5 \times 4 \text{ squares} = 20 \text{ squares.}$$

When obtained by addition, the result is called a *sum*, as you have already learned. When regarded as 5 × 4 squares, it is called a **product.**

4. Count rapidly by 4's to 40. Count slowly and stop at each step long enough to fix in your mind the number of fours; thus,

4, 8 (2 4's), 12 (3 4's), 16 (4 4's), 20 (5 4's), 24 (6 4's), 28 (7 4's), 32 (8 4's), 36 (9 4's), 40 (10 4's).

5. The following may help you to see that 2 4's $= 8$, 3 4's $= 12$, etc.

4+	4+	4+	4+	4+	4+	4+	4+	4+	4
8	12	16	20	24	28	32	36	40	

Each number in the lower line gives the sum of the fours to that point.

6. You have learned that 2 4's, or 2 times 4, is written "2×4." You are now ready to write and *memorize* the following:

TABLE OF 4'S

$2 \times 4 = 8$	$8 \div 4 = 2$
$3 \times 4 = 12$	$12 \div 4 = 3$
$4 \times 4 = 16$	$16 \div 4 = 4$
$5 \times 4 = 20$	$20 \div 4 = 5$
$6 \times 4 = 24$	$24 \div 4 = 6$
$7 \times 4 = 28$	$28 \div 4 = 7$
$8 \times 4 = 32$	$32 \div 4 = 8$
$9 \times 4 = 36$	$36 \div 4 = 9$
$10 \times 4 = 40$	$40 \div 4 = 10$

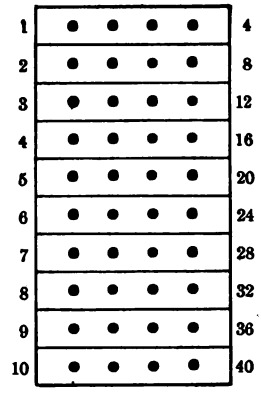
This table and the rectangle on the opposite page should be kept on the blackboard until pupils are familiar with all the facts.

7. If you cover all of the rectangle except the first two columns, you may see that 2×4 squares and 4×2 squares equal 8 squares each. Hence,

$$2 \times 4 = 4 \times 2.$$

8. In like manner, show that $3 \times 4 = 4 \times 3$. Also show that $10 \times 4 = 4 \times 10$.

111. 1. How many dots are shown in this picture? How many in each row?



How many rows are there? How many 4's in 40? $40 \div 4 =$

How many times 4 dots are there in 8 dots? $8 \div 4 =$

How many times 4 dots are there in 12 dots? $12 \div 4 =$

How many times 4 dots are there in 20 dots? $20 \div 4 =$

How many times 4 dots in 36 dots? $36 \div 4 =$

2. The upper row contains what part of the whole number of dots? How many dots does it contain?

$\frac{1}{10}$ of 40 dots = ——— dots. $\frac{1}{10}$ of 40 = ———.

$\frac{1}{4}$ of 40 dots = ——— dots. $\frac{1}{4}$ of 40 = ———.

$\frac{3}{4}$ of 40 dots = ——— dots. $\frac{3}{4}$ of 40 = ———.

112. Call and write results rapidly:

$3 \times 4 =$	$4 \times 5 =$	$9 \times 4 =$	$4 \times 4 =$	$6 \times 4 =$
$4 \times 3 =$	$8 \times 4 =$	$4 \times 9 =$	$4 \times 8 =$	$4 \times 7 =$
$5 \times 4 =$	$7 \times 4 =$	$10 \times 4 =$	$4 \times 6 =$	$4 \times 10 =$
$16 \div 4 =$	$24 \div 4 =$	$32 \div 4 =$	$40 \div 4 =$	$32 \div 4 =$
$36 \div 9 =$	$40 \div 10 =$	$20 \div 5 =$	$12 \div 3 =$	$24 \div 6 =$
$30 \div 10 =$	$28 \div 7 =$	$20 \div 10 =$	$30 \div 3 =$	$24 \div 8 =$

Copy and complete:

$2 \times (\ ) = 8.$	$(\ ) \times 7 = 28.$	$12 = (\ ) \times 4.$
$5 \times (\ ) = 20.$	$8 \times (\ ) = 32.$	$24 = (\ ) \times 4.$
$6 \times (\ ) = 24.$	$9 \times (\ ) = 36.$	$40 = 4 \times (\ ).$

ORAL EXERCISES

113. 1. If one butterfly has 4 wings, how many wings have two butterflies? 3 butterflies?

2. If one cord of wood costs $ 4, what will 4 cords cost?

3. John places 4 books on each of 8 shelves. How many books does he place on the shelves?

4. There are 3 yards of ribbon in Mary's sash. How many feet long is her sash? (3 feet = 1 yard.)

5. If a dozen eggs cost 30 cents, what will $\frac{1}{3}$ of a dozen cost?

6. How many quarts in 8 gallons? (4 quarts equal 1 gallon.)

7. If a gallon of milk costs 12 cents, what will a quart cost?

8. Each of 9 boys ate 4 cakes. How many cakes did they eat? how many dozen?

9. How many inches in $\frac{1}{3}$ of a yard? in $\frac{1}{4}$ of a yard? (36 inches equal 1 yard.)

10. If a man divides 24 pears among some children, giving each child 4 pears, how many children are there?

11. A farmer packs 21 bushels of apples in barrels, putting 3 bushels in each barrel. How many barrels does he use?

12. What will 4 pounds of rice cost at 8¢ a pound?

13. If 1 lb. of butter costs 28¢, what will $\frac{1}{4}$ lb. cost?

ORAL EXERCISES

119. 1. How many 5's in 35? How many 7's in 35?

2. How many nickels in 50 cents?

3. How many dimes in 50 cents?

4. If you give $\frac{1}{5}$ of 50 cents for a handkerchief, how many dimes do you give for it?

5. If you have 28 cents, how many 5-cent oranges can you buy, and how many cents over will you have?

6. A boy has 32 cents. How many 5-cent pies can he buy and how many cents will he have over?

7. How many times, and how many over, is 5 contained in each of the following numbers?

17, 23, 37, 49, 30, 29, 16, 12, 24, 40, 54, 60.

WRITTEN EXERCISES

120. Multiply:

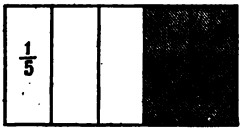
1.	2.	3.	4.	5.	6.
15	20	25	44	54	35
5	5	5	5	5	5
7.	**8.**	**9.**	**10.**	**11.**	**12.**
36	56	67	47	78	87
5	5	5	5	5	5
13.	**14.**	**15.**	**16.**	**17.**	**18.**
125	130	115	105	123	175
5	5	5	5	5	5

Divide:

19.	20.	21.	22.	23.	24.
5)125	5)145	5)115	5)625	5)575	5)725

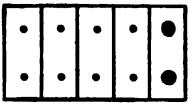
PARTS OF OBJECTS AND OF GROUPS

121. 1. Into how many equal parts is this rectangle divided?



One of the five equal parts of anything is called *one fifth*. It is written $\frac{1}{5}$.

2. How many fifths of the rectangle are dark? How many are light? Write two fifths; three fifths.



3. The card is divided into —— equal parts. Show me one fifth of the card.

Show me $\frac{1}{5}$ of the dots on the card.

$\frac{1}{5}$ of 10 dots = —— dots.

How many fifths of the dots are large?

$\frac{2}{5}$ of 10 dots = —— dots.

$\frac{3}{5}$ of 10 dots = —— dots.

$\frac{4}{5}$ of 10 dots = —— dots.

122. Call results rapidly; copy and complete:

$\frac{1}{2}$ of 10 = ( ).	$\frac{1}{5}$ of 15 = ( ).	$\frac{3}{5}$ of 15 = ( ).
$\frac{1}{3}$ of 15 = ( ).	$\frac{3}{4}$ of 16 = ( ).	$\frac{1}{3}$ of 18 = ( ).
$\frac{1}{4}$ of 16 = ( ).	$\frac{2}{5}$ of 15 = ( ).	$\frac{1}{2}$ of 18 = ( ).
$\frac{1}{2}$ of 24 = ( ).	$\frac{2}{3}$ of 9 = ( ).	$\frac{1}{5}$ of 50 = ( ).
$\frac{1}{3}$ of 24 = ( ).	$\frac{2}{3}$ of 18 = ( ).	$\frac{2}{5}$ of 20 = ( ).
$\frac{1}{4}$ of 24 = ( ).	$\frac{2}{3}$ of 24 = ( ).	$\frac{4}{5}$ of 30 = ( ).

ORAL EXERCISES

123. Call results rapidly:

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

Complete:

$2 \times (\ ) = 10$.	$(\ ) \times 5 = 30$.	$9 \times (\ ) = 45$.
$(\ ) \times 5 = 15$.	$8 \times (\ ) = 40$.	$(\ ) \times 5 = 35$.
$5 \times (\ ) = 25$.	$(\ ) \times 5 = 40$.	$(\ ) \times 10 = 50$.

Memorize and call products by lines:

$3 \times 2 = 6$.	3×2 tens $= 6$ tens.	$3 \times 20 = 60$.
$4 \times 2 = 8$.	4×2 tens $= 8$ tens.	$4 \times 20 = 80$.
$5 \times 2 = 10$.	5×2 tens $= 10$ tens.	$5 \times 20 = 100$.
$5 \times 3 = 15$.	5×3 tens $= 15$ tens.	$5 \times 30 = 150$.
$5 \times 4 = 20$.	5×4 tens $= 20$ tens.	$5 \times 40 = 200$.

Tell the products:

20	20	20	20	20	20	20
2	3	4	5	6	7	8
30	30	30	30	30	30	40
4	5	6	7	8	9	5

Give results:

$50 \div 5 =$	$35 \div 5 =$	$\frac{1}{10}$ of $50 =$
$30 \div 5 =$	$50 \div 10 =$	$\frac{2}{10}$ of $50 =$
$40 \div 5 =$	$30 \div 10 =$	$\frac{1}{5}$ of $50 =$
$45 \div 5 =$	$40 \div 10 =$	$\frac{5}{10}$ of $50 =$

124. 1. How many horses can a blacksmith shoe with 20 shoes?

2. A man had $25 and paid $\frac{1}{5}$ of it for a pair of shoes. How much did the shoes cost?

3. If a boy walks 2 miles an hour, how far does he walk in 10 hours?

4. A grocer had 15 bushels of potatoes and sold $\frac{1}{5}$ of them. How many bushels had he left?

5. Divide 20 apples equally among 5 boys. How many apples will each boy have?

6. At 20¢ a pound, how much must you pay for $\frac{1}{2}$ of a pound of grapes? for $\frac{1}{5}$ of a pound of grapes?

7. If you have 25 oranges, how many times can you give away oranges if you give 5 each time?

8. How many quarts are there in 5 gallons? in 9 gallons?

9. Mr. Hart has 10 barrels of apples. If there are 3 bu. in each barrel, how many bushels has he?

10. I have 4 rows of peach trees. If there are 5 trees in each row, how many trees have I?

11. How many weeks are there in 35 days?

12. Ernest took 40 pecks of potatoes to the store. How many bushels did he take?

13. At 5 cents a ride, how many street-car rides can you take for 50 cents?

14. Mr. Henry gave $1 to his children. If each child received a dime, how many children had he?

WRITTEN EXERCISES

125. 1. Multiply each number by 5: 324; 1615; 1786.

2. Divide each number by 5: 245; 3875; 6265.

3. How many flags at 5 cents apiece could I buy for 57 cents? How many cents would I have left?

4. How many 5-cent stamps can I buy for 99¢, and how many cents will I have left?

5. At $5 a ton, how many tons of coal can be bought for $280?

6. Our cow gives eight quarts of milk a day. How many gallons does she give in five days?

7. Ben had 30 cents and gave $\frac{1}{5}$ of it for a top. How much money had he left?

8. A bricklayer divides 5285 bricks into 5 equal piles. How many bricks does he put into each pile?

9. A man earns $1250 a year and spends $935 a year. How much does he save in 5 years?

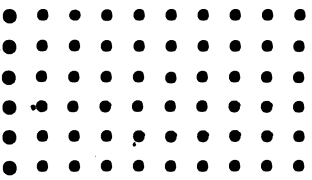
10. How many words will a girl learn to spell in 365 days, if she learns 5 words each day?

11. If a box of pens cost 85 cents, how much will $\frac{1}{5}$ of them cost?

12. Mary gives away $\frac{1}{5}$ of 625 apples, and Grace gives away $\frac{1}{5}$ of 540 apples. How many apples do both give away?

13. Which is the greater, and how much greater, $\frac{1}{5}$ of 720 or $\frac{1}{4}$ of 576?

COUNTING BY SIXES



126. 1. How many dots are there in each row in the picture? How many rows of 10 dots each? How many dots in all?

6×10 dots = —— dots. $6 \times 10 =$ ——.

2. How many large dots do you see? How many *sixes* are there?

10×6 dots = —— dots. $10 \times 6 =$ ——.

3. In 60 there are how many 10's? how many 6's? How many times can you take 10 dots from 60 dots?

60 dots $\div$ 10 dots = ——. $60 \div 10 =$ ——.

4. The large dots are what part of the 60 dots?

$\frac{1}{10}$ of 60 dots = —— dots. $\frac{1}{10}$ of 60 = ——.

5. How many tenths of the 60 dots equal $\frac{1}{2}$ of them?

6. Ten dots are what part of 60 dots?

$\frac{1}{6}$ of 60 dots = —— dots. $\frac{1}{6}$ of 60 = ——.

7. How many sixths of 60 equal $\frac{1}{2}$ of 60? How many sixths of 60 equal $\frac{1}{3}$ of 60?

8. How many small dots are there in the picture on the preceding page? How many rows of 9 small dots are there? How many columns of 6 small dots each?

6×9 dots = —— dots. 9×6 dots = —— dots.

9. Prove by addition that $9 \times 6 = 6 \times 9$.

10. Draw a rectangle 10 inches long and 6 inches wide, and draw horizontal and vertical lines to divide it into squares 1 inch on a side.

How many one-inch squares, or square inches, does it contain? How many times does it contain 6 square inches? 10 square inches?

11. How many square inches are there in $\frac{1}{6}$ of the rectangle?

60 sq. in. $\div 6$ = —— sq. in.

12. How many sixths of the rectangle equal $\frac{1}{3}$ of it?

13. Count by 6's to 60, writing the number of 6's in each sum (or product), as here shown:

	6+	6+	6+	6+	6+	6+	6+	6+	6+	6
Sums:	12	18	24	30	36	42	48	54	60	

127. Complete and memorize:

TABLE OF 6'S

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

Show by addition that 11×6 (or 6×11) $= 66$, and that 12×6 (or 6×12) $= 72$.

ORAL EXERCISES

128. Give results:

1. $30 \div 6 =$	6. $4 \times 7 =$	11. $\frac{1}{6}$ of $30 =$
2. $42 \div 6 =$	7. $6 \times 8 =$	12. $\frac{1}{6}$ of $48 =$
3. $54 \div 6 =$	8. $4 \times 8 =$	13. $\frac{1}{6}$ of $54 =$
4. $36 \div 6 =$	9. $5 \times 8 =$	14. $\frac{1}{6}$ of $36 =$
5. $60 \div 6 =$	10. $5 \times 9 =$	15. $\frac{1}{6}$ of $60 =$

16.	17.	18.	19.	20.
$6\overline{)54}$	$9\overline{)54}$	$6\overline{)60}$	$10\overline{)60}$	$6\overline{)48}$
21.	**22.**	**23.**	**24.**	**25.**
$5\overline{)40}$	$4\overline{)40}$	$10\overline{)40}$	$6\overline{)42}$	$8\overline{)48}$

129. 1. How much will 10 pounds of sugar cost at 6¢ a pound?

2. Five boys bought a ball for 50 cents, sharing the cost equally. How much did each pay?

3. Maud had 11 nickels. If she gave 50 cents for a doll, how much had she left?

4. At 6¢ a pound, what will 12 lb. of rice cost?

5. A bushel of wheat weighs 60 pounds. What is the weight of a half bushel?

6. Six windows contain 48 panes of glass. How many panes are there in each window?

7. If each of 7 boys made 6 snowballs, how many did all of them have?

8. If a horse walks a mile in ten minutes, how many miles will he walk in an hour at that rate?

WRITTEN EXERCISES

130. Copy, multiply, and prove:

1.	2.	3.	4.	5.
123	456	789	324	567
6	6	6	6	6

Copy, divide, and prove:

6.	7.	8.	9.	10.
6)738	6)846	6)690	6)948	6)1296

11. If you have 6 recitations a day, how many will you have in a week? in a school month (4 weeks)?

12. Find the cost of 4 primers at 20¢ each, 5 readers at 30¢ each, and 6 histories at 50¢ each.

13. If a man earns $3.50 a day, how much will he earn in 6 days?

14. Frank gathers 6 times as many nuts as John, who gathers 128 nuts. How many nuts does Frank gather?

15. If each hen averages 212 eggs a year, how many eggs will 6 hens lay in one year?

16. If a ship has sailed $\frac{1}{6}$ of 960 miles, how many miles has it sailed?

17. A firm distributes $234 equally among 6 clerks. How much does each receive?

18. From the product of 675 and 6 take the product of 324 and 5.

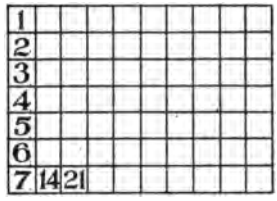
19. $835 \div 6 = ?$

20. $9367 \div 6 = ?$

21. $2745 \div 6 = ?$

22. $4738 \div 6 = ?$

COUNTING BY SEVENS



131. 1. Count these squares by 7's in columns. How many squares are there?

Test the result by counting them by 10's in rows.

$$10 \times 7 = 7 \times 10.$$

2. How many are $7 + 7$, or *two* 7's? $7 + 7 + 7$, or *three* 7's? $7 + 7 + 7 + 7$, or *four* 7's? Continue to ten 7's.

3. Now count by 7's, as follows: "*One* 7 is 7, *two* 7's are 14, *three* 7's are 21, *four* 7's are 28," and so on.

4. Count again in this way: "In 7 there is one 7, in 14 there are two 7's, in 21 there are three 7's," and so on to ten 7's in 70.

132. Complete and memorize:

TABLE OF 7'S

$2 \times 7 = 14.$	$5 \times 7 =$	$8 \times 7 =$
$3 \times 7 =$	$6 \times 7 =$	$9 \times 7 =$
$4 \times 7 =$	$7 \times 7 =$	$10 \times 7 =$

Show by addition that 11×7 (or 7×11) $= 77$; and that 12×7 (or 7×12) $= 84$.

133. 1. Cover three columns of the rectangle on the preceding page, and note that you have left a square containing 7 rows with 7 small squares in each. It contains 49 small squares. $7 \times 7 = 49$.

2. Cover a part of the rectangle and show that $7 \times 8 = 8 \times 7$. Show the same by addition.

3. How many 7's in 60? how many over?
How many 7's in 68? how many over?

ORAL EXERCISES

134. Give the answers:

1. $9 \times 5 =$	7. $45 \div 5 =$	13. $\frac{1}{7}$ of $35 =$
2. $8 \times 7 =$	8. $35 \div 7 =$	14. $\frac{1}{7}$ of $49 =$
3. $9 \times 7 =$	9. $49 \div 7 =$	15. $\frac{1}{7}$ of $56 =$
4. $7 \times 6 =$	10. $42 \div 6 =$	16. $\frac{1}{7}$ of $63 =$
5. $9 \times 6 =$	11. $63 \div 9 =$	17. $\frac{1}{7}$ of $77 =$
6. $9 \times 4 =$	12. $56 \div 7 =$	18. $\frac{1}{7}$ of $84 =$

19.	20.	21.	22.	23.
$7\overline{)63}$	$8\overline{)56}$	$9\overline{)54}$	$10\overline{)70}$	$7\overline{)77}$
24.	**25.**	**26.**	**27.**	**28.**
$8\overline{)48}$	$6\overline{)54}$	$4\overline{)44}$	$11\overline{)77}$	$7\overline{)84}$

135. 1. How many days are there in 7 weeks? How many school days?

2. Tom earned 10¢ a day for 7 days. How much did he lack of earning 1 dollar?

3. Lizzie and Anne each spend \$5 a month. How much do both spend in 7 months?

4. How many bushels are there in 28 pecks?

5. At 12¢ a quart, how much will 7 quarts of chestnuts cost?

6. If 9 children gave 5 cents apiece to the Aid Society, how much did all give?

7. A schoolroom has 42 desks in 7 rows of equal length. How many desks are there in each row?

8. How many tablets at 7¢ each can be bought for 87¢, and how many cents will be left?

WRITTEN EXERCISES

136. Multiply and prove:

1.	2.	3.	4.	5.	6.
146	457	276	677	568	399
7	7	7	7	7	7

Divide and prove:

7.	8.	9.	10.	11.	12.
7)357	7)2870	7)4228	7)658	7)4284	7)8687

13. A man bought 7 horses at $135 each, and sold them at $275 each. What was his gain?

14. Seven girls in a domestic art class spent $2 each for material for a dress and 5 cents for thread. How much did the class spend?

15. A car line is 7 miles long. How far does a car run in making 5 round trips?

16. Divide 6729 by 7. What is the quotient? the remainder?

COUNTING BY EIGHTS

137. 1. Draw a rectangle 10 inches by 8 inches and divide it into one-inch squares. Count the squares by 8's. How many squares are there?

2. Count by 8's to 80, thus: "Once 8 is 8; two times 8 are 16; three times 8 are 24"; and so on.

3. Use the rectangle to show that $10 \times 8 = 8 \times 10$.

4. How many squares are there in 9 columns?

$9 \times 8 = 72$. $8 \times 9 =$ ——.

5. How many rows of 10 squares each are there? How many times are 10 squares contained in 80 squares? $8 \times 10 =$ ——. $80 \div 10 =$ ——.

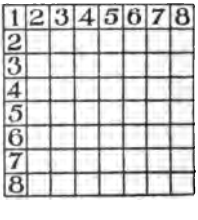
6. Add 8 to 10×8 and find the result of 11×8. Add another 8 and find the result of 12×8.

138. Complete and memorize:

TABLE OF 8's

$2 \times 8 = 16$.	$5 \times 8 =$	$8 \times 8 =$
$3 \times 8 =$	$6 \times 8 =$	$9 \times 8 =$
$4 \times 8 =$	$7 \times 8 =$	$10 \times 8 =$

139. 1. Draw a square 8 inches on a side, and divide it into square inches.



2. How many square inches have you in the upper row? How many rows have you? How many square inches are there in the square?

8×8 sq. in. = —— sq. in. $8 \times 8 = 64$.

3. Draw a square 7 inches by 7 inches, and find how many square inches it contains. $7 \times 7 =$ ——.

4. Numbers like 49 and 64 that can be represented by squares are called **squares** or **square numbers**. The sides of a square are equal, and so are the numbers which multiplied together make a square number.

5. Each table has one square. Can you name the square in the table of 2's? in the table of 3's? in the table of 4's? in the table of 5's? in the table of 6's?

ORAL EXERCISES

140. Find the value of:

1. $32 \div 8$.	7. $\frac{1}{3}$ of 30.	13. $\frac{1}{8}$ of 32.
2. $40 \div 8$.	8. $\frac{2}{3}$ of 30.	14. $\frac{1}{8}$ of 40.
3. $72 \div 8$.	9. $\frac{1}{5}$ of 40.	15. $\frac{1}{8}$ of 72.
4. $48 \div 8$.	10. $\frac{2}{5}$ of 40.	16. $\frac{1}{8}$ of 64.
5. $64 \div 8$.	11. $\frac{1}{4}$ of 40.	17. $\frac{1}{8}$ of 96.
6. $56 \div 8$.	12. $\frac{1}{2}$ of 80.	18. $\frac{1}{8}$ of 88.

19.	20.	21.	22.	23.	24.
9×7.	8×7.	11×8.	$7\overline{)63}$	$8\overline{)88}$	$8\overline{)96}$

141. 1. Sallie had 7 dimes and a nickel. After spending 25¢, how much money had she left?

2. A flag has 8 rows of stars. If each row has 4 stars, how many stars are there on the flag?

3. A barrel contains 40 gallons of oil. How many 5-gallon cans will it fill?

4. If I have 80 cents, to how many boys can I give 10 cents each?

5 Uncle Joshua is 60 years old. If I am $\frac{1}{5}$ as old, what is my age?

6. If one quart of ice cream serves 8 persons, how many persons will 1 gallon serve?

7. If 7 pounds of maple sugar cost 84¢, what is the price a pound?

8. How many weeks are there in 50 days? How many days over?

9. If a bushel of barley weighs 48 pounds, what will a peck of barley weigh?

10. How many strips 8 inches wide can be cut from cloth that is 48 inches wide?

WRITTEN EXERCISES

142. Multiply:

1.	2.	3.	4.	5.	6.
27	38	42	54	48	27
8	8	8	8	8	8

7.	8.	9.	10.	11.	12.
53	72	49	76	88	99
8	8	8	8	8	8

Divide:

13.	14.	15.	16.	17.	18.
8)816	8)752	8)520	8)912	8)536	8)944

143. 1. Sam earns 60¢ a day and Tom 48¢. How much more does Sam earn in a day than Tom? in 8 days?

2. If 36 eggs were sold from a box containing 8 dozen, how many eggs were left?

3. If 1 bushel of coal weighs 80 pounds, what will 8 bushels weigh?

4. A family bought 2 pints of milk a day during February, 1915. How many pints did it buy? how many gallons?

5. What was the February milk bill at 20¢ a gallon?

6. There are 8 quarts in 1 peck. How many quarts are there in 432 pecks?

7. How many pecks are there in 7288 quarts?

8. If a peck of seed costs 88¢, what will 8 qt. cost?

9. A man has $899. How many tables at $8 each can he buy, and how much money will he have left?

10. If there are 8 apples in each bag, how many apples are there in 776 bags?

11. John has 11¢ and Frank has 8 times as much. How much money have both?

12. Find the sum of the product of 7 times 38 and the product of 8 times 97.

13. Find the quotient and remainder of 8374 divided by 8.

COUNTING BY NINES

144. 1. Count by 9's from 0 to 90, thus:

9 18 27 36 45 54 63 72 81 90

2. Count by 9's, saying, "One 9 is 9, two 9's are 18, three 9's are 27," and so on, to 90.

3. Tell how many 9's there are in each number in the lower row, saying, "In 9 there is one 9, in 18 there are two 9's," and so on:

9+ 9+ 9+ 9+ 9+ 9+ 9+ 9+ 9+ 9
18 27 36 45 54 63 72 81 90

145. Complete and memorize the following:

TABLE OF 9's

$2 \times 9 = 18.$	$5 \times 9 =$	$8 \times 9 =$
$3 \times 9 =$	$6 \times 9 =$	$9 \times 9 =$
$4 \times 9 =$	$7 \times 9 =$	$10 \times 9 =$

1. Prove by addition that each pair of factors (numbers multiplied together) gives the same product backward and forward, thus:

$$4 \times 9 = 9 \times 4.$$

2. Add 9 to 10×9, and find the value of 11×9. Add another 9 and find the value of 12×9.

3. Name the square number in the table of 9's.

4. What is the smallest number that can be expressed by two figures? What is the largest number?

COUNTING BY TENS

146. You have already learned to count by 10's almost without knowing it (Art. 24). The facts are summarized below.

Complete and memorize the following:

TABLE OF 10'S

$2 \times 10 = 20.$	$5 \times 10 =$	$8 \times 10 =$
$3 \times 10 =$	$6 \times 10 =$	$9 \times 10 =$
$4 \times 10 =$	$7 \times 10 =$	$10 \times 10 =$

1. Add 10 to 10×10, and find the value of 11×10. Add another 10, and find the value of 12×10.
2. Prove by addition that $11 \times 10 = 10 \times 11$, and that $12 \times 10 = 10 \times 12$.
3. Call the products of 10 multiplied by 3, 5, 7, 4, 6, 9, 8, 10.
4. Count by 10's from 0 to 120.
5. How many 10's in 30, 50, 70, 60, 90, 100?

ORAL EXERCISES

147. Find the values of:

1. $5 \times 9.$	5. $9 \times 10.$	9. $45 \div 9.$
2. $9 \times 7.$	6. $90 \div 9.$	10. $72 \div 9.$
3. $8 \times 9.$	7. $63 \div 9.$	11. $60 \div 10.$
4. $6 \times 10.$	8. $54 \div 9.$	12. $80 \div 10.$

13.	14.	15.	16.	17.
$4 \times 10.$	$11 \times 10.$	$12 \times 10.$	$10\overline{)90}$	$10\overline{)100}$

148. 1. How many dimes are there in 90¢?

2. Grace has 9 beads, and Mary has 10 times as many. How many beads has Mary?

3. John is $\frac{1}{9}$ as old as his father, who is 27 years old? How old is John?

4. A book costs 9 times 10 cents and 4 cents more. How much does it cost?

5. A lady has $45, which she divides equally among 9 children. How much does each child receive?

6. A farmer bought 9 calves at $10 each and 6 at $9 each. How much did they all cost?

7. If I pay $80 for a horse and $\frac{1}{10}$ as much for a saddle, how much does the saddle cost?

8. At his last birthday Jack was 84 months old. How many years old was he?

9. At 9 cents a yard, what will 8 yards of cloth cost?

WRITTEN EXERCISES

149. Multiply:

1.	2.	3.	4.	5.	6.
14	13	15	18	16	19
9	9	9	9	9	9

7.	8.	9.	10.	11.	12.
22	25	28	39	45	72
9	9	9	9	9	9

13.	14.	15.	16.	17.	18.
101	214	325	208	496	892
9	9	9	9	9	9

Divide:

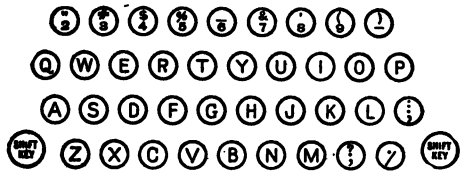
19.	20.	21.	22.	23.
9)180	9)189	9)288	9)198	9)657

24.	25.	26.	27.	28.
9)297	9)369	9)378	9)1935	9)7245

150. 1. If you learn 9 words in spelling each day, how many words do you learn in 174 days?

2. Mr. Jones has 657 fancy buttons. If he places 9 buttons on a card, how many cards will he require for all of his buttons?

3. This keyboard contains 4 banks (rows) of keys. The two middle rows have 10 keys each, and the other



two 9 each. How many keys has the machine? If each key contains 2 characters (letters, figures, etc.), how many characters has the machine? $38 + 38 =$

4. If Russell writes 5 pages an hour on a machine, how many pages can he write in an 8-hour day? At 10¢ a page, how much will he earn?

REVIEW TABLES AND PRACTICE WORK

151. By this time you should know by heart the product of any two numbers from 1 to 10. But to make certain of this, memorize the following tables.

MULTIPLICATION TABLES

$1 \times 2 = 2$	$1 \times 3 = 3$	$1 \times 4 = 4$	$1 \times 5 = 5$
$2 \times 2 = 4$	$2 \times 3 = 6$	$2 \times 4 = 8$	$2 \times 5 = 10$
$3 \times 2 = 6$	$3 \times 3 = 9$	$3 \times 4 = 12$	$3 \times 5 = 15$
$4 \times 2 = 8$	$4 \times 3 = 12$	$4 \times 4 = 16$	$4 \times 5 = 20$
$5 \times 2 = 10$	$5 \times 3 = 15$	$5 \times 4 = 20$	$5 \times 5 = 25$
$6 \times 2 = 12$	$6 \times 3 = 18$	$6 \times 4 = 24$	$6 \times 5 = 30$
$7 \times 2 = 14$	$7 \times 3 = 21$	$7 \times 4 = 28$	$7 \times 5 = 35$
$8 \times 2 = 16$	$8 \times 3 = 24$	$8 \times 4 = 32$	$8 \times 5 = 40$
$9 \times 2 = 18$	$9 \times 3 = 27$	$9 \times 4 = 36$	$9 \times 5 = 45$
$10 \times 2 = 20$	$10 \times 3 = 30$	$10 \times 4 = 40$	$10 \times 5 = 50$

$1 \times 6 = 6$	$1 \times 7 = 7$	$1 \times 8 = 8$	$1 \times 9 = 9$
$2 \times 6 = 12$	$2 \times 7 = 14$	$2 \times 8 = 16$	$2 \times 9 = 18$
$3 \times 6 = 18$	$3 \times 7 = 21$	$3 \times 8 = 24$	$3 \times 9 = 27$
$4 \times 6 = 24$	$4 \times 7 = 28$	$4 \times 8 = 32$	$4 \times 9 = 36$
$5 \times 6 = 30$	$5 \times 7 = 35$	$5 \times 8 = 40$	$5 \times 9 = 45$
$6 \times 6 = 36$	$6 \times 7 = 42$	$6 \times 8 = 48$	$6 \times 9 = 54$
$7 \times 6 = 42$	$7 \times 7 = 49$	$7 \times 8 = 56$	$7 \times 9 = 63$
$8 \times 6 = 48$	$8 \times 7 = 56$	$8 \times 8 = 64$	$8 \times 9 = 72$
$9 \times 6 = 54$	$9 \times 7 = 63$	$9 \times 8 = 72$	$9 \times 9 = 81$
$10 \times 6 = 60$	$10 \times 7 = 70$	$10 \times 8 = 80$	$10 \times 9 = 90$

$1 \times 10 = 10$	$4 \times 10 = 40$	$7 \times 10 = 70$	$10 \times 10 = 100$
$2 \times 10 = 20$	$5 \times 10 = 50$	$8 \times 10 = 80$	$11 \times 10 = 110$
$3 \times 10 = 30$	$6 \times 10 = 60$	$9 \times 10 = 90$	$12 \times 10 = 120$

152.

