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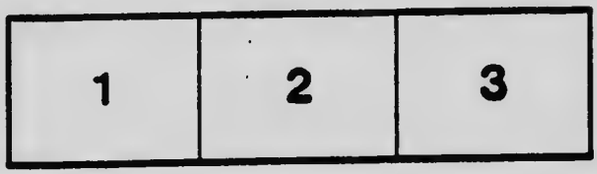

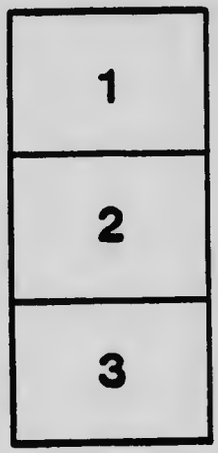

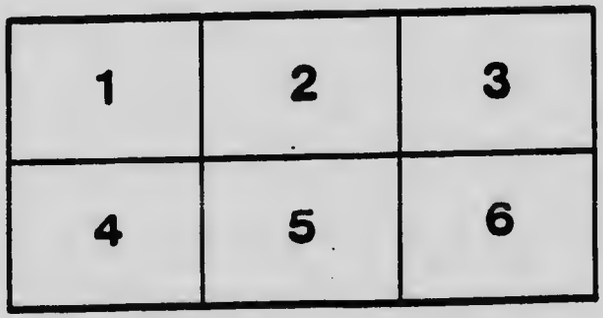

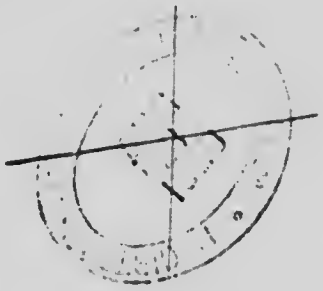

GAGE'S EDUCATIONAL SERIES

ARITHMETIC

BOOK I

BY

J. A. SMITH, B.A.
INSPECTOR OF HIGH SCHOOLS, ALBERTA

AND

R. H. ROBERTS, M.A.
INSPECTOR OF PUBLIC SCHOOLS, ALBERTA

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ARITHMETIC

BOOK I

CHAPTER I

NOTATION AND NUMERATION OF NUMBERS, 10 TO 100

Counting to 10.

Count the number of windows in the school.

Count the number of seats in the first row.

Count the number of boys in the class.

Count the number of girls in the class.

Count the number of pictures on the wall.

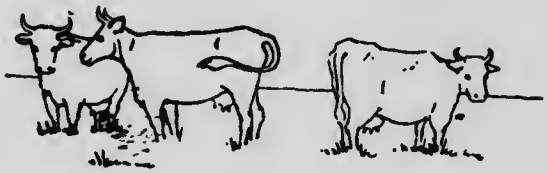
Let us go to the window and count the number of buildings we see.

The teacher should give the children practice in counting out objects to 10. Care should be taken that the children repeat the name of each number correctly.

Each child should have a number box with objects which are easily handled for counting. Such objects as beans, spools, blocks, cones, almonds, etc., make good material.

How many birds are on the fence?

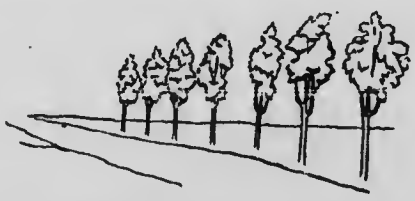
How many cows do you see in the field?



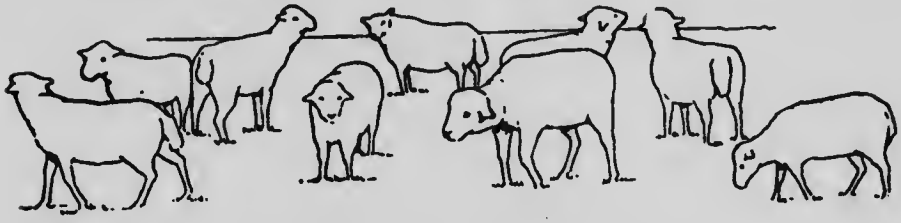
How many boys and girls are listening to the story?

How many apples are in the dish?

How many trees do you see along the road?



How many sheep are in the field?



How many horses is this man driving?

How many little chickens has this mother hen?

Reading and writing numbers to 10.

Have the pupils pick out from their number boxes, *one* spool; *one* block; *one* button; etc.

Give the children the written name and figure: *One*, 1.

Have the pupils pick out *two* spools; *two* beans; *two* rose-hips, etc.

Give the written name and figure: *Two*, 2.

Similarly using the objects, teach the names and figures:

Three, 3	*Four*, 4	*Five*, 5	*Six*, 6
Seven, 7	*Eight*, 8	*Nine*, 9	*Ten*, 10

1. Write on the blackboard the names of different numbers to ten and have the pupils count out objects from their number boxes to represent them.

2. Write on the blackboard the figures representing different numbers to ten and have the pupils count out objects to represent them.

EXERCISE

1. Count out 3 beans; 4 spools; 5 pebbles; 8 blocks; 6 rose-hips; 9 cones; 7 nails; 10 clothes pins.

2. Count out *seven* spools; *five* beans; *eight* blocks; *six* nails; *nine* rose-hips; *three* pebbles; *four* clothes pins; *ten* cones.

3. Give the name for each of the following: 3, 5, 8, 7, 6, 10, 4, 9, 2.

4. Write the figure for each of the following: two, seven, one, five, ten, nine, four, six, eight. three.

5. Write the numbers with the names and figures on the blackboard and keep these for reference. Have individual pupils read aloud from blackboard.

one	two	three	four	five
1	2	3	4	5
six	seven	eight	nine	ten
6	7	8	9	10

SEAT EXERCISE

1. Pupils should draw pictures showing: 6 tents; 8 apples; 5 boys; 7 chickens; 3 spools, etc.

2. The pupils should be asked to make various things from plasticine. Choose exercises that will give an opportunity for applying counting in the number space to 10.

Examples:

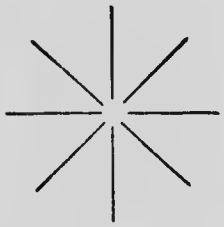
Make a mother hen with 7 little chickens.

Make a bird's nest with 6 eggs.

Make 5 little pigs.

3. Have the children make designs with colored sticks, the teacher drawing the designs on the blackboard. Have the pupils count the number of sticks used in each design, and have them write down the figures.

A few designs are illustrated:



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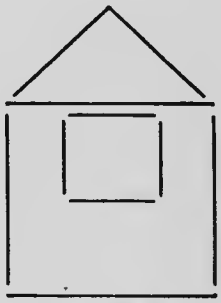


HOUSE

Counting to 25.

Provide each child with objects to count out the numbers from 10 to 25. Test each child carefully and see that he is able to count accurately any number of objects asked for as high as 25.

Reading and writing numbers to 25.

As the child grasps the numbers from 11 to 25, give the figures which represent these numbers.

11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25

Test the pupils frequently in reading these numbers at sight. The numbers should be written on the blackboard or on a chart and should be used for frequent drills.

EXERCISE

1. Have the pupils take out their number boxes and pick out different numbers, *e.g.* 15, 22, 17, 9, 19, 25, 18, etc.

This exercise should be taken daily, until each child is able to count accurately any number of objects to 25.

2. From dictation have the pupils write down the different numbers, giving them in various sequences, *e.g.* 22, 17, 9, 13, 20, 10, 24, 7, 15, 21, etc.

3. Have the pupils copy the numbers from 1 to 25.

Counting to 50.

Reading and writing the numbers to 50.

After the pupils know the numbers to 25, counting of objects to 50 should be taken. The numbers from 26 to 50 should be taught.

EXERCISE

1. From your number boxes pick me out 35, 42, 29, 27, 38, 16 objects.

2. Repeat Example 1, giving a drill on all the numbers to 50.

3. Write the numbers from 20 to 35.

4. Write the numbers from 31 to 50.

5. Write the numbers from 37 to 49.

6. Write from dictation:

(*a*) 17, 28, 35, 42, 39, 47, 41, 30

(*b*) 9, 20, 45, 13, 26, 34, 19, 40

(*c*) 7, 18, 24, 37, 49, 11, 31, 48

7. Read the following numbers:

(*a*) 38, 47, 29, 16, 8, 30, 43, 33
(*b*) 45, 23, 17, 35, 9, 20, 18, 39
(*c*) 10, 29, 42, 37, 15, 27, 11, 21

8. Give the names of all the numbers from 1 to 50 which end in

(*a*) 1 (*b*) 2 (*c*) 3 (*d*) 4 (*e*) 5
(*f*) 6 (*g*) 7 (*h*) 8 (*i*) 9 (*j*) 0

9. What number comes after each of the following:

(*a*) 6, 17, 28, 35, 42, 39, 47, 41
(*b*) 9, 20, 45, 13, 26, 34, 19, 40
(*c*) 7, 18, 23, 37, 49, 11, 31, 48

10. What number comes before each of the following:

(*a*) 38, 47, 29, 16, 8, 30, 43, 33
(*b*) 45, 23, 17, 35, 9, 20, 18, 39
(*c*) 10, 29, 42, 37, 15, 27, 11, 21

Study of numbers 2 *to* 10.

Grouping

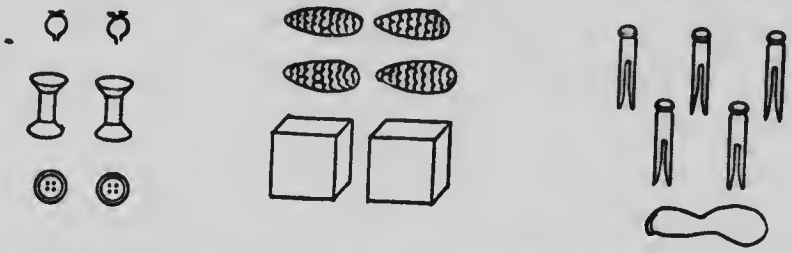
The purpose of grouping is to enable the child to find out the number relations of the various numbers.

The child counts out from his number box 2 objects; these may be alike or may be different objects. He sees the group *two* is made up of two *ones*. He represents this fact with the objects.

In the same way he proceeds with all the numbers to 10, arranging the various groups so as to show all the number relations contained in them.

This work should be manual and oral. The child should be led to discover these relations for himself.

The following are some of the groupings he can make with *six.*



The children should be given considerable practice in grouping objects, so that they know all of the relations of any number.

EXERCISE

1. Write on the blackboard any number or its name and have the pupils show with objects all the number relations.

2. Arrange any group of objects up to 10 and ask the pupils to tell you the number stories represented. Lead the child to grasp the group, without counting out the separate objects composing it.

The combinations of 2 *to* 10.

After the child has studied the number groups and has developed the various number relations from them, he should be given the formal work in number combinations.

The Number 2

Learn:

$$\begin{array}{ll} 1 & 2 \quad \text{Read 1 and 1 are 2.} \\ \underline{1} & \underline{-1} \quad \text{Read 2 take away 1 leaves 1.} \\ 2 & 1 \end{array}$$

The child should learn both the addition and subtraction at the same time. Do not treat these as separate processes. Give frequent and thorough drills on these relations.

Oral problems based on these relations.

1. One cent and one cent are how many cents?

2. Jane had 2 apples. She gave her brother 1. How many did she have left?

3. Bobbie has 1 orange; he wants 2. How many more will he have to get?

4. I gave Kate and Ralph 1 apple each. How many apples did I give away?

The Number 3

Learn:

$$\begin{array}{cccc} 1 & 2 & 3 & 3 \\ +2 & +1 & -1 & -2 \\ \hline 3 & 3 & 2 & 1 \end{array}$$

After the child has discovered the number relations of *Three* from objects, write these on the blackboard. Drill the class on these combinations.

ORAL APPLICATIONS

1. Tom had 3 colts. He sold 2. How many had he left?

2. Mary had 2 black chickens and 1 white chicken. How many chickens had she all together?

3. On the way to school I saw 3 birds; 2 of these were blue, and the rest brown. How many brown birds were there?

4. I had 3 oranges, and I gave 1 to each boy in the class. How many boys were in the class?

5. Mary fed 1 calf, and her sister fed 2. How many calves did they both feed?

The Number 4

Learn:

3	1	4	4	2	4
1	3	−3	−1	2	−2
4	4	1	3	4	2

Oral drill on the combinations.

1. 3 and what are 4? 1 and what are 4?
2. What are 2 and 2? 3 and 1?
3. How many twos are in 4?
4. How many threes are in 4? Answer 1 three and 1 over.

ORAL APPLICATIONS

1. John bought 4 papers and sold 2. How many had he left?

2. Mary had 3 words right and 1 word wrong in spelling. How many words were there to spell?

3. Leslie has 1 sister and 3 brothers. How many brothers and sisters has he all together?

4. In a bird's nest 3 eggs hatched into little birds and 1 did not. How many eggs were in the nest at first?

5. I got 4 story books for Christmas. I have read 1. How many have I yet to read?

6. What are the answers:

3 and 1? 2 take away 1? 4 take away 3?
1 and 2? 2 and 2? 2 and 1?
1 and 3? 4 take away 1?
How many twos in 4?
How many threes in 4?
How many twos in 3?

7. Give the answers at sight:

2	4	3	1	3	4	3	2
1	−2	−1	1	1	−3	2	2

The Number 5

Learn:

				2				
4	1	2	3	2	5	5	5	5
1	4	3	2	1	−3	−2	−4	−
5	5	5	5	5	2	3	1	

Oral drill on the combinations.

1. 3 and what are 5? 2 and what are 5?
2. What are 4 and 1? 3 and 2?
3. 5 take away 4 are how many?
   5 take away 2 are how many?
4. What are 2 and 2 and 1?
5. How many twos are in 5?
6. How many threes are in 5?

ORAL APPLICATIONS

1. Mary received 5 dolls for Christmas. She gave 2 away to a friend. How many did she have left?

2. Fred has 4 white rabbits and 1 brown one. How many rabbits has he?

3. John had 2 cents. He did an errand for his father who gave him 2 cents more, and he was given 1 cent more by his brother. How many cents did he have then?

4. Katie had 5 oranges. She gave 1 to Anne. How many did she have left?

5. On Monday Clara learned 3 new words, and on Tuesday she learned 2 new words. How many new words did she learn on these two days?

6. Give the following at sight:

						1			
3	3	5	3	2	4	2	5	5	1
2	1	−3	−2	2	−1	2	−4	−2	4

The Number 6

Learn:

									2
5	1	6	6	4	2	6	6	3	6	2
1	5	−5	−1	2	4	−4	−2	3	−3	2
6	6	1	5	6	6	2	4	6	3	6

Oral drill on the combinations.

Give the answers:

1. 1 and 5; 3 and 3; 6 take away 3
2. 6 take away 1; 4 and 2; 6 take away 4
3. 2 and 2 and 2; 6 take away 2
4. How many twos are in 6?
5. How many threes are in 6?
6. How many fours are in 6?
7. How many fives are in 6?

ORAL APPLICATIONS

1. Mother had 6 eggs. She cooked 3 for breakfast. How many are left?

2. John had 5 cents. He earned 1 cent. How many cents did he then have?

3. Katie had 6 apples. She gave 4 away. How many had she left?

4. Mother gave 2 plums to Mary, 2 plums to Annie, and 2 plums to Bob. How many plums did she give to the 3 children?

5. Give the answers at sight:

2	6	5	3	4	6	5	3	6	5
4	−5	1	2	−3	−3	−2	3	−4	−1

6. What are 2 twos and 1 more?
What are 2 threes?
What are 1 four and 2 more?
What are 3 and 2 and 1?
What are 2 and 4?
What are 6 take away 3?

The Number 7

Learn:

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

		2
3	3	2
2	3	2
2	1	1
7	7	7

Oral drill on the combinations.

Give the answers:

1. 2 and 5; 7 take away 3; 3 and 2
2. 4 and 3; 7 take away 6; 5 and 2
3. 7 take away 5; 6 and 1; 5 and 2
4. How many threes are in 7?
5. How many twos are in 7?
6. How many fives are in 7?
7. How many sixes are in 7?
8. How many fours are in 7?

9. What are 2 threes and 1?

10. What are 3 twos and 1?

ORAL APPLICATIONS

1. I had 5 black chickens and 2 white chickens. How many chickens did I have all together?

2. There are 7 days in a week. Tom goes to school 5 days. How many days does he stay at home?

3. Mary had a party. She invited 4 girls and 3 boys. How many children were at the party?

4. There were 7 robins on the lawn. 6 flew away. How many were left?

5. Harvey had 7 cents. He bought a ball which cost him 5 cents. How much money did he have left?

6. Give the answers at sight:

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

7. What are 3 twos? 2 threes?

8. What are 1 five and 2 more?

9. What are 3 twos and 1 more?

10. What are 1 four and 3 more?

11. What are 2 and 3 and 2?

The Number 8

Learn:

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

Oral drill on the combinations.

Give the answers:

1. 6 and 2; 7 and 1; 8 take away 6.
2. 5 and 3; 8 take away 4; 8 take away 3.
3. 4 and 4; 2 and 3 and 3; 8 take away 7.
4. 2 and what are 8? 4 and what are 8?
5. 3 and what are 8? 8 take away 2?
6. How many twos in 8? How many threes in 8? How many fours in 8?
7. What are 2 and 1 and 5?
8. What are 3 and 4 and 1?

ORAL APPLICATIONS

1. Mary had 6 oranges and was given 2 more. How many had she then?
2. John had 4 cents. His father gave him 2, and his mother gave him 2 more. How many cents had he then?
3. Jessie had 8 cents. She bought a book costing 5 cents. How many cents had she left?
4. Elsie wrote 8 words in her book. 1 of these was wrong. How many words were right?
5. Tom had a party. He had 8 apples and gave 2 to each boy at the party. How many boys were at the party?
6. Give the answers at sight:

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

7. How many sixes are in 8?
8. How may threes are in 8?
9. How many sevens are in 8?
10. How many fives are in 8?

The Number 9

Learn:

$$\begin{array}{cccccccccccccccc} 8 & 1 & & 9 & & 9 & 7 & 2 & & 9 & & 9 & 6 & 3 & & 9 \\ 1 & 8 & - & 8 & - & 1 & 2 & 7 & - & 7 & - & 2 & 3 & 6 & - & 6 \\ \hline 9 & 9 & & 1 & & 8 & 9 & 9 & & 2 & & 7 & 9 & 9 & & 3 \end{array} \qquad \begin{array}{cccccccccccc} & & & & & & & & & & & 3 \\ 9 & 5 & 4 & & 9 & & 9 & 3 \\ - & 3 & 4 & 5 & - & 5 & - & 4 & 3 \\ \hline & 6 & 9 & 9 & & 4 & & 5 & 9 \end{array}$$

Oral drill on the combinations.

Give the answers:

1. What are 7 and 2? 6 and 3?
2. 5 and what are 9? 2 and what are 9?
3. 9 take away 3 are how many?
4. What are 4 and 4 and 1? What are 3 threes?
5. What are 4 and 3? What are 5 and 4?
6. If we take 3 from 9, how many are left?
7. What are 3 twos and 1? What are 4 twos and 1?
8. How many threes are in 9?
9. How many twos are in 9?
10. How many fours are in 9?

ORAL APPLICATIONS

1. Mary had 6 cents, and her mother gave her 3 more. How many cents has she now?

2. Bobbie and Tom are playing soldiers. Bobbie has 9 soldiers, and Tom has 5. How many more soldiers has Bobbie than Tom?

3. Mary and Lucy were hunting birds' nests. Mary found 7, and Lucy found 2. How many did they both find?

4. Katie had a party with 4 friends. Each friend was given 2 dishes of ice cream, and Katie was given 1 dish. How many dishes of ice cream were there?

5. Stuart had 9 peanuts. He ate 4. How many did he have left?

6. Mother gave 3 candies to each of her 3 children. How many candies did she give all together?

7. Give the answers at sight:

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

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

8. How many twos in 9?
How many threes in 8?
How many fours in 7?
How many threes in 7?
How many fours in 9?

9. What are 2 fours and 1 more?
What are 3 twos and 3 more?
What are 1 six and 2 more?
What are 1 five and 4 more?
What are 4 twos and 1 more?

The Number 10

Learn:

9	1	10	10	8	2	10	10	7	3
1	9	−9	−1	2	8	−2	−8	3	7
10	10	1	9	10	10	8	2	10	10

								2	
								2	
								2	
10	10	6	4	10	10	5	10	2	
−7	−3	4	6	−6	−4	5	−5	2	
3	7	10	10	4	6	10	5	10	

Oral drill on the combinations.

Give the answers:

1. What are 6 and 4? 5 and 4? 7 and 3?
2. What are 4 and 5? 2 and 7? 3 and 4?
3. 5 and what are 10? 7 and what are 9?
4. 6 and what are 10? What are 8 and 1?
5. 2 and what are 10? 7 and what are 10?
6. What are 2 and 4 and 3?
7. What are 3 and 4 and 3?
8. What are 10 take away 8? 10 take away 6? 10 take away 5?
9. How many fives in 10? How many twos in 10?
10. How many are 4 twos? 3 twos? 5 twos? 3 threes? 2 fives?