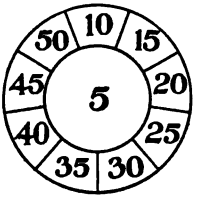
2×2	3×2	4×2	5×2	6×2	7×2	8×2	9×2	10×2
	3×3	4×3	5×3	6×3	7×3	8×3	9×3	10×3
		4×4	5×4	6×4	7×4	8×4	9×4	10×4
			5×5	6×5	7×5	8×5	9×5	10×5
				6×6	7×6	8×6	9×6	10×6
					7×7	8×7	9×7	10×7
						8×8	9×8	10×8
							●×9	10×9
								10×10

After placing this table on the blackboard, give the different products instantly as the factors are pointed out by the teacher.

Find in the table the products that are square numbers.

NOTE. The table should be kept on the blackboard and used until pupils can think or call products at sight or sound. Thus, the product of 6 × 5 or 5 × 6 should be given by the pupil without hesitation as 30.

153. Place one factor, as 5, at the hub and its products to 50 in the rim. When the teacher points to a number in the rim, call the other factor promptly.



NOTE. The numbers should be changed from time to time until all numbers from 2 to 10 have appeared at the hub.

154. Give results quickly:

3 ÷ 3	6 ÷ 2	9 ÷ 9	10 ÷ 2	12 ÷ 4
4 ÷ 2	8 ÷ 8	6 ÷ 3	12 ÷ 6	14 ÷ 7
6 ÷ 6	9 ÷ 3	4 ÷ 4	10 ÷ 5	12 ÷ 2
8 ÷ 4	7 ÷ 7	8 ÷ 2	12 ÷ 3	15 ÷ 5
16 ÷ 8	18 ÷ 6	20 ÷ 5	18 ÷ 3	21 ÷ 7
15 ÷ 3	16 ÷ 4	18 ÷ 9	25 ÷ 5	16 ÷ 2
14 ÷ 2	24 ÷ 8	30 ÷ 5	24 ÷ 4	21 ÷ 3
20 ÷ 4	18 ÷ 2	20 ÷ 2	27 ÷ 9	24 ÷ 6
22 ÷ 2	28 ÷ 7	30 ÷ 6	32 ÷ 8	35 ÷ 7
40 ÷ 8	36 ÷ 9	28 ÷ 4	24 ÷ 3	32 ÷ 4
27 ÷ 3	35 ÷ 5	45 ÷ 9	36 ÷ 6	42 ÷ 7
24 ÷ 2	42 ÷ 6	40 ÷ 5	30 ÷ 3	48 ÷ 8
36 ÷ 4	54 ÷ 9	49 ÷ 7	45 ÷ 5	33 ÷ 3
48 ÷ 6	56 ÷ 8	63 ÷ 9	56 ÷ 7	40 ÷ 4
50 ÷ 5	54 ÷ 6	64 ÷ 8	60 ÷ 6	55 ÷ 5
63 ÷ 7	48 ÷ 4	60 ÷ 5	72 ÷ 9	36 ÷ 3
81 ÷ 9	80 ÷ 8	90 ÷ 9	77 ÷ 7	72 ÷ 8
72 ÷ 6	99 ÷ 9	66 ÷ 6	96 ÷ 8	84 ÷ 7
70 ÷ 7	88 ÷ 8	44 ÷ 4	48 ÷ 8	45 ÷ 9

Call quotients and remainders:

37 ÷ 5	75 ÷ 8	47 ÷ 6	48 ÷ 7
35 ÷ 6	26 ÷ 4	90 ÷ 11	64 ÷ 10
48 ÷ 9	32 ÷ 3	79 ÷ 9	90 ÷ 12
73 ÷ 7	46 ÷ 4	58 ÷ 5	92 ÷ 8
54 ÷ 8	50 ÷ 6	61 ÷ 8	79 ÷ 7

155. 1. How many weeks are there in 364 days?

2. Draw a rectangle that contains 20 sq. in. Draw another that contains 20 sq. in. but of different shape. ($4 \times 5 =$ ——; $2 \times 10 =$ ——.)

3. Howard is 12 years old. If his age is $\frac{1}{3}$ of his father's age, how old is his father?

4. When oil is worth 20¢ a gallon, how much can be bought for 5¢? for $1?

5. If you buy 2 quarts of milk a day at 5¢ a quart, how much will your milk cost you for a week?

6. If 24 sheets of paper make a quire, how many sheets are there in a quire and a half?

7. John read 27 pages each day for 9 days. How many pages did he read?

8. If an oil can holds 5 gallons and a lamp holds 2 quarts, how many times can you fill the lamp from the can?

9. Find the cost of the following bill:

10 lb. coffee at 15¢ a pound . . .	$1.50
12 lb. sugar at 6¢ a pound . . .	
10 lb. rice at 5¢ a pound . . .	
2 doz. eggs at 14¢ a dozen . . .	

10. Find the cost of the following bill:

12 yd. sheeting at 10¢ a yard.
8 yd. suiting at 50¢ a yard.
10 yd. lining at 12¢ a yard.
1 doz. spools of thread at 5¢ each.

A CAMPING TRIP

156. 1. This picture shows 6 boys in camp. One boy hired a boat for four days at 50¢ a day. How much did he pay for boat hire?

2. Another boy rented a tent for $1.80 and 6 cots for $1.20. How much did they cost him?

3. Another boy bought 6 lines for $1.00 and 6 rods at 50¢ each. How much did he pay out?

4. The other three boys bought supplies as follows:

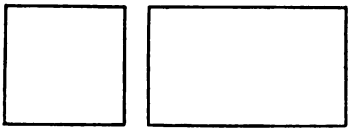
2 lb. bacon	30¢	4 lb. sugar	25¢
3 lb. crackers	30¢	3 doz. eggs	72¢
3 lb. gingersnaps	30¢	2 lb. butter	45¢
10 loaves of bread	50¢	1 gal. oil	18¢

What did these supplies cost each of the three boys if each of them paid the same amount?

5. What were the total expenses of the trip? What was each boy's share?

6. If they caught during the trip 80 trout, 60 bass, and 40 perch, how many fish did they catch in all? What was the average number of fish to each boy?

PERIMETER AND AREA



157. 1. How many sides has a square? how many square corners? How does a rectangle differ from a square?

2. The distance around a square (or other figure) is called its **perimeter**.

3. What name is given to a square each of whose sides is 1 inch long? 1 foot long?

4. Draw a rectangle 3 in. long and 2 in. wide. Divide it into one-inch squares, or square inches, by a horizontal line and two vertical lines.

How many square inches are there in 1 horizontal row? how many such rows?

Then, how many times 3 square inches are there in the rectangle? how many square inches?

2×3 square inches = —— square inches.

This product is called the **area** of the rectangle.

EXERCISES

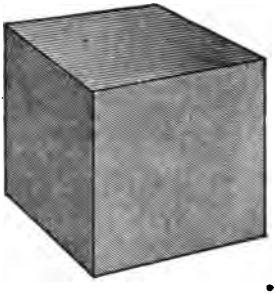
158. 1. A table is 6 ft. square. What is its perimeter? What is its area?

2. A rectangle is 7 ft. by 8 ft. What is its perimeter? What is its area?

3. The perimeter of a square is 32 ft. What is the length of a side? What is its area?

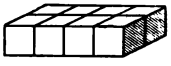
CUBES

159. 1. The picture shows a cube. It has six sides, or faces. Each face is 1 in. long and 1 in. wide.

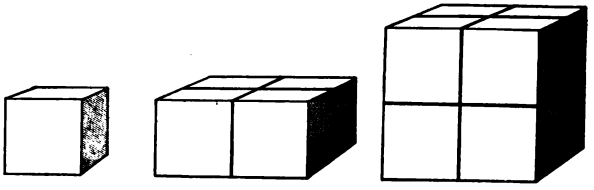


A cube that is 1 inch long, 1 in. wide, and 1 in. thick is called a **cubic inch** (cu. in.).

2. Take a block that is a cubic inch. Place 4 such blocks in a row, and 4 more beside these, as shown. How many cubic inches are there in the two rows? Place 8 more blocks on top of these. How many blocks are in both layers?



3. With 1-inch cubes build a cube 2 in. on each side. How many layers are there? How many



rows in each layer? How many cubes in both rows? in both layers? How many cubic inches in the cube?

4. A 1-inch cube is what part of the 2-inch cube? Point out $\frac{1}{4}$ of the 2-inch cube. Point out $\frac{1}{2}$ of it. How many fourths of the 2-inch cube equal $\frac{1}{2}$ of it?

THE OPERATIONS REVIEWED

ADDITION AND SUBTRACTION

160. How can you test your work in addition? in subtraction? (See Arts. 80 and 94.)

ORAL EXERCISES

161. Add 8 to each number in each column:

43	44	55	76	57	88
53	54	45	56	67	68
63	74	75	46	87	48
73	64	85	86	47	28

Vary this exercise by using other numbers, smaller than 10, in place of 8.

162. Subtract 6 from each number in each line:

42	51	60	73	81	90
41	53	64	75	83	95
45	54	62	71	82	84

Vary this exercise by using other numbers, smaller than 10, in place of 6.

163. Numbers of two figures may be readily added mentally. If, for example, you desire to know the sum of 45 and 24, you may start with 45 and think as follows: 45, 65, 69. What was first added to 45? Then what was added?

Or, starting as before, you may think 45, 49, 69. In this case, what was first added to 45? what next?

Read results, as explained on the preceding page:

25 + 22.	24 + 55.	64 + 32.	81 + 18.
35 + 33.	72 + 27.	44 + 55.	65 + 31.
58 + 31.	63 + 35.	42 + 25.	56 + 43.

164. Going a step farther, you may add orally when "carrying" is needed. Thus, you may add 64 and 27 by thinking 64, 84, 91; or 64, 71, 91.

Read results, as explained above:

25 + 17.	42 + 39.	39 + 27.	15 + 77.
36 + 14.	55 + 36.	81 + 19.	22 + 39.

WRITTEN EXERCISES

165. 1. Add 697 and 545; also 2458 and 1973.

(*a*)		(*b*)	(*c*)
697		697	2458
545		545	1973
12	= sum of ones	1242	4431
13	= sum of tens		
11	= sum of hundreds		
1242	= sum of 697 and 545		

In (*a*) we add each column separately and then add the sums In practice two additions are avoided, as in (*b*) and (*c*). Thus, in (*b*) we write 2 under the ones, and add the 1 ten to the 4 tens and 9 tens, making 14 tens. We then write the 4 in the tens' place, and add the 1 hundred to the 5 hundreds and 6 hundreds, making 12 hundreds, or 1 thousand 2 hundreds, which we write as shown.

Tell how we find the sum in (*c*). In what place do we write the sum of the thousands?

Note that in setting down numbers for addition we ***keep the ones' column in a vertical line.***

Add and test:

2.	3.	4.	5.
785	243	762	624
199	986	218	468

6.	7.	8.	9.
976	872	658	978
844	769	973	794

10.	11.	12.	13.
448	590	838	240
615	125	915	917
730	484	572	503

14.	15.	16.	17.
1834	3391	4276	4456
1216	3075	627	1122
2345	914	1769	1945

18.	19.	20.	21.
2473	3327	4126	2763
5628	2476	3284	3276
1714	2253	2198	3599

Find the values and test:

22. $462 + 384 + 314$.
23. $604 + 894 + 260$.
24. $838 + 979 + 305$.
25. $257 + 78 + 241$.
26. $251 + 346 + 824$.
27. $297 + 864 + 42$.
28. $563 + 89 + 647$.
29. $92 + 458 + 209$.
30. $2364 + 364 + 1499$.
31. $3249 + 1395 + 234$.

166. 1. Subtract 275 from 842; 1758 from 3572.

(*a*)		(*b*)
842	**Minuend**	3572
275	**Subtrahend**	1758
567	**Difference or Remainder**	1814

In (*a*), since we cannot take 5 from 2, we add one of the 4 tens to the 2, making 12. Then 5 from 12 leaves 7. Since we cannot take 7 tens from the remaining 3 tens, we add one of the 8 hundreds to the 3 remaining tens, making 13 tens. Then 7 tens from 13 tens leaves 6 tens. Next, 2 hundreds from the remaining 7 hundreds leaves 5 hundreds.

We may reach the same result by saying, or thinking, "5 from 12 leaves 7; 8 from 14 leaves 6; 3 from 8 leaves 5."

In (*b*), we may say or think, "8 from 12 leaves 4; 6 from 7 leaves 1; 7 from 15 leaves 8; 2 from 3 leaves 1."

Subtract and test:

2.	3.	4.	5.	6.
653	528	745	728	720
217	235	467	539	427
7.	**8.**	**9.**	**10.**	**11.**
627	732	804	310	500
49	453	95	165	109
12.	**13.**	**14.**	**15.**	**16.**
2456	3750	4506	2500	8750
1235	875	2557	1755	2875

Find the values and test:

17. $575 + 165$.
18. $582 + 278$.
19. $468 + 53$.
20. $448 - 279$.
21. $436 - 187$.
22. $511 - 183$.
23. $2527 - 1348$.
24. $7666 - 4378$.
25. $5500 - 3275$.

167. 1. If a colony of bees contains 1 queen, 255 drones, and 4150 workers, how many bees are there in the colony?

QUEEN DRONE WORKER

2. A man had 10 hives of bees. Five hives yielded 30 lb. of honey each, and the rest 40 lb. each. What was the entire output?

3. How much will a pair of horses cost, if one horse costs \$185 and the other \$205?

4. Mr. Thomas paid \$1525 for a lot and sold it for \$1700. How much did he gain?

5. Three men have \$1980. One has \$645; another has \$525. How much has the third man?

6. Morton weighs 128 lb., Frank 96 lb., Jack 116 lb., and Will 131 lb. How much do the four boys weigh?

7. On Monday a freight train started to run 962 miles. The first day it ran 266 miles and the second day 273 miles. How many miles had it then to run?

8. September, April, June, and November have 30 days each. February has 28 days, except in leap years, when it has 29. All other months have 31 days each. How many days in all the months, or in a year?

9. A boy shoots one arrow 97 yd. up the road, and another 65 yd. down the road. How far apart are the two arrows? If shot in the same direction, how far apart would they be?

10. My history contains 413 pages, my geography 244 pages, and my arithmetic 268 pages. How many pages do the three books contain?

11. A city school has 960 pupils, of whom 575 are girls. How many boys are there? how many more girls than boys?

12. A man has 125 more sheep than cows. If he has 650 cows, how many sheep has he?

13. My horse ate 275 qt. of chops in a month, and my cow ate 125 qt. less. How many quarts did my cow eat? How many quarts did both eat?

14. Mr. Brown paid $1785 on a debt of $2963. How much did he still owe?

15. In going to school Elmer took 875 steps, Albert took 789 steps, and Wallace took 675 steps. How many steps did all three take?

16. One company has 87 men, another 93 men, another 85 men, and another 78 men. How many men are needed to make 100 in each company?

17. Edward picked 128 qt. of berries, Roscoe picked 233 qt., and Edgar picked as many as both the others. How many quarts did Edgar pick? How many quarts did the three boys pick?

18. What number added to 8750 will give 9250?

MULTIPLICATION

WRITTEN EXERCISES

168. Multiply:

1.	2.	3.	4.	5.
235	264	241	636	869
2	2	3	3	3
6.	**7.**	**8.**	**9.**	**10.**
326	338	457	234	5834
2	2	2	3	3
11.	**12.**	**13.**	**14.**	**15.**
3223	3423	5324	3445	4123
4	4	3	2	4
16.	**17.**	**18.**	**19.**	**20.**
3020	1230	1823	3155	3698
4	5	6	4	5
21.	**22.**	**23.**	**24.**	**25.**
3285	5165	2125	2125	6781
3	6	4	5	6
26.	**27.**	**28.**	**29.**	**30.**
2125	2125	2125	1090	3052
7	8	9	9	8
31.	**32.**	**33.**	**34.**	**35.**
3250	1250	522	2433	3515
3	4	8	9	7
36.	**37.**	**38.**	**39.**	**40.**
2347	7654	1598	5812	1279
8	5	6	3	9

169. 1. Find the value of $5 \times 19 + 4$.

This means that 4 is to be added to 5×19.

Find the values of:

2. $6 \times 18 + 5$.
3. $7 \times 25 + 6$.
4. $9 \times 45 + 5$.
5. $5 \times 87 + 3$.
6. $8 \times 78 + 7$.
7. $8 \times 88 + 7$.
8. $7 \times 77 + 6$.
9. $9 \times 99 + 8$.
10. $11 \times 24 + 10$.
11. $12 \times 36 + 11$.

12. Find the value of $6 \times 77 - 15$.

This means that 15 is to be subtracted from 6×77.

Find the values of:

13. $2 \times 57 - 25$.
14. $3 \times 45 - 20$.
15. $4 \times 55 - 18$.
16. $7 \times 99 - 19$.
17. $11 \times 12 - 10$.
18. $12 \times 12 - 8$.

170. Note carefully:

10 times $5 = 50$. $7 \times 10 = 70$.
10 times $6 = 60$. $8 \times 10 = 80$.
10 times $10 = 100$. $11 \times 10 = 110$.

From this we learn that —

Annexing 0 to a number multiplies it by 10.

Call results at sight:

10×4.	10×25.	10×87.	10×200.
10×11.	10×37.	10×89.	10×300.
10×14.	10×65.	10×96.	10×500.
10×16.	10×75.	10×100.	10×900.

WRITTEN EXERCISES

171. 1. How many oranges are there in 8 boxes, if each box contains 144 oranges?

144 oranges
8
1152 oranges

Since there are 144 oranges in 1 box, in 8 boxes there are 8 times 144 oranges, or 1152 oranges.

2. In a city school there are 11 teachers. If there are 38 pupils to each teacher, how many pupils are there in that school?

3. If a farmer raises 45 bu. of corn to the acre, how many bushels does he raise on 8 acres?

4. If a merchant buys bananas at 10¢ a dozen and sells them at 20¢ a dozen, how much will he gain on 12 dozen?

5. If a man buys hats at 48¢ each and sells them at 60¢ each, how much does he gain on 12 hats?

6. If a barrel of flour contains 196 lb., how many pounds will 9 barrels contain?

7. A restaurant buys eggs at 24¢ a dozen and serves them at 5¢ each. What is the profit on 10 dozen eggs?

8. How many days are there in 52 weeks?

52
7
364, days in 52 weeks

Since there are 7 days in 1 week, in 52 weeks there are 52 times 7 days. But $52 \times 7 = 7 \times 52$; hence we shorten the work by using the smaller factor as multiplier, as shown. How many days does this lack of being a year?

9. What will it cost to fence a city lot 50 ft. by 150 ft. at $\$1\frac{1}{4}$ a foot?

10. What will 320 rods of fence cost at \$5 a rod?

11. Mr. Bader desires to lay an 8-foot pavement in front of his 50-foot lot. How many square feet will there be in his pavement?

12. What will Mr. Bader's pavement cost at $12¢$ a square foot?

13. What will it cost to construct a sidewalk 5 ft. by 75 ft. at $10¢$ a square foot?

14. How much will a case of eggs (30 dozen) cost at $12¢$ a dozen?

15. If sugar costs $5\frac{1}{2}¢$ a pound, what is gained by selling 200 lb. at $6¢$ a pound?

16. A butcher bought beef at $10¢$ a pound and sold it at $12\frac{1}{2}¢$ a pound. How much did he gain on 100 pounds?

17. If you wink every 3 seconds, how many times do you wink in 1 minute? in 1 hour? in 1 day, if you sleep 10 hours of the day?

18. Eleven boys play "Tug-of-War," 6 on one side and 5 on the other. The 6 boys average 65 lb. apiece in weight, and the others average 79 lb. apiece. If they pull according to their weights, which side will win?

19. A grocer buys 645 barrels of potatoes at \$3 a barrel, and 247 barrels of apples at \$5 a barrel. What do the potatoes and apples together cost?

20. Find the cost of the following bill of groceries:

5 doz. eggs at 30¢ a dozen.
25 lb. sugar at 6¢ a pound.
8 lb. coffee at 25¢ a pound.
6 lb. macaroni at 10¢ a pound.
10 lb. oatmeal at 5¢ a pound.
2 bu. meal at 80¢ a bushel.

21. If a teacher's salary is $975 a year, how much will she receive in 8 years?

22. If the teacher whose annual salary is $975 spends $635 a year, how much will she save in 8 years?

23. What will be the cost of 9 acres of land at $167 an acre?

24. If a pound of grapes costs 9 cents, what will 1363 pounds cost?

25. When milk sells for 8 cents a quart, how much does a dairyman receive for 2880 quarts?

26. A paper of pins cost 2 cents. How much will a merchant gain on 1635 papers of pins if he sells them at 5 cents a paper?

27. If a gardener sets out 7 bulbs in each row, how many bulbs will he set out in 745 rows? If each bulb is worth 3 cents, how much are all of them worth?

28. What is the sum of 7×3125 and 6×4895?

29. What is the difference between 8×7236 and 5×8963?

DIVISION

WRITTEN EXERCISES

172. Divide:

1.	2.	3.	4.	5.
2)376	2)732	3)363	3)510	5)775
6.	**7.**	**8.**	**9.**	**10.**
4)612	4)744	5)610	5)605	5)825
11.	**12.**	**13.**	**14.**	**15.**
6)930	7)875	8)920	9)945	6)396
16.	**17.**	**18.**	**19.**	**20.**
6)1572	6)2286	7)2345	8)2600	6)2256
21.	**22.**	**23.**	**24.**	**25.**
9)2376	9)4995	8)2888	6)5328	6)9702
26.	**27.**	**28.**	**29.**	**30.**
7)1554	7)2156	8)8520	8)3752	7)2226
31.	**32.**	**33.**	**34.**	**35.**
8)4784	9)4797	9)5166	5)9375	7)8106
36.	**37.**	**38.**	**39.**	**40.**
6)8316	7)8008	5)8425	7)6699	8)2296
41.	**42.**	**43.**	**44.**	**45.**
4)3588	5)8910	8)8224	9)5517	7)8897
46.	**47.**	**48.**	**49.**	**50.**
9)3996	9)3897	9)6957	9)8658	9)9495

173. 1. How many 10-cent stamps can you buy for 25¢? How many cents will you have left?

2. How many 10's are there in 25? You may answer "2 10's." But 2 tens are 20. The 5 left over is called a **remainder**.

WRITTEN EXERCISES

174. 1. Divide 218 by 9.

9)218
24, 2 rem.

In this case $218 = 24 \times 9$ and 2 more. Hence, to test your work see if the dividend equals the product of the divisor and quotient plus the remainder.

Find the quotients and remainders, and test:

2. $627 \div 5$.
3. $269 \div 6$.
4. $273 \div 4$.
5. $654 \div 7$.
6. $326 \div 8$.
7. $935 \div 6$.
8. $356 \div 8$.
9. $935 \div 7$.
10. $881 \div 9$.

175. Note carefully:

$50 \div 10 = 5$. $120 \div 10 = 12$.
$30 \div 10 = 3$. $130 \div 10 = 13$.
$100 \div 10 = 10$. $200 \div 10 = 20$.

From this we see that —

Cutting off 0 from a number divides it by 10.

Call results at sight:

$20 \div 10$.	$130 \div 10$.	$310 \div 10$.	$5200 \div 10$.
$70 \div 10$.	$160 \div 10$.	$320 \div 10$.	$6850 \div 10$.
$80 \div 10$.	$180 \div 10$.	$4000 \div 10$.	$7770 \div 10$.
$60 \div 10$.	$250 \div 10$.	$4500 \div 10$.	$9650 \div 10$.

WRITTEN EXERCISES

176. Find the values of:

1. $425 \div 5$.	6. $2270 \div 10$.	11. $1488 \div 6$.
2. $780 \div 6$.	7. $3564 \div 6$.	12. $1370 \div 5$.
3. $994 \div 7$.	8. $7903 \div 7$.	13. $1708 \div 7$.
4. $984 \div 8$.	9. $1048 \div 8$.	14. $1264 \div 8$.
5. $1926 \div 9$.	10. $2115 \div 9$.	15. $3730 \div 10$.

177. 1. Find one of 4 equal parts of 384; of 960.

2. If a train runs 320 miles in 8 hours, how far does it run in 1 hour at that rate?

3. If 3 organs cost \$270, how much does 1 organ cost at that rate? How much will 5 organs cost?

If 3 organs cost \$270,
1 organ costs $\frac{1}{3}$ of \$270 or \$90,
and 5 organs cost $5 \times$ \$90, or \$450.

4. At the rate of 3 for 15¢, what will a dozen oranges cost?

5. What will 10 books cost at the rate of 2 books for \$3? (How many 2's in 10?)

6. If you read a 224-page book in a week, what is your average number of pages a day?

7. How many 3-pound boxes will it take to hold 234 pounds of candy?

8. How many weeks are there in 365 days? How many days over?

9. At \$6 a barrel, how many barrels of flour can be bought for \$354?

10. If a carrier delivers 944 letters in 8 hours, how many letters does he average in 1 hour?

11. Grover gathered 43 qt. of nuts, Stanley gathered 32 qt., and Russell gathered 39 qt. If they divided the nuts equally, how many quarts did each receive?

12. There are 9 sq. ft. in a square yard. A rectangle is 81 ft. by 7 ft. How many square feet does it contain? how many square yards?

13. A boy earns $15 a month and spends $7 a month. How long will it take him to save $96?

14. If a clock strikes 1248 times in 8 days, how many times does it strike in 1 day?

15. A dealer pays $715 for 11 typewriters. How much does each cost?

16. At $9 a dozen, how much will 4 hats cost?

17. At the rate of 5 miles an hour, how many hours will it take a horse to travel 150 miles? If he is on the road 10 hours a day, how many days will be required for the journey?

18. If an automobile goes 216 miles in 9 hours, what is its average rate an hour?

19. At a store California pears are marked "2 for 5¢." How many of these pears can be bought for 50¢? (50¢ = how many times 5¢?)

20. There are 5280 ft. in 1 mi. If a man steps 3 ft. each time, how many steps will he take in 1 mi.?

FACTORS

178. 1. What two numbers multiplied together make 10? Then what are the factors (*makers*) of 10?

2. Is each factor of 10 a divisor of 10?

$10 \div 2 = \text{——}$. $10 \div 5 = \text{——}$.

3. Of what number are 2 and 7 the factors? 2 and 11? 3 and 11?

4. One factor of 21 is 7; what is the other? How is it found? $21 \div 7 = \text{——}$.

5. Name two factors of 12. Name two other factors of 12.

6. Of what two numbers is 30 the product? of what three numbers?

$5 \times 6 = \text{——}$. $2 \times 3 \times 5 = \text{——}$

7. Name two factors of 42. Can you name three factors of 42?

EXERCISES

179. Find the factors (divisors) of the following, naming one set or more:

1. 16.	4. 32.	7. 48.	10. 72.	13. 44.
2. 25.	5. 27.	8. 49.	11. 50.	14. 75.
3. 36.	6. 18.	9. 39.	12. 45.	15. 96.

EASY FRACTIONS

180. 1. You have learned that when anything is divided into two equal parts, one of the equal parts is called one half and is written $\frac{1}{2}$.

2. What is one third? How is it written? What do you understand by $\frac{2}{3}$?

3. What is one fourth? How is it written? What do you understand by $\frac{2}{4}$? by $\frac{3}{4}$?

4. Write one eighth; three eighths; five eighths.

181. Such numbers as halves, thirds, fourths, eighths, etc., representing one or more equal parts of anything, are called **fractions.**

182. Some of our measures in common use are divided into equal parts. These parts are fractions of the whole measures. You are familiar with the parts of some of these measures.

Can you name the familiar parts of a gallon? of a bushel? of a yard? of a foot?

8 pints 4 quarts 2 half gallons 1 gallon

183. 1. The picture shows the relations that exist between a whole gallon and its several parts.

2. Bearing in mind these relations, you will understand the following:

$$\begin{cases} 1 \text{ gal.} = 2 \text{ half gal.} = 4 \text{ qt.} = 8 \text{ pt.} \\ 1 \text{ gal.} = \frac{2}{2} \text{ gal.} = \frac{4}{4} \text{ gal.} = \frac{8}{8} \text{ gal.} \end{cases}$$

$$\begin{cases} \frac{1}{2} \text{ gal.} = 2 \text{ qt.} = 4 \text{ pt.} \\ \frac{1}{2} \text{ gal.} = \frac{2}{4} \text{ gal.} = \frac{4}{8} \text{ gal.} \end{cases}$$

$$\begin{cases} 1 \text{ qt.} = 2 \text{ pt.} \\ \frac{1}{4} \text{ gal.} = \frac{2}{8} \text{ gal.} \end{cases}$$

The relations set forth in the lower line in each couplet are true of the corresponding parts of bushels, of pounds, or of anything else.

3. Complete:

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

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

$$\frac{1}{4} = \frac{}{8}.$$

184. If we wish to add or subtract half gallons and quarts, or quarts and pints, we must change them to the same measure, or parts.

Thus: $\frac{1}{2}$ gal. + 1 qt. = 2 qt. + 1 qt. = 3 qt.;

or $\frac{1}{2}$ gal. + $\frac{1}{4}$ gal. = $\frac{2}{4}$ gal. + $\frac{1}{4}$ gal. = $\frac{3}{4}$ gal.

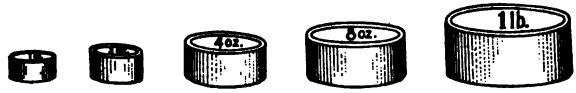
The facts or relations set forth in the last line apply to other measures. For example:

$$\frac{1}{2} \text{ lb.} + \frac{1}{4} \text{ lb.} = \frac{2}{4} \text{ lb.} + \frac{1}{4} \text{ lb.} = \frac{3}{4} \text{ lb.}$$

Copy and complete:

$\frac{1}{4} - \frac{1}{8} = \frac{2}{8} - \frac{1}{8} = \frac{1}{8}$. $\quad \frac{1}{2} + \frac{1}{8} =$

$\frac{1}{4} + \frac{1}{8} =$ $\quad \frac{1}{2} - \frac{1}{8} =$



$\frac{1}{16}$ lb. $\frac{1}{8}$ lb. $\frac{1}{4}$ lb. $\frac{1}{2}$ lb. 1 lb.

185. 1. How many of the smallest weights are equal to the largest? Then how many ounces make a pound? (16 ounces = 1 pound.)

2. How many ounces are there in $\frac{1}{2}$ of a pound? in $\frac{1}{4}$ of a pound? in $\frac{1}{8}$ of a pound?

3. How many sixteenths are there in one? in $\frac{1}{2}$? in $\frac{1}{4}$? in $\frac{1}{8}$?

4. Complete:

$1 = \frac{}{2} = \frac{}{4} = \frac{}{8} = \frac{}{16}$. $\quad \frac{1}{4} = \frac{}{8} = \frac{}{16}$.

$\frac{1}{2} = \frac{}{4} = \frac{}{8} = \frac{}{16}$. $\quad \frac{1}{8} = \frac{}{16}$.

186. Find the values of:

$\frac{1}{2} + \frac{1}{4}$. $\quad \frac{1}{2} - \frac{1}{8}$. $\quad \frac{1}{4} + \frac{3}{8}$. $\quad \frac{1}{8} - \frac{1}{16}$.

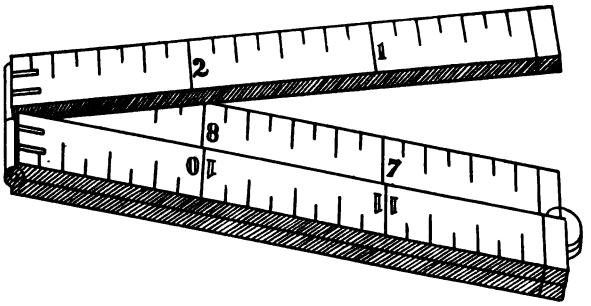
$\frac{1}{2} + \frac{3}{8}$. $\quad \frac{1}{4} + \frac{1}{16}$. $\quad \frac{1}{8} + \frac{1}{16}$. $\quad \frac{1}{4} - \frac{1}{16}$.

$\frac{1}{2}$			$\frac{1}{2}$		
$\frac{1}{3}$		$\frac{1}{3}$		$\frac{1}{3}$	
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

187. Examine a yardstick. Make one and divide it into halves, thirds, and sixths, as shown above on a reduced scale. Then tell how many sixths equal $\frac{1}{3}$. Tell how many sixths equal $\frac{1}{2}$.

Copy and complete:

$\frac{1}{2} + \frac{1}{3} = \frac{}{6} + \frac{}{6} = \frac{}{6}$. $\quad \frac{1}{2} - \frac{1}{3} = \frac{}{6} - \frac{}{6} = \frac{}{6}$.



188. Examine your foot rule, and tell how many inches there are in $\frac{1}{3}$ of a foot; in $\frac{1}{4}$ of a foot.

We find that

$\frac{1}{3}$ ft. = 4 inches, or $\frac{4}{12}$ of a foot.

$\frac{1}{4}$ ft. = 3 inches, or $\frac{3}{12}$ of a foot.

Copy and complete:

$\frac{1}{3}$ ft. + $\frac{1}{4}$ ft. = —— in., or $\frac{\quad}{12}$ ft. + $\frac{\quad}{12}$ ft. = $\frac{\quad}{12}$ ft.