ORAL APPLICATIONS

1. John had 10 cents. He spent 2 cents for a book and 5 cents for a pencil. How much had he left?
2. Mary had a party. She invited 5 boys and 4 girls. How many were at the party?
3. Mary walked 3 blocks to school and 4 blocks farther to the store. How far did she walk all together?
4. Mary has 3 dolls. Lucy has 4 dolls, and Kate has 2 dolls. How many dolls have the 3 girls?
5. Rob had 10 rabbits. He sold 4 of them. How many has he left?
6. Harry has 3 pigeons. He bought 7 more. How many has he now?
7. Edgar wrote 10 words in his book. 2 of these words were wrong. How many words we ght?

8. Give the answers at sight:

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

9. How many twos are in 10?
How many threes are in 10?
How many fives are in 10?
How many fours are in 10?
How many sevens are in 10?

10. What are 3 threes and 1 more?
What are 2 fours and 1 more?
What are 1 five and 4 more?
What are 4 twos?

Counting to 100.

Reading and writing numbers to 100.

After the pupils know the numbers to 50, they should be taught to count, read, and write the numbers from 50 to 100.

EXERCISE

1. Count from 50 to 60; 60 to 70; 70 to 80; 80 to 90; 90 to 100.
2. Write the numbers from 51 to 60.
3. Write the numbers from 60 to 83.
4. Write the numbers from 74 to 100.
5. Write from dictation:
   (*a*) 53, 67, 95, 86, 79.
   (*b*) 58, 92, 64, 85, 77.
   (*c*) 99, 68, 87, 51, 70.
6. Write all the numbers ending in 0 between 10 and 100.
7. Write all the numbers ending in 3 between 23 and 53.

8. Write all the numbers ending in 7 between 47 and 87.
9. Write all the numbers ending in 9 between 69 and 99.
10. Write all the numbers ending in 1 between 1 and 100.

Review of the Numbers to 10

To the Teacher. — Frequent oral drills should be given the pupils on the number relations to 10. Pupils should give the results rapidly. Drill should be taken daily, the teacher varying the exercises. The following exercises are suggested.

Give the answers at sight:

1.

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

2.

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

3.

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

4. Add:

				1	3	4	4	5	2
2	3	4	3	5	2	3	0	2	1
4	3	1	4	2	3	0	3	0	2
3	4	3	2	1	2	1	2	3	4

5. *Teacher dictates and pupils do the work mentally:*

(*a*) 4, add 5, take away 2, add 3, take away 6.

(*b*) 2, add 3, add 4, take away 5, add 3, take away 7.

(*c*) 10, take away 8, add 5, add 2, take away 6.

(*d*) 9, take away 2, take away 3, add 5, take away 6, take away 1, add 8.

(*e*) 10, take away 3, take away 2, add 5, take away 6, add 3.

6. 3 and what are 10? 7 and what are 9?
5 and what are 9? 6 and what are 8?
2 and what are 7? 4 and what are 7?
4 and what are 10? 1 and what are 9?
6 and what are 9? 3 and what are 8?

7. How many twos are in: 5, 8, 9, 10, 7, 6?
How many threes are in: 7, 10, 9, 3, 4, 6, 5?
How many fours are in: 6, 9, 8, 10, 7, 5?
How many fives are in: 10, 9, 7, 6, 8?
How many sixes are in: 9, 8, 6, 7, 10?
How many sevens are in: 10, 9, 8, 7?

8. What are 2 threes and 4 more?
What are 5 twos?
What are 4 twos and 1 more?
What are 2 threes and 3 more?
What are 1 seven and 2 more?
What are 1 six and 4 more?

9. Add the columns at sight:

2		1			4	2			
0	4	0	1	2	1	3		3	2
1	2	5	3	4	0	2	2	2	4
3	4	3	3	1	2	0	3	3	0
2	0	1	2	2	3	2	4	2	3

10. Subtract at sight:

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

1. Mary is 9 years old. Her brother Harry is 4 years younger. How old is Harry?

2. A man sold 5 turkeys to one man and 3 turkeys to another. How many turkeys did he sell to both?

3. On one bush there are 4 roses, on another 2, and on another 3. How many roses are there on the three bushes?

4. Tom has 4 marbles in one pocket and 3 marbles in another pocket. How many marbles has he in both pockets?

5. Mary has a chicken that weighs 4 pounds. Lucy has a chicken that weighs 6 pounds more. How much does Lucy's chicken weigh?

6. Betty bought a book for 5 cents and a pencil for 3 cents. She gave the storekeeper a 10-cent piece. How much change should she receive?

7. Harold rode 9 miles in a motor car, and Jack rode 7 miles. How much farther did Harold ride than Jack?

8. Arthur earned 3 dollars in April, 2 dollars in May, and 4 dollars in June. How much did he earn during the 3 months?

9. A man has to walk 8 miles. He has walked 3 miles. How much farther has he to go?

10. Four girls gave money to the Red Cross. Ethel gave 2 dollars, Beth gave 3 dollars, Kate gave 2 dollars, and Jane gave 3 dollars. How much did they all give together?

Review in Adding

The teacher should test the pupils to see how many correct results can be given in 10 minutes, 5 minutes, 1 minute.

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

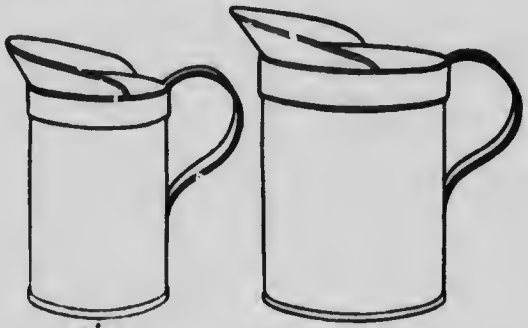
2.	5	4	5	2	9	3	3	2	7	4
	5	3	2	7	1	6	5	3	3	4
3.	3	2	5	3	7	4	1	3	5	5
	7	6	4	4	2	6	7	6	5	3
4.	6	9	5	10	9	8	10	8	8	10
	−3	−2	−4	−1	−5	−6	−2	−3	−1	−7
5.	7	7	10	9	8	9	10	7	9	10
	−3	−1	−7	−3	−4	−2	−6	−2	−8	−5
6.	9	8	7	6	2	3	1	5	6	2
	?	?	?	?	?	?	?	?	?	?
	10	10	9	8	7	9	8	7	10	7
7.	3	1	3	6	2	2	4	2	3	4
	1	2	3	1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

MEASURING

The teacher should have the pint and quart measures. Ask the children to fill the quart measure with water, using the pint measure. Reverse the process. Fill the quart measure with water and have the children pour it into the pint measure, finding out how many pints are in the quart.

Learn:

In 1 quart there are 2 pints.



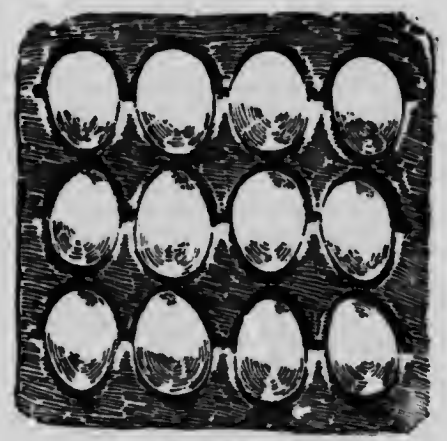
PINT QUART

The teacher should have the pupils count out 12 pencils, 12 brushes, 12 blocks, 12 cones, etc.

Give the name *dozen.*

Learn:

In 1 dozen there are 12 things.



1 DOZEN

Have the pupils count the number of days in the week and the number of months in the year. Also have the pupils count the number of inches on their foot rulers.

Learn:

In 1 week there are 7 days.
In 1 year there are 12 months.
In 1 foot there are 12 inches.

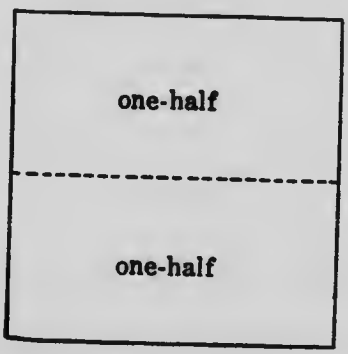
One-half and one-quarter.

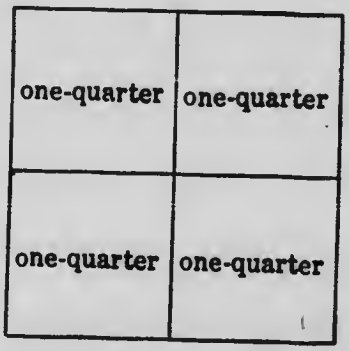
Take a square piece of paper, fold it evenly across *once* so that the edges meet. Now unfold the paper. We see that the paper is marked off into 2 parts and that each part is the same size. The paper is divided into 2 equal parts. We call each of these equal parts *one-half*.

Give the pupils practice in folding squares and circles, so as to develop the idea of dividing anything into 2 equal parts, or taking one-half of it.

Take a square piece of paper and fold it evenly across so that the edges meet. Now fold it again so that the sides meet. Now unfold the paper. We see that the paper is marked off into 4 parts, and that each part is the same size. The paper is divided into 4 equal parts. We call each of these equal parts *one-quarter* or *one-fourth*.

Give the pupils practice in folding squares and circles, so as to develop the idea of dividing anything into 4 equal parts, or taking one-quarter of it.





TELLING TIME

On clocks and watches letters are often used instead of figures in writing the numbers from 1 to 12.

I is used for 1.	VII is used for 7.
II is used for 2.	VIII is used for 8.
III is used for 3.	IX is used for 9.
IV is used for 4.	X is used for 10.
V is used for 5.	XI is used for 11.
VI is used for 6	XII is used for 12

On clocks and watches IIII is used for 4.

Drill on Roman Notation

1. Give the name of each of the following numbers:

V	III	IX	XII	IIII	VIII
II	XI	VI	X	VII	IV

NOTE TO TEACHER. — The teacher should represent with a piece of cardboard the face of a clock with movable hands.

CLOCK

Read the numbers on the clock face.

Point out 9, 7, 6, 3, 12, 1, 10, 8, 5, 4, 2, and 11.

The long hand on the clock is called the minute hand.

The short hand is called the hour hand.

When the minute hand points to XII, and the hour hand points to IX, it is 9 o'clock.

When the minute hand points to XII, and the hour hand points to VI, it is 6 o'clock.

Illustrate by moving the hour hand, 2 o'clock, 4 o'clock, 8 o'clock, 7 o'clock, 11 o'clock, 5 o'clock, 10 o'clock, 3 o'clock, 12 o'clock.

Show the pupils that the minute hand travels all the way round the clock every hour. Then show that when the minute hand has moved from 12 to 6, the hour hand has moved half a space. The time is half past.

Illustrate with the clock face: half past 9; half past 3; half past 8; etc.

By means of the clock face give the pupils practice in reading the half hour.

If the minute hand travels from XII to III, it has gone one-fourth around the clock. We say the time is a quarter past.

Illustrate with the clock face: a quarter past 9; a quarter past 12; a quarter past 3; etc.

By means of the clock face give the pupils practice in reading the quarter past.

If the minute hand has travelled from XII to IX, it has to go from IX to XII to complete the hour. That is, it is a quarter to the next hour.

Illustrate with the clock face: a quarter to 8; a quarter to 4; a quarter to 12; a quarter to 9; a quarter to 5; a quarter to 3; etc.

By means of the clock face give the pupils practice in reading the quarter to.

EXERCISE

Using the clock face, show the following times and have the pupils tell the time in each case:

1. Six o'clock; 3 o'clock; 12 o'clock.

2. Half past 7; a quarter past 5; a quarter to 9; half past 8.

3. A quarter to 3; half past 6; 11 o'clock; a quarter past 6; half past 10.

Continue the exercises until the children are familiar with reading the time.

EXERCISE

Use your foot ruler.

1. Draw a line 6 inches long.
2. Draw a line 4 inches long.
3. Draw a line 8 inches long.
4. Draw a line 5 inches long.
5. Draw a line 10 inches long.

Cut off a strip of cardboard 1 *inch long.*

With this 1 inch as a ruler, find:

6. The number of inches in the length of your reader.
7. The number of inches in the length of your pencil.
8. The number of inches in the length of a piece of chalk.
9. The number of inches in the length of your desk.
10. The number of inches in the length of your note-book.

Oral.

11. On Monday Mary's mother bought 4 quarts of milk. If the milkman gave her the milk in pint bottles, how many bottles should she get?

12. Arthur bought the ice cream for a picnic. He got 3 pints of strawberry ice cream, 3 pints of chocolate ice cream, and 2 pints of vanilla ice cream. How many quarts of ice cream did he buy?

13. Betty started to school on the first day of February and attended every day until the last day of June. How many months did she go to school?

14. Jack bought 3 apples, Robert bought 5 apples, and Harold 2 apples. They divided the apples among 5 boys. How many apples should each boy receive?

15. Tom sells milk. On Monday he sold 3 pints, on Tuesday 2 pints, on Wednesday 4 pints, and on Thursday 1 pint. How many quarts of milk did he sell?

CHAPTER II

NOTATION AND NUMERATION OF NUMBERS, 100 TO 1000

The numbers above 100 are 101, 102, 103, and so on to 199.

After 199 the next number is 200, then follow 201, 202, 203, etc. to 299.

After 299 comes 300.

The other hundred numbers are 400, 500, 600, 700, 800, 900.

After 999 comes 1000.

Drill on recognition of numbers to 1000.

Write from dictation:

	a	*b*	*c*	*d*	*e*
1.	537	629	758	339	206
2.	720	219	507	483	365
3.	983	802	797	685	222
4.	600	250	570	813	206
5.	410	900	730	675	444

Write the following numbers:

6. The 5 numbers following 309.
7. The 6 numbers following 827.
8. The 10 numbers following 240.
9. The 5 numbers before 734.
10. The 10 numbers before 603.

Write the following numbers:

11. All the numbers from 275 to 375.
12. All the numbers from 483 to 583.
13. All the numbers from 792 to 825.
14. All the numbers before 350 down to 280.
15. All the numbers before 815 down to 750.

Read the following numbers aloud:

	a	*b*	*c*	*d*	*e*
16.	777	307	202	700	560
17.	983	540	606	652	440

Write in figures:

18. One hundred thirty-seven.
19. Four hundred nineteen.
20. Eight hundred seven.
21. Three hundred seventy.
22. Ninety-six.
23. Seven hundred eleven.
24. Nine hundred ninety.
25. Five hundred ninety-two.
26. Two hundred two.

Units and Tens

Introductory.

Count out 10 sticks, 20 sticks, 15 sticks, 26 sticks, 17 sticks. Put these in separate piles.

From the pile of 17 sticks count out ten. Tie these in a bundle. In 17 sticks we have 1 bundle of 10 and 7 sticks over. Similarly with 26 sticks we have 2 bundles of 10 and 6 sticks over.

In 15 sticks we have 1 bundle of 10 and 5 sticks over.
In 20 sticks we have 2 bundles of 10 and 0 over.
In 10 sticks we have 1 bundle of 10 and 0 over.

Write down 17, 26, 15, 20, and 10.

Consider 17.

What does the 7 represent? Answer, 7 ones.
What does the 1 represent? Answer, 1 ten.

We see then that 17 is made up of 2 figures, the right-hand figure standing for *ones* or *units* and the left-hand figure standing for *tens*.

Consider 26.

The 6 stands for 6 units or ones and the 2 for 2 tens. Verify this from the sticks.

In writing numbers from 10 *to* 99 *we require* 2 *figures. The right-hand figure is called the units figure. The figure to the left of the units is called the tens figure.*

EXERCISE

Give the units figure and the tens figure in each of the following:

	a	*b*	*c*	*d*	*e*
1.	37	59	63	87	22
2.	19	80	79	33	50
3.	53	75	97	46	66

Write from dictation, placing the units figures under units figures and tens figures under tens figures, the following:

	a	*b*	*c*	*d*	*e*
4.	38	50	21	17	99
5.	37	26	52	36	90

State the number of units and tens in each of the numbers in Examples 4 and 5.

Write the following numbers with figures and write the number of units and tens in each:

Example: Forty-six, 46 = 4 tens 6 units.

6. Seventy-five; thirty-nine; sixty.
7. Thirty-one; ninety-five; fifty-five.
8. Sixty-three; twenty-seven; eighty.
9. Nineteen; seventy-seven; thirty-seven.
10. Thirteen; eighty-one; forty-four.

Write the numbers made up of the following units and tens:

11. 5 tens 4 units; 8 tens 8 units.
12. 6 tens 0 units; 3 tens 7 units.
13. 1 ten 9 units; 9 tens 1 unit.
14. 2 tens 8 units; 8 tens 0 units.
15. 7 tens 7 units; 4 tens 0 units.

Addition to 20

Learn:

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

Oral drill on number relations.

1. What are 10 and 2? 10 and 5? 10 and 7?
2. What are 10 and 6? 10 and 9? 10 and 5?
3. 10 and what are 19? are 15? are 12?
4. 10 and what are 13? are 17? are 14?

5. What are 19 take away 9?
What are 16 take away 10?
What are 12 take away 2?

6. What are 2 and 5 and 3 and 7?
What are 4 and 3 and 2 and 1 and 8?
What are 3 and 5 and 2 and 6?
What are 2 and 6 and 2 and 4?
What are 5 and 4 and 1 and 3?

ORAL APPLICATIONS

1. A boy had 9 cents and earned 10 cents more. How much had he then?

2. A girl had 17 oranges. She sold 7. How many did she have left?

3. Kate made 6 pies for Christmas, and Mary made 10 pies. How many pies did both make?

4. Charles had 15 cents. He spent 10 cents for a book. How much did he have left?

5. On Monday Robert sold 5 papers, on Tuesday 4 papers, on Wednesday 1 paper, and on Thursday 7 papers. How many papers did he sell all together?

6. Give at sight the following:

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

7. Give at sight:

10	17	13	9	16	19	15	14	8	18
−5	−7	−10	−5	−10	−9	−10	−10	−3	−8

8. Add:

2 and 8 and 7; 3 and 7 and 5.
5 and 5 and 3; 4 and 6 and 8;
4 and 2 and 4 and 9; 5 and 2 and 3 and 6.

Learn:

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

Sometimes we write $\begin{array}{r} 9 \\ 2 \\ \hline 11 \end{array}$ as $9+2=11$. *Read* 9 *and* 2 *are* 11

and $\begin{array}{r} 11 \\ -2 \\ \hline 9 \end{array}$ $11-2=9$. *Read* 11 *take away* 2 *are* 9.

Oral drill on number relations.

1. Give the answers:

$5+6$ $3+8$ $10+1$ $11-4$ $11-6$ $11-9$

2. What are

$11-5$? $11-3$? $11-2$? $11-9$? $11-6$? $11-4$?

3. 3 and what are 11? 5 and what are 11?
2 and what are 11? 7 and what are 11?

4. Subtract:

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

5. Give the following results:

2+3+4+2	4+3+4	2+6+3
11−9	5+2+3+7	3+2+4+1+6

ORAL APPLICATIONS

1. John had 11 cents, and he spent 7 cents for fruit. How much had he left?

2. Mary spent 8 cents for a book and 3 cents for a pencil. How much did she spend for both?

3. Tom had 11 pigs. He sold 5 of them. How many had he left?

4. Betty came to school 19 days in one month. She drove 10 days and walked the other days. On how many days did she walk to school?

5. Stuart had 8 words right in spelling and 3 words wrong. How many words did he have to spell?

6. Give at sight:

			2				
			2				
11	4	19	5	11	11	11	11
−5	7	−9	2	−9	−6	−8	−2

7. Add and subtract:

a. 4+5−3+2+2−5+3+2=

b. 5+3−4+6+7=

c. 4+6−3+4=

d. 5+4−2+3+7=

e. 2+9−3+2+9=

Addition by Endings.

Introductory.

Compare the following relations:

3	13	2	12	4	14
1	1	2	2	2	2
4	14	4	14	6	16

In this way we may give the sum of many numbers.

Learn:

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

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

Oral drill on number relations.

1. Add:

15	17	13	16	11	12	14	15
3	2	4	3	8	5	4	4

2. Subtract:

19	15	16	18	17	19	16	13
−7	−2	−4	−3	−4	−6	− 11	−2

3. Give at sight:

15	16	11	14	19	17	12	14
3	−2	8	5	−2	−10	6	5

4. Add:

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

5. Add and subtract:

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

ORAL APPLICATIONS

1. Mary had 15 cents. Her father gave her 4 cents more. How much did she have then?

2. Edgar earned 7 cents on Monday, 3 cents on Wednesday, and 9 cents on Saturday. How much did he earn all together?

3. John has to go 16 miles to town. After he has gone 12 miles, how much farther has he to go?

4. Kate is 12 years old. In how many years will she be 19?

5. I cut a pole into 2 pieces. One piece is 11 feet long, and the other piece is 7 feet long. How long was the pole?

6. There are 16 children in the class, and 10 are girls. How many boys are in the class?

Tests in Addition.

Add at sight. See how many you can do in 10 *minutes* and in 5 *minutes*.

1.

a	*b*	*c*	*d*	*e*	*f*
			3	6	1
1	4	5	4	1	5
7	5	3	1	2	3
2	4	4	2	3	2
3	4	3	5	3	4
5	2	3	2	1	4

2.