$\frac{1}{3}$ ft. − $\frac{1}{4}$ ft. = —— in., or $\frac{\quad}{12}$ ft. − $\frac{\quad}{12}$ ft. = $\frac{\quad}{12}$ ft.

$\frac{1}{3} + \frac{1}{4} = \frac{\quad}{12} + \frac{\quad}{12} = \frac{\quad}{12}$.

$\frac{1}{3} - \frac{1}{4} = \frac{\quad}{12} - \frac{\quad}{12} = \frac{\quad}{12}$.

189. As you know,

$1¢ = \frac{1}{10}$ of a dime.

$2¢ = \frac{2}{10}$ of a dime.

$2¢ = \frac{1}{5}$ of a dime.

Therefore, $\frac{2}{10}$ of a dime = $\frac{1}{5}$ of a dime, and $\frac{2}{10} = \frac{1}{5}$.

Copy and complete:

$\frac{1}{5} + \frac{1}{10} = \frac{\quad}{10} + \frac{\quad}{10} = \frac{\quad}{10}$.

$\frac{1}{5} - \frac{1}{10} = \frac{\quad}{10} - \frac{\quad}{10} = \frac{\quad}{10}$.

WRITTEN EXERCISES

190. 1. Find $\frac{2}{3}$ of 45.

$\frac{1}{3}$ of $45 = 15$.

$\frac{2}{3}$ of $45 = 2 \times 15$, or 30.

Find:

2. $\frac{2}{3}$ of 12.
3. $\frac{3}{4}$ of 20.
4. $\frac{2}{5}$ of 30.
5. $\frac{2}{3}$ of 18.
6. $\frac{3}{5}$ of 15.
7. $\frac{3}{4}$ of 28.
8. $\frac{5}{6}$ of 24.
9. $\frac{3}{4}$ of 36.
10. $\frac{2}{5}$ of 50.
11. $\frac{5}{8}$ of 40.
12. $\frac{7}{8}$ of 32.
13. $\frac{3}{16}$ of 48.

191. 1. John has \$ 12 and Henry has $\frac{3}{4}$ as much. How much has Henry?

2. I paid 60 cents for a book and $\frac{3}{5}$ as much for a ball. How much did I pay for the ball?

3. What will $\frac{3}{4}$ of a pound of tea cost at 72 cents a pound?

4. An orchard has 72 apple trees and $\frac{2}{3}$ as many peach trees. How many peach trees does it contain?

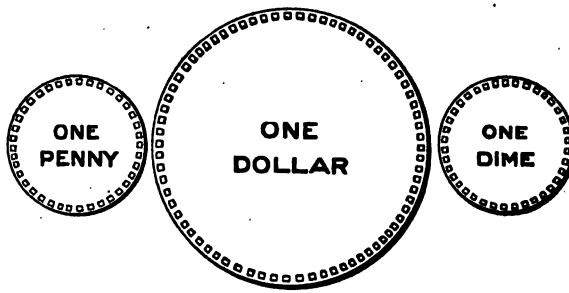
5. A boy had \$ 12. He spent $\frac{2}{3}$ of his money for a suit and $\frac{1}{6}$ of it for a hat. How much did he spend?

6. If Tom ate $\frac{1}{4}$ of a pie and Jerry ate $\frac{1}{3}$ of it, what part of the pie did both eat?

7. Jessie lives $\frac{1}{2}$ of a mile from the schoolhouse, and Anne lives $\frac{1}{3}$ of a mile from it in the opposite direction. How far apart do they live?

8. Mary Jane has two cats. If she gives each $\frac{1}{2}$ pint of milk a day, how many pints will she give them in 2 weeks? how many quarts?

UNITED STATES MONEY



192. 1. How many cents make a dime? How many dimes make a dollar? Then how many cents make a dollar?

10 cents make 1 dime.
10 dimes, or 100 cents, make 1 dollar.

2. Dimes and cents are read together, thus: $2.75 is read "two dollars and seventy-five cents."

3. One dollar is written $1 or $1.00. The sign $ is called the *dollar mark*, and is placed before the figures expressing dollars. Four dollars and twenty-five cents is written $4.25. The dot (*decimal point*) in $4.25 is used to separate the dollars from the cents.

193. Read the following:

$3.75	$7.20	$8.00	$2.05	$105
$4.50	$8.24	$5.45	$5.60	$500

$2.50 is sometimes read "two dollars and a half," and $1.25 "one dollar and a quarter."

Write in figures:

Three dollars and fifty cents. One dollar and twenty-five cents. Five dollars and forty cents. Six dollars and five cents. Ten dollars and seventy-five cents. Eight dollars and two cents. Ten dollars and fifteen cents.

194. When there are no *dollars*, we place the decimal point between the cents and the dollar mark. When there are no dimes, we write 0 in the dimes' place.

Read the following:

\$.15	\$.75	\$.10	\$.07
\$.40	\$.50	\$.25	\$.80

Write in figures:

Forty dollars. One hundred five dollars. Four hundred ten dollars. Five hundred dollars. Twenty-five cents. Ten cents. Three cents. Eighty-eight cents. Ten dollars and five cents.

Write as dollars and cents:

150¢	275¢	225¢	310¢	705¢
425¢	500¢	618¢	609¢	320¢

195. How much money in:

1. 1 5-dollar bill, 3 2-dollar bills, 1 silver dollar, 1 half dollar, and 1 quarter?

2. 1 10-dollar bill, 2 5-dollar bills, 3 silver dollars, 3 quarters, 2 dimes, and 4 cents?

3. 3 20-dollar bills, 5 2-dollar bills, 1 5-dollar gold piece, 2 half dollars, 3 dimes, and 1 nickel?

USEFUL PARTS OF A DOLLAR

196. Copy and complete the following:

$\frac{1}{2}$ of \$ 1 = 50¢.	50¢ = $\frac{1}{2}$ of \$ 1.
$\frac{1}{4}$ of \$ 1 =	25¢ = of \$ 1.
$\frac{3}{4}$ of \$ 1 =	75¢ = of \$ 1.
$\frac{1}{10}$ of \$ 1 =	10¢ = of \$ 1.

197. As we have halves, fourths, and tenths of a dollar in coins, it is often convenient to use the relations above in solving problems. This is shown in the following:

At \$ 1 each, 20 caps would cost \$ 20.
At 50¢ (\$ $\frac{1}{2}$) each, 20 caps would cost $\frac{1}{2}$ of \$ 20, or \$ 10.
At 25¢ (\$ $\frac{1}{4}$) each, 20 caps would cost $\frac{1}{4}$ of \$ 20, or \$ 5.
At 75¢ (\$ $\frac{3}{4}$) each, 20 caps would cost $\frac{3}{4}$ of \$ 20, or \$ 15.
At 10¢ (\$ $\frac{1}{10}$) each, 20 caps would cost $\frac{1}{10}$ of \$ 20, or \$ 2.

In this way give the cost of:

1. 10 lb. of tea at 50¢ a pound.
2. 40 yd. of matting at 25¢ a yard.
3. 80 yd. of carpeting at 75¢ a yard.
4. 60 lb. of candy at 10¢ a pound.
5. 50 lb. of coffee at 25¢ a pound.
6. 20 lb. of butter at 25¢ a pound.
7. 12 doz. oranges at 25¢ a dozen.
8. 50 bu. of apples at 50¢ a bushel.
9. 12 bu. of peaches at 75¢ a bushel.
10. 2 gal. 2 qt. of milk at 10¢ a quart.

WRITTEN EXERCISES

198. 1. Find the sum of \$3.25, \$4.59, and \$5.60.

Dol.	Dimes	Cents		
3	2	5	= \$	3.25
4	5	9	=	4.59
5	6	0	=	5.60
13	4	4	= \$	13.44

What is written in the first column? in the second? in the third?

Are the dots all in one column? How do we get the 13 dollars in the sum?

Note that dollars, dimes, and cents (or dollars and cents) are added just as hundreds, tens, and ones.

Add and test:

2.	3.	4.	5.
\$ 15.15	\$ 26.55	\$ 25.54	\$ 80.76
8.06	5.01	6.34	28.09
8.20	7.75	5.80	7.84
35.85	30.40	10.10	5.00

6.	7.	8.	9.
\$ 16.40	\$ 12.50	\$ 82.25	\$ 25.00
23.38	46.75	24.40	64.30
45.75	80.24	45.00	38.18
78.75	42.65	32.15	17.72

Subtract and test:

10.	11.	12.	13.
\$ 84.75	\$ 75.20	\$ 57.00	\$ 84.05
36.38	18.05	35.25	68.85

14.	15.	16.	17.
\$ 524.50	\$ 231.25	\$ 960.27	\$ 405.35
132.90	78.80	450.95	287.75

Multiply or divide as indicated:

18.	19.	20.	21.
$15 25	$25.60	$12.25	$24.75
3	4	5	3
$45.75			

22.	23.	24.	25.
$41.80	$22.36	$29.08	$57.47
6	5	7	8

26.	27.	28.	29.
2)$24.38	3)$48.54	2)$25.20	2)$75.00
$12.19			

30.	31.	32.	33.
5¢)75¢	3¢)90¢	8¢)72¢	10¢)250¢

199. 1. Mr. Jones's household expenses for one month were as follows: rent, $17.50; groceries, $21.75; milk, $2.75; fruit, $1.25; lights, $2.50; and servant hire, $7.25. What were his expenses for the month?

2. If I bought 5 tons of coal at $3.25 a ton and have paid $12.50, how much do I still owe for it?

3. A man bought 6 cows at $34.25 each. How much did the six cows cost?

4. A dealer paid $122.75 for 5 stoves. What was the average price paid for them?

5. How many pounds of sugar at 6¢ a pound can you buy for $14.40?

6. A farmer paid $350 for a pair of horses. If he sold one for $187.50 and the other for $195, what was his profit?

7. At the rate of 3 for 10¢, how many oranges can you buy for $1.50?

8. If 5 bushels of apples cost $7.25, what will 10 bushels cost at the same rate?

9. Nine boys bought a baseball outfit and shared the cost equally. If each boy paid $.45, what was the cost of the outfit?

10. A round-trip ticket between two towns costs $8.10, which is $3.50 more than the fare one way. What is the fare one way?

11. A boy deposited in a savings bank the following sums: $1.75, $4.15, $19.25, $7.00. If he drew out $7.50, how much remained in bank?

12. Lucy bought a rug 3 yd. by 4 yd. at $1.50 a square yard. What did it cost?

13. One season I sold enough berries at 5¢ a quart to bring $17.50. How many quarts did I sell?

14. A family ordered 1 sack of flour at 72¢, $\frac{1}{2}$ bushel of potatoes at 80¢ a bushel, and 5 lb. of butter at 24¢ a pound. Find the amount of the order.

15. Find the amount of this bill:

6 lb. of steak at $22\frac{1}{2}$¢ a pound.
5 lb. of coffee at 28¢ a pound.
10 lb. of sugar at $6\frac{1}{2}$¢ a pound.
24 lb. of cheese at 8¢ a pound.

GROCERY PROBLEMS

200. If you buy 3 lb. of sugar for 18¢ and give the grocer a half dollar, the latter, in giving you the change, says, "18, 20, 25, 50 cents," as he hands out 2 cents, a nickel, and a quarter.

Note that he begins with the amount purchased and adds until he reaches the amount handed him.

In like manner call the change for:

1. 25¢ when you owe 17¢.
2. 50¢ when you owe 33¢.
3. $1.00 when you owe 65¢.
4. $10.00 when you owe $7.79.

Copy and complete:

	Purchase		Amount	Coin Next Above
5.	$\frac{1}{2}$ lb. tea	@ 72¢ *	$.36	50¢
6.	$2\frac{1}{2}$ lb. coffee	@ 30¢	——	——
7.	$1\frac{1}{2}$ lb. pepper	@ 32¢	——	——
8.	$4\frac{1}{4}$ lb. raisins	@ 20¢	——	——
9.	$6\frac{1}{2}$ lb. prunes	@ 10¢	——	——
10.	$2\frac{1}{4}$ lb. butter	@ 24¢	——	——
11.	$2\frac{3}{4}$ lb. cheese	@ 12¢	——	——

12. Call the change in problems 5 to 11.

* In this problem @72¢ means "at 72¢ a pound."

GENERAL REVIEW WORK

ORAL EXERCISES

201. 1. Give in Roman characters the numbers from 1 to 12. For what purpose have you seen these characters used?

2. What name do you give to 3 tens? to 4 tens? to 5 tens? to 10 tens? to 10 hundreds?

3. In the number 324 which figure denotes the number of ones? the number of tens? the number of hundreds? How is the number read?

4. In the number 502 what does 0 tell?

5. Compare 3×4 with 4×3. What conclusion do you reach as to the order of the factors?

State rapidly the sums, timing yourself:

6. $7+4$.	10. $12+3$.	14. $25+10$.
7. $8+6$.	11. $15+6$.	15. $35+16$.
8. $8+7$.	12. $27+8$.	16. $23+28$.
9. $9+8$.	13. $39+7$.	17. $33+49$.

State rapidly the differences, timing yourself:

18. $23-12$.	22. $52-22$.	26. $21-6$.
19. $34-11$.	23. $64-51$.	27. $32-7$.
20. $44-22$.	24. $52-12$.	28. $36-17$.
21. $55-33$.	25. $37-15$.	29. $59-38$.

State rapidly the products:

30. 7×7.	35. 7×12.	40. 12×5.
31. 6×9.	36. 9×9.	41. 21×4.
32. 8×6.	37. 10×10.	42. 22×3.
33. 9×8.	38. 11×11.	43. 31×6.
34. 5×11.	39. 12×12.	44. 20×5.

State rapidly the quotients:

45. $40 \div 8$.	50. $240 \div 3$.	55. $110 \div 10$.
46. $72 \div 6$.	51. $120 \div 4$.	56. $200 \div 10$.
47. $84 \div 12$.	52. $129 \div 3$.	57. $330 \div 11$.
48. $49 \div 7$.	53. $128 \div 4$.	58. $420 \div 7$.
49. $81 \div 9$.	54. $105 \div 5$.	59. $400 \div 8$.

State the cost of the following articles:

60. A geography at \$.75 and a reader at \$.25.
61. A ball for 30¢ and a bat for 20¢.
62. 3 lb. of coffee at \$.20 a pound.
63. 2 lb. of chocolate at \$.25 a pound.
64. 3 yd. of cashmere at \$1.50 a yard.

State the price a pound if

65. 10 lb. of sugar cost \$.60.
66. 2 lb. of tea cost \$.80.
67. 6 lb. of apricots cost \$.72.
68. 5 lb. of mixed nuts cost \$.90.
69. At \$3 each, how many hats can a dealer buy for \$36?

70. If 5 yd. of cloth cost \$10, how much will 1 yd. cost? How much will 2 yd. cost?

71. If 3 lb. of candy cost \$.60, how much will 5 pounds cost?

72. At 10¢ a dozen, what will 36 apples cost?

73. If 4 lb. of cakes cost 32¢, what will 6 lb. cost?

74. How many pounds of granulated sugar at 6¢ a pound must be given for 6 lb. of maple sugar at 10¢ a pound?

75. At $\frac{1}{5}$ of a dollar a yard, how many yards of sheeting can you buy for a dollar?

76. At $\frac{1}{2}$ of a dollar each, how many caps can you buy for \$5?

77. If you read one half of a 200-page book in 10 days, how many pages do you average a day?

WRITTEN EXERCISES

202. 1. Add 396, 147, 79, 1974.

2. Add 175, 308, 909, 2556, 1236.

3. Add 678, 503, 1813, 1401, 5006.

4. Add 44, 376, 1708, 2987, 3954.

Add and test, timing yourself:

5.	6.	7.	8.	9.
996	7655	3802	5657	6733
821	2849	5639	2397	9258
538	720	8219	9940	1824
745	6135	3048	9532	4092

Subtract and test, timing yourself:

10.	11.	12.	13.	14.
782	9700	1906	4281	81,006
294	1811	1052	3462	56,309

15.	16.	17.	18.	19.
900	8261	8796	6208	8570
602	4894	4321	1432	4607

Multiply:

20.	21.	22.	23.	24.
729	807	899	2487	3983
5	6	9	8	7

25.	26.	27.	28.	29.
616	839	678	7893	6477
7	3	9	5	6

30.	31.	32.	33.	34.
999	847	756	4833	8646
4	8	8	7	9

Divide and test:

35.	36.	37.	38.
5)735	7)8008	9)9504	6)7602

39.	40.	41.	42.
6)836	8)9512	8)8600	5)6425

43.	44.	45.	46.
7)903	9)8838	7)9009	8)6032

203. 1. How much will I have left from $925 after paying for 3 horses at $275 each?

2. A man weighs 175 pounds and his son weighs 43 pounds less. How much do both weigh?

3. A man had to travel 315 miles. How many miles remained after he had traveled $\frac{2}{5}$ of the distance?

4. How many square feet are there in 5 blackboards each 8 feet long and 4 feet wide?

5. If a man earns $750 a year and spends $475, how much will he save in 2 years?

6. If a vessel leaves Liverpool at noon on Thursday and reaches New York the following Tuesday at noon, how many days does the trip require?

7. If the distance from Liverpool to New York is 3540 miles, how many miles does the ship average a day?

8. How many bushels of grain will it take to fill 25 two-bushel bags and a fifty-bushel bin?

9. If Marvin works 8 hours a day, how many hours will he work in a week (6 days)? in 4 weeks?

10. From 5 gallons of oil how many times can you fill a lamp that holds a pint?

11. Fannie has 50 plants. One half of them are sweet peas, one fifth of them violets, and the others roses. How many of each has she?

12. Carl had a kite string 80 ft. long, to which he tied another $\frac{3}{4}$ as long. How long was his string then?

13. George Washington was born in 1732, and took command of the American forces in 1775. How old was he when he took command?

14. Washington became President of the United States in 1789. How old was he at that time?

15. When 9 dozen eggs cost $1.98, what is the price a dozen?

16. Which is the longer, $\frac{1}{4}$ of a yard or $\frac{5}{6}$ of a foot? The difference in length is what part of a foot?

17. If I earn $75 a month and spend $37.50 a month, how much will I save in 10 months?

18. If I deposited in a savings bank $15 each month, how much did I deposit in a year?

19. If 7 acres of land cost $630, how much will 21 acres cost?

20. If 9 acres of land cost $720, how much will 10 acres cost?

21. I bought 15 acres of land at $50 an acre, and sold it at $42.50 an acre. How much did I lose?

22. A merchant buys canned tomatoes at $1 a dozen and sells them at the rate of 2 cans for 25¢. How much does he gain on a dozen cans?

23. A farmer cultivates 240 acres of land. If he plants $\frac{2}{3}$ of it in cotton and the remainder in grain, how many acres does he plant in each?

24. A farmer raised 1659 bu. of corn and $\frac{1}{7}$ as many bushels of potatoes. How many bushels of both did he raise?

25. Alice has collected 216 post cards. If her album holds 4 cards to each page, how many pages do the cards fill?

26. If a school is in session 6 hours a day, how many hours of school are there in a session of 6 school months of 20 days each?

27. There are 144 pens in a gross. How many pens are there in 8 gross?

28. A teacher has $80 to spend during her vacation. If she pays $27.50 for traveling, $37.50 for board, and $12.50 for other expenses, how much has she left?

29. A man who had $7500 in bank drew out $2300 at one time and $2775 at another. How much did he still have in bank?

30. If I pay $4 a month for a room and $15 a month for board, what do I pay for both in 9 months?

31. Walker receives $45 a month for 6 months, and John $65 a month for the same period. How much more does John receive than Walker?

32. A dealer buys coal at $5.75 a ton and sells it at $7 a ton. How much does he gain on 19 tons?

33. A school building has 2 floors with 4 rooms on each floor. How many pupils will it seat, if each room has 30 single desks?

34. A grocer bought 2 bu. of apples at 60¢ a bushel and sold them at 20¢ a peck. How much did he gain?

PART THREE

READING AND WRITING NUMBERS

204. You have learned that when four figures are written in a row, the figure at the right represents *ones*, the second figure represents *tens*, the third figure represents *hundreds*, and the one at the left represents *thousands*.

What is the largest number of thousands that can be written with four figures? How many figures does it take to write ten thousand?

Having learned to write numbers to ten thousand, you are now ready to learn something about larger numbers.

Ten thousand one is written	10,001.
Ten thousand one hundred is written	10,100.
Eleven thousand is written	11,000.
Eleven thousand eleven is written	11,011.

How many hundreds in 1100? How many hundreds in 25,000? Cut off two 0's at the right, thus, 250 | 00, and read the number that is left.

When more than four figures are used, they are usually separated by a comma into groups of three, so that they may be read more easily; thus. 25,987.

Each group of three figures is called a *period.* Beginning at the right, the first group is called the period of units; the second group, the period of thousands; and the third group, the period of millions.

205. The number 2536 may be considered as made up as follows: $2000 + 500 + 30 + 6$.

The two 0's in 25,002 hold places. Of what use are the 0's in the following numbers: 1000, 10,203, 9080?

206. Copy and complete:

$3146 = 3000 + 100 + 40 + 6.$

$4163 =$

$17{,}035 =$

$64{,}371 =$

Copy and complete:

$6000 + 400 + 10 + 7 = 6417.$

$2000 + 100 + 60 + 3 =$

$9000 + 000 + 60 + 0 =$

$10{,}000 + 200 + 80 + 0 =$

207. 1. Compare 1, 10, 100, 1000.

How many ones make 1 ten? How many tens make 1 hundred? How many hundreds make 1 thousand?

2. When 1 stands alone, what number does it express? When it stands at the left of a 0? at the left of two 0's.

3. In 10,000 what does the 1 stand for? For what purpose are the four 0's used?

4. In the number 33, which 3 expresses the greater value? how many times as great? In the number 3303, what is the value of each figure?

Any figure represents ten times the value that it would represent in the next place to the right.

208. After 99 you counted one hundred; after 999, one thousand; after 9999, ten thousand; after 99,999 you come to a number with another name.

It is *one hundred thousand*, written 100,000.

One more than 999,999 is 1000 thousands, which is called *one million*, and is written 1,000,000.

209. The manner of writing numbers is shown in the table:

	Millions	Hundred-thousands	Ten-thousands	Thousands	Hundreds	Tens	Ones
	6	2	0	5	7	3	8
Periods:	Millions		Thousands			Units	

The number in the table is read, "Six million, two hundred five thousand, seven hundred thirty-eight."

1. How many figures are used to write five thousand? to write two hundred thousand?

2. How many figures are used to write six million?

210. The number 4500 may be read "four thousand five hundred," or "forty-five hundred." How is 1915 A.D. usually read?

Read in two ways:

1500	7201	8454	5890
2100	5820	5650	2582
6500	8641	7549	6307
2800	2602	8927	6035
4200	7540	4560	5721

Read the following:

75,028	85,001	47,026	8072
89,465	42,861	45,454	27,063
875,203	828,906	587,820	645,080
1,255,648	2,005,325	2,620,004	3,620,700
8,450,620	7,640,002	9,542,625	10,451,003

Write in figures:

Four thousand forty. Six hundred five.
Eighty thousand eight. Four thousand five.
Fifty thousand fifty. Six hundred thousand five.
Ninety-eight thousand. Two thousand sixty-five.
Forty-nine thousand forty-eight.
Seven thousand three hundred two.
Fourteen hundred ninety-two.
Sixteen thousand seven hundred four.
Five thousand three hundred twenty-six.
Forty-eight thousand five hundred sixty-eight.
One hundred eighty thousand two hundred forty.
Four hundred forty-seven thousand six hundred.

ROMAN NUMERALS

211. Roman numerals are used in marking the dials of clocks and watches, numbering chapters and divisions of books and other printed matter.

The first ten numbers are:

I, II, III, IV or IIII, V, VI, VII, VIII, IX, X.

Other letters used are:

L	C	D	M
50	100	500	1000

Any number may be written in Roman numerals by observing that —

1. A letter placed *after* one of greater or equal value increases the value of the number.

2. A letter placed *before* one of greater value reduces the value of the number.

Read XI, XII, XIII, XIV, XXI, XXIV, XVII, XXX, XL, LXXI, XC, XCIV, XCIX, CC, CD, DC, CM.

212. Complete orally:

1 = I.	11 = XI.	21 = XXI.	35 = XXXV.
2 =	12 =	22 =	45 =
3 =	13 =	23 =	74 =
4 =	14 =	24 =	67 =
5 =	15 =	25 =	34 =
6 =	16 =	26 =	48 =
7 =	17 =	27 =	77 =
8 =	18 =	28 =	89 =
9 =	19 =	29 =	99 =
10 =	20 =	30 =	101 =

ADDITION AND SUBTRACTION

ORAL EXERCISES

213. State the sums:

1.	2.	3.	4.	5.
43	75	63	80	76
16	18	24	28	38

6.	7.	8.	9.	10.
70	76	87	59	38
35	31	50	43	33

11.	12.	13.	14.	15.
12	15	21	30	30
23	42	32	27	50

16.	17.	18.	19.	20.
18	19	23	15	56
26	37	28	82	23

21.	22.	23.	24.	25.
63	85	43	27	37
14	17	26	34	28

26.	27.	28.	29.	30.
15	22	45	51	19
18	16	58	81	42

214. State the differences:

1.	2.	3.	4.	5.
45	56	49	68	74
24	22	27	33	63

In subtracting 24 from 45, say mentally "45, 25, 21"; or "45, 41, 21." You may subtract first the tens and then the ones; or first the ones and then the tens.

6.	7.	8.	9.	10.
43	74	62	80	75
17	18	25	27	37

11.	12.	13.	14.	15.
43	57	63	81	87
17	18	24	29	52

16.	17.	18.	19.	20.
71	77	59	42	34
36	25	42	27	29

21.	22.	23.	24.	25.
27	67	82	46	37
9	14	17	23	18

26.	27.	28.	29.	30.
39	56	87	75	67
23	37	61	34	32

31.	32.	33.	34.	35.
52	90	76	63	102
36	48	39	25	87

WRITTEN EXERCISES

215. Add, and test by adding both upward and downward:

1.	2.	3.	4.	5.
726	1458	7892	9284	7521
582	3379	6765	276	4978
593	2015	828	8933	9542

6.	7.	8.	9.	10.
3582	5137	3427	9845	3205
7625	5528	5055	6242	7818
8094	6258	5967	2305	1867

11.	12.	13.	14.	15.
2578	8765	5236	8257	3424
8125	1822	4893	5172	2878
4523	2185	7017	8253	8075

16.	17.	18.	19.	20.
$258	$243	$6489	$26.48	$90.36
983	479	9628	29.16	25.04
768	192	5394	75.58	94.78
218	584	7590	92.40	29.35

21.	22.	23.	24.	25.
$1454	$4324	$8723	$3682	$2795
4365	9438	4827	2557	7568
6348	7849	4506	5182	1345
3278	2536	8225	1412	2955

26.	27.	28.	29.	30.
$7504	$69418	$157.97	$961.45	$289.28
2042	22694	124.18	220.45	14.70
5730	1547	293.25	43.52	248.03
1872	4063	147.12	260.74	792.38
3780	17678	59.84	180 06	81 78
7695	384	6.39	279.84	814.70

31.	32.	33.	34.
72340	548981	7892	54061
653	12457	58265	6250
45064	5437	8724	27640
63	961	5327	2737
1697	18643	8269	63863

35.	36.	37.	38
61194	62496	8795	87295
6348	13602	3421	12403
7324	2487	16782	8640
6175	6523	5489	29419
8921	9454	6502	8709

39. Add sixteen hundred fifty-three, eighty-five thousand two hundred forty-nine, five thousand forty, seventy-five thousand four hundred thirty-nine.

40. Add sixty-one thousand two hundred sixty-eight, twenty-seven thousand and two, eight thousand seven hundred forty-seven, eighteen thousand six hundred forty, and seventeen hundred twelve.

216. Subtract and test:

1.	2.	3.	4.	5.
2237	4176	7352	5015	7201
759	1849	3178	2372	2924
6.	**7.**	**8.**	**9.**	**10.**
$65.29	$73.48	$64.22	$50.20	$80.27
27.50	37.54	35.76	25.55	78.21
11.	**12.**	**13.**	**14.**	**15.**
$9002	$5004	$5006	$6005	$55216
2447	3708	3727	2069	22222

16. Subtract fifty from five thousand three hundred five.

17. Subtract five thousand seven hundred ninety-eight from nine thousand six hundred seventy-five.

18. Subtract seventeen thousand six hundred ninety-three from twenty thousand six hundred one.

217. 1. Three men went into business together. Jonathan Elliot put in $3545, Cary Holaday put in $5307, and Spencer Carter put in $6500. What was the total amount of capital?

2. In a reading room there are 4647 pamphlets, 4746 periodicals, 1180 novels, and 1123 newspapers. How many novels, pamphlets, periodicals, and newspapers are in the reading room?

3. In a city block there are five houses. They cost $8756, $11,280, $22,050, $16,548, and $19,850. Find the total cost of the five houses.

4. In 1607 Jamestown, the first permanent settlement in America, was begun. How many years was that before the Jamestown Exposition in 1907?

5. Independence was declared in the year 1776. What year was the 139th year after the Declaration of Independence?

6. November 10th was the 314th day of the year. In the same year, June 20th was the 171st. How many days from the earlier to the later date?

7. In 1535 A.D. the first English Bible was printed. How many years ago was that?

8. Rome was founded in 753 B.C. How many years ago was it founded?

9. During an election in a certain state the candidate of one party received 98,807 votes, and his only opponent received 119,829. How much majority did the winner have?

10. The number of depositors in the savings banks of four states during a recent year was respectively 426,113, 28,147, 151,656, and 16,125. How many depositors were there in all?

11. The number of books in each division of a library is as follows:

Division A, 1080 books; Division E, 4502 books;
Division B, 8143 books; Division F, 1793 books;
Division C, 4238 books; Division G, 5250 books;
Division D, 1538 books; Division H, 2529 books.

How many books are there in all?

12. A bank published its debts as follows: to depositors, $2,567,001; to other banks, $47,527; to stockholders, $1,000,000. What was the total amount owed?

13. The expenses for a certain city school for a year are as follows: teachers' salaries, $2250; fuel, lights, and servants, $537.50; supplies and repairs, $430.75; work on grounds, $22.15. What are the total expenses?

14. I bought 5 tons of coal, of which 3 loads, weighing 3375 lb., and 3250 lb., and 3125 lb., have been delivered. How much is yet to be delivered? (1 ton = 2000 lb.)

15. A teacher owes her grocer $127.50 for supplies, and the grocer owes her $72.75 for tuition. If she pays him $25, how much does she still owe?

16. Mr. Wall bought a farm for $2150. After building a house that cost $1500 and a barn that cost $875, he sold the farm for $5000. How much did he gain?

17. A tank contained 20,000 gal. of water. From it were drawn 3750 gal., 4275 gal., and 2250 gal. How many gallons remained in it?

18. The attendance at a state fair for four days was: first day, 12,524; second day, 15,960; third day, 18,982; fourth day, 16,348. Find the total attendance for the four days. Find the difference in attendance on the first day and on the last.

19. A farmer shipped to market 5 carloads of corn. The weights of the loads were: 41,250 lb., 48,500 lb., 42,420 lb., and 52,780 lb. How many pounds of corn did he ship?

20. A wagon with a load of coal weighs 3425 lb. If the wagon weighs 1125 lb., what is the weight of the coal?

21. A dealer bought 30 horses for $5250 and sold them so as to gain $975. How much did he receive for them?

22. A cattle dealer sells 25 cattle for $1875 and gains $560 on the lot. What did he pay for them?

PROBLEMS WITHOUT NUMBERS

218. 1. What do we call putting two or more numbers together?

2. What is a sum in addition?

3. What is a minuend?

4. What do we call the number that we take away?

5. What is the result called in subtraction?

6. When a figure in the minuend is less in value than the figure below it, what must be done in order to subtract? What must be done to the next figure in the minuend?

7. Given the subtrahend and difference, how will you find the minuend?

8. Given the minuend and the difference, how will you find the subtrahend?

MULTIPLICATION

219. 1. Counting by twos is the same as adding two at each step, "Two, four, six, eight," etc.

2. Counting by fours is the same as adding four at each step, "Four, eight, twelve, sixteen," etc.

3. Count by *twos* to 20; by *threes* to 30; by *fours* to 40; by *fives* to 50; and so on until you count by tens to 100.

4. How much is 3 added to 3 four times? 5 added to 5 six times? Then how much is 4 3's? 4×3 (4 times 3)? 6 5's? 6×5 (6 times 5)?

In giving the answers to these questions it is necessary to find the products; that is, to *multiply*.

What are the products of:

5×7, 8×3, 7×4, 3×2, 6×3; 2×7, 5×3, 9×4, 3×6?

Is there any difference in value between 3×8 and 8×3?

Elevens and Twelves

220. 1. Examine the following carefully:

$$\begin{array}{cccccccccccc} 11 & + & 11 & + & 11 & + & 11 & + & 11 & + & 11 & + & 11 & + & 11 & + & 11 & + & 11 & + & 11 \\ 22 & & 33 & & 44 & & 55 & & 66 & & 77 & & 88 & & 99 & & 110 & & 121 & & 132 \end{array}$$

2. Note that

$$11 + 11 \text{ (or 2 11's)} = 22,$$
$$11 + 11 + 11 \text{ (or 3 11's)} = 33,$$
$$11 + 11 + 11 + 11 \text{ (or 4 11's)} = 44.$$

3. How many 11's are added to make 88? How many 11's are added to make 110?

How many are 9 11's? 11×11? 12×11?