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

3.

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

4.

a	*b*	*c*	*d*	*e*
8		1	3	4
1	2	7	5	2
3	5	3	4	7
4	3	1	3	1
2	7	6	3	2

5.

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

6.

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

7.

a	*b*	*c*	*d*	*e*
		7	3	6
4	3	1	1	2
5	4	3	4	1
1	2	3	3	4
7	2	4	6	3
2	6	3	1	3

8.

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

9.

a	*b*	*c*	*d*	*e*
				3
9	8		6	1
2	1	7	4	3
2	2	6	2	4
4	5	2	1	2
2	3	2	3	1

10.

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

Learn:

2+9=11	11−9=2	3+9=12	12−9=3
3+8=11	11−2=9	4+8=12	12−3=9
4+7=11	11−8=3	5+7=12	12−8=4
5+6=11	11−3=8	6+6=12	12−4=8
	11−4=7		12−7=5
	11−7=4		12−5=7
	11−5=6		12−6=6
	11−6=5		

Oral drill on number relations.

1. Give at sight:

2	6	12	3	11	4	12	5	12
9	6	−5	8	−7	8	−6	6	−3

2. What are the following sums?

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

3. Add:

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

4. Subtract:

12	12	11	15	17	12	11	12
−8	−5	−7	−3	−2	−9	−6	−8

5. Add and subtract:

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

6. Mary picked 8 apples from one tree and 4 from another. How many apples has she?

7. After giving away 5 marbles, a boy had 7 left. How many marbles had he at first?

8. Kate has saved 6 cents for a pencil box. She needs 5 cents more. What does the box cost?

9. John spent 8 cents and had 3 cents left. How much had he at first?

10. A farmer has 17 sheep. He sold 5 of them to one man and then sold 3 to another man. How many has he left?

Learn:

4+9=13	13−9=4	5+9=14	14−9=5
5+8=13	13−4=9	6+8=14	14−5=9
6+7=13	13−8=5	7+7=14	14−6=8
	13−5=8		14−8=6
	13−6=7		14−7=7
	13−7=6		

Oral drill on number relations.

1. Give at sight:

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

2. Subtract:

13	14	12	11	13	14	12	14	13	14
−8	−5	−3	−7	−5	−8	−7	−9	−6	−7

3. Add:

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

4. Add and subtract:

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

5. Robert had 14 pigeons. He sold 9. How many did he have left?

6. Mary had 12 eggs. She sold 6. How many did she have left?

7. Charles is 7 years old, and Tom is 6 years older than Charles. How old is Tom?

8. Doris had 18 cents. She spent 4 cents for some fruit and 5 cents for a book. How much did she have left?

9. Harry and Eric are boy scouts. On Tuesday they walked 5 miles, on Wednesday 4 miles, on Thursday 4 miles, and on Friday 6 miles. How far did they walk all together?

10. Tom has saved 6 cents. His sister has saved 8 cents more than Tom. How much have both saved together?

Learn:

6+9=15	7+9=16	8+9=17	9+9=18
7+8=15	8+8=16	17−8=9	18−9=9
15−9=6	16−9=7	17−9=8	
15−6=9	16−7=9		
15−8=7	16−8=8		
15−7=8			

Oral drill on number relations.

1. Give at sight:

6	8	7	7	9	5	8	7	4	8
9	8	8	9	9	9	6	6	9	9

2. Subtract:

15	14	16	17	18	13	16	15	17	15
−9	−8	−7	−9	−9	−5	−9	−7	−8	−6

3. Add at sight:

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

4. Add and subtract:

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

5. Mary bought 1 dozen oranges. She gave away 3 and then bought 6 more. How many has she now?

6. Tom spent 9 cents for candy and 8 cents for nuts. How much did he spend for both?

7. Kate sold chickens for her mother. The first day she sold 5 chickens, the second day 4 chickens, the third day 6 chickens, and the fourth day 5 chickens. How many did she sell all together?

8. Jane has a piece of silk 17 inches long. She cuts off 8 inches from it. How much is left?

9. John has 16 marbles, and Harry has 9. How many more has John?

10. Jean is 8 years old. In how many years will she be 17 years old?

Tests in Addition to 20.

See how many examples you can add in 10 *minutes*, in 5 *minutes*. Test your work by adding both up and down.

	a	*b*	*c*	*d*	*e*
1.	5	2	5	5	2
	3	4	3	2	6
	4	5	4	3	4
	2	6	1	9	5
	3	2	3	2	2

	a	*b*	*c*	*d*	*e*
2.	3	2	5	2	2
	2	3	3	3	1
	6	6	3	7	5
	6	7	8	4	7
				4	4

	a	*b*	*c*	*d*	*e*
3.	2	2	3	2	5
	4	2	2	4	3
	3	6	3	3	1
	2	5	6	2	7
	4	4	5	7	2

	a	*b*	*c*	*d*	*e*
4.		2	6		4
	1	3	3	3	4
	3	2	2	5	3
	5	6	5	3	2
	7	1	2	4	4

	a	*b*	*c*	*d*	*e*
5.		5		7	5
	6	2	3	4	2
	2	2	2	2	1
	3	5	8	3	3
	7	4	3	1	6

	a	*b*	*c*	*d*	*e*
6.	5		1	3	4
	3	4	3	6	1
	4	4	2	2	3
	2	8	7	5	1
	5	3	6	2	7

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

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

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

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

	a	*b*	*c*	*d*	*e*
11.	2	5	4	4	
	3	1	3	1	3
	5	4	6	6	2
	7	3	5	2	6
	2	2	1	3	6

	a	*b*	*c*	*d*	*e*
13.	9	3	6	4	5
	2	1	2	2	3
	2	3	3	1	4
	3	9	2	6	2

12.	2		4	1	
	3	3	2	5	3
	8	3	1	9	5
	3	8	7	2	4
	2	3	5	1	7

14.		7		2	
	1	3	6	3	
	3	2	3	1	9
	2	2	4	3	2
	9	1	2	6	4

	a	*b*	*c*	*d*	*e*
15.		9		8	
	3	2	3	3	8
	5	3	5	2	2
	1	2	1	3	4
	9	2	9	1	2

Addition and Subtraction.

Introductory.

Add 30+42+54

30
42
54
126

Write down the numbers under each other, placing the units under units and the tens under tens. Add the units. Add the tens.

Subtract 75−54.

75
54
21

Write the numbers under each other, placing units under units and tens under tens. Take the units from units and tens from tens.

EXERCISE

Add:

	a	*b*	*c*	*d*	*e*
1.	35	68	25	26	39
	43	71	44	82	40
2.	22	35	54	45	64
	67	70	32	24	30
3.	22	35	24	25	38
	30	12	30	60	70
	46	60	73	24	21
4.	12	40	51	60	75
	23	15	13	23	10
	54	64	24	15	22

Subtract:

	a	*b*	*c*	*d*	*e*
5.	97	87	79	67	58
	82	53	36	35	22
6.	53	87	77	85	99
	41	30	43	34	65
7.	99	65	40	79	83
	36	32	20	23	71

Add:

	a	*b*	*c*
8.	32+40+56	42+30+65	83+20+16
9.	17+20+42	89+20+30	25+34+40
10.	29+60+20	34+15+40	63+45+60

Addition with Carrying.

Introductory.

Add 38+46+15.

38
46
15
99

Write the numbers under each other. Add the units. We have 5+6+8 or 19 units which is 1 ten and 9 units. Write the units 9 under the units and carry the 1 ten to the next, or tens column. Adding the tens we get 1 and 1 and 4 and 3 or 9.

To test the result, after adding the columns upward, add the columns downward. You should get the same result.

EXERCISE

Add and test your results:

	a	*b*	*c*	*d*	*e*
1.	53	32	45	76	32
	36	18	73	29	59
	78	29	18	37	86
2.	35	49	72	25	27
	83	26	28	18	63
	29	23	36	44	49
3.	27	25	37	26	39
	35	49	28	38	42
	84	56	93	75	75
4.	27	25	46	17	36
	85	72	29	38	27
	34	29	43	95	55
5.	30	45	25	70	25
	29	60	38	29	30
	87	87	94	85	98

6. In Grade 2, there are 19 boys and 28 girls. How many pupils are in the class?

7. John spent 45 cents for a book, 30 cents for a work box, and 39 cents for a drawing outfit. How much did he spend all together?

8. Kate weighs 89 lbs. Mary weighs 78 lbs. How much do both weigh?

9. Arthur on his holidays travelled 39 miles by train and 47 miles by motor car. How far did he go all together?

10. William earned 78 cents in May, 35 cents in June, and 82 cents in July. How much did he earn during the three months?

Subtraction with Borrowing.

Introductory.

1. Find the difference between 92 and 75.

$$\begin{array}{r} 92 \\ -75 \\ \hline 17 \end{array}$$

Write the smaller number under the larger. Begin at the units column. 5 cannot be taken from 2. Take 1 ten from 9 tens leaving 8 tens. Add this 1 ten or 10 units to the 2 units, making 12 units. 5 from 12 = 7 and 7 from 8 = 1.

Test. Add 17 to 75. Sum is 92.

2. Find the difference between 70 and 28.

$$\begin{array}{r} 70 \\ -28 \\ \hline 42 \end{array}$$

Test by adding 42 and 28. Sum is 70.

EXERCISE

Subtract and test your results:

	a	*b*	*c*	*d*	*e*
1.	32	83	71	83	74
	15	39	56	28	45

Subtract and test your results:

	a	*b*	*c*	*d*	*e*
2.	60	92	45	80	62
	37	38	28	34	37
3.	62	50	71	85	64
	46	39	48	36	29
4.	66	82	61	60	75
	27	36	48	25	48
5.	84	63	66	71	70
	35	38	27	19	27

6. Mr. Brown is 43 years old. His son is 29 years younger. How old is his son?

7. A farmer had 82 tons of hay. He sold 43 tons. How many tons had he left?

8. Rose had 87 cents. She spent 28 cents. How much has she now?

9. Mary bought a book costing 58 cents. She gave the storekeeper 75 cents. How much change should she receive?

10. A boy earned 72 dollars. He bought a pony for 47 dollars. How much money did he have left?

Tests in Addition and Subtraction.

Find how many of these examples you can work in 10 *minutes*, and in 5 *minutes:*

Test all your results:

	a	*b*	*c*	*d*	*e*
1.	28	17	36	25	34
	30	30	27	43	50
	29	25	80	30	25
	12	14	24	79	34
2.	43	26	38	62	29
	26	15	42	17	30
	15	40	15	30	46
	30	23	80	18	23
3.	28	39	52	84	27
	14	17	38	30	40
	80	40	20	26	19
	25	22	16	18	24
4.	82	75	83	66	58
	−39	−49	−24	−27	−39
5.	40	63	74	34	71
	−15	−48	−36	−15	−34
6.	80	74	63	57	42
	−29	−38	−39	−28	−29

Addition by Endings.

Introductory.

Compare

5	25	35	45
4	4	4	4
9	29	39	49
2	22	32	42
4	4	4	4
6	26	36	46

Addition of number beyond 20 should be based on these tables of endings.

Tables of Endings:

Table of 0's:

9	19	29	39	49	59	69	79	89	99
1	1	1	1	1	1	1	1	1	1
10	20	30	40	50	60	70	80	90	100
1	11	21	31	41	51	61	71	81	91
9	9	9	9	9	9	9	9	9	9
10	20	30	40	50	60	70	80	90	100
8	18	28	38	48	58	68	78	88	98
2	2	2	2	2	2	2	2	2	2
2	12	22	32	42	52	62	72	82	92
8	8	8	8	8	8	8	8	8	8
7	17	27	37	47	57	67	77	87	97
3	3	3	3	3	3	3	3	3	3
3	13	23	33	43	53	63	73	83	93
7	7	7	7	7	7	7	7	7	7
6	16	26	36	46	56	66	76	86	96
4	4	4	4	4	4	4	4	4	4
4	14	24	34	44	54	64	74	84	94
6	6	6	6	6	6	6	6	6	6
5	15	25	35	45	55	65	75	85	95
5	5	5	5	5	5	5	5	5	5

Table of 9's:

8	18	28	1	11	21
1	1	1 etc.	8	8	8 etc.
7	17	27	2	12	22
2	2	2 etc.	7	7	7 etc.
6	16	26	3	13	23
3	3	3 etc.	6	6	6 etc.
5	15	25	4	14	24
4	4	4 etc.	5	5	5 etc.

Table of 8's:

7	17	27	1	11	21
1	1	1 etc.	7	7	7 etc.
6	16	26	2	12	22
2	2	2 etc.	6	6	6 etc.
5	15	25	3	13	23
3	3	3 etc.	5	5	5 etc.
4	14	24	9	19	29
4	4	4 etc.	9	9	9 etc.

Table of 7's:

6	16	26	1	11	21
1	1	1 etc.	6	6	6 etc.
5	15	25	2	12	22
2	2	2 etc.	5	5	5 etc.

4	14	24	3	13	23
3	3	3 etc.	4	4	4 etc.
9	19	29	8	18	28
8	8	8 etc.	9	9	9 etc.

Table of 6's:

5	15	25	1	11	21
1	1	1 etc.	5	5	5 etc.
4	14	24	2	12	22
2	2	2 etc.	4	4	4 etc.
3	13	23	8	18	28
3	3	3 etc.	8	8	8 etc.
9	19	29	7	17	27
7	7	7 etc.	9	9	9 etc.

Table of 5's:

4	14	24	1	11	21
1	1	1 etc.	4	4	4 etc.
3	13	23	2	12	22
2	2	2 etc.	3	3	3 etc.
9	19	29	6	16	26
6	6	6 etc.	9	9	9 etc.
8	18	28	7	17	27
7	7	7 etc.	8	8	8 etc.

Table of 4's:

3	13	23	1	11	21
1	1	1 etc.	3	3	3 etc.
2	12	22	7	17	27
2	2	2 etc.	7	7	7 etc.
9	19	29	5	15	25
5	5	5 etc.	9	9	9 etc.
8	18	28	6	16	26
6	6	6 etc.	8	8	8 etc.

Table of 3's:

2	12	22	1	11	21
1	1	1 etc.	2	2	2 etc.
9	19	29	4	14	24
	4	4 etc.	9	9	9 etc.
5	18	28	5	15	25
5	5	5 etc.	8	8	8 etc.
7	17	27	6	16	26
6	6	6 etc.	7	7	7 etc.

Table of 2's:

1	11	21	6		
1	1	1 etc.	6		
9	19	29	3	13	23
3	3	3 etc.	9	9	etc.

8	18	28	4	14	24
4	4	4 etc.	8	8	8 etc.
7	17	27	5	15	25
5	5	5 etc.	7	7	7 etc.

Table of 1's:

9	19	29	2	12	22
2	2	2 etc.	9	9	9 etc.
8	18	28	3	13	23
3	3	3 etc.	8	8	8 etc.
7	17	27	4	14	24
4	4	4 etc.	7	7	7 etc.
6	16	26	5	15	25
5	5	5 etc.	6	6	6 etc.

DRILL ON ADDITIONS TO 26

Give at sight:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	9	17	7	19	13	5	17	18	5	9
	8	6	8	4	8	7	7	6	9	9
2.	22	17	21	18	23	7	16	19	14	15
	3	8	4	5	2	7	8	5	7	8

The teacher dictates and pupils state answers:

3.	12	15	9	14	22	15	7	15	8	2
	7	6	7	8	3	8	6	9	16	19
4.	5	7	9	2	7	5	21	18	16	9
	8	16	9	22	18	19	4	5	9	8

Add at sight:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
5.	6	5	8	5	4	7	3	5	3	5
	8	6	2	7	6	4	9	9	2	5
	3	7	0	6	9	8	7	4	9	8
	7	3	9	7	4	5	6	5	7	6
6.	7	9	8	7	8	5	7	9	3	4
	5	7	9	6	3	7	6	2	8	2
	9	4	0	1	9	9	4	2	7	8
	2	3	5	7	5	2	7	5	7	8

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
7.	26	35	28	68	72	88	57	19
	35	17	56	17	36	45	63	38
	17	84	40	22	50	20	19	24
	24	32	29	46	29	39	25	50

8. A man bought 3 turkeys. The first weighed 19 lbs., the second 16 lbs., and the third 23 lbs. Find what the three turkeys weighed.

9. A farmer has 29 black pigs, 38 white pigs, and 34 red pigs. How many pigs has he all together?

10. Kate has 37 Leghorn hens, 28 Plymouth Rocks, and 57 Rhode Island Reds. How many hens has she all together?

11. Mary has read 76 pages in one book, 38 pages in another, and 49 pages in a third book. How many pages has she read in all?

12. Ethel's mother bought 29 lbs. of potatoes, 37 lbs. of carrots, and 75 lbs. of beets. How many lbs. of vegetables did she buy all together?

Test in Addition.

Add the following. See how many of these you can add in 10 *minutes*, and in 5 *minutes*. Test your work by adding both up and down.

	a	*b*	*c*	*d*	*e*
1.	33	12	67	43	72
	42	26	34	37	26
	27	43	52	62	63
	57	52	46	26	45
	34	35	21	25	34
	20	26	43	12	21
2.	17	26	43	16	36
	42	43	36	23	48
	33	52	12	42	73
	55	63	67	31	22
	34	22	54	63	55
	41	56	32	25	61
3.	53	30	16	36	24
	25	27	23	42	62
	31	31	71	35	13
	46	53	23	72	29
	73	44	45	21	43
	42	34	31	43	33
4.				12	
	31	56	27	35	35
	25	62	43	41	32
	47	23	31	73	27
	34	31	65	32	41
	27	54	42	64	32
	41	62	33	56	18

	a	*b*	*c*	*d*	*e*
5.	23	20	17	32	40
	62	36	32	64	16
	34	53	23	25	26
	87	41	55	34	41
	51	25	62	13	39
	22	39	34	45	73
6.	40	71	19	73	28
	25	38	63	26	71
	37	13	72	62	64
	62	42	35	37	36
	59	57	12	13	43
	42	62	34	42	52
7.	20	17	34	35	17
	43	62	62	24	28
	18	21	28	63	43
	52	45	41	42	63
	64	33	56	35	34
	27	55	33	26	70
8.	36	27	24	72	62
	29	56	69	38	75
	15	68	43	47	30
	20	30	15	30	85
	43	42	32	28	44
9.	45	27	83	29	53
	30	80	24	32	27
	27	29	30	10	40
	64	14	15	45	34
	15	35	47	39	58

	a	*b*	*c*	*d*	*e*
10.	36	37	43	37	43
	42	83	85	82	36
	80	29	30	56	20
	39	10	19	40	83
	15	42	54	59	24

ORAL DRILL

Counting by 10's:

Count by 10 to 50, to 60, to 70, to 90, to 100.

What are 2 tens? 5 tens? 8 tens? 7 tens?

How many tens are in 30? 60? 90? 70?

What are 4 tens and 3 more? What are 5 tens and 6 more?

What are 7 tens and 9 more?

How many tens are in 17? 28? 43? 39? 76? 82? 95?

Counting by 5's:

Count by 5's to 25, to 40, to 60, to 35.

What are 3 fives? 6 fives? 8 fives? 10 fives? etc.

How many fives are in 15? 30? 50? 25? 45? etc.

What are 4 fives and 2 more? What are 8 fives and 3 more? What are 10 fives and 1 more? etc.

How many fives are in 24? 32? 46? 54? etc.

Counting by 2's:

Count by 2's to 14, to 16, to 20, to 24.

What are 10 twos? 6 twos? 4 twos? etc.

How many twos are in 12? 22? 14? 10? 8? 18? etc.

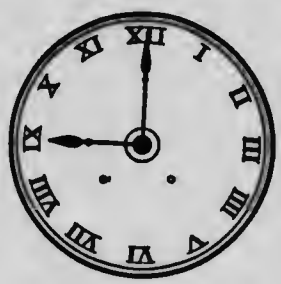
What are 4 twos and 3 more, 7 twos and 5 more? etc.

How many twos are in 11? 21? 17? 13? 9? etc.

Counting by 4's:

Count by 4's to 16, to 32, to 40, to 48, etc.
What are 5 fours? 7 fours? 3 fours? etc.
How many fours are in 12? 24? 32? etc.
What are 5 fours and 3 more? What are 7 fours and 2 more? etc.
How many fours are in 22? 37? 18? 35? etc.

To the Teacher. — The teacher should have a cardboard clock dial with movable hands. This should be used in teaching the time and in testing the pupils in telling time.



Review with pupils the numerals on the clock dial. Test the class in telling the hour, half hour, and quarter hour.

Show the divisions on the clock for minutes. 60 spaces, or each hour space represents 5 minute spaces.

By means of the clock dial, show the pupils the following:

5 minutes past the hour, 10 minutes past the hour.
20 minutes past the hour, 25 minutes past the hour.
5 minutes to the hour, 10 minutes to the hour.
20 minutes to the hour, 25 minutes to the hour.

EXERCISE

Move the hands of the clock dial to represent the following time and ask the pupils to tell the time:

1. 20 minutes after 3; 10 minutes after 5; 25 minutes after 8; 5 minutes after 4.

2. 10 minutes to 2; 25 minutes to 6; 5 minutes to 7; 25 minutes to 12.

Show the pupils the *one*-minute spaces.