Complete:

$1 \times 11 = 11.$	$5 \times 11 =$	$9 \times 11 =$
$2 \times 11 = 22.$	$6 \times 11 =$	$10 \times 11 =$
$3 \times 11 =$	$7 \times 11 =$	$11 \times 11 =$
$4 \times 11 =$	$8 \times 11 =$	$12 \times 11 =$

Complete and memorize:

$11 \times 1 = 11.$	$11 \times 5 =$	$11 \times 9 =$
$11 \times 2 = 22.$	$11 \times 6 =$	$11 \times 10 =$
$11 \times 3 =$	$11 \times 7 =$	$11 \times 11 =$
$11 \times 4 =$	$11 \times 8 =$	$11 \times 12 =$

221. 1. Examine the following:

$$\begin{array}{cccccccccccc} 12+ & 12+ & 12+ & 12+ & 12+ & 12+ & 12+ & 12+ & 12+ & 12+ & 12+ & 12 \\ 24 & 36 & 48 & 60 & 72 & 84 & 96 & 108 & 120 & 132 & 144 & \end{array}$$

2. How many 12's make 36? 60?

Complete:

$1 \times 12 = 12.$	$5 \times 12 =$	$9 \times 12 =$
$2 \times 12 = 24.$	$6 \times 12 =$	$10 \times 12 =$
$3 \times 12 =$	$7 \times 12 =$	$11 \times 12 =$
$4 \times 12 =$	$8 \times 12 =$	$12 \times 12 =$

Complete and memorize:

$12 \times 1 = 12.$	$12 \times 5 =$	$12 \times 9 =$
$12 \times 2 = 24.$	$12 \times 6 =$	$12 \times 10 =$
$12 \times 3 =$	$12 \times 7 =$	$12 \times 11 =$
$12 \times 4 =$	$12 \times 8 =$	$12 \times 12 =$

MULTIPLICATION TABLE

1 × 1 = 1	1 × 2 = 2	1 × 3 = 3	1 × 4 = 4
2 × 1 = 2	2 × 2 = 4	2 × 3 = 6	2 × 4 = 8
3 × 1 = 3	3 × 2 = 6	3 × 3 = 9	3 × 4 = 12
4 × 1 = 4	4 × 2 = 8	4 × 3 = 12	4 × 4 = 16
5 × 1 = 5	5 × 2 = 10	5 × 3 = 15	5 × 4 = 20
6 × 1 = 6	6 × 2 = 12	6 × 3 = 18	6 × 4 = 24
7 × 1 = 7	7 × 2 = 14	7 × 3 = 21	7 × 4 = 28
8 × 1 = 8	8 × 2 = 16	8 × 3 = 24	8 × 4 = 32
9 × 1 = 9	9 × 2 = 18	9 × 3 = 27	9 × 4 = 36
10 × 1 = 10	10 × 2 = 20	10 × 3 = 30	10 × 4 = 40
11 × 1 = 11	11 × 2 = 22	11 × 3 = 33	11 × 4 = 44
12 × 1 = 12	12 × 2 = 24	12 × 3 = 36	12 × 4 = 48
1 × 5 = 5	1 × 6 = 6	1 × 7 = 7	1 × 8 = 8
2 × 5 = 10	2 × 6 = 12	2 × 7 = 14	2 × 8 = 16
3 × 5 = 15	3 × 6 = 18	3 × 7 = 21	3 × 8 = 24
4 × 5 = 20	4 × 6 = 24	4 × 7 = 28	4 × 8 = 32
5 × 5 = 25	5 × 6 = 30	5 × 7 = 35	5 × 8 = 40
6 × 5 = 30	6 × 6 = 36	6 × 7 = 42	6 × 8 = 48
7 × 5 = 35	7 × 6 = 42	7 × 7 = 49	7 × 8 = 56
8 × 5 = 40	8 × 6 = 48	8 × 7 = 56	8 × 8 = 64
9 × 5 = 45	9 × 6 = 54	9 × 7 = 63	9 × 8 = 72
10 × 5 = 50	10 × 6 = 60	10 × 7 = 70	10 × 8 = 80
11 × 5 = 55	11 × 6 = 66	11 × 7 = 77	11 × 8 = 88
12 × 5 = 60	12 × 6 = 72	12 × 7 = 84	12 × 8 = 96
1 × 9 = 9	1 × 10 = 10	1 × 11 = 11	1 × 12 = 12
2 × 9 = 18	2 × 10 = 20	2 × 11 = 22	2 × 12 = 24
3 × 9 = 27	3 × 10 = 30	3 × 11 = 33	3 × 12 = 36
4 × 9 = 36	4 × 10 = 40	4 × 11 = 44	4 × 12 = 48
5 × 9 = 45	5 × 10 = 50	5 × 11 = 55	5 × 12 = 60
6 × 9 = 54	6 × 10 = 60	6 × 11 = 66	6 × 12 = 72
7 × 9 = 63	7 × 10 = 70	7 × 11 = 77	7 × 12 = 84
8 × 9 = 72	8 × 10 = 80	8 × 11 = 88	8 × 12 = 96
9 × 9 = 81	9 × 10 = 90	9 × 11 = 99	9 × 12 = 108
10 × 9 = 90	10 × 10 = 100	10 × 11 = 110	10 × 12 = 120
11 × 9 = 99	11 × 10 = 110	11 × 11 = 121	11 × 12 = 132
12 × 9 = 108	12 × 10 = 120	12 × 11 = 132	12 × 12 = 144

The above table should be reviewed until pupils can give instantly any product when the factors are called.

222. Multiplication is the operation of finding directly the result of continued addition.

WRITTEN EXERCISES

223. Find the products:

1.	2.	3.	4.	5.
268 × 5	815 × 7	910 × 9	327 × 3	722 × 4
6.	**7.**	**8.**	**9.**	**10.**
7225 × 6	8592 × 7	9246 × 9	8527 × 8	5261 × 7
11.	**12.**	**13.**	**14.**	**15.**
5628 × 5	5279 × 7	8946 × 6	2652 × 8	8563 × 9
16.	**17.**	**18.**	**19.**	**20.**
2853 × 8	9521 × 7	3209 × 9	5428 × 8	5291 × 6
21.	**22.**	**23.**	**24.**	**25.**
5217 × 9	8563 × 7	7256 × 6	6256 × 8	7507 × 4
26.	**27.**	**28.**	**29.**	**30.**
7945 × 6	4286 × 5	1237 × 9	5653 × 8	5207 × 7
31.	**32.**	**33.**	**34.**	**35.**
2651 × 11	1257 × 12	8051 × 12	3156 × 11	5652 × 12

224. 1. If a man deposits $126 in bank each week, how much will he deposit in 6 weeks?

$126
6
$756

In 6 weeks he will deposit 6 times $126, or $756. The work is shown at the left.

2. If a watch ticks three times each second, how many times does it tick in a minute? How many times in an hour (60 minutes)?

3. An oarsman makes 25 strokes to the minute. How many strokes will he make in pulling the boat a mile in 9 minutes?

4. Each oarsman of a crew of eight makes 32 strokes a minute. How many strokes are made by all in rowing a mile in 9 minutes?

5. If a man earns $75 a month, how much does he earn in 8 months?

6. A grocer bought 9 barrels of sugar averaging 350 pounds each. How many pounds did he buy?

7. He sold the sugar at 6¢ a pound. How much did he receive for all of it?

8. A turkey weighing 12 pounds sold for 22 cents a pound. How much did it bring?

9. If an ocean liner averages 412 miles a day, how far will it sail in 8 days?

10. A railroad train makes 554 miles each day. How far would the same train run in 6 days of continuous travel?

11. How many miles does a man travel who makes four round trips between two cities 431 miles apart?

12. A man, wishing to reduce the number of his cattle during the winter season, sold 49 head. If he sold one sixth of his herd, how many had he at first?

13. A man had a farm of 137 acres. A neighbor had a farm seven times as large. How many acres did his neighbor's farm contain? How many acres did both farms contain?

14. A merchant pays a rent of $725 annually on his store and $350 annually on his dwelling house. How much would he pay out for rent in 6 years?

15. A man sold 8 cows at $45 each. With the money he received for them he bought 12 sheep at $9 a head. How much money had he left?

16. If a pigeon flies 2058 yards each minute, how many yards will he fly in 9 minutes?

17. Each of nine hives yielded 33 lb. of honey. What is this honey worth at 10¢ a pound?

225. 1. Two 10's and 10 10's are how many 10's?

2. Two 57's and 10 57's are how many 57's?

Now multiply 57 by 12.

$$\begin{array}{r} 57 \\ 12 \\ \hline 114 = 2 \times 57 \\ 570 = 10 \times 57 \\ \hline 684 = 12 \times 57 \end{array}$$

The steps are explained in the orals and shown at the left. The work is done as at the right.

$$\begin{array}{r} 57 \\ 12 \\ \hline 114 \\ 57 \\ \hline 684 \end{array}$$

WRITTEN EXERCISES

226. **1.** Multiply 923 by 26.

(*a*)		(*b*)
723		923
26		26
5538 =	6 × 923	5538
18460 =	20 × 923	1846
23998 =	26 × 923	23998

In (*a*) we first multiply by 6, then by 20, and add the two partial products to obtain the product by 26.

In practice we put down only what is shown in (*b*), placing the right-hand figure of the product by 6 under 6, and the right-hand figure of the product by 2 (tens) under 2 in the tens' column.

Multiply:

2. 60×13.	**7.** 227×18.	**12.** $\$384 \times 52$.
3. 76×16.	**8.** 384×25.	**13.** $\$247 \times 23$.
4. 37×14.	**9.** 421×36.	**14.** $\$237 \times 37$.
5. 78×15.	**10.** 287×45.	**15.** $\$824 \times 14$.
6. 81×14.	**11.** 152×89.	**16.** $\$525 \times 43$.

17. Multiply 723×246.

723		723
246		246
4338 =	6 × 723	4338
28920 =	40 × 723	2892
144600 =	200 × 723	1446
177858 =	246 × 723	177858

In practice, we proceed as shown at the right, placing the right-hand figure of the product by 6 under 6, the right-hand figure of the product by 4 under 4, and the right-hand figure of the product by 2 under 2.

Multiply, using the form at the right:

18. 186×248.	**20.** 346×641.	**22.** 265×462.
19. 242×349.	**21.** 589×52.	**23.** 285×75.

24. 487×25.	30. 2548×16.	36. $\$2564 \times 27$.
25. 646×22.	31. 3452×32.	37. $\$5437 \times 39$.
26. 291×32.	32. 1293×55.	38. $\$2965 \times 17$.
27. 829×326.	33. 265×852.	39. $\$765 \times 365$.
28. 562×857.	34. 725×627.	40. $\$527 \times 179$.
29. 894×972.	35. 856×395.	41. $\$428 \times 652$.

42. Multiply 657 by 207.

(a)		(b)
657	In (a) is shown the complete multiplication. In practice we proceed as in (b), placing the right-hand figure of the product by 2 hundred two places to the left in the hundreds' column.	657
207		207
4599 = 7 × 657		4599
131400 = 200 × 657		1314
135999 = 207 × 657		135999

Multiply as shown in (b):

43.	44.	45.	46.	47.
871	242	687	281	$292
208	309	105	206	107
48.	**49.**	**50.**	**51.**	**52.**
$952	$758	$653	$25.67	$136.59
307	205	103	304	304
53.	**54.**	**55.**	**56.**	**57.**
$829	$278	$637	$346	$794
705	109	305	607	506
58.	**59.**	**60.**	**61.**	**62.**
753	494	413	771	978
204	306	403	407	503

63.	64.	65.	66.	67.
469	629	726	324	267
509	703	409	605	707

68.	69.	70.	71.	72.
842	576	724	845	999
305	208	404	605	202

73. Multiply 762 by 20.

762
20
15240

20 is 2 times 10. Hence we multiply by 2 and annex a 0. In practice, we may arrange the work as shown at the left.

Find the products:

74. 897×20.	**79.** 542×50.	**84.** 243×100.
75. 645×30.	**80.** 549×70.	**85.** 147×200.
76. 296×40.	**81.** 916×80.	**86.** 225×500.
77. 548×60.	**82.** 684×40.	**87.** 525×300.
78. 729×90.	**83.** 922×60.	**88.** 684×600.

227. **1.** At 23 bushels to the acre, what is the yield of 34 acres of wheat?

2. A farmer sold 65 cattle at \$75 a head. How much did he receive for them?

3. A real estate dealer sells 15 city lots for \$975 each. How much does he receive for them?

4. During the season a dealer sold 45 automobiles for \$1250 each. How much did he receive for them?

5. A farmer planted 32 rows of potatoes, each row containing 48 hills. How many hills did he plant?

6. If a freight train averages 22 miles an hour, how far will it run in 24 hours?

7. If a passenger train averages 48 miles an hour, how far will it go in 11 hours?

8. If bricks sell for $8.75 a thousand, how much will 37 thousand bricks cost?

9. A rich man's wealth increases at the rate of $250 daily. How much does it increase in 30 days?

10. Find the cost of a carload of meat weighing 20,576 pounds at 12 cents a pound.

11. The average value of books in a store is 47¢ each. What is the value of 1222 volumes?

12. Bicycles cost a dealer $19 each. Find the amount of a bill for 12 dozen bicycles.

13. A dealer bought comic valentines for 25¢ a gross (12 dozen). How much was gained in selling 3 gross at 1¢ for each valentine?

14. If typewriter paper sells for $1.15 a ream, what is the cost of 125 reams?

15. If a carload of corn contains 820 bu., how much is the corn worth at 65¢ a bushel?

16. A man earns $2.75 a day. If he works 296 days in a year, how much does he earn?

17. A nursery contains in one section 27 rows of young trees with 63 trees to the row. How many trees are there in the section?

18. An excursion boat carried 1565 passengers. What were the receipts if the fares averaged $8 each?

19. A privet hedge can be set out for $.30 a yard. How much will it cost to make such a hedge a half mile (880 yd.) long?

20. A merchant paid 18¢ a pound for coffee and sold it at 24¢ a pound. What did he gain on 275 pounds?

21. At a school entertainment 350 twenty-five cent tickets were sold. How much was realized from the sale of the tickets?

22. In the schools of a certain city 172 teachers are employed. If the number of pupils averages 37 to each teacher, how many pupils are there?

23. If a train makes a round trip each day between two cities that are 225 miles apart, how many miles will it run in a year?

24. A factory averaged 578 yards of cloth a day for 308 working days. How many yards were produced in that time?

25. In a corn-growing contest a boy raised 132 bushels of corn on an acre. At this rate how many bushels of corn would a 25-acre field produce?

26. A farmer raised 40 acres of wheat, yielding 24 bu. an acre; 30 acres of oats, yielding 72 bu. an acre; and 50 acres of corn, yielding 75 bu. an acre. How many bushels of grain did he raise?

27. A corn row contains 182 hills. If the hills are 3 ft. apart, how long is the row? (Draw a diagram showing 10 hills, and see how long the row is.)

DIVISION

228. How many times must you multiply 7 to make 35?

State the number required to make the following products:

$7 \times (\ ) = 42.$	$(\ ) \times 2 = 16.$
$8 \times (\ ) = 72.$	$(\ ) \times 7 = 28.$
$5 \times (\ ) = 40.$	$(\ ) \times 12 = 60.$
$8 \times (\ ) = 56.$	$(\ ) \times 6 = 54.$

When a product and one of the factors are given to find the other factor, we call the operation **division.**

The product becomes a *dividend* and the given factor a *divisor*, while the number to be found is the *quotient.*

229. 1. Point out in the following the divisor, dividend, and quotient:

$18 \div 6 = 3.$ $27 \div 3 = 9.$ $81 \div 9 = 9.$ $84 \div 12 = 7.$
$45 \div 5 = 9.$ $72 \div 9 = 8.$ $54 \div 6 = 9.$ $15 \div 3 = 5.$

2. Complete and show the quotients:

$84 \div 7 = (\ ).$ $84 \div 12 = (\ ).$ $72 \div 8 = (\ ).$ $72 \div 9 = (\ ).$
$63 \div 9 = (\ ).$ $63 \div 7 = (\ ).$ $56 \div 8 = (\ ).$ $48 \div 6 = (\ ).$

3. If the dividend is 36 and the divisor 9, what is the quotient?

4. If the divisor is 9 and the dividend 54, what is the quotient?

230. When the divisor is not greater than 12, but the dividend is larger than 144, the largest product in the Multiplication Table, the process known as **short division** is used. This process has already been explained.

WRITTEN EXERCISES

231. Divide and test your results by seeing if the product of divisor and quotient equals the dividend:

1.	2.	3.	4.	5.	6.
3)576	5)870	7)525	8)624	3)258	6)294
7.	**8.**	**9.**	**10.**	**11.**	**12.**
7)504	2)532	6)492	5)640	8)656	6)210
13.	**14.**	**15.**	**16.**	**17.**	**18.**
9)216	3)642	5)825	9)648	6)264	7)294
19.	**20.**	**21.**	**22.**	**23.**	**24.**
4)376	5)635	6)390	7)581	9)657	6)822

Divide and test:

25. $625 \div 5$. **28.** $66.20 \div 2$. **31.** $78.06 \div 6$.

26. $531 \div 3$. **29.** $47.56 \div 2$. **32.** $36.75 \div 7$.

27. $858 \div 6$. **30.** $82.56 \div 4$. **33.** $35.36 \div 2$.

What is:

34. $\frac{1}{2}$ of 64? **38.** $\frac{1}{4}$ of 84? **42.** $\frac{1}{5}$ of \$230?

35. $\frac{1}{2}$ of 52? **39.** $\frac{1}{4}$ of 148? **43.** $\frac{1}{8}$ of \$960?

36. $\frac{1}{3}$ of 96? **40.** $\frac{1}{5}$ of 105? **44.** $\frac{1}{6}$ of \$2652?

37. $\frac{1}{3}$ of 72? **41.** $\frac{1}{5}$ of 125? **45.** $\frac{1}{10}$ of \$2310?

232. 1. Divide 25 by 2.

$25 \div 2 = 12$, and 1 undivided.

Notice that the undivided portion of the dividend is less than the divisor. This undivided portion is called the **remainder.** (Art. 173.) The result is usually written $12\frac{1}{2}$.

TEST: $12 \times 2 + 1 = 25$.

Multiply quotient by dividend and add the remainder.

2. Divide 77 by 8.

$77 \div 8 = 9$, and remainder 5.

TEST: $8 \times 9 + 5 = 77$.

Divide and test:

3. 35 by 4.
4. 49 by 5.
5. 56 by 6.
6. 60 by 7.
7. 68 by 8.
8. 70 by 9.
9. 85 by 9.
10. 90 by 7.
11. 85 by 11.
12. 93 by 12.
13. 76 by 9.
14. 82 by 12.
15. 88 by 12.
16. 79 by 11.
17. 102 by 12.

Divide and test:

18. $526 \div 8$.
19. $342 \div 7$.
20. $137 \div 6$.
21. $861 \div 8$.
22. $243 \div 5$.
23. $682 \div 3$.
24. $387 \div 4$.
25. $562 \div 6$.
26. $142 \div 8$.
27. $627 \div 9$.
28. $386 \div 6$.
29. $922 \div 3$.
30. $341 \div 4$.
31. $622 \div 7$.
32. $524 \div 6$.
33. $796 \div 9$.
34. $222 \div 11$.
35. $333 \div 12$.
36. $249 \div 11$.
37. $364 \div 9$.
38. $512 \div 7$.
39. $259 \div 6$.
40. $967 \div 8$.
41. $983 \div 9$.

233. 1. A man had 650 bushels of corn and sold $\frac{1}{5}$ of it. How many bushels did he sell? How many had he left?

2. John Galt's crop of apples was 7500 bushels, and he kept one hundredth part of the crop for family use. How many bushels did he keep?

3. The same man exported one third of his crop. How many bushels were exported?

4. It cost a man $4200 to build a house. If one fourth of this amount was for labor, how much did the labor on the house cost?

5. A baseball team played 81 games in a season and lost one third of them. How many games did they win?

6. In a geography class the teacher asked 72 questions on examination. One eighth of these questions were answered incorrectly. How many questions were answered correctly?

7. An opera house has 480 seats. If $\frac{1}{8}$ of them are sold in advance of a lecture, how many remain unsold?

8. A set of china has 144 pieces. If $\frac{1}{12}$ of the pieces are saucers, how many saucers are there?

9. A man leased a house and lot for $288 a year. How much was the rent a month?

10. If 8 boys weigh 680 pounds, what is their average weight?

11. In 8 days a boy worked 304 problems in arithmetic. How many problems on an average did he solve per day?

12. A strawberry bed yields 12 quarts of strawberries to the row. If the total yield is 432 quarts, how many rows are there?

234. 1. Divide 5652 by 12.

(*a*)	(*b*)	(*c*)
12)5652	12)5652(400	471
471	4800	12)5652
	12)852(70	48
	840	85
	12)12(1	84
	12	12
		12

56 hundreds ÷ 12 = 4 hundreds, and 8 hundreds remaining. 8 hundreds = 80 tens, and 80 tens + 5 tens = 85 tens. 85 tens ÷ 12 = 7 tens, and 1 ten remaining. 1 ten = 10, and 10 + 2 = 12. 12 ÷ 12 = 1.

The process as shown in (*a*) is called "short division"; as shown in (*c*), "long division."

In (*b*) the successive divisions are shown. The several quotients added together make the entire quotient. (400 + 70 + 1 = 471.)

NOTE. The three divisions given above are to show the development of *long division* from *short division*. When the divisor is 11 or 12 the example should be solved by *short* division and no pupil should be encouraged to work otherwise. The division (*c*) is the form to be used invariably in long division. In explaining long division use the phrase "first quotient figure" rather than "partial quotient."

2. Divide 5088 by 24; also divide 25,172 by 124.

(*a*)

$$\begin{array}{r} 212 \\ 24\overline{)5088} \\ 48 \\ \hline 28 \\ 24 \\ \hline 48 \\ 48 \\ \hline \end{array}$$

(*b*)

$$\begin{array}{r} 203 \\ 124\overline{)25172} \\ 248 \\ \hline 372 \\ 372 \\ \hline \end{array}$$

In (*a*) the first quotient figure is found by seeing how often 2 is contained in 5. Since 2 is contained in 5 more than 2 and less than 3 times, we know that 24 is contained in 50 less than 3 times. So we try 2. (Should a quotient figure thus found prove to be too large, we reduce it.) Write 2 in the quotient over 0, the last figure of the partial dividend. Multiplying 24 by 2 and subtracting the product from 50 gives a *remainder less than the divisor*, showing 2 to be the correct quotient figure.

Bring down 8; $28 \div 24 = 1$ and remainder 4, less than the divisor.

Bring down 8; $48 \div 24 = 2$, and there is no remainder.

Note the five steps in dividing: (1) finding the probable quotient figure; (2) writing the figure; (3) multiplying; (4) subtracting; (5) bringing down the next figure.

In finding the second quotient figure in (*b*), we see that 124 is not contained in 37; hence we write 0 in the quotient, and annex the 2 to 37. Then 124 is contained in 372 three times.

WRITTEN EXERCISES

Divide as indicated and test:

3. $6951 \div 21$.	**8.** $3344 \div 22$.	**13.** $7248 \div 24$.
4. $6944 \div 31$.	**9.** $9912 \div 21$.	**14.** $6688 \div 22$.
5. $9553 \div 41$.	**10.** $3534 \div 31$.	**15.** $3276 \div 26$.
6. $5088 \div 24$.	**11.** $7378 \div 31$.	**16.** $6552 \div 52$.
7. $4708 \div 22$.	**12.** $5863 \div 41$.	**17.** $11{,}424 \div 32$.

Divide and test:

18. 14,944 by 32.
19. 23,520 by 35.
20. 78,599 by 53.
21. 77,974 by 26.
22. 98,838 by 57.
23. 5656 by 101.
24. 15,225 by 203.
25. 17,690 by 305.
26. 67,192 by 148.
27. 72,576 by 432.

235. Division with Remainders.

1.
$$\begin{array}{r} 213 \\ 34\overline{)7267} \\ 68 \\ \hline 46 \\ 34 \\ \hline 127 \\ 102 \\ \hline 25 \end{array}$$
25 Remainder.

TEST:
$$\begin{array}{r} 213 \\ 34 \\ \hline 852 \\ 639 \\ \hline 7242 \\ 25 \\ \hline 7267 \end{array}$$

Divide and test:

2. $2928 \div 31$.
3. $9826 \div 38$.
4. $8564 \div 46$.
5. $7267 \div 22$.
6. $15{,}256 \div 35$.
7. $86{,}431 \div 72$.
8. $71{,}253 \div 98$.
9. $86{,}523 \div 123$.
10. $17{,}691 \div 148$.
11. $81{,}345 \div 243$.
12. $71{,}248 \div 986$.
13. $86{,}291 \div 642$.
14. $35{,}347 \div 864$.
15. $82{,}946 \div 327$.
16. $21{,}846 \div 546$.
17. $13{,}529 \div 298$.
18. $64{,}532 \div 437$.
19. $81{,}279 \div 283$.
20. $60{,}275 \div 742$.
21. $90{,}483 \div 865$.

236. 1. In a certain high school there are 256 boys and 425 girls. One fourth of the number of boys and one fifth of the number of girls compose a chorus class. How many are there in the class?

2. In a factory there are 1248 operatives. If $\frac{1}{3}$ of this number are women, how many men are employed?

3. In a certain city the census of 1910 showed 12,564 inhabitants. In 5 years the population had increased by one fourth. What was the population in 1915?

4. A regular railroad ticket between two cities costs $8.85. Special excursion rates reduce this amount one third. What is the excursion rate?

5. A traveling salesman sold during the year $33,125.50 worth of goods. If his commission was $\frac{1}{25}$ of the whole, how much did he make on the sales?

6. A farmer sold 250 lb. of cotton more than $\frac{1}{4}$ of his crop. If his crop was 8848 lb., how many pounds did he sell?

7. In 1890 a Southern city had 7250 inhabitants. In 1915 its population had increased to 58,000. What was the average yearly increase?

8. If a farmer raised 750 bushels of wheat on 30 acres, how many bushels to the acre did his crop average?

9. A farmer raised 1875 bu. of potatoes. If the crop averaged 125 bu. to the acre, how many acres did he have in potatoes?

10. If 72 buggies were sold for $5400, what was the average price?

11. A dealer paid $1260 for 3 dozen sewing machines. How much did they cost apiece?

12. How many bushels of wheat are there in a load of 2400 lb., if a bushel of wheat weighs 60 lb.?

13. A grocer bought 75 boxes of oranges for $168.75. How much did he pay for each box?

14. A farmer sold 480 bu. of wheat at $1 a bushel. How many hogs at $15 each can he buy with the money?

15. The school attendance for 1 month (20 days) in one room was 580. What was the average daily attendance?

16. A drover bought cattle for $1350 and sold them for $1800. If he gained $15 on each, how many did he buy?

17. John lives 1760 yd. from the schoolhouse. How many steps will he take in going to school if he averages 2 ft. to the step?

18. It is 95 miles from Baltimore to Philadelphia by a certain railroad. How many round trips have been made by a train that has run 10,830 miles?

19. In a speed contest Mr. Keller wrote on a typewriter 41,040 words in 6 hours. How many words did he average a minute?

20. In the same contest Miss Carey wrote 34,560 words in 6 hours. What was her average a minute?

PRACTICE WORK

237. 1. Take 24, add 5, subtract 8, divide by 3, and subtract 3.

Pupils should mentally keep up with the teacher as each step is called, and should be able to give or write results immediately. Thus, he should think, "24, 29, 21, 7, 4."

2. Take 7, multiply it by 9, subtract 7, subtract 6, and divide by 10.

3. Divide 63 by 7, add 9, divide by 6, multiply by 5, and add 5.

4. Multiply 12 by 5, subtract 4, divide by 7, and multiply by 3.

5. Add quickly 3, 7, 11, 4, 9, 2.

6. Add quickly 9, 2, 3, 12, 8, 7.

7. Call results of $6+4-7+3+9-2+6$.

8. Count by 7's from 48 to 6.

9. Count by 6's from 13 to 37.

10. Count by 3's from 11 to 41.

11. Count by 6's from 4 to 64.

12. Count by 9's from 28 to 100.

13. Count by 7's from 2 to 72.

14. Count by 4's from 3 to 51.

15. Starting with 37, subtract by 3's until 1 is reached.

16. Starting with 92, subtract by 8's until 4 is reached.

PROBLEMS WITHOUT NUMBERS

238. 1. What is a short method of adding?

2. In multiplication, what name is given to the number to be multiplied?

3. What name is given to the number that shows how many times it is to be multiplied?

4. What is the result in multiplication called?

5. If the product and multiplier are known, how is the multiplicand found?

6. Given the product and multiplicand, how do you find the multiplier?

7. What name is given to the number to be divided? to the number by which you divide? to the result?

8. If you cannot divide the dividend exactly by the divisor, what name is given to the number that is left over?

9. Given the dividend and quotient, how will you find the divisor?

10. If the divisor and quotient are known, how will you find the dividend?

11. If the divisor, quotient, and remainder are known, how will you find the dividend?

12. How do you multiply by a number of two figures, when the right-hand figure is 0?

13. Make problems, using numbers, to illustrate the above principles.

SOLUTION OF PROBLEMS

239. In solving problems, observe the following directions:

1. **Read each problem carefully.**
2. **State what is given.**
3. **State what is to be found.**
4. **Plan the work that you think will give the answer.**
5. **Work as planned, and test the result.**

240. 1. If a quart of molasses cost 15 ¢, what will 4 quarts cost?

15 — 1 quart cost 15 ¢.
4 — 4 quarts will cost 4 times 15 ¢.
60 — The actual work is shown at the left.

2. What will 24 yd. of silk cost at $ 1.50 a yard?

3. What will 1 dozen sofas cost at $ 18 each?

4. What will 40 mules cost at $ 125 each?

5. At 60 ¢ a bushel, what will a peck of potatoes cost?

4)60 — 1 bu. cost 60 ¢.
15 — 1 peck = ¼ bu.
1 peck will cost ¼ of 60 ¢, or 15 ¢.

6. If 15 barrels of flour cost $ 87.60, what is the cost of one barrel?

7. A grocer buys 25 lb. of coffee for $ 4.50. What does the coffee cost a pound?

8. At $ 3 each, how many hats can be bought for $ 48?

$$3\overline{)48}\quad 16$$

1 hat costs $ 3.
$ 48 will buy 1 hat for every $ 3.
$ 48 will buy 16 hats.

9. If a boy reads 15 pages a day, how many days will it take him to read a 450-page book?

10. If an automobile makes 18 miles an hour, how many hours will it take to go 162 miles?

11. A dealer pays $ 60 for 4 stoves. At this rate what will 3 stoves cost?

$$4\overline{)60}\quad 15\quad \times 3\quad 45$$

4 stoves cost $ 60.
1 stove cost $\frac{1}{4}$ of $ 60, or $ 15.
3 stoves cost 3 × $ 15, or $ 45.

12. If 7 pounds of tea cost $ 4.20, how much will 25 pounds cost at the same rate?

13. If you breathe 90 times in 5 minutes, how many times will you breathe in an hour?

14. Roy bought 7 valentines at 9¢ each, and gave the merchant $ 1 in payment. How much change did he receive?

$$\begin{array}{rr} 9 & \$\ 1.00 \\ 7 & .63 \\ \hline 63 & \$\ .37 \end{array}$$

1 valentine cost 9¢.
7 valentines cost 7 × 9¢, or 63¢.
$ 1.00 − $ .63 = $ .37.

15. A man bought 12½ lb. of steak at 18¢ a pound. How much change should he get if he handed the butcher a 5-dollar bill?

16. At the rate of 3 turkeys for $5, how many turkeys can I buy for $100?

5)100
20 — $5 will buy 3 turkeys.
3 — $100 = 20 × $5.
60 — $100 will buy 20 × 3 turkeys, or 60 turkeys.

17. An agent bought 5 village lots for $625. How many such lots can he buy for $3125?

18. A dealer paid $750 for 20 buggies and sold them at $42 each. How much did he gain?

42
20 — 1 buggy brought $42.
840 — 20 buggies brought 20 × $42, or $840.
750 — $840 − $750 = $90, gain.
90

19. A man bought 60 bushels of apples at $.80 a bushel. He sold 30 bushels at $1 a bushel, and the rest at $1.10 a bushel. How much did he gain?

20. The weights of 5 boys are 85 lb., 88 lb., 92 lb., 95 lb., and 90 lb. What is their average weight?

85
88
92 — 85 lb. + 88 lb. + 92 lb. + 95 lb. + 90 lb. = 450 lb., total weight.
95
90 — ⅕ of 450 lb. = 90 lb., average weight.
5)450
90

21. The combined weight of a class of 15 boys is 1275 pounds. What is their average weight?

22. If 40 gal. of molasses cost $24, what will 1 gallon of it cost?

23. A dealer paid $481 for 13 steers. What did he pay a head?

24. If 5 boxes contain 720 oranges, how many oranges will 18 such boxes contain?

25. A merchant paid $36 for a dozen hats. He sold 7 of them at $4 each, and 5 of them at $3.50 each. How much did he gain?

26. A man paid $550 for a lot, and built a house on it that cost 3 times as much. How much did the house and lot cost?

27. If it requires 1650 boards to make a mile of fence, how many boards will be required to inclose a square field one mile on a side?

28. James earns $27.50 a week, and Marshall earns $22.50 a week. How much do both earn in 52 weeks?

29. Mr. Coplan bought 13,000 dozen eggs in a month at an average of 15¢ a dozen. What did they cost?

30. At $114 a dozen, how much will a jeweler have to pay for 4 clocks?

31. I sold a horse for $175 and lost $15. How much would I have gained by selling it for $225?

32. I bought 4 packages of starch at $12\frac{1}{2}$¢ a package and 1 dozen cakes of soap at $4\frac{1}{2}$¢ each. How did they all cost?