Test the pupils in pointing out different minute spaces such as:

4 minutes after the hour, 16 minutes after the hour, 22 minutes after the hour, etc.

12 minutes to the hour, 26 minutes to the hour, 22 minutes to the hour, etc.

By means of the clock dial show the pupils different time and have the time read by the pupils.

Test the individual pupils carefully in reading the time. This work should be continued until the pupils can read the time without difficulty.

EXERCISE

Move the hands of the clock dial to represent the following time. Ask the pupils to tell the time.

1. 17 minutes after 5; 26 minutes after 8; 19 minutes after 2, etc.

2. 24 minutes to 2; 3 minutes to 4; 14 minutes to 6, etc.

CANADIAN MONEY

The teacher should have the various coins of Canadian money in the class room. The children should become familiar with the different coins, and the one-dollar bill.

Using the actual coins, the teacher should give the pupils exercises in exchanging coins for those of other denominations, making change, etc.

5 one-cent pieces = 1 five-cent piece.
2 five-cent pieces = 1 ten-cent piece.
4 quarters = 1 dollar.
2 quarters = 1 fifty-cent piece.
2 fifty-cent pieces = 1 dollar.

Notation for Canadian Mone

Introductory.

1. John has 2 dollars. Write down how much money he has.

2 dollars = $2

2. Mary has 3 dollars and 25 cents. Write down how much money Mary has.

3 dollars and 25 cents = $3.25.

EXERCISE

Read the following sums of money:

	a	*b*	*c*	*d*	*e*
1.	$ 3.75	$4.	$ 2.25	$ 6.35	$ 8.15
2.	$ 5.45	$9.	$ 7.85	$ 2.40	$13.75
3.	$ 6.72	$3.83	$15.24	$ 7.29	$ 9.13
4.	$25.27	$4.73	$65.27	$12.43	$ 2.26

Write down from dictation:

5.	$ 3.25	$ 4.	$ 5.50	$ 6.25	$9.
6.	$12.50	$ 7.35	$24.35	$13.65	$4.13
7.	$ 2.95	$ 4.27	$ 6.34	$22.23	$7.29
8.	$10.25	$17.43	$24.72	$13.36	$8.31

Drill on additions to 50.

Give at sight:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	37	27	19	47	38	42	25	33	47	29
	9	8	9	6	5	9	7	9	8	5
2.	28	45	46	29	32	25	16	7	29	36
	3	7	6	9	7	9	8	9	8	9

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
3.	29	42	15	26	17	36	29	34	39	35
	3	9	8	9	5	8	5	8	7	8

Add at sight:

	a	*b*	*c*	*d*	*e*
4.	9	5	2	5	8
	8	9	9	9	4
	7	6	7	8	6
	6	8	6	4	5
	8	3	9	7	8
	3	8	3	6	3
5.	8	8	7	8	6
	3	9	8	5	9
	9	5	0	7	8
	4	7	9	9	3
	5	6	8	3	9
	3	8	9	8	5

Add from dictation:

6. *a.* 9+5+8+7+3+6=
   b. 8+5+9+7+8+9=
   c. 9+7+8+8+7+5=
   7+6+9+2+8+9=
   e. 6+9+8+5+7+6=

7. *a.* 9+4+6+5+8+7=
   b. 8+6+5+9+6+5=
   c. 5+7+9+6+7+9=
   d. 8+6+8+9+5+7=
   e. 6+7+9+7+8+6=

Add:

	a	*b*	*c*	*d*	*e*
8.	38	48	82	39	84
	47	36	29	87	39
	95	52	17	56	45
	36	20	29	29	73
	20	84	84	64	85
	62	39	70	75	96
9.	27	75	52	29	76
	83	83	65	83	83
	90	29	83	77	29
	57	16	29	65	17
	64	34	70	80	28
	38	27	24	29	66
10.	29	89	27	36	83
	38	36	83	22	70
	45	25	95	85	29
	38	43	24	40	48
	84	99	54	39	34
	36	64	63	76	65
	57	27	92	15	13
	20	30	78	47	44

Drill on subtraction.

Subtract and test your answers:

	a	*b*	*c*	*d*	*e*	*f*
1.	78	47	65	84	82	71
	29	29	38	26	38	44

	a	*b*	*c*	*d*	*e*	*f*
2.	62	85	93	82	60	70
	29	56	47	48	29	44
3.	478	543	768	363	275	428
	259	216	239	128	138	109
4.	571	582	871	674	863	443
	316	415	317	339	247	219
5.	342	780	781	650	781	787
	127	526	506	227	209	329
6.	283	522	670	445	762	281
	109	117	249	208	307	129
7.	983	830	722	637	530	720
	257	417	109	218	218	313
8.	624	763	2653	7262	6472	3690
	109	406	1338	5129	2108	2267

Notation of Hundreds.

Introductory.

Read the following numbers: 326, 459, 787, 893, 905.
Study the number 326.

6 represents 6 units.
2 represents 2 tens.
3 represents 3 hundreds.

The third place in writing numbers is the hundreds place.

1 hundred = 10 tens = 100 units.

EXERCISE

State the units, tens, and hundreds in each of the following:

	a	*b*	*c*	*d*	*e*
1.	387	206	560	368	983
2.	253	750	893	222	456
3.	759	836	263	457	629
4.	826	543	294	836	720
5.	264	703	963	263	765

Accuracy and Time Tests.

Work the following exercises. Test your addition and subtraction. See how many you can work correctly in 10 *minutes*, and in 5 *minutes*.

Add:

	a	*b*	*c*	*d*	*e*
1.	38	56	29	57	72
	49	28	37	63	18
	20	40	56	40	25
	56	29	24	98	83
	83	36	30	35	29
	29	75	48	24	54
	37	39	59	38	67
2.	54	37	24	17	45
	63	60	39	29	63
	85	28	50	83	27
	72	54	83	45	19
	29	35	27	62	29
	13	26	43	84	83
	40	72	25	72	27
	29	85	86	89	40

3.

48	17	38	47	69
29	28	45	65	72
37	35	60	20	17
20	84	83	33	28
54	36	29	17	35
63	65	19	45	62
84	72	65	86	45
29	29	83	29	83

Arrange the following numbers in vertical columns, and add:

4. *a.* 38+56+22+19+40+72+29
   b. 17+38+33+45+92+46+36
   c. 52+19+70+85+39+45+63
   d. 84+23+75+34+26+50+28
   e. 69+29+35+25+56+40+39

5. *a.* 36+72+84+49+38+59+30
   b. 44+83+65+17+29+35+60
   c. 85+16+74+34+87+70+26
   d. 93+64+85+46+25+43+80
   e. 75+22+66+47+50+77+19

6. *a.* 42+59+16+30+57+34+85
   b. 36+85+20+49+33+65+27
   c. 84+50+36+77+45+32+66
   d. 29+35+88+30+75+83+29
   e. 15+69+36+72+83+25+39

Subtract, and check your results:

7.

a	*b*	*c*	*d*	*e*
652	745	633	581	982
349	208	217	265	735

	a	*b*	*c*	*d*	*e*
8.	293	537	645	930	432
	108	218	236	727	213
9.	736	320	435	680	753
	218	108	229	264	249

Add and subtract:

10. *a.* 9+8+5−8+7+9−8+5−9+6−8
b. 4+9+5+8−9+7−8+9−7+6−3
c. 6+8+5+9−7+8+5−7+9+5−9
d. 7+9+7−9+4+7−8+5+7−8−9
e. 9+8+7−8+5+6−9−8−5+8+7

CHAPTER III

READING AND WRITING NUMBERS FROM 1000 TO 10,000

One thousand is written 1000.

Two thousand is written 2000.

Three thousand is written 3000.

Four thousand is written 4000.

Five thousand is written 5000.

Six thousand is written 6000.

Seven thousand is written 7000.

Eight thousand is written 8000.

Nine thousand is written 9000.

Ten thousand is written 10,000.

One thousand eight hundred and sixty-seven is written 1867. 1867 = 1 thousand 8 hundreds 6 tens 7 units.

Five thousand two hundred forty-three is written 5243. 5243 = 5 thousands 2 hundreds 4 tens 3 units.

Note. — The figure in the 4th place to the left of units is called thousands.

Read the following numbers:

	a	*b*	*c*	*d*	*e*
1.	5367	8231	6729	3283	7273
2.	7650	5305	9284	7638	4303
3.	2100	7340	9200	8460	6050
4.	6500	2034	5089	9060	8072
5.	7004	8600	9007	6005	8030

Write from dictation:

	a	*b*	*c*	*d*	*e*
6.	3227	4583	6720	8329	2365
7.	5286	9837	4628	5675	8364
8.	7200	6030	5072	8072	6070
9.	2005	3070	6008	9035	8040
10.	5643	7083	9006	7016	8036

Write down the following numbers, stating the number of thousands, hundreds, tens, and units in each number. Thus:

6328 = 6 thousands, 3 hundreds, 2 tens, 8 units.

	a	*b*	*c*	*d*	*e*
11.	3275	4860	5983	7659	8340
12.	9650	7835	8420	9225	6427
13.	8700	5600	2830	4020	7006
14.	9006	8002	6070	4075	6040
15.	6500	7200	8263	5960	7239

NOTE TO TEACHER. — Pupils should be given frequent practice in reading numbers.

Write in figures:

16. Two thousand three hundred sixty-three.
17. Four thousand five hundred seventy.
18. Eight thousand twenty-seven.
19. Nine thousand three hundred six.
20. Six thousand two hundred ninety-six.

Roman Notation to 25.

Write down the Roman numbers for:

10 5 3 1 12 9 7 4 8

In reading the time the pupils have learned:

1	2	3	4	5	6
I	II	III	IV	V	VI
7	8	9	10	11	12
VII	VIII	IX	X	XI	XII

To write 15 we use the symbol for 10 and 5. Thus,

$15 = 10 + 5 = XV$ $\qquad$ $20 = 10 + 10 = XX$

$19 = 20 - 1 = 10 + 10 - 1 = XIX$ $\qquad$ $21 = 10 + 10 + 1 = XXI$

$25 = 10 + 10 + 5 = XXV$

Learn:

13	14	15	16	17	18	19
XIII	XIV	XV	XVI	XVII	XVIII	XIX
20	21	22	23	24	25	
XX	XXI	XXII	XXIII	XXIV	XXV	

PROBLEMS

Read the following numbers aloud:

	a	*b*	*c*	*d*	*e*
1.	XIV	XVII	XXII	XV	XIX
2.	IX	XXIV	XIV	XVIII	XXI
3.	XIII	XX	XI	XXV	XVI
4.	XXIII	XII	X	XIX	XXIV

Write in figures the Roman numerals in the exercise given above.

Addition.

The pupils have learned to add columns, the sums of which do not exceed 50. Longer columns, with sums increasing until 100 is reached, should now be taken. The

number relations should be based on the fundamental combinations and the tables of endings.

Note. — Accuracy and time tests should be taken frequently. A few suggestive exercises are given.

Give at sight:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	78	65	47	63	47	54	45	72
	9	7	6	9	8	9	7	9
2.	37	59	65	82	45	67	77	84
	8	7	9	9	8	7	9	8

Teacher dictates, pupils give answers orally:

3.	49	68	78	89	97	49	56	76
	9	7	5	4	6	8	5	9
4.	85	77	84	65	39	48	62	81
	9	5	9	4	8	8	7	8
5.	34	82	79	35	69	76	88	79
	8	5	6	9	7	6	9	9

Add at sight:

	a	*b*	*c*	*d*	*e*
1.	8	5	3	9	5
	9	8	7	8	8
	7	6	9	3	9
	5	9	6	8	3
	8	8	8	9	7
	3	4	8	5	9
	6	8	4	6	7
	5	3	7	6	3
	8	0	5	7	9
	4	8	9	9	8

	a	*b*	*c*	*d*	*e*
2.	8	5	9	4	8
	4	7	8	7	9
	6	5	0	8	7
	4	9	3	9	8
	7	9	9	8	9
	8	7	9	4	8
	5	8	9	0	8
	9	0	7	9	6
	9	8	6	9	8
	7	7	7	8	7
3.	8	9	6	9	8
	4	7	9	8	7
	5	9	7	5	9
	9	9	0	7	9
	8	3	5	9	6
	4	9	7	4	5
	8	9	4	9	7
	5	9	8	9	8
	7	6	8	9	5
	8	7	7	5	8
4.	28	85	79	64	78
	95	39	85	47	65
	72	83	37	95	62
	29	75	63	83	47
	37	29	54	63	29
	75	89	39	42	65
	83	29	65	70	92
	46	50	92	27	86
	78	29	65	83	46
	95	83	42	69	78

	a	*b*	*c*	*d*	*e*
5.	49	68	72	85	63
	87	49	58	69	78
	68	45	83	72	85
	75	89	70	69	87
	29	36	45	67	29
	76	59	47	83	67
	95	87	85	75	76
	29	28	37	63	49
	82	37	75	87	99
	77	66	88	99	66

6. Arrange in columns, and add:

a. 84+79+83+9+27+79+86+59+28
b. 76+8+29+56+29+95+7+39+76
c. 84+75+69+7+18+29+35+83+6
d. 29+38+75+92+5+68+35+79+86
e. 95+76+36+47+86+72+65+72+29
f. 28+98+20+49+9+86+72+98+65
g. 86+77+65+47+59+7+79+64+86
h. 29+47+58+64+7+90+87+95+36

Addition.

Example 1: Add

3657
498
7836
540
29
12,560

Arrange the numbers under each other, units under units, tens under tens, etc. Begin with the units and add. We get 30. Write down 0 under units and carry the 3 tens to the tens column. Add. We get 26 tens. Write down the 6 tens and carry the 2 hundreds to the next, or hundreds column. Add. We get 25 hundreds. Write down the 5 hundreds and carry the 2 thousands to the next, or thousands place. Add. We get 12 thousand, which we write down under thousands.

Example 2: Add 756+3269+847+29.

$$\begin{array}{r} 756 \\ 3269 \\ 847 \\ 29 \\ \hline 4901 \end{array}$$

EXERCISE

Add:

	a	*b*	*c*	*d*
1.	3279	759	8365	7283
	865	2983	5670	793
	9265	859	329	2658
	729	38	4729	8309
	84	6475	79	836
	6329	499	765	29
2.	6850	429	3765	8693
	298	5683	7839	2760
	4035	72	836	509
	783	2659	3083	596
	29	783	498	6783
	9834	8656	7659	2659
	769	3208	4323	7838
3.	6583	2968	7568	4659
	2839	765	29	356
	646	7359	8563	9476
	7838	9695	3846	958
	783	294	656	3659
	79	85	2609	438
	3629	5436	79	8368
	785	6383	2959	1765

4. Arrange in columns, and add:

a. 3647+289+5678+439+57+8365+27
b. 9648+3287+297+483+6287+29+9837
c. 469+6389+2478+498+5683+72+6589
d. 7295+864+7263+29+4583+756+295
e. 6273+496+8569+37+4989+7265+939
f. 729+6584+2947+78+3658+429+6500
g. 4386+293+647+7291+8564+72+7878
h. 2965+473+7893+8937+4936+39+6858

Example: Add \$36.75+\$2.37+\$68.49+\$8.78.

Arrange in columns, the dollars under dollars and cents under cents.

\$36.75
2.37
68.49
8.78
\$116.39

Begin at the right-hand figure and add as in ordinary addition, carrying in each case to the next column on the left.

EXERCISE

Add:

	a	*b*	*c*	*d*
1.	\$8.29	\$75.36	\$29.45	\$38.95
	29.45	7.89	8.83	19.25
	7.26	29.35	78.29	45.63
	13.25	28.37	9.25	6.20
	2.75	6.25	7.38	2.95
2.	\$39.75	\$87.25	\$7.65	\$27.85
	13.95	7.78	83.29	65.73
	27.45	26.36	17.45	29.69
	43.76	62.75	26.63	63.17
	7.25	3.65	2.87	6.56

Arrange in columns and add:

3. *a.* \$6.25+\$38.75+\$29.35+\$7.79+\$28.37
   b. \$29.37+\$7.83+\$87.65+\$29.36+\$65.38
   c. \$64.89+\$26.47+\$7.39+\$8.75+\$64.75+\$9
   d. \$85.65+\$72.75+\$6.95+\$67.83+\$73.85+\$8
   e. \$783.25+\$654.65+\$7.98+\$39.65+\$257.83+\$7

4. A boy spent \$4.75 for a pair of shoes, \$23.25 for a new suit, \$1.75 for a cap, and \$18.95 for an overcoat. What was the total cost?

5. A woman sold some turkeys for \$16.45, chickens for \$23.85, geese for \$22.70, and ducks for \$9.85. How much did she get for all?

6. Robert sold a calf for \$13.75, a pig for \$26.35, a lamb for \$9.65, two turkeys for \$5.75, and some chickens for \$15.30. How much did he receive for all?

7. Kate bought a doll for \$3.75, a doll's carriage for \$6.35, a doll's house for \$8.75, and a wagon for \$15.65. What did all the articles cost her?

SUBTRACTION

Alternative Method.

Example 1: Find the difference between 3256 and 1879.

PROCESS

3256
1879
1377

Write the smaller number under the larger, placing units under units, tens under tens, etc. Begin at the units column. Since 9 is greater than 6, think 9 and 7 are 16. Write down 7 in the units column. Carry 1 to 7 in the tens column, which makes 8. Since 8 is greater than 5, think 8 and 7 are 15. Write down 7 in the tens column. Carry 1 to 8 in the hundreds column, making 9. Since 9 is greater than 2, think 9 and 3 are 12. Write down 3. Carry 1 to 1 in the thousands column, making 2. 2 from 3 leaves 1. Write down 1 in the thousands column.

Test by adding 1377 and 1879, the sum should be 3256.

Example 2: Find the difference between 4206 and 2857.

$$\begin{array}{r} 4206 \\ 2857 \\ \hline 1349 \end{array}$$

Example 3: Find the difference between 4500 and 3657.

$$\begin{array}{r} 4500 \\ 3657 \\ \hline 843 \end{array}$$

Example 4: Find the difference between 4000 and 2867.

$$\begin{array}{r} 4000 \\ 2867 \\ \hline 1133 \end{array}$$

Example 5: Find the difference between \$384.25 and \$97.68.

$$\begin{array}{r} \$384.25 \\ 97.68 \\ \hline \$286.57 \end{array}$$

NOTE TO THE TEACHER. — It is advisable to teach *one* method only and give the practice in the use of this, so that the work will be done with accuracy and facility.

EXERCISE

Subtract and test:

	a	*b*	*c*	*d*	*e*
1.	6283	7569	5832	7683	6325
	4358	2673	2678	2595	4587
2.	8934	7263	6459	5483	6434
	5986	5476	3684	2995	2778
3.	6242	8353	4354	7483	5239
	5787	2976	2985	2698	2587

	a	*b*	*c*	*d*	*e*
4.	3583	4323	5838	4326	5273
	2697	2678	2959	2769	2695
5.	6504	7206	6043	7036	2058
	2875	2957	2594	2988	1679
6.	7204	5028	6075	7040	6400
	3678	4399	2886	2865	5837
7.	6500	7250	6034	5040	8640
	2938	2875	2856	2697	2965
8.	5000	6200	7600	6200	4000
	2873	4583	2856	5837	2967
9.	5210	6150	7100	5102	6000
	2876	2479	2647	2647	2865
10.	4205	31006	72005	42100	62100
	2987	28459	36586	28365	28357

	a	*b*	*c*	*d*
11.	$384.25	$523.32	$623.15	$683.35
	175.69	289.76	285.78	295.78
12.	$290.25	$500.00	$683.00	$400.00
	196.68	286.63	285.76	263.79

13. Find the difference between:

a. 6710 and 3859
b. 21064 and 8965
c. 17608 and 9759
d. 11200 and 8467
e. $256.25 and $89.97
f. $506.15 and $329.78
g. $700.00 and $89.85
h. $650.00 and $135.68

14. Add and subtract:

$36847+483-5643+2647-3847+593-8475$

15. Add and subtract:

$\$285.75+\$583.95-\$89.35+\$68.45-\$347.83$
$+\$229.68-\$228.76$

PROBLEMS

1. BILL OF FARE AT RESTAURANT

Soup	15¢	Meat	32¢
Fish	24¢	Sandwich . . .	16¢
Potatoes	8¢	Pudding	10¢
Bread and Butter	12¢	Tea, Coffee . . .	5¢
Pie	10¢	Milk	5¢

Father, Mother, and the 4 children took lunch down town.

(*a*) Mary chose soup, bread and butter, sandwich, and milk. Find the cost of her lunch.

(*b*) Tom had fish, potatoes, and pudding. What did he pay?

(*c*) Kate had meat, bread and butter, pudding, and milk. What did her lunch cost?

(*d*) Mother had soup, meat, potatoes, pudding, and tea. What was the cost of her lunch?

(*e*) Father had soup, fish, potatoes, bread and butter, pie, and coffee. What did his lunch cost?

(*f*) Eric had soup, fish, bread and butter, pudding, and milk. What did his lunch cost?

(*g*) Find the total cost of the lunch for the family.

2. Harry earned 45 cents. He put it in his bank with 39 cents he already had. How much has he in the bank?

3. Robert bought a horse for $65, a saddle for $16, and a bridle for $8. How much did he pay for all?

4. Frank is a newsboy. On Monday he sold 18 papers, on Tuesday he sold 29 papers, and on Wednesday 35 papers. How many papers did he sell during the three days?

5. Margaret had $5.00. She spent $2.25 for a hat. How much did she have left?

6. Jane is 16 years old, and Annie is 7 years younger. How old is Annie?

7. Harold had 138 pigeons. He sold 89 of them. How many has he left?

8. William's father owned 356 sheep. He sold 287 of them. How many has he now?

9. Fred weighs 78 lbs., and Charles weighs 82 lbs. How much heavier is Charles than Fred?

Multiplication and Division.

Table of 2's.

Introductory. Count by 2's to 10, 20, 16, 24, etc. How many twos are in 12, 20, 24, 14, 16, 8, etc.?

Give at sight:

2	4	6	10	3	7	9	5	11	8	12
2	4	6	10	3	7	9	5	11	8	12

Study:

2	2	2	2	2	2	
	2	2	2	2	2	
		2	2	2	2	
			2	2	2	
				2	2	
					2	
2	4	6	8	10	12	

Give the answers:

What are: 7 twos? 3 twos? 11 twos? 9 twos? 6 twos? 8 twos? 12 twos?

Learn:

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

DRILL — ORAL

1. What are 2 sixes? 2 eights? 2 sevens? etc.

2. Give the answers: 2×6, 2×8, 2×4, 2×10, 2×11, 2×5, 2×3, 2×7, 2×12, 2×2, 2×9.

3. Give the answers.

Example: $2\times4+3$ read 2 times 4 and 3 = 11.

$2\times6+2$	$2\times7+5$	$2\times9+3$	$2\times11+6$
$2\times7+3$	$2\times8+6$	$2\times10+7$	$2\times4+5$
$2\times9+5$	$2\times12+3$	$2\times5+6$	$2\times3+7$

4. How many twos are in 18, 6, 12, 24, 16, 8, 10, 14, 22, 4?

5. How many twos are in 21, 15, 11, 17, 7, 19, 25, 13, 9, 23?

6. Tom sold 7 papers at 2 cents each. How much did he get for them?

7. Apples cost 2 cents each. How many can I buy for 10 cents? for 20 cents? for 24 cents?

8. There are 7 girls in the class, and twice as many boys as girls. How many boys are in the class?

9. Mary had 16 oranges, and she gave 2 to each child in her class. How many children were in the class?

10. John bought 2 sheep paying $9 for each. How much did the sheep cost him?

NOTE TO THE TEACHER. — Frequent, rapid drills on the tables are required in order that these may be mastered by the pupils.

Multiplication by 2.

Example: Multiply 367 by 2.

$$\begin{array}{r} 367 \\ \times 2 \\ \hline 734 \end{array}$$

Two times 7 units are 14 units = 1 ten 4 units. Write down 4 units under units and carry 1 ten. Two times 6 tens are 12 tens and carrying 1 ten makes 13 tens = 1 hundred 3 tens. Write down 3 tens under tens and carry 1 hundred. Two times 3 hundreds are 6 hundreds and carrying 1 hundred makes 7 hundreds. Write down 7 hundreds.

Note. — The sign of multiplication is $\times$.

EXERCISE

	a	*b*	*c*	*d*	*e*
1.	647 $\times 2$	529 $\times 2$	645 $\times 2$	327 $\times 2$	593 $\times 2$
2.	356 $\times 2$	479 $\times 2$	369 $\times 2$	580 $\times 2$	275 $\times 2$

	a	*b*	*c*	*d*	*e*
3.	259	396	468	756	709
	×2	×2	×2	×2	×2
4.	894	960	708	530	986
	×2	×2	×2	×2	×2

5. Ralph has 2 acres of potatoes. He digs 239 bushels from each acre. How many bushels does he get from 2 acres?

6. Bertha has 2 flocks of chickens with the same number in each flock. If there are 378 in one flock, how many chickens are in both?

7. Marbles are 2 for 1 cent. How many marbles can Eric buy with 12 cents?

8. Mary's mother buys 2 quarts of milk each day. How many quarts will she buy in a week?

9. A farmer sold 11 quarts of milk. How many pints did he sell?

10. Tom has $49, and William has twice as much as Tom. How much has William?

Division by 2.

Example 1: Divide 4274 by 2.

2137 *Ans.*
2)4274

Begin at the left-hand figure. Four thousands divided by 2 is 2 thousands. Write down 2 above. Two hundreds divided by 2 is 1 hundred. Write down 1 above. Seven tens divided by 2 is 3 tens and 1 over. Write down 3 tens and carry the 1 ten from tens to units, making 14 units. 14 units divided by 2 is 7 units. Write down 7 units.

Example 2: Divide 3271 by 2.

$$2\overline{)3271} \qquad 1635 \quad 1 \textit{ remainder.}$$

Note. — The sign for division is ÷.

If we divide a number by 2, the result is one-half the number or $\frac{1}{2}$.

To divide a number by 2, we take $\frac{1}{2}$ of it, or *to find* $\frac{1}{2}$ *of a number we divide by* 2.

EXERCISE

Divide by 2:

	a	*b*	*c*	*d*	*e*
1.	4684	6842	8648	4866	8486
2.	5472	3684	9436	5638	2636
3.	64392	95812	43752	6732	2504
4.	7002	8300	4950	7250	6430

Find $\frac{1}{2}$ of each of the following numbers:

	a	*b*	*c*	*d*	*e*
5.	648	3264	7538	2064	7500
6.	43750	9300	4700	2572	6300

7. A farmer had 456 sheep. He put half of them in a field. How many did he put in the field?

8. John earned \$98. He put $\frac{1}{2}$ of it in the bank. How much has he left?

9. Mother divided 450 cents equally between Kate and Jane. How much should each receive?

10. Harold had 530 chickens. He sold $\frac{1}{2}$ of them. How many has he left?

Table of 3's.

Introductory.

Count by 3's to 15, 24, 30, etc.

How many threes are in 18, 21, 12, 9, 24, 30, 15, 27, 6, 36?

Give at sight:

2	4	6	10	3	7	12	9	5	8	11
2	4	6	10	3	7	12	9	5	8	11
2	4	6	10	3	7	12	9	5	8	11

Give the answers:

What are 3 threes? 7 threes? 9 threes; etc.

Learn:

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

ORAL DRILL

1. What are 3 nines? 3 sixes? 3 fours? 3 threes? 3 sevens? etc.

2. Give the answers:

3×6	3×9	3×12	3×7	3×10
3×5	3×4	3×8	3×11	3×3

3. Give the answers:

3×6+2	3×7+5	3×9+4	3×11+6
3×7+3	3×8+6	3×10+7	3×4+5
3×9+5	3×12+3	3×5+6	3×3+7

4. How many threes are in 21, 12, 15, 27, 36, 9, 30, 18, 24, 33?

5. How many threes are in 31, 17, 26, 11, 7, 29, 14, 38, 35, 23, 16, 31?

6. Apples are worth 3 cents each. How many should I get for 30 cents?

7. Robert's father bought 3 pigs at $9 each. What did the pigs cost?

8. Mary bought pencils at 3 cents each. How many would she get for 18 cents?

9. If oranges are worth 3 cents each, what is the cost of 1 dozen?

10. Kate's mother bought 3 quarts of milk each day. What was the cost of the milk at 11 cents per quart?

EXERCISE

	a	*b*	*c*	*d*	*e*
1.	647 ×3	529 ×3	645 ×3	327 ×3	593 ×3
2.	356 ×3	479 ×3	369 ×3	580 ×3	275 ×3
3.	259 ×3	736 ×3	468 ×3	856 ×3	709 ×3
4.	894 ×3	960 ×3	708 ×3	530 ×3	986 ×3

	a	*b*	*c*	*d*	*e*
5.	6583	4063	9273	8567	5089
	×3	×3	×3	×3	×3

6. Leslie has $349. Harry has 3 times as much money. How much has Harry?

7. A farmer sold 3 sheep, receiving $24.50 for each. How much did he get for the sheep?

8. Tom buys marbles at 3 for 1 cent. How much will 75 marbles cost?

9. What is the cost of 3 lbs. of butter at 69 cents a pound?

10. A farmer sold 279 bushels of special seed wheat at $3 per bushel. How much did he get for the wheat?

Note. — To find ⅓ of a number we divide the number by 3.

EXERCISE

Divide by 3:

	a	*b*	*c*	*d*	*e*
1.	911	12738	2262	1584	7059
2.	14037	[illegible]	17502	2094	17517
3.	2307		10221	16227	11721
4.	20427		25212	8595	14724

Find ⅓ of each of the following numbers:

	a	*b*	*c*	*d*	*e*
5.	11541	27249	12279	2691	17511
6.	8427	29421	26811	14964	17022

7. A farmer had 837 sheep. He sold ⅓ of them. How many did he sell?

8. There are 3 feet in one yard. How many yards long is a walk that measures 33 feet?

9. A strip of carpet is 1 yard wide. How many strips will be required for a room 24 feet wide?

10. A man bought 3 acres of land, paying $81. What is the price of 1 acre?

Table of 4's.

Introductory. Count by 4's to 16, 24, 32, etc.

How many fours are in 20, 28, 36, 8, 16, 44? etc.

Give at sight:

2	4	6	10	3	7	12	9	5	8	11
2	4	6	10	3	7	12	9	5	8	11
2	4	6	10	3	7	12	9	5	8	11
2	4	6	10	3	7	12	9	5	8	11

Give the answers:

What are 4 fours? 7 fours? 9 fours? etc.

Learn:

4 times 1 are 4	1 times 4 are 4
4 times 2 are 8	2 times 4 are 8
4 times 3 are 12	3 times 4 are 12
4 times 4 are 16	4 times 4 are 16
4 times 5 are 20	5 times 4 are 20
4 times 6 are 24	6 times 4 are 24
4 times 7 are 28	7 times 4 are 28
4 times 8 are 32	8 times 4 are 32
4 times 9 are 36	9 times 4 are 36
4 times 10 are 40	10 times 4 are 40
4 times 11 are 44	11 times 4 are 44
4 times 12 are 48	12 times 4 are 48

ORAL DRILL

1. What are 4 nines? 4 sixes? 4 fours? 4 threes? 4 sevens? etc.

2. Give the answers:

4×6	4×9	4×12	4× 7	4×10
4×5	4×4	4×8	4×11	4×3

3. Give the answers:

4×6+2	4×7 +5	4×9 +4	4×11+6
4×7+3	4×8 +6	4×10+7	4×4 +5
4×9+5	4×12+3	4×5 +6	4×3 +7

4. How many fours are in 20, 28, 36, 12, 44?

5. How many fours are in 21, 17, 26, 31, 11, 38, 14, 19?

6. Apples are worth 4 cents each. How many should I get for 40 cents?

7. Robert's father bought 4 pigs at $12 each. What did the pigs cost?

8. Mary bought pencils at 4 cents each. How many would she get for 24 cents?

9. If oranges are worth 4 cents each, what is the cost of 1 dozen?

10. Kate's mother bought 4 quarts of milk each day. What was the cost of the milk at 12 cents a quart?

EXERCISE

	a	*b*	*c*	*d*	*e*
1.	647	529	645	327	593
	×4	×4	×4	×4	×4
2.	356	479	369	580	275
	×4	×4	×4	×4	×4

	a	*b*	*c*	*d*	*e*
3.	259 ×4	736 ×4	468 ×4	856 ×4	709 ×4
4.	894 ×4	960 ×4	708 ×4	530 ×4	986 ×4
5.	6583 ×4	4060 ×4	9273 ×4	8567 ×4	5089 ×4

6. Robert has $487. Harry has 4 times as much money. How much has Harry?

7. A farmer sold 4 sheep, receiving $24.50 for each. How much did he get for the sheep?

8. Tom buys marbles at 4 for 1 cent. How much will 72 marbles cost?

9. What is the cost of 4 lbs. of cheese at 79 cents a lb.?

10. A farmer sold 279 bushels of seed wheat at $4 per bushel. How much did he get for the wheat?

To find ¼ of a number, we divide by 4.

EXERCISE

Divide by 4:

	a	*b*	*c*	*d*	*e*
1.	844	904	2384	11232	70942
2.	14092	15608	3264	90604	16024
3.	2308	96054	90752	50944	5084
4.	60924	98732	68704	67484	13728

Find ¼ of each of the following numbers:

	a	*b*	*c*	*d*	*e*
5.	11504	27432	26492	1604	70584
6.	84084	67944	2104	73212	18916

7. A farmer had 1024 sheep. He sold ¼ of them. How many did he sell?

8. There are 4 quarts in a gallon. How many gallons are in a tank containing 168 quarts?

Table of 5's.

Introductory. Count by 5's to 20, 35, 45, 60, 15, 55, 30, 40, 25, 55.

How many *fives* are in 25, 40, 55, 15, 35, 45, 10, 30, 60?

Give at sight:

2	4	6	10	3	7	9	5	11	8	12
2	4	6	10	3	7	9	5	11	8	12
2	4	6	10	3	7	9	5	11	8	12
2	4	6	10	3	7	9	5	11	8	12
2	4	6	10	3	7	9	5	11	8	12

Give the answers:

What are 6 fives? 9 fives? 10 fives? 3 fives? 12 fives? 7 fives? 11 fives? 8 fives?

Learn:

5 times 1 are 5	1 times 5 are 5
5 times 2 are 10	2 times 5 are 10
5 times 3 are 15	3 times 5 are 15
5 times 4 are 20	4 times 5 are 20
5 times 5 are 25	5 times 5 are 25
5 times 6 are 30	6 times 5 are 30
5 times 7 are 35	7 times 5 are 35
5 times 8 are 40	8 times 5 are 40
5 times 9 are 45	9 times 5 are 45
5 times 10 are 50	10 times 5 are 50
5 times 11 are 55	11 times 5 are 55
5 times 12 are 60	12 times 5 are 60

ORAL DRILL

1. What are 5 eights? 5 sixes? 5 nines? 5 sevens? 5 threes? 5 tens? etc.

2. Give the answers:

5×7 5×10 5×8 5×3 5×9 5×6 5×12, etc.

3. Give the answers:

$5\times6+2$	$5\times7+3$	$5\times9+3$	$5\times11+6$
$5\times7+5$	$5\times8+6$	$5\times10+7$	$5\times4+5$
$5\times9+6$	$5\times12+3$	$5\times5+6$	$5\times3+7$

4. How many *fives* are in 25, 40, 60, 15, 35, 10, 45, 30, 55, 20, 50?

5. How many *fives* are in 36, 23, 17, 29, 38, 43, 24, 53, 9, 19, 11, 58?

6. Arthur sold 12 *Halifax Heralds* at 5 cents each. How much should he receive for them?

7. Mary bought 7 books at 5 cents each. How much did she pay for them?

8. A flower bed is 9 feet wide. It is five times as long as it is wide. How long is the bed?

9. There are 6 girls in a class, and five times as many boys as girls. How many boys are in the class?

10. Robert saved $5 a week. How much would he save in 8 weeks?

EXERCISE

	a	*b*	*c*	*d*	*e*
1.	6893	5476	2835	7293	6485
	$\times5$	$\times5$	$\times5$	$\times5$	$\times5$
2.	3567	4793	3696	5809	2757
	$\times5$	$\times5$	$\times5$	$\times5$	$\times5$

	a	*b*	*c*	*d*	*e*
3.	8293 ×5	3763 ×5	4685 ×5	5739 ×5	7093 ×5
4.	8947 ×5	9607 ×5	7083 ×5	5308 ×5	9867 ×5

5. A man had 14 cows. He kept 9 of them and sold the remainder at $69 each. How much did he get for the cows he sold?

6. John set out 5 rows of celery plants. There are 78 plants in each row. How many plants did he set out?

7. A farmer bought 5 horses at $275 each. What did the horses cost?

8. A man saves $63 a month. How much will he save in 5 months?

9. A man drives 5 hours in a motor car going 28 miles an hour. How far does he go in 5 hours?

To find $\frac{1}{5}$ of a number we divide the number by 5.

EXERCISE

Divide by 5:

	a	*b*	*c*	*d*	*e*
1.	6340	25810	7290	8565	7265
2.	7285	39215	29835	64730	8295
3.	69210	24840	62860	72950	18260
4.	700020	51020	43750	26930	62710

Find $\frac{1}{5}$ of each of the following numbers:

	a	*b*	*c*	*d*	*e*
5.	26400	35240	42930	17560	12465
6.	78300	64200	82515	72630	46530

7. A man earned $2850 in a year. He saved $\frac{1}{5}$ of this. How much did he save?

8. A farmer bought lambs at $5 each. How many should he get for $350.00?

Table of 6's.

Introductory. Count by 6's to 24, 42, 48, 60, etc.

How many sixes are in 18, 30, 12, 36, 54? etc.

Give at sight:

2	4	6	10	3	7	12	9	5	8	11
2	4	6	10	3	7	12	9	5	8	11
2	4	6	10	3	7	12	9	5	8	11
2	4	6	10	3	7	12	9	5	8	11
2	4	6	10	3	7	12	9	5	8	11
2	4	6	10	3	7	12	9	5	8	11

Give the answers:

What are 4 sixes? 7 sixes? 9 sixes? etc.

Learn:

6 times 1 are 6	1 times 6 are 6
6 times 2 are 12	2 times 6 are 12
6 times 3 are 18	3 times 6 are 18
6 times 4 are 24	4 times 6 are 24
6 times 5 are 30	5 times 6 are 30
6 times 6 are 36	6 times 6 are 36
6 times 7 are 42	7 times 6 are 42
6 times 8 are 48	8 times 6 are 48
6 times 9 are 54	9 times 6 are 54
6 times 10 are 60	10 times 6 are 60
6 times 11 are 66	11 times 6 are 66
6 times 12 are 72	12 times 6 are 72

ORAL DRILL

1. What are 6 nines? 6 sixes? 6 fours? 6 threes? 6 sevens? etc.

2. Give the answers:

6×6 6×8 6×12 6×4 6×10 6×7 etc.

3. Give the answers:

6×7+6	6×7+3	6×7+3	6×10+5
6×5+8	6×4+8	6×2+9	6×12+3
6×9+2	6×3+5	6×3+4	6×11+6

4. How many sixes are in 18, 36, 48, 12, 30?

5. How many sixes are in 17, 26, 31, 43, 35, 20, 25?

6. Apples are worth 6 cents each. How many should I get for 54 cents?

7. Leslie's father bought 6 pigs at $12 each. What did the pigs cost?

8. Mary bought pencils at 6 cents each. How many would she get for 48 cents?

9. If apples are worth 6 cents each what is the cost of nine apples?

10. A train travels 834 miles a day. How far will it travel in 6 days?

EXERCISE

	a	*b*	*c*	*d*	*e*
1.	684	904	616	327	589
	×6	×6	×6	×6	×6
2.	356	697	387	493	573
	×6	×6	×6	×6	×6

	a	*b*	*c*	*d*	*e*
3.	259 ×6	687 ×6	382 ×6	317 ×6	867 ×6
4.	1234 ×6	6320 ×6	6538 ×6	948 ×6	657 ×6
5.	7956 ×6	1978 ×6	6587 ×6	7825 ×6	3642 ×6

6. Harry has 9 sheep, and James has 6 times as many as Harry. How many has Harry?

7. A farmer sold 6 loads of wheat for $54.90 a load. How much did he get for all?

8. John saved $6 a month. How much money did he save in a year?

9. Milk is 6 cents a pint. What will be the cost of 67 pints?

10. A restaurant uses 6 bushels of potatoes a day. How many bushels will it use in 66 days?

Note. — To find $\frac{1}{6}$ *of a number we divide the number by* 6.

EXERCISE

Divide by 6:

	a	*b*	*c*	*d*	*e*
1.	18678	10560	20232	5280	96126
2.	1266	30792	12452	59646	70206
3.	13674	69408	11322	1086	10092
4.	59682	7806	61044	19652	10038

Find $\frac{1}{6}$ of each of the following numbers:

	a	*b*	*c*	*d*	*e*
5.	69402	29646	29844	1632	40506
6.	10014	9708	11124	63360	5280

7. A farmer had 6 acres in potatoes from which he dug 1074 bushels. How many bushels did he get from each acre?

8. Leslie gathered 6 eggs a day. How long will it take him to gather 5 dozen?

9. A quart of ice cream will serve 6 persons. How many quarts must be ordered for a picnic of 252 persons?

10. John's father bought lambs at $6 each. He spent $1404. How many lambs did he buy?

Table of 7's.

Introductory. Count by 7's to 21, 35, 49, 56, 63, 70, 28, 42, 77, 84.

How many *sevens* are in 35, 28, 63, 49, 56, 70, 42, 84, 77, 14, 21?

Give at sight:

2	4	6	10	3	7	9	5	8	11	12
2	4	6	10	3	7	9	5	8	11	12
2	4	6	10	3	7	9	5	8	11	12
2	4	6	10	3	7	9	5	8	11	12
2	4	6	10	3	7	9	5	8	11	12
2	4	6	10	3	7	9	5	8	11	12
2	4	6	10	3	7	9	5	8	11	12

Give the answers:

What are 6 sevens? 8 sevens? 7 sevens? 10 sevens? 3 sevens? etc.