33. If a press prints 325 papers in a minute, how long will it take to print 10,725 papers?

34. Annie's grades were as follows: arithmetic, 92; geography, 95; grammar, 98; history, 91; physiology, 94. What was her average grade?

35. Louis is 11 years old. His father lacks 5 years of being 4 times as old. How old is his father?

36. Ada bought 5 doz. eggs at 17¢ a dozen, 18 lb. of sugar at $6\frac{1}{2}$¢ a pound, and 5 lb. of coffee at 16¢ a pound. What was the amount of her purchases?

37. A boy has a half dollar, 3 quarters, 3 dimes, 2 nickels, and 4 pennies. If he buys a book for 46¢, a ball for 45¢, and a bat for 25¢, how much will he have left?

38. By selling 200 lots at $125 each, an agent gained $3750. What did they cost?

39. A car containing 756 bushels of wheat was unloaded in 18 minutes. How many bushels were unloaded in 5 minutes?

40. A drover bought 35 head of cattle at $46 a head, and sold them for $1500. Did he gain or lose? How much?

41. Two trains started toward each other at the same time from two cities that are 1500 miles apart. If one averaged 25 miles an hour and the other 30 miles an hour, how far apart were they at the end of 24 hours? (First find distance both traveled in 1 hr.)

UNITED STATES MONEY AND DECIMALS

241. 1. A boy buys a tablet for 5 cents, and in paying for it, offers the salesman a dime. How much change must be given?

2. How many cents in a dime? What is another name for the piece of money whose value is 5¢? How many of these pieces equal a dime in value?

3. What pieces of money are coined which have values greater than a dime and less than a dollar?

4. In how many different ways can you change a quarter into dimes and nickels?

5. Charles bought a top for 3¢, two agates at 5¢ each, a bank for 10¢, and 6 sheets of paper at 1¢ each. How much change did he receive out of a half dollar?

6. How many dimes make a half dollar? How many half dollars make a dollar?

7. How many tablets at 3 for a dime can you buy with 10 dimes? How many at the same price can you buy for a dollar?

8. What part of a dollar is one dime? What part is 2 dimes? What part is 5 dimes?

9. How many tenths of a dollar make a dollar? How many tenths of anything make a whole?

10. If 10 cents make a dime and 10 dimes make a dollar, how many cents make a dollar? Then, what part of a dollar is a cent? What part is 2 cents? What part is 3 cents?

242. Study carefully:

$1¢ = \$.01 = .01$ of a dollar $= \frac{1}{100}$ of a dollar.

$2¢ = \$.02 = .02$ of a dollar $= \frac{2}{100}$ of a dollar.

$5¢ = \$.05 = .05$ of a dollar $= \frac{5}{100}$ of a dollar.

$10¢ = \$.10 = .10$ of a dollar $= \frac{10}{100}$ (or $\frac{1}{10}$) of a dollar.

$20¢ = \$.20 = .20$ of a dollar $= \frac{20}{100}$ (or $\frac{1}{5}$) of a dollar.

$25¢ = \$.25 = .25$ of a dollar $= \frac{25}{100}$ (or $\frac{1}{4}$) of a dollar.

$50¢ = \$.50 = .50$ of a dollar $= \frac{50}{100}$ (or $\frac{1}{2}$) of a dollar.

A cent is one hundredth of a dollar, which is written \$.01. A dime is one tenth of a dollar and is written \$.1, or .1 of a dollar.

243. Tell the number of dimes and cents in each of the following; then read each as tenths and hundredths of a dollar:

\$.02	\$.35	\$.64	\$.59	\$.05	\$.75
\$.50	\$.06	\$.80	\$.53	\$.20	\$.86
\$.38	\$.27	\$.55	\$.48	\$.93	\$.63

It is not necessary to read "no dimes" or "no cents," etc.; read only those numbers that have value.

NOTE. If an introduction to decimals is not required in your course of study, omit pages 196–200.

READING AND WRITING DECIMALS

244. Tenths and hundredths are called **decimals**, and the point used with them is called a **decimal point**.

The decimal point is used to separate ones and tenths, and the places at the right of the point are called **decimal places**.

Hundreds	Tens	Ones		Tenths	Hundredths
1	2	1	.	2	1

The number in the table is read "one hundred twenty-one *and* twenty-one hundredths."

In reading decimals use "and" only between the ones and tenths.

Read the following:

148.04	$8.24	17.05	45.11 lb.
.29	$65.02	1.15	157.8 bu.
67.2	25.05	.05	5.6 gal.
$48.21	60.06	$3.65	1.7 in.
$92.65	85.09	14.02	15.9 yd.
$87.30	78.17	37.26	68.3 ft.

Write as decimals:

8 tenths.	25 hundredths.
4 tenths.	50 hundredths.
17 hundredths.	97 hundredths.
8 hundredths.	1 and 8 tenths.

Twenty-seven and five hundredths.

Eighty-two and four hundredths.

One hundred four and sixty hundredths.

Five thousand fifty and four hundredths.

ADDITION AND SUBTRACTION

245. In adding decimals, set them down with the decimal points in a vertical line and put a decimal point in the sum underneath those in the numbers added, as you have done in adding dollars and cents.

Add and observe:

\$ 8.09	8.09 lb.	8.09
16.53	16.53 lb.	16.53
29.21	29.21 lb.	29.21
6.05	6.05 lb.	6.05
\$ 59.88	59.88 lb.	59.88

WRITTEN EXERCISES

246. Add:

1.	2.	3.	4.	5.
82.4	29.35	40.03	98.43	4.3
65.2	122.2	65.2	36.2	29.65
18.19	82.07	89.12	42.03	126.25

Add by lines and test:

6.	\$ 27.04,	\$ 82.61,	\$ 153.20,	\$ 5.62.
7.	69.28,	145.21,	16.23,	2.35.
8.	\$ 43.26,	\$ 89.48,	\$ 27.65,	\$ 18.62.
9.	84.21,	169.5,	80.01,	81.26.

Subtract and test:

10.	11.	12.	13.	14.
\$ 98.50	\$ 71.87	62.58	148.75	82.44
62.04	60.09	32.42	35.30	36.24

15.	16.	17.	18.	19.
85.32	98.43	45.60	63.29	$81.12
22.23	8.49	7.29	62.23	64.01

20.	21.	22.	23.	24.
256.83	27.65	92.25	25.18	122.30
75.55	8.48	16.66	7.02	66.77

25.	26.	27.	28.	29.
$167.27	752.10	840.16	917.85	948.62
98.15	672.25	760.17	824.92	878.78

247. 1. How many acres are there in 3 fields of 12.75 acres, 81 acres, and 21.42 acres respectively?

2. The distance from Chicago to Buffalo is 439.4 miles, and from Buffalo to New York 535.9 miles. What is the distance over this route from Chicago to New York?

3. On a railroad folder, Charlottesville is marked 114.6 miles west from Washington, and Clifton Forge 210.3 miles in the same direction. How far is it from Charlottesville to Clifton Forge?

4. Roy had $10. If he spent $1.25 for gloves and $1.87 for a hat, how much had he left?

5. Find the sum of twenty-five and seven hundredths, eight and three tenths, sixty-four and five hundredths, and forty-two hundredths.

6. Find the difference between seventy-eight and nine tenths, and twenty-four and thirty-three hundredths.

MULTIPLICATION AND DIVISION

248. Multiplication of Decimals by Whole Numbers.

1. How many tenths are 2×4 tenths? (2×4 tenths $= 8$ tenths; $2 \times .4 = .8$).

2. How many are 5×9 tenths? (5×9 tenths $=$ 45 tenths, or 4.5; $5 \times .9 = 4.5$.)

When a decimal is multiplied by a whole number, the product has as many decimal places as the multiplicand.

WRITTEN EXERCISES

249. 1. Multiply 6.4 by 4.

$$\begin{array}{r} 6.4 \\ 4 \\ \hline 25.6 \end{array}$$

4×4 tenths $= 16$ tenths, or 1.6. We write the 6 under *tenths*, and "carry" the one. How do we get the 25? How many decimal places in the multiplicand? How many in the product?

2. Multiply \$ 22.55 by 15; also 22.55 by 15.

(*a*)	(*b*)
\$ 22.55	22.55
15	15
112 75	112 75
225 5	225 6
\$338.25	338.25

How many decimal places in the multiplicand? How many in the product?

Multiply:

3. \$ 125.60 by 9.
4. \$ 35.75 by 12.
5. \$ 9.27 by 62.
6. \$ 98.75 by 62.
7. 37.65 by 56.
8. 19.54 by 85.
9. 27.68 by 57.
10. 85.12 by 53.
11. 86.40 by 67.
12. 192.8 by 82.
13. 53.65 by 25.
14. 18.5 by 125.

250. Division of Decimals by Whole Numbers.

1. What is $\frac{1}{2}$ of 8 tenths? ($\frac{1}{2}$ of 8 tenths = 4 tenths.)
2. What is $\frac{1}{3}$ of 39 hundredths? ($\frac{1}{3}$ of .39 = .13.)
3. What is $\frac{1}{4}$ of 16 hundredths? ($\frac{1}{4}$ of .16 = .04.)
4. What is $\frac{1}{4}$ of 16 tenths? ($\frac{1}{4}$ of 1.6 = .4.)

When a decimal is divided by a whole number, the quotient has as many decimal places as the dividend.

WRITTEN EXERCISES

251. 1. Divide 25.6 by 4.

$$\begin{array}{r} 6.4 \\ 4\overline{)25.6} \end{array}$$

$\frac{1}{4}$ of 25 = 6, and 1 remaining. We write 6 in the column of ones. 1 and 6 tenths = 16 tenths. $\frac{1}{4}$ of 16 tenths = 4 tenths. We write 4 tenths under tenths. How many decimal places has the quotient?

2. Divide 297.92 by 56.

$$\begin{array}{r} 5.32 \\ 56\overline{)297.92} \\ 280 \\ \hline 179 \\ 168 \\ \hline 112 \\ 112 \\ \hline \end{array}$$

How many decimal places in the dividend? How many in the quotient?

Divide and test:

3. 56.82 by 3.
4. 178.5 by 7.
5. 49.08 by 12.
6. 65.34 by 11.
7. 62.59 by 11.
8. 814.2 by 6.
9. 485.1 by 21.
10. 31.24 by 22.
11. $50.64 by 24.
12. 322.4 by 31.
13. $70.68 by 31.
14. $54.53 by 41.
15. 131.08 by 29.
16. 2280.2 by 26.
17. 1174.4 by 32.
18. $296.80 by 56.
19. 114.48 by 27.
20. 1168.4 by 92.

252. At 12¢ a pound find the cost of:

1. 20 lb. prunes.
2. 42 lb. bacon.
3. 78 lb. beef.
4. 236 lb. paper.
5. 492 lb. cotton.
6. 130 lb. coffee.
7. 116 lb. lard.
8. 312 lb. butterine.

Find the cost of each when:

9. 8 lambs cost $28.
10. 25 hats cost $62.50.
11. 12 chairs cost $21.
12. 40 readers cost $12.
13. 16 bu. oats cost $7.20.
14. 42 gal. oil cost $5.04.
15. 90 yd. silk cost $135.
16. 110 qt. milk cost $8.80.

17. The amount of a grocery bill was $47.50, of which $\frac{1}{5}$ was profit. What was the profit?

18. A trucker sold a case (24 qt.) of berries for $3.84. What was the price a quart?

19. A bookstore bought 8 dictionaries that cost $77.55, including $1.75 expressage. What was the cost of a copy without expressage?

20. If 2 dozen pairs of skates cost $22.80, what is the cost of one pair?

21. A house and lot cost $3264.40. If the lot cost $\frac{1}{4}$ of this amount, what was the cost of the house?

22. A grocer sold 24 lb. of dried fruit for $1.92, thereby gaining $.48. What was the cost a pound?

23. Find the total cost of 48 bundles laths @ $1.25, 27 barrels lime @ $1.16, 15 thousand bricks @ $9.75.

PROBLEMS IN GARDENING

253. 1. This school garden is 108 ft. wide and 200 ft. long. How many feet is it around the garden?

2. The part of the garden devoted to flowers contained 4 violet beds each 4 ft. by 12 ft. How many square feet were planted in violets?

3. From the plot planted in sweet peas the number of stems cut each day averaged 24 during the months of July and August. How many dozen stems were cut during the two months?

4. The class worked 40 minutes in this garden on 3 days of each week. How many hours did they spend in this work in 4 school weeks?

5. A boy planted in this garden a pint of sweet corn. The yield was 132 ears, which sold at 15¢ a dozen. How much did the corn bring?

6. The cost of maintaining this garden for nine months was: preparation of ground, $7.50; fertilizer, $8.75; tools, $3.40; seeds and plants, $15; other expenses, $4.50. Find the total cost. What was the average cost for each month?

PROBLEMS WITHOUT NUMBERS

254. 1. What sign means the same as the word "dollar" or "dollars"?

2. What does the sign ¢ mean?

3. In writing a number composed of dollars and cents, by what do we separate the dollars from the cents?

4. How do you arrange dollars and cents in addition? in subtraction?

5. If you know how many dollars and cents one yard of cloth costs, how will you find how much several yards cost?

6. If a merchant tells you how many dollars and cents a certain number of umbrellas cost, how will you find the cost of one umbrella?

7. If you have a certain number of dollars, how will you find how many dimes you have? How will you find how many cents you have?

8. In multiplying dollars and cents by a whole number, where do we place the decimal point in the product?

9. In dividing dollars and cents by a whole number, where do we place the decimal point in the quotient?

COMMON FRACTIONS

255. You have learned that one or more equal parts of a number are called **fractions.** (See Art. 181.)

1. Point to the whole melon. Show the half of a melon and tell how many halves make a whole.

2. How many fourths of the melon make a whole? How many fourths make a half?

3. How many eighths of the melon make the whole? How many eighths make a half? How many make a fourth?

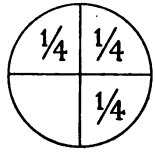
256. 1. In this picture point to a third of a melon. How many of these parts can be cut from one melon? from 2 melons?

2. Point to one sixth of a melon. Tell how many sixths equal one third of a melon. How many sixths equal one half?

257. Write in figures:

One half, one third, two thirds, one fourth, two fourths, three fourths.

258. 1. Read $\frac{1}{4}$. Point to this part of the circle and tell into how many equal parts the circle has been divided. Look again at $\frac{1}{4}$, and tell which figure (1 or 4) shows the number of parts into which the whole has been divided. Where is that figure written?



2. Read $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{8}$. Draw circles and treat each of these fractions as you treated $\frac{1}{4}$.

3. Read $\frac{3}{4}$. Show these parts of the circle. How many parts do you show? Which of the figures (3 or 4) tells the number of parts shown by you? Where is it written?

259. The figure below the line tells the number of equal parts into which the whole is divided. It gives the name to the fraction, and is called the **denominator**.

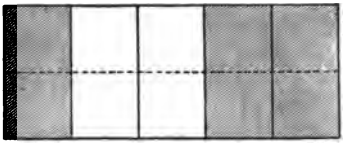
The figure above the line tells the number of equal parts taken, and is called the **numerator**.

Thus: $\frac{7}{8}$ numerator. denominator.

Name each numerator and denominator and tell what it shows:

$\frac{2}{3}$, $\frac{2}{5}$, $\frac{3}{6}$, $\frac{3}{8}$, $\frac{5}{8}$, $\frac{5}{6}$, $\frac{7}{12}$, $\frac{9}{10}$, $\frac{3}{16}$.

260. 1. Into how many parts is the rectangle divided by the vertical lines?



What part of the rectangle is shaded at the left? What part of the rectangle is shaded at the right?

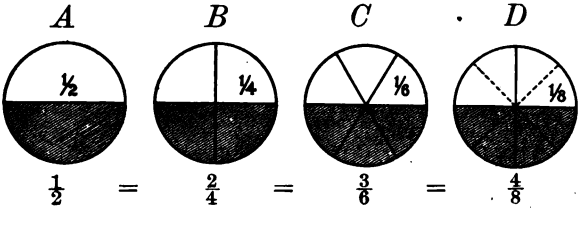
2. Add $\frac{1}{5}$ and $\frac{2}{5}$ of the rectangle, and tell their sum. The dotted line cuts the rectangle horizontally into how many parts? Into how many parts does it cut each fifth? Then the vertical and horizontal lines cut the rectangle into how many parts?

3. Show by the picture $\frac{2}{10}$, $\frac{3}{10}$, $\frac{4}{10}$, $\frac{5}{10}$, $\frac{6}{10}$, $\frac{8}{10}$.

4. Complete:

$\frac{2}{10} = \frac{1}{5}$. $\frac{8}{10} = \frac{}{5}$. $\frac{4}{6} = \frac{}{3}$. $\frac{4}{8} = \frac{}{2}$.

$\frac{4}{10} = \frac{}{5}$. $\frac{2}{6} = \frac{}{3}$. $\frac{2}{8} = \frac{}{4}$. $\frac{6}{8} = \frac{}{4}$.



$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$

261. *A*, *B*, *C*, and *D* are equal circles. What part of each is shaded? How many parts of each are shaded?

A is divided into two equal parts, called *halves*. Tell about *B*, *C*, and *D*. Are the shaded parts of equal size? Then complete: $\frac{1}{2} = \frac{2}{4} = \frac{}{6} = \frac{}{8}$.

262. Use your foot rule and complete:

$\frac{1}{2}$ ft. + $\frac{1}{3}$ ft. = $\frac{1}{6}$ ft. + $\frac{1}{2}$ ft. =

$\frac{1}{3}$ ft. + $\frac{1}{4}$ ft. = $\frac{1}{4}$ ft. + $\frac{1}{6}$ ft. =

$\frac{1}{6}$ ft. + $\frac{1}{3}$ ft. = $\frac{5}{12}$ ft. + $\frac{1}{6}$ ft. =

Observe carefully:

$\frac{1}{2}$ ft. = 6 inches = $\frac{6}{12}$ ft. $\frac{1}{2} = \frac{6}{12}$.

$\frac{1}{3}$ ft. = 4 inches = $\frac{4}{12}$ ft. $\frac{1}{3} = \frac{4}{12}$.

$\frac{1}{4}$ ft. = 3 inches = $\frac{3}{12}$ ft. $\frac{1}{4} = \frac{3}{12}$.

$\frac{1}{6}$ ft. = 2 inches = $\frac{2}{12}$ ft. $\frac{1}{6} = \frac{2}{12}$.

Note that changing fractions of a foot to inches is the same as changing them to twelfths of a foot.

Complete:

$\frac{1}{4} = \frac{3}{12}$. $\frac{2}{3} = \frac{\quad}{12}$. $\frac{5}{6} = \frac{\quad}{12}$. $\frac{2}{6} = \frac{\quad}{12}$

$\frac{1}{6} = \frac{\quad}{12}$. $\frac{2}{4} = \frac{\quad}{12}$. $\frac{3}{4} = \frac{\quad}{12}$. $\frac{3}{6} = \frac{\quad}{12}$.

CHANGE OF FORM

263. You have learned that $\frac{1}{4} = \frac{3}{12}$. It is seen that the $\frac{3}{12}$ may be obtained by multiplying both 1 and 4 by 3. Hence,

Both numerator and denominator may be multiplied by the same number without changing the value of the fraction.

EXERCISES

Change:

1. $\frac{1}{2}$ and $\frac{1}{3}$ to 6ths.
2. $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ to 8ths.
3. $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ to 12ths.
4. $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{5}{6}$ to 12ths.
5. $\frac{1}{2}$, $\frac{2}{5}$, and $\frac{1}{10}$ to 20ths.
6. $\frac{5}{6}$, $\frac{3}{8}$, and $\frac{3}{4}$ to 24ths.

264. Since $\frac{3}{12}=\frac{1}{4}$, we see that $\frac{1}{4}$ may be obtained by dividing both 3 and 12 by 3. Hence,

Both numerator and denominator may be divided by the same number without changing the value of the fraction.

WRITTEN EXERCISES

265. Change to the smallest denominators:

1. $\frac{3}{15}$.
2. $\frac{4}{12}$.
3. $\frac{6}{8}$.
4. $\frac{3}{24}$.
5. $\frac{8}{16}$.
6. $\frac{5}{10}$.
7. $\frac{6}{12}$.
8. $\frac{12}{20}$.
9. $\frac{12}{16}$.
10. $\frac{9}{12}$.
11. $\frac{10}{15}$.
12. $\frac{8}{20}$.

13. $\frac{25}{100}=\frac{25\div 5}{100\div 5}=\frac{5}{20}$; $\frac{5\div 5}{20\div 5}=\frac{1}{4}$.

14. $\frac{75}{90}$.
15. $\frac{200}{1000}$.
16. $\frac{25}{125}$.
17. $\frac{30}{36}$.
18. $\frac{12}{64}$.
19. $\frac{140}{160}$.

266. 1. Is $\frac{3}{16}$ larger or smaller than $\frac{1}{4}$?

$\frac{1}{4}=\frac{4}{16}$ Hence $\frac{3}{16}$ is less than $\frac{1}{4}$.

Compare:

2. $\frac{3}{8}$ and $\frac{5}{16}$.
3. $\frac{2}{5}$ and $\frac{3}{10}$.
4. $\frac{3}{16}$ and $\frac{1}{8}$.
5. $\frac{11}{16}$ and $\frac{3}{4}$.
6. $\frac{3}{4}$ and $\frac{9}{16}$.
7. $\frac{2}{7}$ and $\frac{1}{4}$.

From the above we see that before comparing fractions we must change them to the same denominator.

WRITTEN EXERCISES

267. 1. Which is larger, $\frac{1}{4}$ or $\frac{1}{5}$?

$$\frac{1}{4}=\frac{1\times 5}{4\times 5}=\frac{5}{20}. \qquad \frac{1}{5}=\frac{1\times 4}{5\times 4}=\frac{4}{20}.$$

$\frac{1}{4}$ is larger than $\frac{1}{5}$.

Change to a common denominator, and compare:

2. $\frac{2}{3}$ and $\frac{4}{5}$.
3. $\frac{5}{6}$ and $\frac{4}{5}$.
4. $\frac{3}{4}$ and $\frac{2}{3}$.
5. $\frac{5}{8}$ and $\frac{2}{3}$.
6. $\frac{9}{10}$ and $\frac{5}{6}$.
7. $\frac{6}{7}$ and $\frac{4}{5}$.

8. Change $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{5}{8}$ to 24ths.

$$\frac{1}{2}=\frac{1\times 12}{2\times 12}=\frac{12}{24}. \qquad \frac{3}{4}=\frac{3\times 6}{4\times 6}=\frac{18}{24}.$$

$$\frac{2}{3}=\frac{2\times 8}{3\times 8}=\frac{16}{24}. \qquad \frac{5}{8}=\frac{5\times 3}{8\times 3}=\frac{15}{24}.$$

Change:

9. $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$ to 20ths.
10. $\frac{1}{4}$, $\frac{5}{6}$, $\frac{2}{3}$ to 12ths.
11. $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$ to 12ths.
12. $\frac{2}{3}$, $\frac{2}{5}$, $\frac{1}{6}$ to 30ths.
13. $\frac{1}{2}$, $\frac{5}{6}$, $\frac{3}{8}$ to 24ths.
14. $\frac{1}{4}$, $\frac{3}{5}$, $\frac{5}{8}$ to 40ths.
15. $\frac{1}{8}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{5}{16}$ to 32ds.
16. $\frac{7}{12}$, $\frac{2}{3}$, $\frac{4}{9}$, $\frac{5}{6}$ to 36ths.

ADDITION AND SUBTRACTION

268. We have seen that before adding half gallons and quarts, we must change half gallons to quarts (Art. 184). In like manner, before adding halves and fourths, we must change halves to fourths, or change both to some common measure.

Fractions to be added or subtracted must have the same denominator.

EXERCISES

269. 1. Find the sum of $\frac{2}{3}$ and $\frac{1}{6}$.

$$\frac{2}{3}=\frac{2\times 2}{3\times 2}=\frac{4}{6}. \qquad \frac{4}{6}+\frac{1}{6}=\frac{5}{6}.$$

How many sixths are 4 sixths and 1 sixth?

Complete:

2. $\frac{1}{3}+\frac{1}{6}=\frac{2}{6}+\frac{1}{6}=$
3. $\frac{1}{2}+\frac{1}{6}=$
4. $\frac{1}{3}+\frac{5}{6}=$
5. $\frac{1}{2}+\frac{1}{3}=$
6. $\frac{1}{2}+\frac{2}{3}=$
7. $\frac{1}{2}+\frac{1}{12}=$
8. $\frac{5}{6}+\frac{1}{12}=\frac{10}{12}+\frac{1}{12}=$
9. $\frac{1}{2}+\frac{5}{12}=$
10. $\frac{1}{2}+\frac{7}{12}=$
11. $\frac{1}{2}+\frac{11}{12}=$
12. $\frac{1}{3}+\frac{5}{12}=$
13. $\frac{1}{3}+\frac{7}{12}=$

14. Subtract $\frac{1}{6}$ from $\frac{2}{3}$.

$$\frac{2}{3}=\frac{2\times 2}{3\times 2}=\frac{4}{6}. \qquad \frac{4}{6}-\frac{1}{6}=\frac{3}{6}, \text{ or } \frac{1}{2}.$$

One sixth from 4 sixths leaves how many sixths?

Complete:

15. $\frac{1}{3}-\frac{1}{6}=\frac{2}{6}-\frac{1}{6}=$
16. $\frac{1}{2}-\frac{1}{6}=$
17. $\frac{5}{6}-\frac{1}{3}=$
18. $\frac{1}{2}-\frac{1}{3}=$
19. $\frac{2}{3}-\frac{1}{2}=$
20. $\frac{1}{2}-\frac{1}{12}=$
21. $\frac{5}{6}-\frac{1}{12}=$
22. $\frac{1}{3}-\frac{1}{12}=$
23. $\frac{1}{2}-\frac{5}{12}=$
24. $\frac{7}{12}-\frac{1}{2}=$
25. $\frac{11}{12}-\frac{1}{2}=$
26. $\frac{2}{3}-\frac{5}{12}=$

270. Notice carefully:

(*a*) $\frac{1}{2}+\frac{1}{3}=\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$.

(*b*) $\frac{1}{2}+\frac{1}{3}=\frac{6}{12}+\frac{4}{12}=\frac{10}{12}$, or $\frac{5}{6}$.

From this example it is clear that in a given addition more than one common denominator may be used. It probably occurs to you that the smaller the denominator, the simpler the work.

In adding and subtracting fractions always use the **least common denominator** of the given fractions.

WRITTEN EXERCISES

271. 1. Add $\frac{3}{4}$ and $\frac{1}{10}$.

$\frac{3}{4}+\frac{1}{10}=\frac{15}{20}+\frac{2}{20}=\frac{17}{20}$.

The least common denominator is 20, which is the smallest number that contains 4 and 10.

By what do you multiply the numerator and denominator of $\frac{3}{4}$ to change it to 20ths? By what do you multiply the numerator and denominator of $\frac{1}{10}$?

2. Subtract $\frac{2}{5}$ from $\frac{2}{3}$.

$$\frac{2}{3}-\frac{2}{5}=\frac{10}{15}-\frac{6}{15}=\frac{4}{15}.$$

Add or subtract, as indicated:

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

Add and subtract in the order indicated:

24. $\frac{5}{8}+\frac{2}{3}-\frac{5}{6}=$
25. $\frac{7}{12}-\frac{1}{4}+\frac{1}{6}=$
26. $\frac{7}{8}-\frac{5}{6}+\frac{1}{2}=$
27. $\frac{2}{3}-\frac{1}{5}+\frac{1}{2}=$
28. $\frac{1}{2}+\frac{1}{3}-\frac{1}{5}=$
29. $\frac{1}{2}-\frac{1}{3}+\frac{1}{6}=$
30. $\frac{7}{12}+\frac{1}{3}-\frac{1}{6}=$
31. $\frac{1}{3}+\frac{1}{6}-\frac{1}{9}=$
32. $\frac{1}{4}+\frac{1}{3}-\frac{1}{20}=$
33. $\frac{1}{2}-\frac{1}{12}-\frac{1}{4}=$
34. $\frac{1}{2}-\frac{1}{7}+\frac{1}{4}=$
35. $\frac{5}{12}+\frac{1}{2}-\frac{1}{3}=$
36. $\frac{3}{4}-\frac{3}{10}+\frac{9}{20}=$
37. $\frac{5}{8}+\frac{1}{4}-\frac{1}{12}=$
38. $\frac{2}{3}+\frac{5}{6}-\frac{3}{5}=$
39. $\frac{1}{2}-\frac{1}{6}+\frac{1}{3}=$

272. A fraction whose numerator is larger than its denominator may be changed to a whole number, or to a whole number and a fraction.

A number made up of a whole number and a fraction is called a **mixed number**; thus, $3\frac{1}{4}$.

EXERCISES

273. 1. Change $\frac{25}{4}$ to a mixed number.

$25 \div 4 = 6\frac{1}{4}$

There are 4 fourths in one. In 25 fourths there are as many *ones* as there are 4 fourths. 25 fourths ÷ 4 fourths = 6 and 1 fourth remaining. 6 and one fourth is written $6\frac{1}{4}$.

Change to whole or mixed numbers:

2. $\frac{56}{8}$.
3. $\frac{83}{9}$.
4. $\frac{29}{8}$.
5. $\frac{35}{6}$.
6. $\frac{59}{9}$.
7. $\frac{90}{4}$.
8. $\frac{60}{12}$.
9. $\frac{58}{6}$.
10. $\frac{101}{12}$.
11. $\frac{202}{10}$.
12. $\frac{21}{16}$.
13. $\frac{100}{25}$.

WRITTEN EXERCISES

274. 1. Add $4\frac{1}{4}$ and $5\frac{3}{4}$.

$4\frac{1}{4} = 4\frac{2}{4}$
$5\frac{3}{4} = 5\frac{3}{4}$
$9\frac{5}{4} = 10\frac{1}{4}$

We add the whole numbers and fractions separately; then add the results, as shown.

2. From $6\frac{1}{4}$ subtract $3\frac{2}{3}$.

$6\frac{1}{4} = 6\frac{3}{12} = 5\frac{15}{12}$
$3\frac{2}{3} = 3\frac{8}{12} = 3\frac{8}{12}$
$2\frac{7}{12}$

Since $\frac{8}{12}$ is greater than $\frac{3}{12}$, we "borrow" 1, or $\frac{12}{12}$, from 6, and add it to $\frac{3}{12}$. $\frac{3}{12} + \frac{12}{12} = \frac{15}{12}$. We then subtract, as shown.

Add:

3.	4.	5.	6.	7.
$12\frac{1}{2}$	$7\frac{1}{3}$	$13\frac{5}{6}$	$24\frac{1}{3}$	$13\frac{5}{6}$
15	$9\frac{2}{5}$	$12\frac{5}{12}$	$5\frac{1}{6}$	$7\frac{1}{4}$

Subtract:

8.	9.	10.	11.	12.
$6\frac{3}{4}$	$7\frac{1}{3}$	$6\frac{5}{8}$	$18\frac{1}{6}$	$6\frac{3}{4}$
$5\frac{1}{12}$	$5\frac{5}{6}$	$5\frac{1}{3}$	$12\frac{2}{3}$	$5\frac{7}{8}$

Find the values of:

13. $12 + 5\frac{6}{7}$.
14. $15\frac{2}{5} + 8\frac{1}{6}$.
15. $17\frac{2}{5} + 8\frac{1}{3}$.
16. $7\frac{2}{5} - 2\frac{1}{10}$.
17. $9\frac{3}{4} - 2\frac{3}{5}$.
18. $22\frac{1}{12} - 15\frac{1}{3}$.

275. 1. A farmer cultivated $47\frac{1}{4}$ acres and grazed $32\frac{3}{4}$ acres. How many acres did he have in cultivation and in pasture combined?

2. If it requires $3\frac{7}{8}$ yd. of cloth for a coat, $2\frac{1}{4}$ yd. for a pair of trousers, and $\frac{7}{8}$ yd. for a vest, how many yards are required for the suit?

3. A coal dealer received a carload of coal containing 40 tons. He sold to one man $12\frac{1}{2}$ tons, and to another $17\frac{1}{8}$ tons. How many tons had he left?

4. Mr. Fleming drives from A to B in 3 hours. The first hour he drives $5\frac{1}{2}$ miles, the second $6\frac{1}{8}$ miles, and the third $6\frac{7}{8}$ miles. How many miles is it from A to B?

5. If you owe a merchant \$$\frac{1}{2}$, \$$\frac{1}{5}$, and \$$\frac{1}{10}$, what part of a dollar do you owe him? How much change should he give you, if you hand him a dollar?

6. If $17\frac{3}{8}$ yd. are cut from a 40-yd. roll of matting, how many yards remain?

7. From the sum of $8\frac{9}{10}$ and $7\frac{1}{5}$ subtract their difference.

8. If I write "$\$8\frac{3}{4}+\$7\frac{1}{2}$," and it is printed "$\$8\frac{3}{4}-\$7\frac{1}{2}$," what is the amount of the error?

9. Mr. Smith sold one day $\$15\frac{3}{4}$ worth of hay, $\$7\frac{1}{4}$ worth of corn, and $\$8\frac{1}{5}$ worth of chops. How much did he receive for hay, corn, and chops?

10. If you buy a hat for $\$1\frac{1}{4}$, a pair of shoes for $\$2\frac{1}{2}$, and a coat for $\$5\frac{3}{4}$, and hand the clerk a 10-dollar bill, how much change should he give you?