Learn:

7 times 1 are 7	1 times 7 are 7
7 times 2 are 14	2 times 7 are 14
7 times 3 are 21	3 times 7 are 21
7 times 4 are 28	4 times 7 are 28
7 times 5 are 35	5 times 7 are 35
7 times 6 are 42	6 times 7 are 42
7 times 7 are 49	7 times 7 are 49
7 times 8 are 56	8 times 7 are 56
7 times 9 are 63	9 times 7 are 63
7 times 10 are 70	10 times 7 are 70
7 times 11 are 77	11 times 7 are 77
7 times 12 are 84	12 times 7 are 84

ORAL DRILL

1. What are 7 eights? 7 nines? 7 threes? 7 sixes? 7 twelves? 7 sevens? etc.

2. Give the answers:

7×6	7×9	7×12	7×3	7×8
7×4	7×7	7×10	7×2	etc.

3. Give the answers:

7×6+4	7×8+5	7×11+6	7×10+4
7×7+8	7×12+4	7×4+8	7×8+4
7×9+5	7×3+7	7×5+9	7×9+8

4. How many *sevens* are in 42, 63, 14, 49, 77, 56, 21, 35, 70, 28, 84?

5. How many *sevens* are in 37, 24, 17, 68, 51, 46, 87, 29, 54, 61, 75?

6. Helen had 9 weeks vacation. How many days vacation did she have?

7. If bread costs 7 cents a loaf, find the cost of 7 loaves.

8. Charles sold 12 pigs at $7 each. How much would he receive?

9. Edwin saved $7 a month for 8 months. How much has he saved?

10. A boy walks 7 miles per day for 4 days. How far has he walked?

EXERCISE

	a	*b*	*c*	*d*	*e*
1.	6893	5476	2835	7293	6485
	×7	×7	×7	×7	×7
2.	3567	4793	3698	5809	2759
	×7	×7	×7	×7	×7
3.	8293	3768	4685	5739	7093
	×7	×7	×7	×7	×7
4.	8947	9608	7089	5983	9867
	×7	×7	×7	×7	×7
5.	36587	62908	48397	56006	29683
	×7	×7	×7	×7	×7

6. How many days are in 39 weeks?

7. John saved $19 each month for 7 months. How much has he saved?

8. Mary picked 59 quarts of berries each week. How many quarts did she pick in 7 weeks?

9. A woman uses 7 pints of milk each day. How many pints of milk would she use in 1 year (365 days)?

10. It is 47 weeks to Christmas. How many days is it until Christmas?

Note. — To find $\frac{1}{7}$ of a number we divide by 7.

EXERCISE

Divide by 7:

	a	*b*	*c*	*d*	*e*
1.	18781	6881	20263	68845	21609
2.	27342	6779	16492	20356	6811
3.	13559	19922	53445	65142	20881
4.	59444	25942	9786	27496	58765

Find $\frac{1}{7}$ of each of the following numbers:

	a	*b*	*c*	*d*	*e*
5.	44849	29649	20566	47663	26096
6.	27356	9709	20517	51037	38052

7. Gordon bought sheep at \$7 each. How many should he get for \$973?

8. A farmer sold 203 quarts of milk in 1 week. How much milk did he sell in one day?

9. It is 133 days since New Year's day. How many weeks is it since New Year's?

10. Mary's father earned \$3220 each year. He saved $\frac{1}{7}$ of what he earned. How much did he save?

Table of 8's.

Introductory.

Count by 8's to 24, 32, 56, 48, 40, 16, 72, 88, 96, 64.

How many 8's are in 40, 16, 72, 64, 24, 32, 80, 96, 56?

Give at sight:

8	9	10	11	12
8	9	10	11	12
8	9	10	11	12
8	9	10	11	12
8	9	10	11	12
8	9	10	11	12
8	9	10	11	12
8	9	10	11	12

Review:

8 times 5	8 times 7	8 times 6
8 times 2	8 times 3	8 times 4

What are 8 nines? 8 twelves? 8 eights? 8 elevens? 8 tens?

Learn:

8 times 8 are 64	9 times 8 are 72
8 times 9 are 72	10 times 8 are 80
8 times 10 are 80	11 times 8 are 88
8 times 11 are 88	12 times 8 are 96
8 times 12 are 96	

ORAL DRILL

1. What are 8 nines? 8 fives? 8 sevens? 8 sixes? 8 twelves? etc.

2. Give the answers:

8×9	8×11	8×7	8×8	
8×4	8×12	8×3	8×5	etc.

3. Give the answers:

8×7+5	8×5+7	8×2+5	8×10+7
8×9+4	8×3+6	8×11+9	8×8+5
8×6+7	8×4+9	8×12+6	8×9+6

4. How many *eights* are in 56, 72, 16, 24, 32, 40, 88, 48, 64, 80, 96?

5. How many *eights* are in 31, 29, 75, 19, 68, 39, 46, 82, 101, 58, 62?

6. Milk is worth 8 cents a pint. Find the cost of 9 pints.

7. Jane bought 7 books at 8 cents each. How much did the books cost?

8. A boy sold 12 papers at 8 cents each. How much did he receive?

9. A farmer bought 8 sheep at $8 each. What did the sheep cost?

10. A man drove 8 miles an hour for 7 hours. How far did he go?

Multiply:

	a	*b*	*c*	*d*	*e*
1.	5476	2835	7293	6485	9834
	×8	×8	×8	×8	×8
2.	3567	4793	3698	5809	2759
	×8	×8	×8	×8	×8
3.	8947	9603	7089	5983	9867
	×8	×8	×8	×8	×8

4.	36587	62908	48397	56706	29638
	×8	×8	×8	×8	×8
5.	8293	3768	4685	5739	7093
	×8	×8	×8	×8	×8

6. A man earns $8 per day. How much would he earn in 27 days?

7. Robert saved $8 a month for 18 months. How much has he saved?

8. A farmer sold 47 pigs at $8 each. How much did he receive for them?

9. A shoe dealer bought 35 pairs of shoes at $8 per pair. How much did the shoes cost him?

10. A man drives his motor car at the rate of 29 miles an hour. How far does he go in 8 hours?

Note. — To find $\frac{1}{8}$ of a number we divide the number by 8.

Divide by 8:

	a	*b*	*c*	*d*	*e*
1.	3032	42776	7864	6112	7256
2.	3656	7573	29352	111032	52864
3.	91272	285040	753168	23048	43176
4.	26583	729638	22438	62897	58395
5.	726109	326193	58343	26478	360934

6. A farmer bought some calves at $8 each. He paid $592 for them. How many calves did he buy?

7. The wages of 8 men for a month amounted to $1344. How much did each man earn in the month?

8. A woman bought 8 yards of cloth, paying $10.80 for it. What was the cloth worth per yard?

9. A farmer stores his wheat in 8 equal sized bins. If he has 3480 bushels of wheat, how many bushels are in each bin?

Table of 9's.

Introductory.

Count by 9's to 27, 54, 90, 45, 63, 72, 18, 99, 36, 108, 81.

How many 9's are in 45, 72, 81, 99, 63, 108, 36? etc.

Review: 9 times 2 — 9 times 7 — 9 times 3
9 times 4 — 9 times 6 — 9 times 5
9 times 8

Give at sight:

9	10	11	12
9	10	11	12
9	10	11	12
9	10	11	12
9	10	11	12
9	10	11	12
9	10	11	12
9	10	11	12
9	10	11	12

What are 9 nines? 9 tens? 9 elevens? 9 twelves?

Learn:

9 times 9 are 81	10 times 9 are 90
9 times 10 are 90	11 times 9 are 99
9 times 11 are 99	12 times 9 are 108
9 times 12 are 108	

ORAL DRILL

1. What are 9 sevens? 9 sixes? 9 nines? 9 threes? 9 elevens? 9 eights? etc.

2. Give the answers:

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

3. Give the answers:

9×7+5	9×5+7	9×10+7	
9×8+3	9×3+6	9×7+6	
9×4+5	9×8+7	9×9+3	etc.

4. How many *nines* are in 36, 63, 72, 18, 108, 90, 45, 27?

5. How many *nines* are in 42, 39, 76, 85, 22, 69, 93, 111?

6. Strawberries are worth 9 cents a box. What is the price of 7 boxes?

7. What is the cost of 6 lbs. of sugar at 9 cents a lb.?

8. Harold bought 12 lbs. of candies for Christmas. He paid 9 cents a lb. for them. What did he pay for the candies?

9. A man saves $8 a week. How much will he save in 9 weeks?

10. Robert earns $5 per week. What will he earn in 9 weeks?

Multiply:

	a	*b*	*c*	*d*	*e*
1.	5476	2835	7293	6485	9834
	×9	×9	×9	×9	×9
2.	3567	4793	3698	5809	2759
	×9	×9	×9	×9	×9

	a	*b*	*c*	*d*	*e*
3.	8947 ×9	9608 ×9	7089 ×9	5983 ×9	9867 ×9
4.	36587 ×9	62908 ×9	48397 ×9	5679 ×9	9638 ×9
5.	8293 ×9	3768 ×9	4685 ×9	5739 ×9	7093 ×9

6. A grocer bought 279 lbs. of sugar at 9 cents a lb. How much did he pay for the sugar?

7. A farmer sold 9 cows at $89 each. How much did he receive for the cows?

8. Two boys went walking for 19 days; each day they walked 9 miles. How far did they go in the 19 days?

9. Find the cost of 9 pairs of skates at $2.75 a pair.

Note. — To find $\frac{1}{9}$ *of a number we divide the number by* 9.

EXERCISE

Divide by 9:

	a	*b*	*c*	*d*	*e*
1.	4763	2839	5647	6835	4327
2.	72653	23258	36345	72653	20935
3.	24765	63583	22473	21358	47383
4.	21083	45783	85834	67673	25839
5.	47658	32109	83647	52634	76839

6. Nine girls in a Red Cross Club saved $117. How much did each save?

7. A woman bought sugar at 9 cents a lb. She paid $5.13. How many lbs. did she buy?

8. Jane bought 9 yards of silk and paid $15.75. How much was the silk worth per yard?

9. Nine boys buy a tent for $24.75 and divide the cost equally. How much does each pay?

Tables of 10's, 11's, *and* 12's.

Introductory.

Count by 10's to 50, 30, 90, 100, 70, 40, etc.
Count by 11's to 66, 99, 77, 22, 55, 88, etc.
Count by 12's to 48, 96, 72, 108, 132, 120, etc.
How many 10's are in 70, 30, 60, 90, 120? etc.
How many 11's are in 66, 44, 88, 55, 99? etc.
How many 12's are in 72, 108, 120, 84? etc.

Review. 10 times 2, 4, 5, 6, 7, 9, 3, 8.
11 times 3, 5, 6, 2, 8, 9, 7, 4.
12 times 2, 5, 4, 6, 8, 7, 9, 3.

Learn:

10 times 10 are 100	11 times 10 are 110
10 times 11 are 110	12 times 10 are 120
10 times 12 are 120	11 times 11 are 121
	11 times 12 are 132
	12 times 11 are 132
	12 times 12 are 144

ORAL DRILL

1. What are 10 eights? 10 nines? 10 sixes? etc.
What are 11 sevens? 11 twelves? 11 fours? etc.
What are 12 sixes? 12 nines? 12 sevens? etc.

2. Give the answers:

10×6	10×7	10×8	10×9	12×12
11×7	11×12	11×9	11×3	11×6
12×5	12×8	12×7	12×4	12×9

3. Give the answers:

11×7+5	11×8+9	12×6+8	
12×9+4	12×4+5	12×5+4	
10×6+7	12×6+9	11×4+9	etc.

4. How many 10's are in 20, 50, 60? etc.
How many 11's are in 44, 88, 55? etc.
How many 12's are in 48, 96, 72, 60? etc.

5. How many 10's are in 35, 83, 69? etc.
How many 11's are in 57, 69, 31? etc.
How many 12's are in 38, 54, 76? etc.

6. What does it cost to send a 12-word telegram at 7 cents for each word?

7. What is the cost of 8 grape-fruits at 10 cents each?

8. Oranges are worth 6 cents each. Find the price of 1 dozen.

9. Eleven girls brought 10 cents each to the Sunshine Fund. How much money did they all bring?

10. Mary earned 12 cents a day for 12 days. How much did she earn all together?

Multiply:

	a	*b*	*c*	*d*	*e*
1.	5476	2835	7293	6485	9834
	×10	×10	×10	×10	×10
2.	3567	4793	3698	5809	2759
	×11	×11	×11	×11	×11
3.	8947	9608	7089	5983	9867
	×11	×11	×11	×11	×11

	a	*b*	*c*	*d*	*e*
4.	3659 ×12	6298 ×12	4839 ×12	5679 ×12	9638 ×12
5.	8293 ×12	3768 ×12	4685 ×12	5739 ×12	7093 ×12

Divide:

	a	*b*	*c*
6.	89354 by 10	72384 by 10	568039 by 10
7.	26735 by 11	29835 by 11	37389 by 11
8.	56437 by 11	78658 by 11	84658 by 11
9.	26837 by 12	65839 by 12	72683 by 12
10.	76483 by 12	23256 by 12	82658 by 12

Find:

	a	*b*	*c*
11.	$\frac{1}{10}$ of 86475	$\frac{1}{11}$ of 83534	$\frac{1}{12}$ of 76583
12.	$\frac{1}{12}$ of 28365	$\frac{1}{10}$ of 39847	$\frac{1}{11}$ of 45038
13.	$\frac{1}{10}$ of 27969	$\frac{1}{11}$ of 87468	$\frac{1}{12}$ of 75834
14.	$\frac{1}{11}$ of 45839	$\frac{1}{12}$ of 72683	$\frac{1}{12}$ of 83209

PROBLEMS

1. There are 36 cabbage plants in a row. How many plants will be required for 12 rows?

2. How many sheep costing \$12 each can be bought for \$540?

3. Milk is worth 11 cents a quart. Find how much the milk for a family will cost in 1 month, if 87 quarts are used.

4. How many weeks are in 294 days?

5. Mary is reading a book with 160 pages. If she reads 8 pages in one hour, how long will she take to read the book?

6. Marbles are sold at 8 for 10 cents. Find the price of 120 marbles.

7. A woman bought 3 dozen lemons at 5 cents each. What was the cost of the lemons?

8. There were 856 people in church. One-fourth were children. How many children were in church?

9. A man has a journey of 342 miles to make. He has gone $\frac{1}{3}$ of it. How far has he gone?

10. A farmer had 448 sheep. He sold $\frac{1}{8}$ of his flock. How many did he sell?

EXERCISE

Write down from dictation, arrange in columns, and add:

1. 8463+298+5683+787+8963+5477.

2. 9568+75+3298+793+3298+29+8566.

3. 293+8367+6567+9583+376+2978+78.

4. 9583+49+2980+579+683+7832+76.

5. 839+7760+2105+3983+29+7653.

Write down from dictation and subtract:

	a	*b*
6.	8210−2958	6100−2987
7.	9206−7587	2220−1937
8.	5100−4769	3225−1769

	a	*b*
9.	8620 − 5937	4963 − 2278
10.	5120 − 4763	6580 − 2793

Write down from dictation and multiply:

	a	*b*
11.	6873 by 7	8497 by 9
12.	7285 by 6	3298 by 8
13.	2647 by 4	7839 by 5
14.	8395 by 7	9376 by 9
15.	6229 by 8	3269 by 7

Write down from dictation and divide:

	a	*b*
16.	2835 by 7	4325 by 8
17.	7384 by 5	3649 by 9
18.	2225 by 7	7634 by 4
19.	6210 by 9	5460 by 8
20.	3245 by 7	2622 by [illegible]

Find the value of:

	a	*b*
21.	$\frac{1}{8}$ of 6245	$\frac{1}{9}$ of 3242
22.	$\frac{1}{7}$ of 2243	$\frac{1}{5}$ of 6234
23.	$\frac{1}{8}$ of 9847	$\frac{1}{7}$ of 8345
24.	$\frac{1}{4}$ of 8253	$\frac{1}{8}$ of 8876
25.	$\frac{1}{5}$ of 72[illegible]	$\frac{1}{7}$ of 83210

Accuracy and Time Test.

See how many examples you can work in 10 *minutes*, and in 5 *minutes*.

Addition.

	a	*b*	*c*	*d*	*e*
1.	6293	7293	8465	9847	9568
	478	989	767	283	5483
	2965	2659	39	3043	295
	823	729	8265	629	75
	4765	8395	568	4738	2969
	986	7886	2999	6567	829
	2438	5263	7608	295	8395
	95	777	983	9859	695
2.	9858	6475	8693	7788	5896
	658	937	809	2959	829
	3577	2648	5834	753	8395
	294	763	283	8347	777
	7658	9806	9439	953	8365
	29	83	564	3286	776
	385	297	4767	5783	6668
	2989	6485	6083	839	576
3.	2989	7683	4589	3678	5983
	976	809	3265	8563	2446
	7839	8323	598	473	738
	29	859	75	3269	9308
	587	6575	8239	7283	839
	6583	2395	789	658	4275
	777	898	3285	2663	596
	9320	8459	764	296	3569

Subtract:

	a	*b*	*c*	*d*	*e*
4.	84053	53000	29103	83102	62000
	29786	26478	15647	56479	38495
5.	23012	71002	65000	70000	51000
	15839	35687	28579	28396	28326

Multiplication.

Multiply:

	a	*b*	*c*	*d*
6.	8473 by 7	9863 by 9	2698 by 8	7283 by 7
7.	6593 by 3	83093 by 4	9856 by 9	7839 by 8
8.	3279 by 5	26985 by 6	65839 by 7	8093 by 9
9.	45638 by 6	83097 by 7	64839 by 4	20983 by 8
10.	6387 by 7	2983 by 8	76849 by 9	4987 by 6

Division.

Divide:

	a	*b*	*c*
11.	86573 by 6	29683 by 8	41653 by 9
12.	82647 by 9	213985 by 5	64832 by 7
13.	24383 by 8	22645 by 8	23478 by 9
14.	23980 by 6	62346 by 7	41658 by 8
15.	92835 by 7	22328 by 9	62158 by 8

Find:

	a	*b*	*c*
16.	$\frac{1}{7}$ of 84763	$\frac{1}{8}$ of 86953	$\frac{1}{8}$ of 276035
17.	$\frac{1}{6}$ of 54839	$\frac{1}{7}$ of 28345	$\frac{1}{5}$ of 34835
18.	$\frac{1}{11}$ of 26478	$\frac{1}{6}$ of 47683	$\frac{1}{4}$ of 26478
19.	$\frac{1}{8}$ of 35647	$\frac{1}{9}$ of 72893	$\frac{1}{9}$ of 43506
20.	$\frac{1}{6}$ of 24358	$\frac{1}{12}$ of 23476	$\frac{1}{8}$ of 62583

CHAPTER IV

READING AND WRITING NUMBERS FROM 10,000 TO MILLIONS

Ten thousand is written 10,000.
Twenty thousand is written 20,000.
Thirty thousand is written 30,000.
Forty thousand is written 40,000.
Fifty thousand is written 50,000.
One hundred thousand is written 100,000.
Two hundred thousand is written 200,000.
Five hundred thousand is written 500,000.
Nine hundred thousand is written 900,000.
One million is written 1,000,000.
Fifty-six millions is written 56,000,000.

Read 653,247.

Beginning with the units, mark off to the left periods of three figures. The first period of three figures is usually called the units period. It contains the units, tens, and hundreds figures. The second period is called the thousands period. In this period the figures are read in the ordinary way, and are called thousands.

Example: Read 698,358.

Mark off the number into periods. The units period contains 358. The thousands period contains 698. Begin to read from the left.

Thus, six hundred ninety-eight *thousand*, three hundred fifty-eight.

Read 720,207.

Seven hundred twenty *thousand*, two hundred and seven.

If a number contains more than six figures, we shall have a third period after the thousands. This is called the millions period.

Read 7,283,567.

Seven million, two hundred eighty-three thousand, five hundred sixty-seven.

The following table will illustrate the method of marking off numbers into periods.

Examples: 72,386,258; 234,708,530.

Millions			Thousands			Units		
Hundreds	Tens	Units	Hundreds	Tens	Units	Hundreds	Tens	Units
	7	2	3	8	6	2	5	8
2	3	4	7	0	8	5	3	0

Draw a diagram similar to that given above, and arrange the following numbers in their correct places.

	a	*b*	*c*
1.	328,475	72,683	9,728,560
2.	79,500	236,475,600	500,003
3.	965,500	78,600,500	590,070,850

Read 238,457,685.

This number contains 3 periods. It is read thus:

Two hundred thirty-eight million, four hundred fifty-seven thousand, six hundred eighty-five.

EXERCISE

Read the following numbers:

	a	*b*	*c*
1.	827,395	460,832	296,723
2.	729,080	265,746	798,006
3.	520,008	760,800	295,630
4.	983,720	906,053	283,700
5.	726,835	700,800	600,002
6.	8,340,756	5,290,008	26,765,983
7.	26,730,820	52,685,200	75,830,295
8.	438,265,839	79,230,650	84,209,806
9.	671,728,386	230,560,728	7,265,832
10.	95,008,006	19,200,303	87,200,000

EXERCISE

Write down in 3 columns, all the numbers given in the 10 examples above, and add as 3 separate addition examples.

EXERCISE

Write from dictation:

	a	*b*	*c*
1.	365,847	295,363	728,456
2.	384,728	750,285	834,650
3.	983,720	830,534	225,400
4.	283,500	715,320	920,608
5.	635,002	283,750	408,002
6.	7,834,256	2,583,765	6,283,583
7.	2,583,496	7,835,959	5,732,694
8.	15,793,683	25,343,627	97,285,400
9.	56,204,630	38,400,003	26,700,350
10.	73,650,725	84,265,003	90,700,300

EXERCISE

Arrange the nur ' s given in the 10 examples above, in 3 addition columns, and add:

Accuracy Test.

1.	2.	3.	4.
8277	7281	6987	9752
6949	4969	6668	7831
9788	8799	7875	5527
9686	8698	8997	9886
6798	9769	4885	7734
5848	4858	9796	9958
7984	8979	8689	9475
5878	7857	8799	6279

5.	6.	7.	8.
6677	5966	7238	4922
1196	2787	4497	7857
6336	6896	9864	9637
9474	8567	8937	4762
4893	5674	4774	5446
8986	8963	3683	6697
8449	7878	9489	6857
7723	9667	8119	9434

9.	10.	11.	12.
7533	5644	2674	8758
6387	2674	6445	3357
4491	7473	7966	9185
8746	4758	5863	4613
9384	8229	4349	8496
8434	2294	3849	3492
7586	7587	7461	8631
3796	4736	4918	9669

Multiply:

	a	*b*	*c*
1.	86,573 by 7	298,376 by 6	39,584 by 8
2.	483,957 by 6	65,897 by 9	48,763 by 7
3.	987,653 by 7	208,953 by 8	56,837 by 5
4.	548,376 by 8	678,394 by 7	987,583 by 9

Divide:

	a	*b*
1.	2,810,973 by 9	583,768 by 7
2.	4,286,135 by 6	234,783 by 8
3.	628,076 by 3	7,283,632 by 5
4.	958,347 by 7	2,121,253 by 9
5.	2,777,382 by 9	5,454,320 by 7

PROBLEMS

Introductory.

There are 2 pints in 1 quart.
There are 4 quarts in 1 gallon.
There are 2 gallons in 1 peck.
There are 4 pecks in 1 bushel.

There are [illegible]es in 1 foot.
There are 3 feet in 1 yard.
There are 36 inches in 1 yard.

There are 16 ounces in 1 pound.
There are 100 pounds in 1 hundredweight.

There are 60 minutes in 1 hour.
There are 24 hours in 1 day.
There are 7 days in 1 week.

ORAL PROBLEMS

1. A milkman sold 84 pints of milk. How many quarts did he sell?

2. A grocer bought 15 gallons of maple syrup. How many quarts of syrup did he buy?

3. A farmer sold 25 bushels of potatoes. How many pecks did he sell?

4. A man feeds his horses 30 gallons of oats in a week. How many pecks of oats does he feed?

5. Mary bought 18 feet of dress goods. How many yards did she buy?

6. A table-cloth is 72 inches long. What is its length in yards?

7. A woman bought $\frac{1}{4}$ of a pound of pepper. How many ounces did she buy?

8. A farmer sold a hog which weighed 225 lbs. How many hundredweight did the hog weigh?

9. A man worked 8 hours a day for 12 days. How many hours did he work?

10. I travel on a train from 8 A.M. until 2.30 P.M. How long am I on the train?

EXERCISE

1. A man had \$7500. He paid \$3950 for a house, \$675 for repairing the house, and \$454.50 for house furnishings. How much money has he left?

2. A man deposits in the bank $125.75 a month for the first 7 months of the year and $146.50 a month for the balance of the year. How much money did he deposit during the year?

3. A farmer received $472.50 for 6 cows. What was the average price per cow?

4. One boy has $3.60 in 10-cent pieces, and another boy has $1.75 in 5-cent pieces. How many coins have the two boys?

5. A man bought 8 bushels of potatoes at 75¢ per bushel and sold them at 25¢ per peck. How much did he make?

6. A boy rides his bicycle at an average speed of 7 miles an hour. How long will it take him to go a distance of 231 miles?

7. A lady bought a pair of gloves for $1.75, handkerchiefs for 75¢, a pair of shoes for $8.50, a skirt for $7.65. She gave the clerk two ten-dollar bills. What change should she get?

8. A farmer's wife sold to a grocer 8 dozen eggs at 55¢ a dozen, 9 pounds of butter at 45¢ a pound, and 6 bushels of potatoes at 95¢ a bushel. How much does the grocer owe the farmer's wife?

Multiplying by Numbers that Exceed Twelve.

Introductory.

Multiply 9783 by 7.

$$\begin{array}{r} 9783 \\ \times\quad 7 \\ \hline 68{,}481 \end{array}$$

In this example the number 9783 is called the *multiplicand*, the number 7 the *multiplier*, and the number 68,481 the *product*.

The *Multiplicand* is the number multiplied.

The *Multiplier* is the number by which we multiply.

The *Product* is the number resulting from the multiplication.

Example: Multiply 479 by 57.

$$\begin{array}{r} 479 \\ \underline{57} \\ \end{array}$$

1st partial product $3{,}353 = 7$ times the multiplicand.
2nd partial product $23{,}950 = 5 \times 10$ times multiplicand = 50 times multiplicand.
Entire product $27{,}303 = 57$ times the multiplicand.

Since 57 is composed of 7 units and 5 tens or 50, 57 times the number must be equal to 7 times the number plus 50 times the number. 7 times 479 is 3353, the *first partial* product. We get 50 times 479 by first finding 10 times 479 and then multiplying this result by 5. 10 times 479 is 4790 and 5 times 4790 is 23,950, the *second partial* product. We write this under the first product, so that units come under units, tens under tens, etc., and then we add the two partial products together.

$$\begin{array}{r} 479 \\ \underline{57} \\ 3353 \\ \underline{2395} \\ 27{,}303 \end{array}$$

In actual practice we always omit the zero, thus:

Example: Multiply 479 by 257.

$$\begin{array}{r} 479 \\ \underline{257} \\ \end{array}$$

1st partial product $3{,}353 =$ 7 times 479.
2nd partial product $23{,}950 =$ 50 times 479.
3rd partial product $95{,}800 = 200$ times 479.
Entire product $123{,}103 = 257$ times 479.

In this example the multiplier is composed of 7 units, 5 tens or fifty, and 2 hundreds or 200, so that 257 times the number will be 7 times the number plus 50 times the number plus 200 times the number.

$$\begin{array}{r} 479 \\ 257 \\ \hline 3353 \\ 2395 \\ 958 \\ \hline 123{,}103 \end{array}$$

In actual practice we omit the zeros.

Test. Multiply the multiplier by the multiplicand. If the product is the same as before, the work is likely to be correct.

EXERCISE

Multiply:

1. 744 by 65
2. 895 by 87
3. 972 by 96
4. 825 by 58
5. 973 by 79
6. 8462 by 86
7. 9643 by 95
8. 8532 by 69
9. 8984 by 48
10. 4659 by 89
11. 28,352 by 64
12. 41,678 by 85
13. 34,073 by 63
14. 40,735 by 628
15. 29,304 by 789
16. 90,705 by 897
17. 43,445 by 678
18. 37,436 by 835
19. 88,888 by 789
20. 23,567 by 597
21. 6484 by 965
22. 7856 by 758
23. 6748 by 697
24. 4878 by 834
25. 8547 by 586
26. 85,474 by 745
27. 46,887 by 984
28. 56,184 by 798
29. 56,664 by 487
30. 25,473 by 448
31. 73,519 by 473
32. 81,897 by 654

To multiply, when the multiplicand, the multiplier, or both, contain zeros.

Example: Multiply 2479 by 4006.

```
  2479
  4006
 14874
9916
9,930,874
```

4006 times 2479 equals 4000 times 2479 plus 6 times 2479; 6 times 2479 is 14,874; 4000 times 2479 is 9,916,000. These partial products are written one under the other, as before, the zeros being omitted.

EXERCISE

Multiply:

1. 415 by 307
2. 7004 by 902
3. 2769 by 708
4. 1364 by 5004
5. 9006 by 7036
6. 8009 by 7008
7. 1684 by 4008
8. 2002 by 4103
9. 3678 by 7068
10. 9999 by 8008
11. 3674 by 200,901
12. 3798 by 90,809

Example: Multiply 614,0[illegible] 700.

```
  614,000
      700
429,800,000
```

This result i[illegible]me as that obtained by multiplying 614 by 7, and then annexing to the right *five* zeros, which is the sum of the number of zeros to the right of both the multiplicand, 614, and the multiplier, 7.

EXERCISE

Find the following products:

1. 473 by 600
2. 847 by 700
3. 9642 by 6300
4. 1875 by 6340
5. 27 by 9000
6. 6000 by 43
7. 18,000 by 623
8. 6400 by 640
9. 650 by 650
10. 83,600 by 7500
11. 9230 by 7000
12. 8000 by 61,000

EXERCISE

1. If the cost of raising a crop of wheat is \$9.75 per acre, how much will it cost to raise 85 acres?

2. The oat crop in a 148-acre field averaged 67 bushels to the acre. Find the number of bushels this field yields.

3. What is the value of a carload of 48 steers at \$57.50 each?

4. A train travels at the rate of 38 miles per hour. What distance will it travel in 2 days?

5. A carpenter earns \$7.50 a day. How much will he earn in a month of 26 working days?

6. Coal sells for \$8.75 a ton. What will be the amount of my coal bill, if I burn 18 tons?

7. If 38 cows produce 379 pounds of milk each per month, how many pounds do the cows produce in a month?

EXERCISE

1. In 1 ream of paper there are 480 sheets. How many sheets are there in 947 reams?

2. If a cotton mill manufactures 637 yards of cloth in one day, how many yards will it make in 307 days?

3. At \$125 each what will 49 horses cost?

4. A merchant bought 29 pieces of cloth; in each piece there were 57 yards. How many yards did he buy?

5. If 19,008 pounds of hay are required for the horses of a cavalry regiment for one day, how many pounds will be needed for 206 days?

6. What would be the cost of constructing 309 miles of macadam road at \$3975 a mile?

7. How many apples will an orchard containing 208 trees produce, if the average yield is 1269 apples for each tree?

8. How many yards of sheeting are in 57 bales, each bale containing 25 pieces and each piece 43 yards?

EXERCISE

1. How much will it cost to build 307 miles of railroad at $4060 a mile?

2. A contractor built 604 miles of railroad at $6500 a mile. How much was the contract worth?

3. Find the cost of 486 acres of land at $37 per acre.

4. If it requires 720 barrels of provisions to supply an army for one day, how many barrels will be required for 365 days?

5. If it cost $9805 to build one mile of railroad, how much will it cost to build 809 miles?

6. How many yards of cloth are in 43 bales, each bale containing 72 pieces, and each piece 29 yards?

7. If a railway train goes 18 miles an hour, how far will it go in 17 days of 24 hours each?

8. A merchant had 26 pieces of cloth of 54 yards each, which he sold for 45 cents a yard. How much did he get for the cloth?

Division by Numbers that Exceed 12.

Introductory.

Divide 86,573 by 9.

$$\begin{array}{r} 9{,}619 \quad \text{2 remainder} \\ 9\overline{)86{,}573} \end{array}$$

In the example above, 86,573 is called the *dividend*, 9 is called the *divisor*, 9619 is called the *quotient*, and 2 is called the *remainder*.

The *dividend* is the number to be divided.

The *divisor* is the number by which the dividend is divided.

The *quotient* is the number of times the divisor is contained in the dividend.

The *remainder* is the number left over when the division is not exact.

Long Division.

In the example given above, the work of division is done mentally. Where we have large numbers, it is necessary to write down all the steps, showing the work in dividing, multiplying, and subtracting.

Example: Divide 86,573 by 9.

```
   9619
9)86573
  81
  55
  54
  17
   9
  83
  81
   2  remainder
```

Example: Divide 7681 by 43.

Method	Explanation
178 43)7681 43 338 301 371 344 27	76 hundreds divided by 43 are 1 hundred. Write 1 in the quotient above the hundreds. Then 43×1 hundred = 43 hundreds. Subtract 43 hundreds from 76 hundreds. Remainder 33 hundreds. To 33 hundreds add 8 tens, making 338 tens. 338 tens divided by 43 are 7 tens. Write 7 tens in the quotient above the tens. Then 43×7 tens = 301 tens. Subtract 301 tens from 338 tens. Remainder 37 tens. To 37 tens add 1 unit, making 371 units. 371 units divided by 43 are 8 units. Write 8 units in the quotient, above the units. Then 43×8 units are 344 units. Subtract 344 units from 371 units; remainder is 27 units.

NOTE TO THE TEACHER. — The teacher should develop the brief form of long division shown on the left. Pupils should not be required to learn or write down the detailed explanation of the method.

Example: Divide 100,221 by 37.

```
    2708
37)100221
   74
   262
   259
     321
     296
      25   Remainder
```

Note. — The remainder after each partial division must be less than the divisor.

Example: Divide 8476 by 53.

```
     159                          Test
53)8476                          159   Quotient
   53                             53   Divisor
   317                           477
   265                           795
    526                         8427
    477                           49   Remainder
     49   Remainder             8476   Dividend
```

Note. — To test the accuracy of division, multiply the quotient by the divisor, add the remainder to the product. The result should be the dividend.

Test for Multiplication.

Example: Multiply 7832 by 356.

		Test
7832		7832
356		356)2788192
46992		2492
39160		2961
23496		2848
2788192		1139
		1068
		712
		712

EXERCISE

Divide. Test your answers.

	a	*b*	*c*	*d*
1.	1323 by 21	2564 by 31	1876 by 41	21,283 by 51
2.	2193 by 41	3952 by 31	58,563 by 61	30,783 by 62
3.	8475 by 32	7293 by 52	6897 by 62	7248 by 32
4.	9465 by 43	7386 by 44	9473 by 24	6984 by 33
5.	86,156 by 71	74,383 by 54	26,378 by 82	43,657 by 64

	a	*b*	*c*
6.	18,749 by 63	28,465 by 27	46,035 by 58
7.	27,231 by 24	31,406 by 34	86,664 by 47
8.	29,364 by 62	83,735 by 72	46,792 by 87
9.	86,473 by 64	64,371 by 47	56,932 by 39
10.	89,576 by 27	78,391 by 68	96,243 by 76

EXERCISE

Divide. Test your answers.

	a	*b*	*c*
1.	46,827 by 27	87,468 by 64	97,648 by 63
2.	13,853 by 45	8,642,396 by 35	66,842 by 93

	a	*b*	*c*
3.	87,648 by 81	419,421 by 97	80,647 by 86
4	81,761 by 59	60,803 by 92	86,647 by 78
5.	29,583 by 37	26,278 by 29	65,843 by 39
6.	173,843 by 86	223,475 by 69	262,837 by 58
7.	638,473 by 87	262,973 by 96	209,835 by 57
8.	203,473 by 38	546,803 by 87	268,347 by 49
9.	219,583 by 92	627,834 by 86	472,658 by 75
10.	346,583 by 49	206,583 by 53	728,935 by 89

EXERCISE

Divide. Test your answers.

	a	*b*
1.	583,475 by 121	236,469 by 153
2.	648,532 by 163	4,836,583 by 172
3.	2,029,653 by 142	629,584 by 192
4.	3,269,583 by 123	728,564 by 165
5.	2,647,835 by 184	609,324 by 156
6.	428,356 by 223	7,269,483 by 189
7.	624,783 by 241	538,473 by 323
8.	29,658,647 by 234	628,584 by 351
9.	826,573 by 543	293,847 by 449
10.	726,584 by 349	728,364 by 279

EXERCISE

Divide. Test your answers.

	a	*b*
1.	628,357 by 378	265,867 by 259
2.	426,583 by 229	7,863,842 by 531
3.	3,973,053 by 726	2,264,783 by 437

	a	*b*
4.	296,476 by 229	8,364,753 by 279
5.	6,473,832 by 435	264,658 by 634
6.	206,473 by 237	628,658 by 373
7.	465,983 by 449	6,475,836 by 729
8.	2,020,937 by 516	3,627,875 by 479
9.	6,278,394 by 239	3,265,862 by 457
10.	2,164,783 by 339	6,078,364 by 347

EXERCISE

1. A farmer sold his cattle at $51 per head. He received $72,012.00. How many cattle did he sell?

2. The province built 471 miles of gravel road at a cost of $2,325,798. What is the average cost per mile?

3. The C. P. R. built 287 miles of railway at a cost of $5,236,602. What is the average cost per mile?

4. The Western Manufacturing Company employs 250 men. The wages paid for 1 year were $337,500. What was the average yearly wage?

5. A produce dealer bought turkeys at $3.75 each. If he paid $9101.50, find the number of turkeys bought.

6. A farmer sold a load of wheat at $1.85 a bushel and received for the load $231.25. How many bushels were in the load?

7. A man is travelling by motor car at the rate of 27 miles per hour. He has a journey of 2160 miles to make and travels 10 hours a day. How many days does it take to make the journey?

8. Sound travels 37,060 feet in 34 seconds. How far will it travel in 1 second?

9. I bought a farm of 160 acres for $12,000. What was the cost per acre?

10. A farmer had 248 acres in wheat and raised 8928 bushels. Find the average yield per acre.

EXERCISE

1. A carpenter can earn $145 a month; his expenses are at the rate of $88 a month. He wishes to purchase a lot of ground which contains 19 acres, and is held at $42 per acre. In what time may he save enough to make the purchase?

2. A farmer bought land from A at $60 an acre, and the same quantity from B at $85 an acre. The whole amounted to $53,215. How many acres did he buy from each?

3. A merchant sold a piece of cloth containing 45 yards, and another containing 63 yards, at $3.75 a yard. What did he receive for the cloth?

4. A man left $2535 to each of his four children, but one of them dying the three remaining children divided the money equally among them. How much did each receive?

5. A man earns $25 a week and spends $12 a week; he saves $195. How many weeks does he work?

6. A farmer has 24 cows and 93 sheep, worth $2988; if the sheep are worth $12 each, how much is each cow worth?

7. How many barrels of flour at $6 a barrel are equal in value to 1100 tons of coal at $9 a ton?

8. If a mechanic earns $165 a month, and his expenses are $69 a month, how long will it take him to pay for a market garden of 16 acres, worth $72 an acre?

EXERCISE

1. What will 15 slates cost, if 5 slates cost 80 cents?

2. If 4 books cost 72 cents, what will 3 books cost?

3. If 6 barrels of flour cost $48, what will 7 barrels cost?

4. What will be the cost of 16 cords of wood, if 4 cords cost $24?

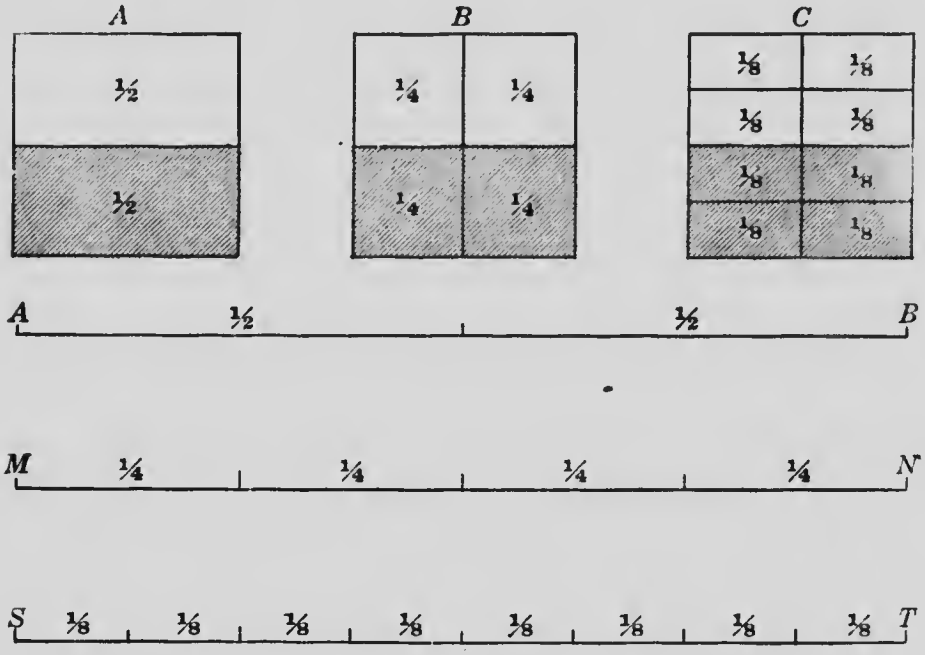
5. If 15 yards of cloth cost $75, what will 20 yards cost?

6. If 7 pounds of beef cost $1.75, what will 5 pounds cost?

7. If 12 men can earn $84 in a day, how much can 4 men earn in the same time?

8. If 28 acres of land cost $2100, how much will 43 acres cost at the same rate?

Fractions.



Into how many equal parts is the square A divided?
Into how many equal parts is the square B divided?

Into how many equal parts is the square C divided?
What part of square A is each of the two equal parts?
What part of square B is each of the four equal parts?
What part of the square C is each of the eight equal parts?

One or more of the equal parts of anything is called a *fraction*.