11. Governor Blank rode from the capital to his home 100 miles away in an automobile. If he stopped for dinner $54\frac{1}{4}$ miles from the capital, how far had he to ride after dinner?

12. If a man willed $\frac{1}{3}$ of his estate to his wife, $\frac{7}{12}$ of it to his children, and the remainder to his church, what part of the estate did the church get?

13. If Roy's grades for five months were $87\frac{1}{2}$, 89, $90\frac{1}{4}$, $92\frac{1}{2}$, and $95\frac{3}{4}$, what was his average?

14. A father weighs $205\frac{1}{4}$ lb., one son weighs $92\frac{3}{4}$ lb., and the other $87\frac{1}{2}$ lb. How much more than both does the father weigh?

15. Mark has $\$1\frac{1}{4}$. If his mother gives him $\$\frac{3}{5}$ and his sister gives him $\$\frac{1}{10}$, how much will he lack of having enough money to buy a $\$2\frac{1}{2}$ pair of shoes?

16. Two boys agree to chop a pile of wood. If in a day one can chop $\frac{1}{10}$ of it, and the other can chop $\frac{3}{20}$ of it, what part can they both chop in that time?

17. How many days will it take both of these boys working together to finish the job?

MULTIPLICATION

276. Note carefully:

3×1 dollar $= 3$ dollars.
3×2 pounds $= 6$ pounds.
3×3 yards $= 9$ yards.

3×1 tenth $= 3$ tenths.	$3 \times \frac{1}{10} = \frac{3}{10}$.
3×2 tenths $= 6$ tenths.	$3 \times \frac{2}{10} = \frac{6}{10}$.
3×3 tenths $= 9$ tenths.	$3 \times \frac{3}{10} = \frac{9}{10}$.

To multiply a fraction by a whole number, **multiply the numerator by the whole number.**

WRITTEN EXERCISES

277. 1. Multiply $\frac{5}{6}$ by 7.

$\frac{5}{6} \times 7 = \frac{35}{6}$, or $5\frac{5}{6}$. $\quad 7 \times \frac{5}{6} = \frac{35}{6}$, or $5\frac{5}{6}$.

Note that $\frac{5}{6} \times 7 = 7 \times \frac{5}{6}$.

2. Multiply $\frac{5}{6}$ by 3.

$\frac{5}{6} \times 3 = \frac{15}{6} = 2\frac{3}{6}$, or $2\frac{1}{2}$.

Multiply:

3. $\frac{1}{3}$ by 9.	10. $\frac{2}{5}$ by 6.	17. 24 by $\frac{3}{16}$.
4. $\frac{7}{8}$ by 3.	11. $\frac{7}{8}$ by 12.	18. 15 by $\frac{7}{10}$.
5. $\frac{9}{10}$ by 6.	12. $\frac{5}{12}$ by 8.	19. 21 by $\frac{6}{7}$.
6. $\frac{5}{6}$ by 4.	13. $\frac{7}{15}$ by 2.	20. 36 by $\frac{7}{8}$.
7. $\frac{2}{3}$ by 8.	14. $\frac{4}{5}$ by 8.	21. 25 by $\frac{3}{4}$.
8. $\frac{5}{8}$ by 9.	15. 18 by $\frac{8}{9}$.	22. 42 by $\frac{2}{5}$.
9. $\frac{3}{4}$ by 10.	16. 6 by $\frac{3}{10}$.	23. 78 by $\frac{5}{6}$.

WRITTEN EXERCISES

278. 1. Find $\frac{3}{4}$ of 40.

(*a*)

$\frac{1}{4}$ of $40 = 10$.

$\frac{3}{4}$ of $40 = 30$.

(*b*)

$\frac{3}{4} \times 40 = \frac{120}{4} = 30$.

Note that $\frac{3}{4}$ of $40 = \frac{3}{4} \times 40$.

Find:

2. $\frac{2}{3}$ of 12.
3. $\frac{3}{5}$ of 20.
4. $\frac{5}{6}$ of 36.
5. $\frac{3}{10}$ of 90.
6. $\frac{5}{8}$ of 32.
7. $\frac{7}{12}$ of 84.
8. $\frac{3}{8}$ of 40.
9. $\frac{3}{4}$ of 28.
10. $\frac{5}{6}$ of 96.
11. $\frac{3}{5}$ of 75.
12. $\frac{3}{4}$ of 16 lb.
13. $\frac{4}{5}$ of \$100.
14. $\frac{3}{8}$ of 48 gal.
15. $\frac{7}{12}$ of 36 in.
16. $\frac{3}{8}$ of 56 bu.

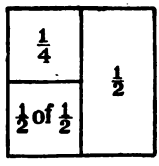
17. Multiply 12 by $3\frac{1}{2}$:

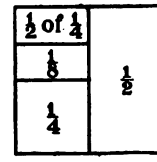
$$\begin{array}{r} 12 \\ 3\frac{1}{2} \\ \hline 36 = 3 \times 12 \\ 6 = \frac{1}{2} \text{ of } 12 \\ \hline 42 = 3\frac{1}{2} \times 12 \end{array} \qquad \begin{array}{r} 3\frac{1}{2} \\ 12 \\ \hline 36 = 12 \times 3 \\ 6 = 12 \times \frac{1}{2} \\ \hline 42 = 12 \times 3\frac{1}{2} \end{array}$$

Note that $12 \times 3\frac{1}{2} = 3\frac{1}{2} \times 12$.

Multiply:

18. 12 by $5\frac{1}{2}$.
19. 15 by $2\frac{3}{5}$.
20. 24 by $6\frac{2}{3}$.
21. 16 by $8\frac{3}{4}$.
22. 19 by $3\frac{3}{5}$.
23. 18 by $5\frac{1}{6}$.
24. 48 by $16\frac{2}{3}$.
25. 36 by $4\frac{5}{6}$.
26. 42 by $5\frac{5}{8}$.
27. 18 by $66\frac{2}{3}$.
28. $9\frac{7}{10}$ by 50.
29. $7\frac{5}{12}$ by 60.
30. $7\frac{1}{9}$ by 72.
31. $6\frac{7}{8}$ by 48.
32. $12\frac{1}{2}$ by 18.



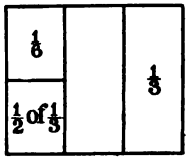


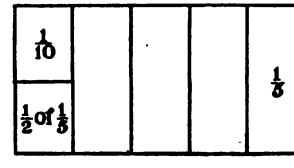
279. 1. The square figure at the left shows $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{2}$ of $\frac{1}{2}$.

How does $\frac{1}{2}$ of $\frac{1}{2}$ compare with $\frac{1}{4}$? $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{4}$.

2. The square figure on the right shows $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{2}$ of $\frac{1}{4}$, and $\frac{1}{8}$.

How does $\frac{1}{2}$ of $\frac{1}{4}$ compare with $\frac{1}{8}$? $\frac{1}{2}$ of $\frac{1}{4} = \frac{1}{8}$.





3. The rectangle on the left shows $\frac{1}{3}$, $\frac{1}{6}$, and $\frac{1}{2}$ of $\frac{1}{3}$.

How does $\frac{1}{2}$ of $\frac{1}{3}$ compare with $\frac{1}{6}$? $\frac{1}{2}$ of $\frac{1}{3} = \frac{1}{6}$.

4. Show by the rectangle on the right that

$$\tfrac{1}{2} \text{ of } \tfrac{1}{5} = \tfrac{1}{10}.$$

280. We have found from the last article that

$$\tfrac{1}{2} \text{ of } \tfrac{1}{2} = \tfrac{1}{4}, \text{ or } \tfrac{1}{2} \times \tfrac{1}{2} = \tfrac{1}{4}.$$

$$\tfrac{1}{2} \text{ of } \tfrac{1}{4} = \tfrac{1}{8}, \text{ or } \tfrac{1}{2} \times \tfrac{1}{4} = \tfrac{1}{8}.$$

$$\tfrac{1}{2} \text{ of } \tfrac{1}{3} = \tfrac{1}{6}, \text{ or } \tfrac{1}{2} \times \tfrac{1}{3} = \tfrac{1}{6}.$$

$$\tfrac{1}{2} \text{ of } \tfrac{1}{5} = \tfrac{1}{10}, \text{ or } \tfrac{1}{2} \times \tfrac{1}{5} = \tfrac{1}{10}.$$

The same results (the products of fractions) can be obtained by **multiplying numerators together and denominators together.**

WRITTEN EXERCISES

281. Find the products:

1. $\frac{1}{2} \times \frac{1}{6} =$
2. $\frac{1}{2} \times \frac{1}{12} =$
3. $\frac{1}{3} \times \frac{1}{6} =$
4. $\frac{1}{3} \times \frac{1}{2} =$
5. $\frac{1}{4} \times \frac{1}{2} =$
6. $\frac{1}{5} \times \frac{1}{2} =$
7. $\frac{2}{3} \times \frac{2}{5} =$
8. $\frac{3}{4} \times \frac{1}{2} =$
9. $\frac{3}{8} \times \frac{4}{5} =$

282. Find the cost of:

1. 5 yd. of silk @ $\$2\frac{1}{4}$.
2. $6\frac{1}{4}$ yd. of ribbon @ $16¢$.
3. 8 yd. of batting @ $7\frac{1}{2}¢$.
4. 36 yd. of muslin @ $12\frac{1}{2}¢$.
5. 6 doz. buttons @ $16\frac{2}{3}¢$.
6. 32 yd. of linen @ $74\frac{1}{2}¢$.
7. 2 doz. eggs @ $22\frac{1}{2}¢$.
8. 3 lb. of buckwheat flour @ $8\frac{1}{3}¢$.
9. $6\frac{1}{2}$ lb. of bacon @ $18¢$.
10. 16 lb. of sugar @ $5\frac{3}{4}¢$.
11. 12 gal. of kerosene @ $12\frac{3}{4}¢$.
12. 6 lb. of butter @ $37\frac{1}{2}¢$.
13. $8\frac{1}{4}$ lb. of macaroni @ $8¢$.
14. 24 herrings @ $2\frac{1}{2}¢$.
15. $5\frac{1}{2}$ gal of molasses @ $60¢$.
16. $6\frac{3}{4}$ lb. of beef @ $12¢$.
17. 12 lb. of sausage @ $12\frac{1}{2}¢$.
18. $2\frac{5}{12}$ doz. oranges @ $60¢$.
19. $3\frac{1}{3}$ doz. bananas @ $15¢$.
20. $3\frac{1}{3}$ doz. grapefruit @ $\$1.08$.

21. What must I pay for 7 oranges at $3\frac{1}{3}¢$ each?

$7 \times 3\frac{1}{3}¢ = 23\frac{1}{3}¢$ or $23¢$. In results, $\frac{1}{2}¢$ or over is counted as $1¢$; less than $\frac{1}{2}¢$ is disregarded.

What must I pay for:

22. 24 fish lines @ $12\frac{1}{2}¢$?

23. 5 handkerchiefs @ $16\frac{2}{3}¢$?

24. 10 bananas @ $1\frac{1}{4}¢$?

25. 10 lb. of sugar @ $5\frac{7}{8}¢$?

26. $12\frac{1}{4}$ lb. of ham @ $15¢$?

27. 50 yd. of calico @ $4\frac{1}{3}¢$?

28. $7\frac{1}{2}$ lb. of maple sugar @ $11¢$?

29. A farmer sold at different times 20 doz. eggs @ $22\frac{1}{2}¢$, 15 doz. @ $16\frac{2}{3}¢$, and $12\frac{1}{2}$ doz. at $15¢$. How much did he receive in all for the eggs?

30. A grocer bought a sack of coffee containing 125 lb. at $12\frac{1}{5}¢$ a pound, and sold it at $15¢$ a pound. How much did he gain?

31. If you read $7\frac{1}{2}$ pages an hour, how many pages can you read in 5 days, reading 3 hours a day?

32. What will be the cost of fencing a rectangular field 64 rods long and 36 rods wide at $87\frac{1}{2}¢$ a rod?

33. If one room requires 36 yd. of carpeting and another $\frac{5}{6}$ as much, how many yards does the second room require?

34. A boy worked Saturdays for his father at $10¢$ an hour. How much would his father pay him for $7\frac{3}{4}$ hours' work?

DIVISION

283. Note carefully:

$\frac{1}{2}$ of 2 boys = 1 boy.	$\frac{1}{2}$ of 2 = 1.
$\frac{1}{2}$ of 4 girls = 2 girls.	$\frac{1}{2}$ of 4 = 2.
$\frac{1}{2}$ of 8 cents = 4 cents.	$\frac{1}{2}$ of 8 = 4.
2 halves ÷ 2 = 1 half.	$\frac{2}{2} \div 2 = \frac{1}{2}$.
4 thirds ÷ 2 = 2 thirds.	$\frac{4}{3} \div 2 = \frac{2}{3}$.
6 fourths ÷ 2 = 3 fourths	$\frac{6}{4} \div 2 =$?

To divide a fraction by a whole number, **divide the numerator by the whole number.**

WRITTEN EXERCISES

284. Find the quotients:

1.	$\frac{3}{4} \div 3$.	5.	$\frac{25}{8} \div 5$.	9.	$16\frac{2}{3} \div 2$.
2.	$\frac{8}{9} \div 4$.	6.	$\frac{16}{9} \div 4$.	10.	$15\frac{3}{4} \div 3$.
3.	$\frac{9}{9} \div 3$.	7.	$\frac{32}{5} \div 8$.	11.	$24\frac{4}{5} \div 4$.
4.	$\frac{15}{16} \div 5$.	8.	$\frac{40}{12} \div 8$.	12.	$32\frac{8}{16} \div 8$.

285. 1. If a man earns $\$\frac{25}{4}$ in 5 days, how much does he earn in a day?

2. If 3 lb. of chocolate costs $\$\frac{9}{10}$, what is the price a pound?

3. If 3 boys do $\frac{9}{12}$ of a piece of work in 1 day, what part of the work is done by 1 boy?

4. If 3 yards of silk cost $\$3\frac{3}{5}$, what is the price a yard?

5. If I divide $12\frac{4}{9}$ yd. of ribbon into two equal parts, what will be the length of each part?

EQUAL PARTS OF A DOLLAR

286. You have learned (Art. 197) how easy it is to find the cost of any number of things when the price of each is a dime, a quarter, or a half dollar. The same method may be extended to other equal parts of a dollar. Remember that

$50¢ = \$\frac{1}{2}$.	$25¢ = \$\frac{1}{4}$.	$16\frac{2}{3}¢ = \$\frac{1}{6}$.
$33\frac{1}{3}¢ = \$\frac{1}{3}$.	$20¢ = \$\frac{1}{5}$.	$12\frac{1}{2}¢ = \$\frac{1}{8}$.

WRITTEN EXERCISES

287. 1. What will 15 yd. of sheeting cost at $33\frac{1}{3}¢$ a yard?

At \$1 a yard, 15 yd. would cost \$15.
At $33\frac{1}{3}¢$ (\$$\frac{1}{3}$) a yard, 15 yd. will cost $\frac{1}{3}$ of \$15, or \$5.

2. What will 48 lb. of coffee cost at $16\frac{2}{3}¢$ a pound?

At \$1 a pound, 48 lb. would cost \$48.
At $16\frac{2}{3}¢$ (\$$\frac{1}{6}$) a pound, 48 lb. will cost $\frac{1}{6}$ of \$48, or \$8.

In like manner find the cost of:

3. 24 knives @ $50¢$.
4. 18 towels @ $33\frac{1}{3}¢$.
5. 40 readers @ $25¢$.
6. 55 lb. coffee @ $20¢$.
7. 60 yd. matting @ $16\frac{2}{3}¢$.
8. 88 yd. cambric @ $12\frac{1}{2}¢$.
9. Find the cost of 40 gal. of sirup @ \$1.25.

At \$1 a gallon, 40 gal. would cost \$40.
At \$$1\frac{1}{4}$ a gallon, 40 gal. will cost \$40 + $\frac{1}{4}$ of \$40, or \$50.

In like manner find the cost of:

10. 12 yd. of velvet carpet @ \$1.50.
11. 30 reams of paper @ \$1.33$\frac{1}{3}$.

BUYING GROCERIES

Price List

Peanuts	7¢ a lb.	Lemons	12¢ a doz.
Rice	$8\frac{1}{3}$¢ a lb.	Eggs	24¢ a doz.
Candy	$16\frac{2}{3}$¢ a lb.	Oranges	$2.50 a box.
Chestnuts	$1.80 a bu.	Berries	$12\frac{1}{2}$¢ a qt.
Apples	$1.50 a bu.	Molasses	50¢ a gal.

288. From this price list find the cost of:

1. 12 lb. peanuts.
2. 13 doz. lemons.
3. 50 lb. peanuts.
4. $2\frac{1}{2}$ bu. chestnuts.
5. $6\frac{1}{2}$ bu. apples.
6. 5 doz. eggs.
7. 12 qt. berries.
8. 9 lb. candy.
9. 25 bu. apples.
10. 25 boxes oranges.
11. 30 qt. berries.
12. $15\frac{1}{2}$ bu. chestnuts.
13. 12 gal. of molasses and 3 doz. eggs.
14. 8 lb. of peanuts and 6 lb. of rice.
15. 5 doz. lemons and 3 lb. of candy.
16. 8 boxes of oranges, 3 bu. of apples, and 18 qt. of berries.
17. How many pounds of candy can be bought for $1.00?
18. How many dozen lemons can you buy for $1.50?
19. Find the cost of the following bill:

12 bu. chestnuts. 67 doz. eggs.
15 boxes oranges. 50 gal. molasses.
225 lb. rice. 300 lb. candy.

REVIEW WORK

WRITTEN EXERCISES

289. 1. Looking northward from my house, I see a church tower known to be $2\frac{5}{8}$ miles distant. Looking southward I see a second tower $1\frac{1}{4}$ miles away. How far apart are these towers?

2. Bruce rode $25\frac{1}{3}$ miles in one direction and returned along the same route $12\frac{1}{5}$ miles. How far was he then from the starting point?

3. If 10 coats are cut from 35 yd. of cloth, how many yards each do the coats average?

4. If $3\frac{3}{4}$ lb. of chocolate caramels are divided equally among 3 girls, how much does each receive?

5. I bought $1\frac{1}{4}$ bu. of apples, and sold $\frac{1}{5}$ of them. What part of a bushel did I sell? ($1\frac{1}{4}$ bu. $= \frac{5}{4}$ bu.)

6. If $\frac{1}{4}$ lb. of pepper costs $8¢$, how many pounds can you buy for $96¢$?

7. Find the value of $\frac{5}{6} + \frac{3}{8} - \frac{7}{12}$.

8. How much will 1500 ft. of flooring cost at $3\frac{1}{4}¢$ a foot?

9. Find the cost of $3\frac{1}{2}$ reams of drawing paper at \$6.50 a ream.

10. When lemons are selling at 3 for $5¢$, what is one worth? What is one dozen worth?

11. If three handkerchiefs sell for $25¢$, what would one dozen cost at the same rate?

12. If a bushel of Irish or white potatoes costs 45¢, what will $2\frac{1}{2}$ bushels cost?

13. A barrel of a beverage sold at soda fountains holds $48\frac{1}{2}$ gallons. What would a barrel of it cost at 78¢ a gallon?

14. A remnant of cloth was measured by a shopkeeper and found to contain $1\frac{2}{3}$ yd. If the regular price for a yard of this cloth is 48¢ and he wishes to reduce the price $\frac{1}{4}$, what must he mark the piece?

15. A dealer sold 4 bushels of chestnuts at the rate of 25¢ for $\frac{1}{8}$ of a bushel. How much did he get for them?

16. A baker uses $\frac{3}{8}$ lb. of flour for a loaf of bread. How many pounds of flour does he use in making 80 such loaves?

17. A mechanic earns $16 a week. If he spends $\frac{1}{4}$ of his wages for board and $\frac{1}{3}$ of what is left for other expenses, how much does he save a week?

18. If $\frac{2}{3}$ of the cost of my horse is $120, what did I pay for it?

$\frac{2}{3}$ of the cost = $120.
$\frac{1}{3}$ of the cost = $\frac{1}{2}$ of $120, or $60.
The cost = 3 × $60 or $180.

19. If $\frac{3}{4}$ of a certain number is 36, what is the number?

20. Frank caught 18 trout, which was $\frac{2}{3}$ of the number caught by Howard. How many trout did Howard catch?

DENOMINATE NUMBERS

LIQUID MEASURE

290. Liquid Measure is used in measuring water, milk, oil, etc.

Pint

Quart

Gallon

TABLE

2 pints (pt.) = 1 quart (qt.)
4 quarts = 1 gallon (gal.)
1 gallon = 4 quarts = 8 pints

ORAL EXERCISES

291. 1. Measure with a quart measure the water in a gallon measure. How many times will the water in the gallon measure fill the quart measure?

2. How many quarts are there in a gallon?

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

4. How many quarts are there in 2 gallons? in 3 gallons?

5. How many gallons are there in 8 quarts? in 16 quarts?

WRITTEN EXERCISES

292. 1. Change 3 gal. 2 qt. to quarts.

1 gal = 4 qt.; 3 gal. = 3 × 4 qt., or 12 qt.
12 qt. + 2 qt. = 14 qt.
The work is best performed as at the right.

$$\begin{array}{r} 3 \\ \times\ 4 \\ \hline 12 \\ +\ 2 \\ \hline 14 \end{array}$$ (qt.)

Change:

2. 1 gal. 2 qt. to quarts.
3. 2 gal. 3 qt. to quarts.
4. 5 qt. and 1 pt. to pints.
5. 7 qt. 1 pt. to pints.
6. 4 gal. 2 qt. to quarts.
7. 5 gal. 2 qt. to pints.

8. Change 43 pt. to quarts and pints.

1 qt. = 2 pt.; 43 pt. ÷ 2 pt. = 21, the number of quarts, with a remainder of 1 pt.
The result is 21 qt. 1 pt.
The work is best performed as at the right.

$$\begin{array}{r} 2)43 \\ \hline 21 + 1 \end{array}$$ (pt.)

9. Change 34 qt. to gallons and quarts.
10. Find the number of gallons in 32 qt.
11. How many quarts are there in 56 pt.?
12. Change 74 qt. to gallons and quarts.
13. Change 81 pt. to gallons and pints.
14. If milk can be bought at 20¢ a gallon and sold at 8¢ a quart, how much is gained on each gallon?
15. At 25¢ a pint, find the cost of 1 gal. of cream.
16. If a pint of water weighs a pound, find the weight of 3 gallons of water.

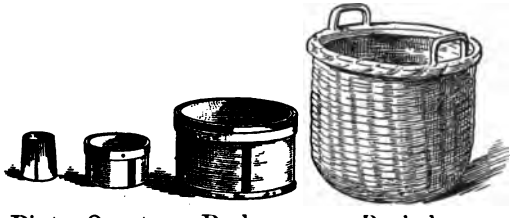
17. An importer received olive oil in quart, pint, and half-pint bottles — 100 half pints, 126 pints, and 56 quarts. How many gallons did he receive in all?

18. In a boarding school 150 of the students used oil lamps. Each student used 1 quart of oil in 3 days. How many gallons were used by all the students in the month of November?

19. Mineral water will be delivered in a certain town at 10¢ for a two-quart bottle, or 50¢ for four gallons delivered at one time. How much would you save on 8 gallons by buying four gallons at a time?

DRY MEASURE

293. Dry Measure is used in measuring grain, seed, fruit, vegetables, etc.



Pint Quart Peck Bushel

TABLE

2 pints (pt.) = 1 quart (qt.)
8 quarts = 1 peck (pk).
4 pecks = 1 bushel (bu.)

In addition to the measures mentioned, a half-bushel measure is often used.

294. 1. 8×2 pints $= 16$ pints $= 1$ peck.

2. $4 \times 8 \times 2$ pints $= 64$ pints $= 1$ bushel.

3. 4×8 quarts $= 32$ quarts $= 1$ bushel.

WRITTEN EXERCISES

295. 1. How many pints are there in 15 quarts? in 36 qt.?

2. How many pecks are there in 176 qt.? in 84 qt.?

3. How many pints are there in 12 pk.? in $7\frac{1}{2}$ pk.?

4. How many pints are there in 3 pk. 3 qt.?

5. In $2\frac{1}{2}$ bu. of onions there are how many quarts?

6. How many pint packages can a seedsman make up from $\frac{1}{2}$ bushel of beans?

7. At 45¢ a peck, what will a barrel of apples cost? (1 barrel of apples $= 3$ bu.)

8. A man bought one bushel of peanuts for \$ 1.75, and sold them at 5¢ a pint. How much did he gain?

9. If my horse eats 6 qt. of oats a day, how many days will 6 bu. last him?

10. If a barrel of apples costs \$ 3.00, how much did they cost a peck?

11. A man bought a barrel of apples at the rate of 50¢ a half peck. How much was the price a bushel?

12. If a laborer eats $\frac{1}{4}$ of a bushel of meal a week, how many bushels of meal will he eat in 30 weeks?

AVOIRDUPOIS WEIGHT

296. Avoirdupois Weight is used in weighing ordinary articles of trade, as cattle, coal, grain, and groceries.

Ounce Pound

TABLE

16 ounces (oz.) = 1 pound (lb.)
2000 pounds = 1 ton (T.)

WRITTEN EXERCISES

297. 1. How many ounces are there in 6 lb.? in 5 lb.?

2. How many pounds are there in 3 T.? in $2\frac{1}{2}$ T.?

3. How many ounces are there in 7 lb. 9 oz.?

4. How many ounces are there in 150 lb.?

5. How many pounds are there in 256 oz.? in 480 oz.?

6. How many ounces are there in $\frac{1}{2}$ lb.? in $\frac{1}{4}$ lb.?

7. A photographer had 2 lb. of flash powder. He took 12 flashlight pictures, using 1 ounce each time. How much powder had he left?

8. If a man eats three 4-ounce loaves of bread a day, how many pounds of bread will he eat in 100 days?

9. A bushel of wheat weighs 60 lb. How many pounds are there in a bin containing $62\frac{1}{2}$ bushels?

10. If a bushel of coal weighs 80 pounds, how many bushels are there in a ton?

MEASURE OF TIME

298. TIME TABLE

60 seconds (sec.)	=	**1 minute (min.)**
60 minutes	=	**1 hour (hr.)**
24 hours	=	**1 day (da.)**
7 days	=	**1 week (wk.)**
365 days	=	**1 year (yr.)** *
12 months (mo.)	=	**1 year (yr.)**

* Leap year has 366 days.

Pupils should also memorize the following:

Thirty days hath September,
April, June, and November.

The other months have 31 days each, except February. That month has 28 days, except in leap years, when it has 29 days.

WRITTEN EXERCISES

299. 1. How many seconds are there in 6 min.?

2. How many hours are there in 5 da.?

3. How many minutes are there in 12 hr.?

4. How many minutes are there in a day?

5. How many minutes are there from 6:30 A.M. to noon?

6. How many hours are there from 9 A.M. to 2:30 P.M.?

7. A school opens at 8:45 A.M. and closes at 2:15 P.M. If a half hour is given for recess, what length of time is spent in school?

8. A horse trots a mile in 2 min. 20 sec. How many seconds does it average to the half mile? to the quarter mile?

9. An automobile can travel 30 mi. an hour. How far can it travel in a minute? How far can it travel in $\frac{1}{6}$ of an hour?

10. How many years was it from the Philadelphia Centennial Exposition in 1876 to the Panama-Pacific Exposition in San Francisco in 1915?

11. When the sun rises at 5:30 and sets at 6:30, how many hours is it from sunrise to sunset?

12. How many weeks are there in a leap year? how many days over?

13. What time does the sun rise and set to-day? How long is it from sunrise to sunset?

LINEAR MEASURE

300. **Linear Measure** is used in measuring lengths.

TABLE

12 inches (in.)	**= 1 foot (ft.)**
3 feet	**= 1 yard (yd.)**
$5\frac{1}{2}$ yards, or $16\frac{1}{2}$ feet	**= 1 rod (rd.)**
320 rods	**= 1 mile (mi.)**

301. Copy and complete:

1 mi. $= 320 \times 5\frac{1}{2}$ yd. $=$ —— yd.

1 mi. $= 320 \times 16\frac{1}{2}$ ft. $=$ —— ft.

ORAL EXERCISES

302. 1. What is the length of the best standing jump made by a pupil in your school? What is the length of the best running jump?

2. Willie's height is 4 ft. 4 in. Tell his height in inches; in feet.

3. How far do you live from school? from church?

4. What measure is used in measuring distances?

WRITTEN EXERCISES

303. Change:

1. 3 ft. 6 in. to inches.
2. 5 yd. 2 ft. to feet.
3. 6 yd. 1 ft. to feet.
4. 5 ft. 11 in. to inches.
5. 13 yd. 4 in. to inches.
6. 2 rd. 3 yd. to yards.
7. 2 rd. $2\frac{1}{2}$ in. to inches.
8. 3 rd. 10 ft. to feet.
9. 1 mi. 880 yd. to yards.
10. 1 mi. 1320 ft. to feet.

Change:

11. 21 in. to feet and inches.
12. 19 ft. to yards and feet.
13. 50 in. to yards and inches.
14. 77 ft. to yards and feet.
15. $\frac{1}{2}$ yd. to inches.
16. $1\frac{1}{2}$ ft. to inches.
17. $\frac{1}{2}$ mi. to yards.
18. $\frac{3}{4}$ mi. to yards.
19. $2\frac{1}{2}$ mi. to yards.
20. 1 ft. 6 in. to feet.

304. 1. A boy runs 220 yd. in one minute. At that rate, in how many minutes can he run a mile?

2. If a horse walks 440 yd. in 15 minutes, how far will he walk in 60 minutes?

3. How many rods of fence are required to inclose a field $\frac{1}{4}$ of a mile long and 40 rods wide?

4. A boy lives 160 rods from school. How many miles does he travel in making 4 round trips?

5. In a certain city 16 blocks equal a mile in length. How many rods long is each block?

6. The school grounds are too large to be measured with a foot rule or a yardstick, so I used a 25-foot line and found the lot was 10 lines long and 8 lines wide. What was the length of the lot in feet? What was its width in feet?

7. Measure the length, width, and height of your schoolroom in feet and express them in yards.

8. The height of a building may be estimated by counting the number of stories (as shown by the windows), allowing 10 or 12 feet to each story. Estimate the heights of several buildings.

MEASURING LENGTHS

305. 1. If the school yard in which the class is making measurements is 90 ft. by 120 ft., how many feet does a boy go in running once around the yard?

2. The distance in a straight line from one corner of the yard to the opposite corner is found to be 150 ft. This distance is how much less than the combined length of a side and an end?

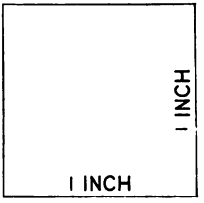
3. The bricks used in the school building are 8 in. long, and one layer along the side has 120 bricks and one layer across the end 90 bricks. Find the length and the width of the building. (For mortar between joints, allow 5 ft. for the side of the building and $3\frac{3}{4}$ ft. for the end.)

4. Each of the 19 pupils in the class required a foot rule costing 3¢, a yardstick costing 12¢, a tape line costing 30¢, and a notebook costing 15¢. What was the cost of these materials for the class?

SURFACE MEASURE

306. 1. Draw a square 1 foot on a side. Divide it into square inches by drawing horizontal and vertical lines. What is the length in inches of each of its sides? How many square inches does it contain?

2. Draw a square 1 yard on a side on the blackboard. Divide this square into square feet by drawing horizontal and vertical lines. How many square feet does it contain?



3. What is a square inch? a square foot? a square yard? a square rod?

307. The number of square units contained in a rectangle or any other surface is called its **area**. The area of a figure is the number of these units within its boundaries.

308. TABLE

144 square inches (sq. in.) = 1 square foot (sq. ft.)
9 square feet = 1 square yard (sq. yd.)
160 square rods = 1 acre (A.)
1 acre = 4840 square yards

309. Copy and complete:

1 sq. ft. $= 12 \times 12$ sq. in. $=$ —— sq. in.

1 sq. yd. $= 3 \times 3$ sq. ft. $=$ —— sq. ft.

1 A. $= 160 \times 30\frac{1}{4}$ sq. yd. $=$ —— sq. yd.

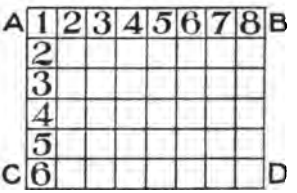
WRITTEN EXERCISES

310. Change:

1. 10 sq. yd. to sq. ft.
2. 5 sq. yd. 20 sq. ft. to sq. ft.
3. 4 sq. ft. 40 sq. in. to sq. in.
4. 72 sq. ft. to sq. yd.
5. 288 sq. in. to sq. ft.
6. 432 sq. in. to sq. ft.
7. 1 acre to sq. yd.
8. $2\frac{1}{2}$ acres to sq. yd.

Areas

311. Draw a line, AB, 8 inches long. Make a square corner at A and draw AC, 6 inches long. Complete the rectangle as shown.



Count eight squares in a row and six rows. Then multiply 8×6. How do you get the number of square feet in the rectangle without counting the squares?

The area of a rectangle is the product of the numbers that measure its length and width.

WRITTEN EXERCISES

312. Find the area of the following rectangles:

	Length	Width		Length	Width
1.	8 ft.	5 ft.	4.	150 ft.	50 ft.
2.	10 yd.	5 yd.	5.	25 yd.	75 yd.
3.	80 yd.	40 yd.	6.	150 ft.	30 ft.

313. 1. How many square yards in a strip of carpet $\frac{3}{4}$ of a yard wide and 16 yards long?

2. How many square yards of linoleum will cover a floor which is 24 feet wide and 36 feet long?

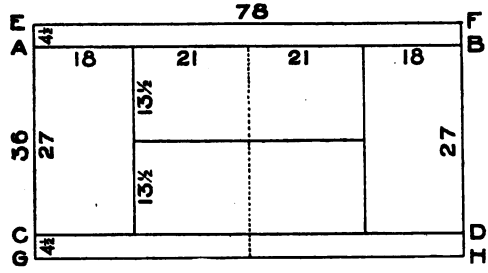
3. What is the area of a rectangular city block measuring 264 feet long and 330 feet wide?

4. One of the grass plots between the two roadways of an avenue is 20 feet wide and 360 feet long. Find the area.

5. What is the area of a square 70 yd. on a side? Is it greater or less than 1 acre? how much?

6. What is the difference in area between a square 70 yd. on a side and a rectangle 71 yd. long and 69 yd. wide?

7. The drawing gives the plan of a tennis court, the lengths being marked in feet. Find the area of the single court *ABDC;* also of the double court *EFHG.*



8. Measure your schoolroom, draw a ground plan of it, marking the position of doors, windows, etc. In this plan let 1 inch equal 10 feet. Find the number of square feet in the floor.

SOLID MEASURE

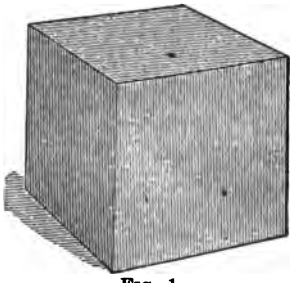


FIG. 1.

314. 1. Figure 1 represents a cubic inch. How many edges has a cubic inch? how many faces? What is the length of each edge? What is the shape of each face?

2. What is a cubic foot? a cubic yard?

3. In Figure 2 note how many cubic inches are put together to make a cubic foot. Point to the row and tell how many cubic inches it contains; then to

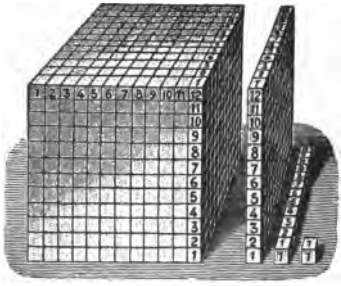


FIG. 2.

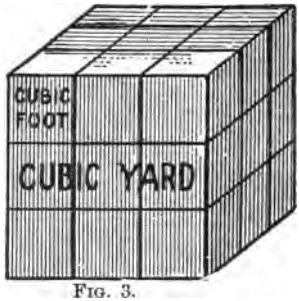


FIG. 3.

the layer, and tell how many rows it contains; then to the cubic foot, and tell how many layers it contains.

$12 \times 12 \times 12$ cubic inches $= 1728$ cubic inches.

4. In Figure 3 note how the cubic yard is built up of cubic feet, — 3 cubic feet to a row, 3 rows to a layer, and 3 layers to the cubic yard.

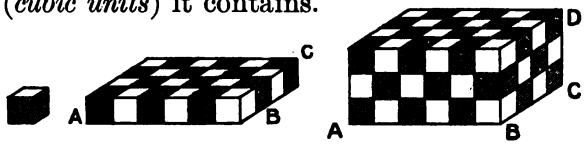
$3 \times 3 \times 3$ cubic feet $= 1$ cubic yard.

315. TABLE

1728 cubic inches (cu. in.) = 1 cubic foot (cu. ft.)
27 cubic feet = 1 cubic yard (cu. yd.)

Volume

316. The volume of a solid tells how many small cubes (*cubic units*) it contains.



1. If the small cube represents a cubic inch, what is the length AB of the solid at the right? What is the breadth BC? What is the height CD?

2. How many cubic inches are shown in the front row AB of the layer in the center? (6×1 cu. in. = 6 cu. in.)

3. How many cubic inches are there in the 4 rows, or in the layer? (4×6 cu. in. = 24 cu. in.)

4. How many cubic inches are there in the 3 layers of the solid at the right? ($3 \times 4 \times 6$ cu. in. = 72 cu. in.)

The volume of any square-cornered (rectangular) solid is the product of the numbers that measure its length, breadth, and thickness.

WRITTEN EXERCISES

317. Change:

1. 8 cu. yd. to cu. ft.
2. 15 cu. yd. to cu. ft.
3. 1080 cu. ft. to cu. yd.
4. 2592 cu. ft. to cu. yd.
5. 4860 cu. ft. to cu. yd.
6. 5 cu. ft. to cu. in.

318. 1. How many cubic inches are there in a brick 8 in. long, 4 in. wide, and $2\frac{1}{2}$ in. thick?

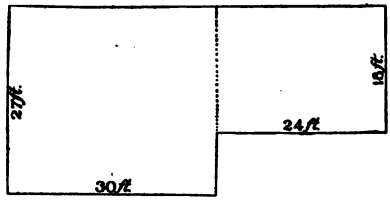
2. What is the volume of a cement block 3 ft. long, $\frac{3}{4}$ ft. wide, and $\frac{2}{3}$ ft. thick?

3. How many cubic feet in a cord of wood, if a pile of wood 8 ft. long, 4 ft. wide, and 4 ft. high is a cord?

4. A ton of anthracite coal occupies about 38 cubic feet. How many tons will a bin 19 ft. long, 12 ft. wide, and 6 ft. deep contain?

5. How many cubic feet of air are there in a schoolroom that is 40 ft. long, 30 ft. wide, and 12 ft. high?

6. A cistern is 6 ft. long, 5 ft. wide, and 4 ft. deep. If a cubic foot of water weighs $62\frac{1}{2}$ lb., what is the weight of the water when the cistern is full?



7. According to the plan shown above, find the number of cubic feet of earth that must be removed to make a cellar 6 ft. deep. (First find area of each rectangle.)

8. How much would this excavation cost at 55¢ a cubic yard?

BILLS AND RECEIPTS

319. Did you ever see one of your father's store bills? What is a bill? How is a bill receipted?

Suppose that John Smith bought of Blank & Co. 20 lb. of sugar at 5¢ a pound, 10 lb. of coffee at 15¢ a pound, and 5 gal. of coal oil at 18¢ a gallon.

Blank & Co. would give Mr. Smith a **bill** like this:

Nashville, Tenn., July 1, 1915.

Mr. John Smith,

Bought of BLANK & CO.

May	5	20 lb. Sugar @ 5¢	1	00
"	7	10 lb. Coffee @ 15¢	1	50
June	1	5 gal. Coal Oil @ 18¢		90
			3	40
		Reed. payment, Blank & Co.		

WRITTEN EXERCISES

320. 1. Copy and complete the following bill:

[*Name of place, and date*]

M · [*Insert your name*]

Bought of [*Name*] , Grocer.

[*Date*]	3 lb. Baking Powder @ 20¢		
	2 lb. Chocolate @ 35¢		
	6 lb. Apricots @ 12½¢		
	8 lb. Prunes @ 8¢		

2. Mr. T. M. Scott bought of Martin & Mayo, Grocers, Richmond, Va., the following:

3 lb. butter @ 24¢;
5 lb. coffee @ 18¢;
10 lb. sugar @ 6¢;
3 doz. eggs @ 30¢;
4 lb. cheese @ 16¢;

Make out his bill and receipt it.

3. Mrs. A. G. Brown bought the following from Peck & Pierce, Dealers in Dry Goods, Mobile, Ala.:

12½ yd. cashmere @ 90¢;
3½ yd. flannel @ 90¢;
10 yd. muslin @ 12½¢;
8 yd. cambric @ 8¢;

Make out her bill and receipt it.

Make out and receipt the following bills, supplying your name and the names of dealers whom you know:

4. Bill of meats: 2½ lb. steak @ 24¢, 4 lb. lamb chops @ 20½¢, 5 lb. fish @ 10¢, 3 lb. liver @ 9¢, 4 lb. bacon @ 18½¢.

5. Bill of dry goods: 5 yd. sheeting @ 22¢, 12½ yd. domestic @ 10¢, 1 pair gloves $2.75, 5 yd. lace @ 15¢, 7 yd. muslin @ 6¼¢.

6. Bill of groceries: 1½ pk. sweet potatoes @ 33¢, 1¼ lb. tea @ 60¢, 2 qt. cranberries @ 12½¢, 3½ lb. raisins @ 14¢, 3 doz. oranges at 35¢, 2 bu. apples @ 75¢, 2 gal. molasses @ 45¢.

Make out bills for the following:

7. 5 lb. butter @ 33¢, 4 doz. eggs @ 36¢, 2 lb. cheese @ 20¢, 2 doz. oranges @ 30¢.

8. 2 lb. almonds @ 20¢, 2 lb. filberts @ 18¢, 2 lb. pecans @ 18¢, 3 lb. English walnuts @ 25¢.

9. 9 yd. linen @ 60¢, 5 yd. lace @ 40¢, 2 yd. ribbon @ 50¢, 2 doz. buttons @ 20¢.

10. 5½ yd. gingham @ 15¢, 3 yd. lace @ 30¢, 1 doz. pearl buttons @ 9¢, 2 spools thread @ 5¢.

11. 3½ lb. butter @ 32¢, 5 lb. coffee @ 35¢, 3 pk. of potatoes @ 30¢.

12. 10 lb. granulated sugar @ 6½¢, 3½ lb. raisins @ 16¢, 4 qt. currants @ 8¢, 2¼ lb. figs @ 20¢.

13. 3 lb. powdered sugar @ 6¢, ½ doz. oranges @ 40¢, 3 grapefruit @ 8¢, 1 bunch of celery @ 15¢.

14. 3½ lb. mixed nuts @ 20¢, 3 lb. candy @ 40¢, 2½ doz. oranges @ 35¢, 4 doz. bananas @ 15¢, 2 qt. peanuts @ 5¢.

15. 2 pairs gloves @ $1.25, 4 ties @ 60¢, ½ doz. handkerchiefs @ $1.50, 4 pairs stockings @ 40¢.

16. 6 collars @ 15¢, 4 pairs cuffs @ 25¢, 2 ties @ 50¢, 2 shirts @ $1.25.

17. 3 fishing rods @ $2.25, 2 reels @ 45¢, 100 yd. fishing line @ 2¢, 4 doz. trout flies @ 35¢.

18. 4 lb. steak @ 28¢, 8 lb. bacon @ 18¢, 3 lb. ham @ 25¢, 4 lb. sausage @ 15¢.

SOLUTION OF PROBLEMS

321. 1. Find the cost of 12 hats at the rate of 4 hats for $8.

(*a*)	(*b*)
4 hats cost $8.	4 hats cost $8.
1 hat costs $\frac{1}{4}$ of $8, or $2.	12 hats = 3 × 4 hats.
12 hats cost 12 × $2, or $24.	12 hats cost 3 × $8, or $24.

Which solution is the simpler?

By either method find the cost of:

2. 12 oranges at the rate of 3 for 10¢.
3. 250 pencils at the rate of 50 for $1.
4. 24 tablets at the rate of 3 for 25¢.
5. 24 bars of soap at the rate of 6 for 50¢.
6. 15 yd. of silk at the rate of 3 yd. for $5.
7. 25 gal. of oil at the rate of 5 gal. for 80¢.
8. 60 books at the rate of 12 for $1.50.
9. 30 cows at the rate of 3 for $100.
10. 1 pk. of peanuts at the rate of 2 qt. for 15¢.
11. 60 ft. of rope at the rate of 12¢ a yard.
12. If Kate plants 36 bulbs in 4 rows, how many bulbs will she plant in 20 rows?
13. If 3 gal. of water weigh 25 lb., what will 30 gal. weigh?
14. If 6 handkerchiefs cost 50¢, what will 5 dozen cost?

15. At $\$\frac{1}{2}$ a peck, what will $5\frac{1}{2}$ bu. of apples cost?

16. If Houston walks to school and back in $\frac{2}{3}$ of an hour, how many hours will it take him to make 30 round trips?

17. A garden is 40 ft. by 60 ft. If it averages 3 plants to every 2 sq. ft., how many plants does it contain?

18. If 4 dozen trout flies cost $\$2.50$, what will 12 dozen cost at the same rate?

19. If 25 ft. of rope make 3 jumping ropes, how many feet will be required for 36 jumping ropes? How many jumping ropes will 250 ft. make?

20. If 6 bunches of firecrackers cost $25\cent$, what will 12 dozen bunches cost?

21. If a machine makes 3 doz. bolts in 5 minutes, how many dozen will it make in an hour?

22. John rides in a trolley to and from school every day, and pays 25 cents a week for car fare. How much car fare will he pay in 8 school months (4 weeks each)? What is his fare for each ride?

23. If $\frac{1}{3}$ of a ton of fertilizer costs $\$6\frac{2}{3}$, how much will 6 tons cost?

24. If $2\frac{1}{2}$ doz. eggs cost $50\cent$, how much will $7\frac{1}{2}$ doz. cost?

25. If $6\frac{1}{4}$ yd. of silk cost $\$12.50$, how much will $12\frac{1}{2}$ yd. cost?

26. If a farmer raises 125 bu. of wheat on 5 acres, how many bushels does he raise on $27\frac{1}{2}$ acres?

GENERAL REVIEW WORK

WRITTEN EXERCISES

322. Add and check, timing yourself:

1.	2.	3.	4.	5.
301	501	5097	7132	9371
875	279	7636	6418	6584
316	888	7478	7894	4887
478	748	8990	8749	9654
765	657	4329	6547	4572
892	756	1170	3218	6217

6.	7.	8.	9.
$27.85	$125.40	$328.30	$524.40
52.60	223.55	427.40	603.05
75.80	470.34	112.81	840.10
64.20	855.16	314.72	516.60
34.85	432.73	876.46	206.04

Add by columns; then by lines:

10.	11.	12.	13.
$656.78	$204.65	$3046.48	$4487.28
545.70	543.87	3567.73	2981.38
634.61	234.98	5455.87	7825.33
723.25	452.67	2343.70	7634.25
812.34	783.65	4516.32	6554.72
437.82	518.45	2874.96	9853.15

Subtract rapidly and check results:

14.	15.	16.	17.	18.	19.
602	406	807	490	8604	7623
369	338	496	173	4536	4517

20.	21.	22.	23.	24.	25.
384	416	600	520	7003	9802
233	174	489	302	3786	9685

26.	27.	28.	29.	30.
$725.26	$675.25	$632.80	$720.42	$915.83
189.08	155.89	347.85	365.06	311.95

31.	32.	33.	34.	35.
$500.00	$740.50	$507.02	$415.65	$562.25
207.50	119.67	399.99	275.86	388.77

36.	37.	38.	39.	40.
$822.50	$607.50	$733.22	$770.05	$900.05
657.89	534.32	509.67	508.97	497.68

41.	42.	43.
415,739	628,936	875,932

From each of these three numbers, subtract the sum of the group below it:

2631	14,159	27,503
5828	34,684	50,417
8506	28,261	36,827
2945	60,523	13,278

Multiply and test:

44. 385×165.
45. 272×768.
46. 684×285.
47. 452×368.
48. 547×843.
49. 642×578.
50. 873×396.
51. 891×697.
52. 284×297.
53. 742×386.
54. 936×594.
55. 547×365.
56. 834×721.
57. 777×222.
58. 385×368.
59. 945×672.
60. 753×378.
61. 483×590.
62. 618×282.
63. 785×568.
64. 378×189.
65. 533×376.
66. 834×394.
67. 553×178.
68. 846×225.
69. 728×117.
70. 932×644.
71. 888×333.
72. 773×682.
73. 918×363.
74. 844×562.
75. 729×650.
76. 732×248.
77. 865×577.
78. 583×479.
79. 836×368.
80. 749×298.
81. 647×369.
82. 729×454.
83. 846×405.
84. 907×304.
85. 801×906.

Divide and test:

86. $9342 \div 27$.
87. $8771 \div 49$.
88. $8421 \div 67$.
89. $2975 \div 35$.
90. $7448 \div 76$.
91. $6003 \div 69$.
92. $3712 \div 58$.
93. $3060 \div 36$.
94. $4371 \div 93$.
95. $22{,}002 \div 38$.
96. $47{,}208 \div 56$.
97. $67{,}314 \div 78$.
98. $27{,}312 \div 48$.
99. $43{,}306 \div 59$.
100. $36{,}482 \div 37$.
101. $38{,}778 \div 46$.
102. $27{,}702 \div 38$.
103. $34{,}278 \div 87$.
104. $41{,}818 \div 721$.
105. $56{,}682 \div 846$.
106. $21{,}425 \div 446$.
107. $58{,}745 \div 876$.
108. $49{,}810 \div 509$.
109. $96{,}101 \div 967$.
110. $36{,}708 \div 798$.
111. $72{,}072 \div 936$.
112. $76{,}911 \div 827$.

Add or subtract as indicated:

113. $\frac{1}{2}+\frac{1}{4}$.
114. $\frac{1}{3}+\frac{1}{9}$.
115. $\frac{1}{2}+\frac{3}{8}$.
116. $\frac{2}{6}+\frac{5}{6}$.
117. $\frac{1}{2}+\frac{3}{4}$.
118. $\frac{3}{4}+\frac{7}{8}$.
119. $\frac{1}{6}+\frac{5}{12}$.
120. $\frac{1}{4}+\frac{3}{8}$.
121. $\frac{2}{5}+\frac{1}{3}$.
122. $\frac{2}{3}+\frac{7}{8}$.
123. $\frac{3}{4}+\frac{2}{3}$.
124. $\frac{1}{2}+\frac{7}{8}$.
125. $\frac{1}{3}+\frac{5}{6}$.
126. $\frac{5}{6}+\frac{3}{4}$.
127. $\frac{3}{4}+\frac{7}{12}$.
128. $\frac{5}{6}+\frac{7}{12}$.
129. $\frac{1}{3}+\frac{2}{5}$.
130. $\frac{2}{3}+\frac{3}{5}$.
131. $\frac{2}{3}+\frac{1}{15}$.
132. $\frac{3}{10}+\frac{4}{5}$.
133. $1\frac{2}{5}+2\frac{3}{4}$.
134. $5\frac{7}{10}+4\frac{3}{20}$.
135. $8\frac{1}{3}+3\frac{3}{8}$.
136. $7\frac{1}{2}+9\frac{5}{6}$.
137. $\frac{3}{4}-\frac{1}{2}$.
138. $\frac{1}{2}-\frac{3}{8}$.
139. $\frac{7}{8}-\frac{3}{4}$.
140. $\frac{3}{5}-\frac{1}{2}$.
141. $\frac{2}{3}-\frac{1}{6}$.
142. $\frac{5}{6}-\frac{2}{3}$.
143. $\frac{1}{2}-\frac{1}{3}$.
144. $\frac{1}{2}-\frac{1}{5}$.
145. $4\frac{2}{5}-1\frac{1}{10}$.
146. $5\frac{1}{6}-3\frac{1}{12}$.
147. $7\frac{7}{12}-5\frac{1}{2}$.
148. $6\frac{2}{3}-3\frac{1}{2}$.

Find the products:

149. $\frac{5}{6}\times 7$.
150. $\frac{7}{8}\times 3$.
151. $\frac{4}{9}\times 5$.
152. $\frac{5}{12}\times 8$.
153. $\frac{3}{16}\times 15$.
154. $\frac{6}{7}\times 12$.
155. $\frac{3}{5}\times 10$.
156. $\frac{5}{8}\times 9$.
157. $\frac{7}{16}\times 11$.
158. $1\frac{5}{16}\times 8$.
159. $\frac{7}{9}\times 18$.
160. $\frac{6}{7}\times 15$.
161. $\frac{2}{3}\times\frac{3}{7}$.
162. $\frac{3}{5}\times\frac{2}{3}$.
163. $\frac{5}{8}\times\frac{2}{9}$.
164. $\frac{5}{6}\times\frac{7}{8}$.
165. $\frac{4}{5}\times\frac{5}{6}$.
166. $\frac{3}{8}\times\frac{3}{5}$.

Find the quotients:

167. $\frac{20}{3}\div 5$.
168. $\frac{15}{32}\div 3$.
169. $\frac{21}{22}\div 7$.
170. $\frac{24}{7}\div 8$.
171. $\frac{35}{24}\div 7$.
172. $\frac{12}{15}\div 4$.
173. $\frac{30}{16}\div 6$.
174. $\frac{16}{19}\div 8$.
175. $\frac{1}{3}$ of 234.
176. $\frac{2}{3}$ of 324.
177. $\frac{1}{4}$ of 628.
178. $\frac{3}{4}$ of 528.

179. How many pints are there in $5\frac{1}{2}$ quarts?

180. How many quarts are there in $12\frac{1}{2}$ gallons?

181. How many pecks are there in $7\frac{1}{2}$ bushels?

182. How many bushels are there in 32 pecks?

183. How many ounces are there in $3\frac{1}{2}$ pounds?

184. 64 ounces equal how many pounds?

185. How many inches are there in 1 foot? in $3\frac{1}{2}$ feet? in 1 yard? in $2\frac{1}{2}$ yd.?

186. $16\frac{1}{2}$ ft. equal 1 rd. How many feet in 4 rd.?

187. There are 320 rd. in 1 mile. How many rods are there in 2 miles? in 12 miles?

188. There are 5280 ft. in 1 mile. How many yards are there in a mile? in $\frac{1}{4}$ of a mile?

Find the perimeter of a square whose side is:

189. 4 in. **191.** $3\frac{1}{2}$ in. **193.** $10\frac{1}{2}$ ft. **195.** $3\frac{1}{4}$ ft.

190. 6 in. **192.** $4\frac{3}{4}$ in. **194.** 15 ft. **196.** $5\frac{1}{2}$ ft.

Find the area of the square whose side is:

197. 2 in. **198.** 12 ft. **199.** 24 in. **200.** 39 yd.

Find the area of a rectangle whose length and width are:

201. 12 in., 5 in. **203.** 15 in., 8 in. **205.** 15 ft., 12 ft.

202. 10 in., 6 in. **204.** 24 in., 15 in. **206.** 18 ft., 14 ft.

Find the number of cubic inches in a box whose length, width, and depth are:

207. 12 in., 6 in., 4 in. **209.** 24 in., 10 in., 12 in.

208. 15 in., 8 in., 6 in. **210.** 18 in., 15 in., 12 in.

323. 1. Henry had $16.25 and received $7.90. He paid out $3.15. How much had he left?

2. Joe has $19.20, John has $12.42, and Sam has as much as both Joe and John. How much money has Sam?

3. A fisherman caught 1284 fish on Monday, 999 on Tuesday, 1102 on Wednesday, 1086 on Thursday, 1075 on Friday, and 1250 on Saturday. How many fish did he catch during the week?

4. A set of china has 1 doz. cups, 1 doz. saucers, 1 doz. breakfast plates, 1 doz. dinner plates, 1 doz. soup plates, 1 doz. ice-cream saucers, 1 doz. individual butter dishes, 4 platters, 2 covered dishes (2 pieces each), 1 butter dish (3 pieces), 1 gravy boat (2 pieces), 1 sugar bowl, 1 cream pitcher, 1 pickle dish. How many pieces are there in this set?

5. A waiter had on his tray 15 cups, 15 saucers, 17 plates, and 15 tumblers. By accident he broke 23 pieces. How many pieces were unbroken?

6. James and Marvin are 1000 steps apart and start toward each other. If James takes 30 steps a minute and Marvin 35 steps a minute, how many steps apart will they be at the end of 10 minutes?

7. A grocer bought 5 boxes of oranges containing 144 oranges to the box. If 1 orange out of each ten was spoiled, how many good oranges had he?

8. Mr. B shipped 20 cases of eggs. If each case contained 30 doz., how many eggs did he ship?

9. How many persons can stand on an acre of ground, if we allow 4 persons to the square yard?

10. A newsboy sells daily (except Sunday) 15 one-cent papers and 25 two-cent papers. How many papers does he sell in 4 weeks? How much does he get for them?

11. A farmer sold 60 turkeys at the rate of 3 for $5. How much did he get for them?

12. A man who worked 24 days at $1.75 a day received in payment 3 tons of coal worth $4.25 a ton, 2 cords of wood worth $3 a cord, and the balance in money. How much money did he receive?

13. A man bought a suit of clothes for $18. If he paid half of that sum for the coat, and $\frac{2}{3}$ of the remainder for the pants, how much did each garment (coat, pants, and vest) cost?

14. Mrs. White sold $\frac{3}{4}$ of her chickens and had 36 left. How many chickens had she at first?

15. A steamship makes a voyage in $6\frac{5}{6}$ days, sailing 444 mi. a day. What is the length of the voyage?

16. If a train averages 30 mi. an hour, how far will it run from 9 A.M. to 3:30 P.M.?

17. A grocer imported 10 gal. of olive oil. How many pint bottles did he need to hold it?

18. A hauled 56 bu. of wheat at a load, and B 60 bu. of corn. What was the difference in weights between the loads, if a bushel of wheat weighs 60 lb. and a bushel of corn weighs 56 lb.?

19. For a school entertainment 350 tickets were sold at 25¢ each. If the expenses were $18.75, how much was cleared?

20. Mr. Brown's team cannot pull over 2000 lb. at a load. What is the greatest number of barrels of flour he can haul if a barrel of flour weighs 196 lb.?

21. My lot fronts 132 ft. on the street. At 12¢ a square foot, what will it cost me to lay a pavement 5 ft. wide in front of it?

22. At the rate of 1 mi. in 2 min., how many yards does a horse trot in a minute? in a second?

23. If $\frac{3}{5}$ of a ton of coal costs $1.80, what is the price a ton?

24. At 50¢ a basket, what will 24 baskets of tomatoes cost? ($50¢ = \$\frac{1}{2}$.)

25. What will 12 yd. of ribbon cost at $33\frac{1}{3}$¢ a yard? ($33\frac{1}{3}¢ = \$\frac{1}{3}$)

26. At $12\frac{1}{2}$¢ a pound, what will a 480-pound bale of cotton cost? ($12\frac{1}{2}¢ = \$\frac{1}{8}$.)

27. Mrs. Black bought an 18-pound turkey for Thanksgiving at $16\frac{2}{3}$¢ a pound. What did it cost?

28. The width of my tablet is $7\frac{3}{4}$ in. The ruling shows 25 lines to the page. What is the total length of these lines?

29. What will $3\frac{5}{6}$ doz. typewriter ribbons cost at 78¢ each?

30. Mr. Mayo is 67 yr. old. In what year was he born?

31. A merchant sold 35 barrels of apples at $2.75 a barrel and 40 barrels at $3.25 a barrel. How many barrels did he sell? What did he get for them?

32. If a cubic foot of water weighs 1000 ounces, how many pounds does it weigh?

33. The distance from Montgomery to Richmond is 724 miles. What would the fare be at 3¢ a mile? at $2\frac{1}{2}$¢ a mile?

34. How many loaves of bread will a barrel of flour (196 lb.) make, if each loaf contains 8 oz. of flour?

35. I bought 6 lb. of coffee at $18\frac{2}{3}$¢ a pound, 24 lb. of sugar at $6\frac{1}{4}$¢ a pound, and $1\frac{1}{2}$ lb. of tea at 60¢ a pound. If I handed the grocer a 5-dollar bill, how much change should I have received?

36. A dairyman started out with 4 cans of milk, containing 16 qt., 20 qt., 18 qt., and 24 qt., respectively. How many gallons of milk had he in the four cans?

37. How much does a butcher gain on 100 lb. of meat bought at $16\frac{2}{3}$¢ a pound and sold at 20¢ a pound?

38. How many hours are there in June, July, August, and September?

39. A lot 96 ft. long is $\frac{1}{4}$ as wide. How wide is it? How many square feet does it contain?

40. What will 2 bushels of chestnuts cost if $\frac{1}{4}$ of a peck cost 30 cents?

41. A lady bought 3 yd. of blue ribbon and $2\frac{1}{2}$ times as much white ribbon. How many yards did she buy in all?

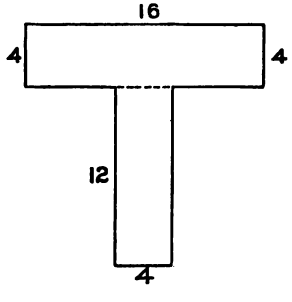
42. A salary of \$1500 was increased by $\frac{1}{10}$ of itself. What was it after the increase?

43. A merchant had 95 oranges. He sold $\frac{3}{5}$ of them at 2¢ each and the remainder at 3¢ each. How much did he receive for them?

44. A dealer bought 100 lb. of tea at the rate of 5 lb. for \$4, and sold it at the rate of 4 lb. for \$5. How much did he gain?

45. During the month of June a conductor made 15 round trips between two cities that are 110 miles apart. How far did he travel? If he was paid at the rate of $2\frac{1}{2}$¢ a mile, how much did he earn during the month?

46. A block of marble measuring two feet on each edge was polished at a cost of \$1.50 a square foot. How much did the polishing cost?



47. The figure at the left gives a reduced plan of a banquet table in the form of a letter T. Find the area of the table, the lengths of the sides being marked in feet.

48. How many eggs at 30¢ a dozen will pay for 60 lb. of sugar at $6\frac{1}{2}$¢ a pound?

49. A dealer paid $ 365 for 5 typewriters and a phonograph. If the typewriters cost $ 65 each, how much did the phonograph cost?

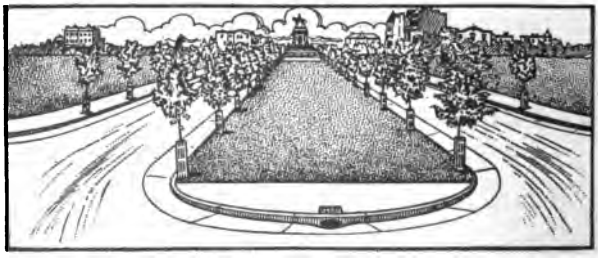
50. If a mechanic receives $ 3 for 10 hours' work, how many hours must he work to earn enough to pay for a 12-dollar suit of clothes?

51. If 28 boys are playing "hide and seek," how many are "seeking" when two-sevenths of the boys are "hiding"?

52. An express train leaves New York for St. Louis traveling at an average rate of 36 miles an hour. If the distance is 1048 miles, how far will the train be from St. Louis after it has traveled 23 hours?

53. An East Side school has 10 teachers. If it requires $ 5850 to pay these teachers for 9 months, what is the average salary a month?

54. The grass plot leading to the Lee statue, which is shown in the picture below, is 36 ft. wide and 200 ft. long. How many square feet does the plot contain? How many square yards are in the plot?



TABLES FOR REFERENCE

1 × 2 = 2	2 ÷ 2 = 1	1 × 3 = 3	3 ÷ 3 = 1
2 × 2 = 4	4 ÷ 2 = 2	2 × 3 = 6	6 ÷ 3 = 2
3 × 2 = 6	6 ÷ 2 = 3	3 × 3 = 9	9 ÷ 3 = 3
4 × 2 = 8	8 ÷ 2 = 4	4 × 3 = 12	12 ÷ 3 = 4
5 × 2 = 10	10 ÷ 2 = 5	5 × 3 = 15	15 ÷ 3 = 5
6 × 2 = 12	12 ÷ 2 = 6	6 × 3 = 18	18 ÷ 3 = 6
7 × 2 = 14	14 ÷ 2 = 7	7 × 3 = 21	21 ÷ 3 = 7
8 × 2 = 16	16 ÷ 2 = 8	8 × 3 = 24	24 ÷ 3 = 8
9 × 2 = 18	18 ÷ 2 = 9	9 × 3 = 27	27 ÷ 3 = 9
10 × 2 = 20	20 ÷ 2 = 10	10 × 3 = 30	30 ÷ 3 = 10
11 × 2 = 22	22 ÷ 2 = 11	11 × 3 = 33	33 ÷ 3 = 11
12 × 2 = 24	24 ÷ 2 = 12	12 × 3 = 36	36 ÷ 3 = 12
1 × 4 = 4	4 ÷ 4 = 1	1 × 5 = 5	5 ÷ 5 = 1
2 × 4 = 8	8 ÷ 4 = 2	2 × 5 = 10	10 ÷ 5 = 2
3 × 4 = 12	12 ÷ 4 = 3	3 × 5 = 15	15 ÷ 5 = 3
4 × 4 = 16	16 ÷ 4 = 4	4 × 5 = 20	20 ÷ 5 = 4
5 × 4 = 20	20 ÷ 4 = 5	5 × 5 = 25	25 ÷ 5 = 5
6 × 4 = 24	24 ÷ 4 = 6	6 × 5 = 30	30 ÷ 5 = 6
7 × 4 = 28	28 ÷ 4 = 7	7 × 5 = 35	35 ÷ 5 = 7
8 × 4 = 32	32 ÷ 4 = 8	8 × 5 = 40	40 ÷ 5 = 8
9 × 4 = 36	36 ÷ 4 = 9	9 × 5 = 45	45 ÷ 5 = 9
10 × 4 = 40	40 ÷ 4 = 10	10 × 5 = 50	50 ÷ 5 = 10
11 × 4 = 44	44 ÷ 4 = 11	11 × 5 = 55	55 ÷ 5 = 11
12 × 4 = 48	48 ÷ 4 = 11	12 × 5 = 60	60 ÷ 5 = 12
1 × 6 = 6	6 ÷ 6 = 1	1 × 7 = 7	7 ÷ 7 = 1
2 × 6 = 12	12 ÷ 6 = 2	2 × 7 = 14	14 ÷ 7 = 2
3 × 6 = 18	18 ÷ 6 = 3	3 × 7 = 21	21 ÷ 7 = 3
4 × 6 = 24	24 ÷ 6 = 4	4 × 7 = 28	28 ÷ 7 = 4
5 × 6 = 30	30 ÷ 6 = 5	5 × 7 = 35	35 ÷ 7 = 5
6 × 6 = 36	36 ÷ 6 = 6	6 × 7 = 42	42 ÷ 7 = 6
7 × 6 = 42	42 ÷ 6 = 7	7 × 7 = 49	49 ÷ 7 = 7
8 × 6 = 48	48 ÷ 6 = 8	8 × 7 = 56	56 ÷ 7 = 8
9 × 6 = 54	54 ÷ 6 = 9	9 × 7 = 63	63 ÷ 7 = 9
10 × 6 = 60	60 ÷ 6 = 10	10 × 7 = 70	70 ÷ 7 = 10
11 × 6 = 66	66 ÷ 6 = 11	11 × 7 = 77	77 ÷ 7 = 11
12 × 7 = 72	72 ÷ 6 = 12	12 × 7 = 84	84 ÷ 7 = 12

1 × 8 = 8	8 ÷ 8 = 1	1 × 9 = 9	9 ÷ 9 = 1
2 × 8 = 16	16 ÷ 8 = 2	2 × 9 = 18	18 ÷ 9 = 2
3 × 8 = 24	24 ÷ 8 = 3	3 × 9 = 27	27 ÷ 9 = 3
4 × 8 = 32	32 ÷ 8 = 4	4 × 9 = 36	36 ÷ 9 = 4
5 × 8 = 40	40 ÷ 8 = 5	5 × 9 = 45	45 ÷ 9 = 5
6 × 8 = 48	48 ÷ 8 = 6	6 × 9 = 54	54 ÷ 9 = 6
7 × 8 = 56	56 ÷ 8 = 7	7 × 9 = 63	63 ÷ 9 = 7
8 × 8 = 64	64 ÷ 8 = 8	8 × 9 = 72	72 ÷ 9 = 8
9 × 8 = 72	72 ÷ 8 = 9	9 × 9 = 81	81 ÷ 9 = 9
10 × 8 = 80	80 ÷ 8 = 10	10 × 9 = 90	90 ÷ 9 = 10
11 × 8 = 88	88 ÷ 8 = 11	11 × 9 = 99	99 ÷ 9 = 11
12 × 8 = 96	96 ÷ 8 = 12	12 × 9 = 108	108 ÷ 9 = 12

1 × 10 = 10	10 ÷ 10 = 1	1 × 11 = 11	11 ÷ 11 = 1
2 × 10 = 20	20 ÷ 10 = 2	2 × 11 = 22	22 ÷ 11 = 2
3 × 10 = 30	30 ÷ 10 = 3	3 × 11 = 33	33 ÷ 11 = 3
4 × 10 = 40	40 ÷ 10 = 4	4 × 11 = 44	44 ÷ 11 = 4
5 × 10 = 50	50 ÷ 10 = 5	5 × 11 = 55	55 ÷ 11 = 5
6 × 10 = 60	60 ÷ 10 = 6	6 × 11 = 66	66 ÷ 11 = 6
7 × 10 = 70	70 ÷ 10 = 7	7 × 11 = 77	77 ÷ 11 = 7
8 × 10 = 80	80 ÷ 10 = 8	8 × 11 = 88	88 ÷ 11 = 8
9 × 10 = 90	90 ÷ 10 = 9	9 × 11 = 99	99 ÷ 11 = 9
10 × 10 = 100	100 ÷ 10 = 10	10 × 11 = 110	110 ÷ 11 = 10
11 × 10 = 110	110 ÷ 10 = 11	11 × 11 = 121	121 ÷ 11 = 11
12 × 10 = 120	120 ÷ 10 = 12	12 × 11 = 132	132 ÷ 11 = 12

1 × 12 = 12	12 ÷ 12 = 1	7 × 12 = 84	84 ÷ 12 = 7
2 × 12 = 24	24 ÷ 12 = 2	8 × 12 = 96	96 ÷ 12 = 8
3 × 12 = 36	36 ÷ 12 = 3	9 × 12 = 108	108 ÷ 12 = 9
4 × 12 = 48	48 ÷ 12 = 4	10 × 12 = 120	120 ÷ 12 = 10
5 × 12 = 60	60 ÷ 12 = 5	11 × 12 = 132	132 ÷ 12 = 11
6 × 12 = 72	72 ÷ 12 = 6	12 × 12 = 144	144 ÷ 12 = 12

United States Money

10 cents	= 1 dime (d.)
10 dimes	= 1 dollar ($)
100 cents	= 1 dollar

Linear Measure

12 inches (in.)	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
$5\frac{1}{2}$ yards, or $16\frac{1}{2}$ feet	= 1 rod (rd.)
320 rods	= 1 mile (mi.)
5280 feet	= 1 mile

Square Measure

144 square inches (sq. in.)	= 1 square foot (sq. ft.)
9 square feet	= 1 square yard (sq. yd.)
$30\frac{1}{4}$ square yards	= 1 square rod (sq. rd.)
160 square rods	= 1 acre (A.)
640 acres	= 1 square mile (sq. mi.)

Cubic Measure

1728 cubic inches (cu. in.)	= 1 cubic foot (cu. ft.)
27 cubic feet	= 1 cubic yard (cu. yd.)
128 cubic feet	= 1 cord

Liquid Measure

2 pints (pt.)	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)

Dry Measure

2 pints	= 1 quart
8 quarts	= 1 peck (pk.)
4 pecks	= 1 bushel (bu.)

Measures of Weight

16 ounces	= 1 pound (lb.)
2000 pounds	= 1 ton (T.)

Measures of Time

60 seconds (sec.)	= 1 minute (min.)
60 minutes	= 1 hour (hr.)
24 hours	= 1 day (da.)
7 days	= 1 week (wk.)
365 days	= 1 year (yr.)
366 days	= 1 leap year
12 months (mo.)	= 1 year (yr.)

Counting

12 things	= 1 dozen (doz.)
20 things	= 1 score
24 sheets	= 1 quire

ANSWERS

Page 161. — **1.** 1901. **2.** 6852. **3.** 15,485. **4.** 18,493. **5.** 22,041. **6.** 19,301. **7.** 16,923. **8.** 14,449. **9.** 18,392. **10.** 12,890. **11.** 15,226. **12.** 12,772. **13.** 17,146. **14.** 21,682. **15.** 14,377. **16.** $2227. **17.** $1498. **18.** $29,101. **19.** $223.62. **20.** $239.53. **21.** $15,445. **22.** $24,147. **23.** $26,281. **24.** $12,833. **25.** $14,663.

Page 162. — **26.** $28,623. **27.** $115,784. **28.** $788.75. **29.** $1946.06. **30.** $2240.87. **31.** 119,817. **32.** 586,479. **33.** 88,477. **34.** 154,551. **35.** 89,962. **36.** 94,562. **37.** 40,989. **38.** 146,466. **39.** 167,381. **40.** 117,369.

Page 163. — **1.** 1478. **2.** 2327. **3.** 4174. **4.** 2643. **5.** 4277. **6.** $37.79. **7.** $35.94. **8.** $28.46. **9.** $24.65. **10.** $2.06. **11.** $6555. **12.** $1296. **13.** $1279. **14.** $3936. **15.** $32,994. **16.** 5255. **17.** 3877. **18.** 2908. **Article 217.** — **1.** $15,352. **2.** 11,696. **3.** $78,484.

Page 164. — **4.** 300 yr. **5.** 1915. **6.** 143 da. **9.** 21,022. **10.** 622,041. **11.** 29,073.

Page 165. — **12.** $3,614,528. **13.** $3240.40. **14.** 250 lb. **15.** $29.75. **16.** $475. **17.** 9725 gal. **18.** 63,814.

Page 166. — **19.** 184,950 lb. **20.** 2300 lb. **21.** $6225. **22.** $1315.

Page 170. — **1.** 1340. **2.** 5705. **3.** 8190. **4.** 981. **5.** 2888. **6.** 43,350. **7.** 60,144. **8.** 83,214. **9.** 68,216. **10.** 36,827. **11.** 28,140. **12.** 36,953. **13.** 53,676. **14.** 21,216. **15.** 77,067. **16.** 22,824. **17.** 66,647. **18.** 28,881. **19.** 43,424. **20.** 31,746. **21.** 46,953. **22.** 59,941. **23.** 43,536. **24.** 50,048. **25.** 30,028. **26.** 47,670. **27.** 21,430. **28.** 11,133. **29.** 45,224. **30.** 36,449. **31.** 29,161. **32.** 15,084. **33.** 96,612. **34.** 34,716. **35.** 67,824.

Page 171. — **2.** 180; 10,800. **3.** 225 strokes. **4.** 2304 strokes. **5.** $600. **6.** 3150 lb. **7.** $189. **8.** $2.64. **9.** 3296 mi. **10.** 3324 mi.

Page 172. — **11.** 3448 mi. **12.** 294. **13.** 957 A.; 1096 A. **14.** $6450. **15.** $252. **16.** 18,522 yd. **17.** $29.70.

Page 173. — **2.** 780. **3.** 1216. **4.** 518. **5.** 1170. **6.** 1134. **7.** 4086. **8.** 9600. **9.** 15,156. **10.** 12,915. **11.** 13,528. **12.** $19,968. **13.** $5681. **14.** $8769. **15.** $11,536. **16.** $22,575. **18.** 46,128. **19.** 84,458. **20.** 221,786. **21.** 30,628. **22.** 122,430. **23.** 21,375.

Page 174. — **24.** 12,175. **25.** 14,212. **26.** 9312. **27.** 270,254. **28.** 481,634. **29.** 868,968. **30.** 40,768. **31.** 110,464. **32.** 71,115. **33.** 225,780. **34.** 454,575. **35.** 338,120. **36.** $69,228. **37.** $212,043. **38.** $50,405. **39.** $279,225. **40.** $94,333. **41.** $279,056. **43.** 181,168. **44.** 74,778. **45.** 72,135 **46.** 57,886. **47.** $31,244. **48.** $292,264. **49.** $155,890. **50.** $67,259. **51.** $7803.68. **52.** $41,523.36. **53.** $584,445. **54.** $30,302. **55.** $194,285. **56.** $210,022. **57.** $401,764. **58.** 153,612. **59.** 151,164. **60.** 166,439. **61.** 313,797. **62.** 491,934.

Page 175. — **63.** 238,721. **64.** 442,187. **65.** 296,934. **66.** 196,020. **67.** 188,769. **68.** 256,810. **69.** 119,808. **70.** 292,496. **71.** 511,225. **72.** 201,798. **74.** 17,940. **75.** 19,350. **76.** 11,840. **77.** 32,880. **78.** 65,610. **79.** 27,100. **80.** 38,430. **81.** 73,280. **82.** 27,360. **83.** 55,320. **84.** 24,300. **85.** 29,400. **86.** 112,500. **87.** 157,500. **88.** 410,400. **Article 227.** — **1.** 782 bu. **2.** $4875. **3.** $14,625. **4.** $56,250. **5.** 1536.

Page 176. — **6.** 528 mi. **7.** 528 mi. **8.** $323.75. **9.** $7500. **10.** $2469.12. **11.** $574.34. **12.** $2736. **13.** $3.57. **14.** $143.75. **15.** $533. **16.** $814. **17.** 1701. **18.** $12,520.

Page 177. — **19.** $264. **20.** $16.50. **21.** $87.50. **22.** 6364 pupils. **23.** 164,250 mi. **24.** 178,024 yd. **25.** 3300 bu. **26.** 6870 bu. **27.** 543 ft.

Page 179. — **1.** 192. **2.** 174. **3.** 75. **4.** 78. **5.** 86. **6.** 49. **7.** 72. **8.** 266. **9.** 82. **10.** 128. **11.** 82. **12.** 35. **13.** 24. **14.** 214. **15.** 165. **16.** 72. **17.** 44. **18.** 42. **19.** 94. **20.** 127. **21.** 65. **22.** 83. **23.** 73. **24.** 137. **25.** $125. **26.** $177. **27.** $143. **28.** $33.10. **29.** $23.78. **30.** $20.64. **31.** $13.01. **32.** $5.25. **33.** $17.68. **34.** 32. **35.** 26. **36.** 32. **37.** 24. **38.** 21. **39.** 37. **40.** 21. **41.** 25. **42.** $46. **43.** $120. **44.** $442. **45.** $231.

Page 180. — **3.** 8 q. 3 r. **4.** 9 q. 4 r. **5.** 9 q. 2 r. **6.** 8 q. 4 r. **7.** 8 q. 4 r. **8.** 7 q. 7 r. **9.** 9 q. 4 r. **10.** 12 q. 6 r. **11.** 7 q. 8 r.

12. 7 q. 9 r. **13.** 8 q. 4 r. **14.** 6 q. 10 r. **15.** 7 q. 4 r. **16.** 7 q. 2 r. **17.** 8 q. 6 r. **18.** 65 q. 6 r. **19.** 48 q. 6 r. **20.** 22 q. 5 r. **21.** 107 q. 5 r. **22.** 48 q. 3 r. **23.** 227 q. 1 r. **24.** 96 q. 3 r. **25.** 93 q. 4 r. **26.** 17 q. 6 r. **27.** 69 q. 6 r. **28.** 64 q. 2 r. **29.** 307 q. 1 r. **30.** 85 q. 1 r. **31.** 88 q. 6 r. **32.** 87 q. 2 r. **33.** 88 q. 4 r. **34.** 20 q. 2 r. **35.** 27 q. 9 r. **36.** 22 q. 7 r. **37.** 40 q. 4 r. **38.** 73 q. 1 r. **39.** 43 q. 1 r. **40.** 120 q. 7 r. **41.** 109 q. 2 r.

Page 181. — **1.** 130 bu.; 520 bu. **2.** 75 bu. **3.** 2500 bu. **4.** $1050. **5.** 54. **6.** 63. **7.** 420. **8.** 12. **9.** $24. **10.** 85 lb.

Page 182. — **11.** 88. **12.** 36 qt.

Page 183. — **3.** 331. **4.** 224. **5.** 233. **6.** 212. **7.** 214. **8.** 152. **9.** 472. **10.** 114. **11.** 238. **12.** 143. **13.** 302. **14.** 304. **15.** 126. **16.** 126. **17.** 357.

Page 184. — **18.** 467. **19.** 672. **20.** 1483. **21.** 2999. **22.** 1734. **23.** 56. **24.** 75. **25.** 58. **26.** 454. **27.** 168.

Article 235. — **2.** 94 q. 14 r. **3.** 258 q. 22 r. **4.** 186 q. 8 r. **5.** 330 q. 7 r. **6.** 435 q. 31 r. **7.** 1200 q. 31 r. **8.** 727 q. 7 r. **9.** 703 q. 54 r. **10.** 119 q. 79 r. **11.** 334 q. 183 r. **12.** 72 q. 256 r. **13.** 134 q. 263 r. **14.** 40 q. 787 r. **15.** 253 q. 215 r. **16.** 40 q. 6 r. **17.** 45 q. 119 r. **18.** 147 q. 293 r. **19.** 287 q. 58 r. **20.** 81 q. 173 r. **21.** 104 q. 523 r.

Page 185. — **1.** 149. **2.** 832. **3.** 15,705. **4.** $5.90. **5.** $1325.02. **6.** 2462 lb. **7.** 2030. **8.** 25 bu. **9.** 15 A.

Page 186. — **10.** $75. **11.** $35. **12.** 40 bu. **13.** $2.25. **14.** 32. **15.** 29. **16.** 30. **17.** 2640. **18.** 57. **19.** 114. **20.** 96.

Page 189. — **2.** $36. **3.** $216. **4.** $5000. **6.** $5.84. **7.** $.18.

Page 190. — **9.** 30 da. **10.** 9 hr. **12.** $15. **13.** 1080. **15.** $2.75.

Page 191. — **17.** 25. **19.** $15. **21.** 85 lb.

Page 192. — **22.** $.60. **23.** $37. **24.** 2592. **25.** $9.50. **26.** $2200. **27.** 6600. **28.** $2600. **29.** $1950. **30.** $38. **31.** $35. **32.** $1.04.

Page 193. — **33.** 33 min. **34.** 94. **35.** 39 yr. **36.** $2.82. **37.** $.53. **38.** $21,250. **39.** 210 bu. **40.** $110 lost. **41.** 180 mi.

Page 197. — **1.** $165.79. **2.** $233.62. **3.** $194.35. **4.** $176.66. **5.** $160.20. **6.** $268.47. **7.** $233.07. **8.** $179.01. **9.** $414.98. **10.** $36.46. **11.** $11.78. **12.** 30.16. **13.** 113.45. **14.** 46.20.

Page 198. — **15.** 63.09. **16.** 89.94. **17.** 38.31. **18.** 1.06. **19.** 17.11. **20.** 181.28. **21.** 19.17. **22.** 75.59. **23.** 18.16. **24.** 55.53. **25.** $69.12. **26.** 79.85. **27.** 79.99. **28.** 92.93. **29.** 69.84. **Article 247.** — **1.** 115.17 A. **2.** 975.3 mi. **3.** 95.7. **4.** $6.88. **5.** 97.84. **6.** 54.57.

Page 199. — **3.** $1130.40. **4.** $429. **5.** $574.74. **6.** $6122.50. **7.** 2108.4. **8.** 1660.9. **9.** 1577.76. **10.** 4511.36. **11.** 5788.80. **12.** 15,809.6. **13.** 1341.25. **14.** 2312.5.

Page 200. — **3.** 18.94. **4.** 25.5. **5.** 4.09. **6.** 5.94. **7.** 5.69. **8.** 135.7. **9.** 23.1. **10.** 1.42. **11.** $2.11. **12.** 10.4. **13.** $2.28. **14.** $1.33. **15.** 4.52. **16.** 87.7. **17.** 36.7. **18.** $5.30. **19.** 4.24. **20.** 12.7.

Page 201. — **1.** $2.40. **2.** $5.04. **3.** $9.36. **4.** $28.32. **5.** $59.04. **6.** $15.60. **7.** $13.92. **8.** $37.44. **9.** $3.50. **10.** $2.50. **11.** $1.75. **12.** $.30. **13.** $.45. **14.** $.12. **15.** $150. **16.** $.08. **17.** $9.50. **18.** $16. **19.** $9.475. **20.** $.95. **21.** $2448.30. **22.** $.06. **23.** $237.57.

Page 202. — **1.** 616 ft. **2.** 192 sq. ft. **3.** 1488. **4.** 8 hr. **5.** $19.80. **6.** $39.15.

Page 208. — **1.** $\frac{1}{5}$. **2.** $\frac{1}{3}$. **3.** $\frac{3}{4}$. **4.** $\frac{1}{3}$. **5.** $\frac{1}{2}$. **6.** $\frac{1}{2}$. **7.** $\frac{1}{3}$. **8.** $\frac{1}{5}$. **9.** $\frac{3}{4}$. **10.** $\frac{1}{3}$. **11.** $\frac{2}{3}$. **12.** $\frac{2}{5}$. **14.** $\frac{5}{8}$. **15.** $\frac{1}{3}$. **16.** $\frac{1}{3}$. **17.** $\frac{5}{6}$. **18.** $\frac{3}{16}$. **19.** $\frac{7}{8}$.

Page 209. — **9.** $\frac{13}{20}$. **10.** $\frac{21}{12}$. **11.** $\frac{21}{12}$. **12.** $\frac{17}{30}$. **13.** $\frac{11}{14}$. **14.** $\frac{53}{40}$. **15.** $\frac{14}{36}$.

Page 211. — **3.** $\frac{7}{10}$. **4.** $\frac{13}{15}$. **5.** $\frac{5}{6}$. **6.** $\frac{9}{10}$. **7.** $\frac{7}{12}$. **8.** $\frac{9}{10}$. **9.** $\frac{13}{18}$. **10.** $\frac{29}{36}$. **11.** $\frac{5}{9}$. **12.** $\frac{3}{4}$. **13.** $\frac{9}{10}$. **14.** $\frac{23}{24}$. **15.** $\frac{13}{24}$. **16.** $\frac{17}{36}$. **17.** $\frac{1}{12}$. **18.** $\frac{1}{10}$. **19.** $\frac{1}{12}$. **20.** $\frac{3}{10}$. **21.** $\frac{1}{24}$. **22.** $\frac{5}{12}$. **23.** $\frac{5}{21}$. **24.** $\frac{11}{24}$. **25.** $\frac{1}{4}$. **26.** $\frac{13}{24}$. **27.** $\frac{23}{30}$. **28.** $\frac{13}{30}$. **29.** $\frac{1}{4}$. **30.** $\frac{3}{4}$. **31.** $\frac{7}{18}$. **32.** $\frac{8}{15}$. **33.** $\frac{1}{6}$. **34.** $\frac{17}{24}$. **35.** $\frac{7}{12}$. **36.** $\frac{9}{10}$. **37.** $\frac{13}{24}$. **38.** $\frac{9}{10}$. **39.** $\frac{2}{3}$.

Page 212. — **3.** $27\frac{1}{4}$. **4.** $16\frac{11}{15}$. **5.** $26\frac{1}{4}$. **6.** $29\frac{1}{4}$. **7.** $21\frac{1}{12}$.

Page 213. — **8.** $1\frac{3}{4}$. **9.** $1\frac{1}{3}$. **10.** $1\frac{7}{24}$. **11.** $5\frac{1}{4}$. **12.** $\frac{7}{8}$. **13.** $17\frac{3}{4}$. **14.** $23\frac{17}{20}$. **15.** $25\frac{11}{15}$. **16.** $5\frac{3}{10}$. **17.** $7\frac{3}{20}$. **18.** $6\frac{3}{4}$. **Article 275.** — **1.** 80 A. **2.** 7 yd. **3.** $10\frac{3}{8}$ T. **4.** $18\frac{1}{2}$ mi. **5.** $\$\frac{1}{3}$; $20\not{e}$. **6.** $22\frac{5}{8}$ yd. **7.** $14\frac{3}{8}$.

Page 214. — **8.** $15. **9.** $31.20. **10.** $.50. **11.** $45\frac{3}{4}$ mi. **12.** $\frac{1}{12}$. **13.** 91. **14.** 25 lb. **15.** $.55. **16.** $\frac{1}{4}$. **17.** 4 da.

Page 215. — **3.** 3. **4.** $2\frac{1}{3}$. **5.** $5\frac{3}{8}$. **6.** $3\frac{1}{3}$. **7.** $5\frac{1}{3}$. **8.** $5\frac{1}{3}$. **9.** $7\frac{1}{2}$. **10.** $2\frac{3}{5}$. **11.** $10\frac{1}{2}$. **12.** $3\frac{1}{3}$. **13.** $\frac{1}{15}$. **14.** $6\frac{3}{5}$. **15.** 16.

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Page 220.—1. $\frac{1}{4}$. 2. $\frac{3}{8}$. 3. $\frac{1}{8}$. 4. $\frac{3}{16}$. 5. $\frac{5}{8}$. 6. $\frac{4}{5}$. 7. $\frac{4}{5}$. 8. $\frac{5}{12}$. 9. $8\frac{1}{3}$. 10. $5\frac{1}{4}$. 11. $6\frac{1}{3}$. 12. $4\frac{1}{16}$. **Article 285.**—1. $1.25. 2. $.30. 3. $\frac{1}{4}$. 4. $1.20. 5. $6\frac{3}{4}$.

Page 221.—3. $12. 4 $6. 5. $10. 6. $11. 7. $10. 8. $11. 10. $18. 11. $40.

Page 222.—1. $.84. 2. $1.56. 3. $3.50. 4. $4.50. 5. $9.75. 6. $1.20. 7. $1.50. 8. $1.50. 9. $37.50. 10. $62.50. 11. $3.75. 12. $27.90. 13. $6.72. 14. $1.06. 15. $1.10. 16. $26.75. 17. 6 lb. 18. $12\frac{1}{2}$ doz. 19. $168.93.

Page 223.—1. $3\frac{7}{8}$ mi. 2. $13\frac{3}{15}$ mi. 3. $3\frac{1}{2}$ yd. 4. $1\frac{1}{4}$ lb. 5. $\frac{1}{4}$ bu. 6. 3 lb. 7. $1\frac{1}{4}$. 8. $48.75. 9. $22.75. 10. $1\frac{1}{4}$¢; 20¢. 11. $1.

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Page 226.—2. 6 qt. 3. 11 qt. 4. 11 pt. 5. 15 pt. 6. 18 qt. 7. 44 pt. 9. 8 gal. 2 qt. 10. 8 gal. 11. 28 qt. 12. 18 gal. 2 qt. 13. 10 gal. 1 pt. 14. 12¢. 15. $2. 16. 24 lb.

Page 227.—17. 36 gal. 18. 375 gal. 19. $.60.

Page 228.—1. 30 pt.; 72 pt. 2. 22 pk.; $10\frac{1}{2}$ pk. 3. 192 pt.; 120 pt. 4. 54 pt. 5. 80 qt. 6. 32. 7. $5.40. 8. $1.45. 9. 32 da. 10. $.25. 11. $4. 12. $7\frac{1}{2}$ bu.

Page 229.—1. 96 oz.; 80 oz. 2. 6000 lb.; 5000 lb. 3. 121 oz. 4. 2400 oz. 5. 16 lb.; 30 lb. 6. 8 oz.; 4 oz. 7. 1 lb. 4 oz. 8. 75 lb.

Page 230. — **9.** 3750 lb. **10.** 25 bu.

Page 231. — **1.** 360 sec. **2.** 120 hr. **3.** 720 min. **4.** 1440 min. **5.** 330 min. **6.** 5½ hr. **7.** 5 hr. **8.** 70 sec.; 35 sec. **9.** ¼ mi.; 5 mi. **10.** 39 yr. **11.** 13 hr. **12.** 52 wk.; 2 da.

Page 232. — **1.** 42 in. **2.** 17 ft. **3.** 19 ft. **4.** 71 in. **5.** 472 in. **6.** 14 yd. **7.** 398½ in. **8.** 26½ ft. **9.** 2640 yd. **10.** 6600 ft.

Page 233. — **11.** 1 ft. 9 in. **12.** 6 yd. 1 ft. **13.** 1 yd. 14 in. **14.** 25 yd. 2 ft. **15.** 18 in. **16.** 18 in. **17.** 880 yd. **18.** 1320 yd. **19.** 4400 yd. **20.** 1½ ft. **Article 304.** — **1.** 8 min. **2.** 1760 yd. **3.** 240 rd. **4.** 4 mi. **5.** 20 rd. **6.** 250 ft.; 200 ft.

Page 234. — **1.** 420 ft. **2.** 70 ft. **3.** 85 ft.; 63¾ ft. **4.** $11.40.

Page 236. — **1.** 90 sq. ft. **2.** 65 sq. ft. **3.** 616 sq. in. **4.** 8 sq. yd. **5.** 2 sq. ft. **6.** 8 sq. ft. **7.** 4840 sq. yd. **8.** 12,100 sq. yd. **Article 312.** — **1.** 40 sq. ft. **2.** 50 sq. yd. **3.** 3200 sq. yd. **4.** 7500 sq. ft. **5.** 1875 sq. yd. **6.** 4500 sq. ft. **Article 313.** — **1.** 12 sq. yd.

Page 237. — **2.** 96 sq. yd. **3.** 2 A. **4.** 7200 sq. ft. **5.** 4900 sq. yd.; 60 sq. yd. greater. **6.** 1 sq. yd. **7.** 2106 sq. ft.; 2808 sq. ft.

Page 239. — **1.** 216 cu. ft. **2.** 405 cu. ft. **3.** 40 cu. yd. **4.** 96 cu. yd. **5.** 180 cu. yd. **6.** 8640 cu. in.

Page 240. — **1.** 80 cu. in. **2.** 1½ cu. ft. **3.** 128 cu. ft. **4.** 36 T. **5.** 14,400 cu. ft. **6.** 7500 lb. **7.** 7452 cu. ft. **8.** $151.80.

Page 241. — **1.** $2.69.

Page 242. — **2.** $3.76. **3.** $16.29. **4.** $2.93. **5.** $6.29. **6.** $5.44.

Page 243. — **7.** $4.09. **8.** $1.87. **9.** $8.80. **10.** $1.92. **11.** $3.77. **12.** $1.98. **13.** 77 ¢. **14.** $3.48. **15.** $7.25. **16.** $5.40. **17.** $11.05. **18.** $3.91.

Page 244. — **2.** 40 ¢. **3.** $5. **4.** $2. **5.** $2. **6.** $25. **7.** $4. **8.** $7.50. **9.** $1000. **10.** 60 ¢. **11.** $2.40. **12.** 180. **13.** 250 lb. **14.** $5.

Page 245. — **15.** $11. **16.** 20 hr. **17.** 3600. **18.** $7.50. **19.** 300 ft.; 30. **20.** $6. **21.** 36 doz. **22.** $8; 2½ ¢. **23.** $120. **24.** $1.50. **25.** $25. **26.** 687½ bu.

Page 246. — **1.** 3627. **2.** 3829. **3.** 34,700. **4.** 39,958. **5.** 41,285. **6.** $255.30. **7.** $2107.18. **8.** $2059.69. **9.** $2690.19. **10.** $3810.50. **11.** $2738.37. **12.** $21,805.06. **13.** $39,336.11.

Page 247. — **14.** 233. **15.** 68. **16.** 311. **17.** 317. **18.** 4068. **19.** 3106. **20.** 151. **21.** 242. **22.** 111. **23.** 218. **24.** 3217. **25.** 117. **26.** $536.18. **27.** $519.36. **28.** $284.95. **29.** $355.36. **30.** $608.88. **31.** $292.50. **32.** $620.83. **33.** $107.03. **34.** $139.79. **35.** $173.48. **36.** $164.61. **37.** $73.18. **38.** $223.55. **39.** $261.08. **40.** $402.37. **41.** 395,829. **42.** 491,309. **43.** 747,907.

Page 248. — **44.** 63,525. **45.** 208,896. **46.** 194,940. **47.** 166,336. **48.** 461,121. **49.** 371,076. **50.** 345,708. **51.** 621,027. **52.** 84,348. **53.** 286,412. **54.** 555,984. **55.** 199,655. **56.** 601,314. **57.** 172,494. **58.** 141,680. **59.** 635,040. **60.** 284,634. **61.** 284,970. **62.** 174,276. **63.** 445,880. **64.** 71,442. **65.** 200,408. **66.** 328,596. **67.** 98,434. **68.** 190,350. **69.** 85,176. **70.** 600,208. **71.** 295,704. **72.** 527,186. **73.** 333,234. **74.** 474,328. **75.** 473,850. **76.** 181,536. **77.** 499,105. **78.** 279,257. **79.** 307,648. **80.** 223,202. **81.** 238,743. **82.** 330,966. **83.** 342,630. **84.** 275,728. **85.** 725,706. **86.** 346. **87.** 179. **88.** 125 q. 46 r. **89.** 85. **90.** 98. **91.** 87. **92.** 64. **93.** 85. **94.** 47. **95.** 579. **96.** 843. **97.** 863. **98.** 569. **99.** 734. **100.** 986. **101.** 843. **102.** 729. **103.** 394. **104.** 58. **105.** 67. **106.** 48 q. 17 r. **107.** 67 q. 53 r. **108.** 97 q. 437 r. **109.** 99 q. 368 r. **110.** 46. **111.** 77. **112.** 93.

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Page 250. — **179.** 11 pt. **180.** 50 qt. **181.** 30 pk. **182.** 8 bu. **183.** 56 oz. **184.** 4 lb. **185.** 12 in.; 42 in.; 36 in.; 90 in. **186.** 72 ft. **187.** 640 rd.; 3840 rd. **188.** 1760 yd.; 440 yd. **189.** 16 in. **190.** 24 in. **191.** 14 in. **192.** 19 in. **193.** 42 ft. **194.** 60 ft. **195.** 13 ft. **196.** 22 ft. **197.** 4 sq. in. **198.** 144 sq. ft. **199.** 4 sq. ft. **200.** 1521 sq. yd. **201.** 60 sq. in. **202.** 60 sq. in. **203.** 120 sq. in. **204.** 360 sq. in. **205.** 180 sq. ft. **206.** 252

sq. ft. **207.** 288 cu. in. **208.** 720 cu. in. **209.** 2880 cu. in. **210.** 3240 cu. in.

Page 251. — **1.** $21. **2.** $31.62. **3.** 6796. **4.** 100. **5.** 39. **6.** 350. **7.** 648. **8.** 7200.

Page 252. — **9.** 19,360. **10.** 960; $15.60. **11.** $100. **12.** $23.25. **13.** $9; $6; $3. **14.** 144. **15.** 3034 mi. **16.** 195 mi. **17.** 80. **18.** No difference.

Page 253. — **19.** $68.75. **20.** 10. **21.** $79.20. **22.** 880 yd.; 14⅔ yd. **23.** $3. **24.** $12. **25.** $4. **26.** $60. **27.** $3. **28.** 16 ft. 1½ in. **29.** $35.88.

Page 254. — **31.** 75 bbl.; $226.25. **32.** 62½ lb. **33.** $21.72; $18.10. **34.** 392. **35.** $1.48. **36.** 19½ gal. **37.** $3.33⅓. **38.** 2928 hr. **39.** 24 ft.; 2304 sq. ft. **40.** $9.60.

Page 255. — **41.** 10½ yd. **42.** $1650. **43.** $2.28. **44.** $45. **45.** 3300 mi.; $82.50. **46.** $36. **47.** 112 sq. ft. **48.** 13 doz.

Page 256. — **49.** $40. **50.** 40 hr. **51.** 20. **52.** 220 mi. **53.** $65. **54.** 7200 sq. ft.; 800 sq. yd.

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