A square, a line, a circle, 1 dollar, 1 inch, 1, are called units.

When the square A is divided into two equal parts each part is also a unit, but a smaller unit than the whole square of which each is a part. Each of these equal units is a fractional part of the large unit, the whole square; each unit is one-half of it. These units are called fractional units.

A *fractional unit* is one of the equal parts into which a unit has been divided.

What is the fractional unit of each part in square B? In square C?

The fractional unit in square A is one-half, written $\frac{1}{2}$.
The fractional unit in square B is one-fourth, written $\frac{1}{4}$.
The fractional unit in square C is one-eighth, written $\frac{1}{8}$.

Three of the fractional units in square B are represented by the fraction $\frac{3}{4}$. Five of the fractional units in square C are represented by the fraction $\frac{5}{8}$.

A fraction consists of one or more fractional units, as $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{8}$, $\frac{2}{3}$, $\frac{4}{5}$, etc.

The number below the line shows the number of equal parts or fractional units into which the whole has been divided.

The number above the line shows how many of the equal parts or fractional units are taken.

Write the fractions representing one of the equal parts of the line AB; two of the equal parts of the line MN; three

of the equal parts of the line MN; four of the equal parts of the line ST; seven of the equal parts of the line ST.

Divide a line into 5 equal parts. What is the fractional unit of each part? Write the fraction that represents 2 of these parts; 3 of these parts; 4 of these parts; 5 of these parts.

In square B how many fourths are shaded? The shaded part is what part of the whole square? One-half is equal to how many fourths?

In square C how many eighths are shaded? How many fourths are shaded? What part of the whole square is the shaded part?

One-half is equal to how many eighths?

Two-fourths are equal to how many eighths?

$\frac{1}{2}=\frac{4}{8}$ $\frac{2}{4}=\frac{4}{8}$ $\frac{1}{2}=\frac{2}{4}=\frac{4}{8}$

EXERCISE

1. $\frac{1}{4}$ is what part of $\frac{1}{2}$? $\frac{1}{8}$ is what part of $\frac{1}{4}$? $\frac{1}{8}$ is what part of $\frac{1}{2}$?

2. $\frac{1}{2}+\frac{1}{2}=\frac{?}{2}$; $\frac{1}{4}+\frac{1}{4}=\frac{?}{2}$; $\frac{2}{4}+\frac{1}{4}=\frac{?}{4}$; $\frac{2}{4}-\frac{1}{4}=\frac{?}{4}$.

3. $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=\frac{?}{4}$; $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}=\frac{?}{8}$; $\frac{3}{8}+\frac{1}{8}=\frac{?}{8}$; $\frac{3}{8}+\frac{2}{8}=\frac{?}{8}$.

4. $\frac{1}{2}+\frac{1}{4}=\frac{?}{4}$; $\frac{1}{2}+\frac{3}{4}=\frac{?}{4}$; $\frac{1}{4}+\frac{1}{8}=\frac{?}{8}$; $\frac{1}{4}+\frac{5}{8}=\frac{?}{8}$.

5. $\frac{1}{2}+\frac{1}{8}=\frac{?}{8}$; $\frac{1}{2}+\frac{3}{8}=\frac{?}{8}$; $\frac{1}{2}+\frac{5}{8}=\frac{?}{8}$.

6. $\frac{1}{2}-\frac{1}{8}=\frac{?}{8}$; $\frac{1}{4}-\frac{1}{8}=\frac{?}{8}$; $\frac{1}{2}-\frac{3}{8}=\frac{?}{8}$; $\frac{3}{4}-\frac{5}{8}=\frac{?}{8}$; $\frac{3}{4}-\frac{1}{2}=\frac{?}{4}$; $\frac{7}{8}-\frac{1}{4}=\frac{?}{8}$; $\frac{6}{8}-\frac{1}{2}=\frac{?}{8}$.

7. How many halves are in 2? in $2\frac{1}{2}$? in 3? in $6\frac{1}{2}$?

8. How many fourths are in 2? in 3? in 4? in $3\frac{1}{4}$? in $3\frac{1}{2}$?

9. How many eighths are in 2? in 4? in 5? in $2\frac{1}{8}$? in $3\frac{1}{4}$? in $2\frac{1}{2}$?

Examples:

Add: $1\frac{1}{4}$
$3\frac{2}{4}$
$4\frac{3}{4}$

Add the fractional numbers $\frac{1}{4}$ and $\frac{2}{4}=\frac{3}{4}$. Add the whole numbers 1 and $3=4$. Sum $=4\frac{3}{4}$.

Add: $2\frac{1}{4}$, $3\frac{3}{4}$, 6 — $\frac{1}{4}+\frac{3}{4}=\frac{4}{4}=1$. Carry the 1 to the column of whole numbers. $1+3+2=6$.

Add: $4\frac{2}{4}$, $5\frac{3}{4}$, $10\frac{1}{4}$ — $\frac{2}{4}+\frac{3}{4}=\frac{5}{4}=1+\frac{1}{4}$. Put down $\frac{1}{4}$ and carry the whole number 1 to the column of whole numbers. The sum of whole numbers equals $1+5+4=10$.

Subtract: $5\frac{3}{4}$, $4\frac{2}{4}$, $1\frac{1}{4}$ — $\frac{3}{4}-\frac{2}{4}=\frac{1}{4}$. $5-4=1$.

Subtract: 6, $2\frac{3}{4}$, $3\frac{1}{4}$ — $6=5+\frac{4}{4}$ or $5\frac{4}{4}$. $5\frac{4}{4}-2\frac{3}{4}=3\frac{1}{4}$.

EXERCISE

1. Add.

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
$1\frac{1}{2}$	$2\frac{1}{4}$	$4\frac{3}{4}$	$3\frac{2}{4}$	$5\frac{1}{8}$	$3\frac{7}{8}$	$4\frac{5}{8}$	$2\frac{7}{8}$
$2\frac{1}{2}$	$3\frac{2}{4}$	$2\frac{1}{4}$	$5\frac{3}{4}$	$4\frac{3}{8}$	$2\frac{1}{8}$	$5\frac{3}{8}$	$6\frac{2}{8}$

2. Subtract:

a	*b*	*c*	*d*	*e*	*f*
$6\frac{1}{2}$	$7\frac{3}{4}$	$3\frac{5}{8}$	$5\frac{7}{8}$	$4\frac{6}{8}$	$5\frac{3}{4}$
$3\frac{1}{2}$	$2\frac{1}{4}$	$2\frac{1}{8}$	$2\frac{5}{8}$	$3\frac{1}{8}$	3

g	*h*	*i*	*j*	*k*	*l*
$7\frac{6}{8}$	4	7	8	6	9
4	$2\frac{1}{4}$	$5\frac{1}{2}$	$4\frac{1}{6}$	$3\frac{3}{4}$	$7\frac{5}{6}$

NOTE TO TEACHER. — By means of circles, squares, lines, etc. teach the relation of: *thirds* and *sixths*; *thirds* and *ninths*; *fifths* and *tenths*; *halves* and *sixths*; *halves* and *tenths*.

Show that $\frac{1}{2}=\frac{2}{4}=\frac{3}{6}=\frac{4}{8}=\frac{5}{10}$.

EXERCISE

1. $\frac{1}{3}+\frac{1}{3}=\frac{?}{3}$; $\frac{1}{3}+\frac{2}{3}=\frac{?}{3}$; $\frac{3}{3}-\frac{1}{3}=\frac{?}{3}$; $\frac{3}{3}-\frac{2}{3}=\frac{?}{3}$.

2. $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}=\frac{?}{8}$; $\frac{2}{8}+\frac{1}{8}=\frac{?}{8}$; $\frac{2}{8}+\frac{3}{8}=\frac{?}{8}$; $\frac{4}{8}-\frac{1}{8}=\frac{?}{8}$; $\frac{5}{8}-\frac{4}{8}=\frac{?}{8}$.

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

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

5. $\frac{1}{3}+\frac{1}{9}=\frac{?}{9}$; $\frac{2}{3}+\frac{1}{9}=\frac{?}{9}$; $\frac{1}{3}+\frac{4}{9}=\frac{?}{9}$; $\frac{1}{3}-\frac{1}{9}=\frac{?}{9}$; $\frac{2}{3}-\frac{4}{9}=\frac{?}{9}$; $\frac{2}{3}-\frac{6}{9}=\frac{?}{9}$.

6. $\frac{1}{5}+\frac{1}{10}=\frac{?}{10}$; $\frac{1}{5}+\frac{3}{10}=\frac{?}{10}$; $\frac{3}{5}+\frac{4}{10}=\frac{?}{10}$; $\frac{1}{5}-\frac{1}{10}=\frac{?}{10}$; $\frac{3}{5}-\frac{5}{10}=\frac{?}{10}$; $\frac{4}{5}-\frac{6}{10}=\frac{?}{10}$.

7. $\frac{1}{2}+\frac{1}{6}=\frac{?}{6}$; $\frac{1}{2}+\frac{4}{6}=\frac{?}{6}$; $\frac{1}{2}-\frac{1}{6}=\frac{?}{6}$; $\frac{1}{2}-\frac{2}{6}=\frac{?}{6}$.

8. $\frac{1}{2}+\frac{1}{10}=\frac{?}{10}$; $\frac{1}{2}+\frac{3}{10}=\frac{?}{10}$; $\frac{1}{2}-\frac{3}{10}=\frac{?}{10}$; $\frac{1}{2}-\frac{4}{10}=\frac{?}{10}$.

EXERCISE

1. Add:

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
$4\frac{1}{3}$	$5\frac{2}{3}$	$3\frac{1}{6}$	$7\frac{2}{6}$	$8\frac{2}{5}$	$9\frac{4}{5}$	$5\frac{4}{9}$	$2\frac{5}{9}$	$4\frac{3}{10}$	$5\frac{7}{10}$
$5\frac{2}{3}$	$6\frac{2}{3}$	$5\frac{4}{6}$	$8\frac{5}{6}$	$5\frac{3}{5}$	$6\frac{3}{5}$	$8\frac{2}{9}$	$8\frac{7}{9}$	$7\frac{6}{10}$	$9\frac{4}{10}$

2. Subtract:

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
$7\frac{5}{6}$	$8\frac{4}{9}$	$6\frac{7}{10}$	$5\frac{1}{2}$	$7\frac{1}{2}$	$9\frac{1}{6}$	$6\frac{1}{9}$	$8\frac{3}{10}$	$7\frac{1}{6}$	$9\frac{3}{10}$
$3\frac{2}{3}$	$5\frac{1}{3}$	$2\frac{3}{5}$	$2\frac{1}{6}$	$3\frac{3}{10}$	$4\frac{2}{3}$	$2\frac{1}{3}$	$4\frac{4}{5}$	$4\frac{1}{2}$	$6\frac{1}{2}$

Draw a line 8 inches long and divide it into two equal parts. What part of the whole line is each part? How many inches are there in each part? How do you find $\frac{1}{2}$ of 8 inches?

Divide the line into 4 equal parts. What part of the whole line is each part? How many inches are there in each part? How do you find $\frac{1}{4}$ of 8 inches? How many inches are there in $\frac{2}{4}$ of the line?

Divide a line 12 inches long into three equal parts. What part of the whole line is each part? How many inches are there in each part? How do you find $\frac{1}{3}$ of 12 inches? How would you find $\frac{1}{6}$ of 12 inches? How many inches are there in $\frac{2}{3}$ of this line? in $\frac{4}{6}$ of this line? in $\frac{5}{6}$ of this line?

Divide 12 blocks into two groups, each group having an equal number of blocks. How many blocks are there in each group? Each group contains $\frac{1}{2}$ of all the blocks. $\frac{1}{2}$ of 12 blocks = 6 blocks.

$\frac{1}{2}$ of 12 = 6.

Divide 12 blocks into six groups, each group having an equal number of blocks. Each group is what part of all the groups? The number in each group will be what part of the whole number of blocks? How many blocks are there in each group?

$\frac{1}{6}$ of 12 blocks = 2 blocks
$\frac{1}{6}$ of 12 = 2.

How many blocks are there in 2 groups? Two groups are $\frac{2}{6}$ of all the blocks.

$\frac{2}{6}$ of 12 blocks = 4 blocks
$\frac{2}{6}$ of 12 = 4.

$\frac{3}{6}$ of 12 = ? $\frac{4}{6}$ of 12 = ? $\frac{5}{6}$ of 12 = ?

Examples:

To find $\frac{5}{6}$ of 24. $\frac{1}{6}$ of 24 = 4, then $\frac{5}{6}$ of 24 = 5 times 4 = 20.

To find $\frac{7}{8}$ of 40. $\frac{1}{8}$ of 40 = 5, then $\frac{7}{8}$ of 40 = 7 times 5 = 35.

EXERCISE

1. What is $\frac{1}{4}$ of 12? $\frac{3}{4}$ of 20? $\frac{1}{8}$ of 16? $\frac{5}{8}$ of 16?
$\frac{1}{3}$ of 21? $\frac{2}{3}$ of 15? $\frac{1}{3}$ of 15? $\frac{1}{5}$ of 15?
$\frac{1}{9}$ of 27? $\frac{7}{9}$ of 27? $\frac{5}{7}$ of 21? $\frac{8}{9}$ of 81?
$\frac{5}{8}$ of 72? $\frac{6}{7}$ of 49? $\frac{1}{3}$ of 60? $\frac{7}{9}$ of 54?
$\frac{3}{8}$ of 88? $\frac{5}{6}$ of 54?

2. 4 is what part of 16? 8 is what part of 24? 6 is what part of 24? 5 is what part of 30? 7 is what part of 42? 3 is what part of 21? 7 is what part of 21? 9 is what part of 45? 9 is what part of 81? 8 is what part of 72? 2 is what part of 18?

3. If I cut $\frac{1}{3}$ yard of tape from a piece $\frac{3}{4}$ yard long, how much is left?

4. A board is $3\frac{2}{3}$ feet long. What length of board will be left, if I saw off a piece $1\frac{1}{3}$ feet long?

5. A boy works $2\frac{1}{3}$ hours on Monday and $3\frac{5}{8}$ hours on Tuesday. How many hours did he work both days?

6. A window is $5\frac{3}{4}$ feet high and $3\frac{1}{2}$ feet wide. How much greater is the height than the width?

7. There are $\frac{7}{8}$ of a yard of cloth in one piece and $\frac{3}{8}$ of a yard in another piece. What length of cloth is there in the two pieces?

8. Helen bought 6 yards of ribbon and used $1\frac{3}{4}$ yards for a hair ribbon. How much has she left?

9. I spent $\$1\frac{1}{2}$ for groceries and $\$\frac{3}{4}$ for meat. How much money did I spend all together?

10. If 8 yards of cloth cost \$24, what part of \$24 will one yard cost?

11. Find the cost of each of the following:

$3\frac{1}{2}$ pounds of steak at 30¢ a pound.
$4\frac{1}{3}$ dozen eggs at 45¢ a dozen.
$6\frac{1}{4}$ pounds of cheese at 32¢ a pound.
$2\frac{3}{4}$ yards of cloth at 80¢ a yard.
$5\frac{2}{3}$ dozen oranges at 60¢ a dozen.

12. There are $5\frac{1}{2}$ yards in 1 rod. How many yards are there in 20 rods?

13. What part of a foot is 4 inches? 3 inches? 9 inches? 8 inches?

14. Express as pounds, 20 ounces; 24 ounces; 28 ounces.

15. What part of a yard is 9 inches? 27 inches? 24 inches?

16. How many hours longer is $\frac{1}{2}$ of a day than $\frac{1}{8}$ of a day?

17. At 40¢ per pound find the cost of 5 pounds 4 ounces of butter.

18. Find the number of ounces in $\frac{3}{4}$ pound, in $\frac{7}{8}$ pound, in $\frac{5}{16}$ pound.

19. What part of a pound is 2 ounces? 4 ounces? 12 ounces? 8 ounces?

20. If you buy $1\frac{5}{8}$ dozen eggs at 48¢ per dozen, how much change should you get from a dollar bill?

CHAPTER V

PROBLEM WORK AND ACCURACY TESTS

ORAL EXERCISE

1. A lady gave a half dollar and three 10-cent pieces for 2 yards of muslin. What was the price per yard?

2. A boy is reading a book of 100 pages. He has read 60 pages. How long will it take him to finish the book, if he reads 10 pages an hour?

3. If 3 pounds of sugar cost 30 cents, what will 7 pounds cost?

4. How many cars are there in two passenger trains, one having 18 cars and the other 15 cars?

5. Bacon sells for 60 cents a pound. What part of a pound can I buy with 20 cents?

6. A man is 34 years old. In how many years will he be 50 years old?

7. How many days are there in 6 weeks? How many hours are there in $1\frac{1}{2}$ days? How many minutes are there in $2\frac{1}{2}$ hours?

8. A motor car travels at the rate of 20 miles per hour. How long will it take to travel a distance of 70 miles?

9. How many times can 15 cents be subtracted from 75 cents?

10. A family uses 3 quarts of milk per day. How many quarts are used in the month of June?

ORAL EXERCISE

1. I pay \$56 for coal at \$8 per ton. How many tons do I buy?

2. Oranges are selling at 3 for 10 cents. How many can I buy for half a dollar?

3. A milliner trims 8 hats that cost her \$5 each and sells them at \$9 each. How much does she make?

4. In an arithmetic exercise there were 21 problems. James solved $\frac{2}{3}$ of them. How many did he solve?

5. A merchant bought overcoats at \$30 and sold them at \$42. How much does he make on the sale of 5 coats?

6. At 49 cents each, how many hockey sticks can be bought for \$5? How much change will there be?

7. How many quarts of milk are in a 15-gallon can?

8. If a boy saves 10 cents a day during the month of December, how much less than \$4 does he save?

9. If 6 pounds of sugar cost 72 cents, how many pounds can be bought for 60 cents?

10. A baker burns 20 tons of coal every 3 months. What will his coal cost for the year at \$5 per ton?

PROBLEMS WITHOUT NUMBERS

1. If you know the cost of one thing, how can you find the cost of a given number of things?

2. If you know the cost of a given number of things, how can you find the price of one thing?

3. If you know the total selling price of two things and the selling price of one of them, how can you find the selling price of the other?

4. If a division is exact, the dividend is the product of what two numbers?

5. If you know the cost of a quart of anything, how can you find the cost by the gallon? By the pint?

6. How do you find the number of minutes in a day? The number of hours in a week?

7. If a certain number of articles cost a given sum, how can you find how much three times as many articles cost?

8. If you know the cost price of an article and the price for which it was sold, how can you find the gain?

9. If you know the cost price of an article and the gain made in selling the article, how can you find the selling price?

10. If you know the selling price of an article and the gain, how can you find the cost price?

11. If you buy a given number of sheep at a certain price per sheep and sell them at a greater price per sheep, in what two ways can you find the total gain?

12. How do you find three-fourths of any number?

Making Change

Find the amount of change in each of the following:

	Articles purchased	*Amount paid*
1.	$1\frac{1}{2}$ yards lace at 30¢ per yard	$1
2.	1 knife, 55 cents	$1
3.	8 yards of print at 25¢ per yard	$2
4.	3 dozen eggs at 45¢ per dozen 2 pounds bacon at 65¢ per pound 12 pounds sugar at 15¢ per pound . . .	$5

	Articles purchased	*Amount paid*
5.	2 pair shoes at \$6.75 per pair ½ dozen handkerchiefs at \$3 per dozen 3 collars at 25¢ each 5 pairs stockings at 75¢ per pair	\$20
6.	2 brooms at 75¢ each 7 bars soap at 5¢ per bar 9 pounds rice at 12¢ per pound 6 pounds tea at 65¢ per pound 8 pounds coffee at 55¢ per pound	\$15
7.	1 suit of clothes @ \$58.75 1 overcoat @ \$32.50	\$100
8.	½ dozen kitchen chairs @ \$1.75 each . .	\$15
9.	2 pounds steak @ 35¢ per pound Leg of mutton, 6 pounds, @ 48¢ per pound 6 pounds cured ham @ 60¢ per pound . .	\$10

EXERCISE

1. From the sum of \$3.50 and \$4.75 take the difference between \$8.20 and \$6.50.

2. Find the total cost of the following bills of goods:

(*a*) 1 dozen handkerchiefs @ 25¢ each.
2 dozen towels @ 30¢ each.
30 napkins @ 75¢ each.
9 yards of silk @ \$2.75 per yard.
15 yards cotton @ 25¢ per yard.

(*b*) 1 case of eggs (30 dozen) @ 45¢ per dozen.
15 pounds of tea @ 70¢ per pound.
6 baskets of grapes @ 85¢ per basket.
2 quarts of maple syrup @ \$2.00 per gallon.
½ dozen canned fruit @ 45¢ per can.

3. A farmer brought to a store $3.75 worth of eggs and $7.45 worth of butter. How many pounds of sugar at 10¢ a pound should he receive in exchange?

4. A farmer sold some oats for $450, wheat for $970, and barley for $580. How many acres of land at $25 per acre could he buy with this money?

5. A mill owner sold his mill that cost him $13,200 at a loss of $1650, and with the money bought land at $30 per acre. How many acres was he able to buy?

6. At 5¢ a pint what will 6 quarts of milk cost?

7. How many gallons of molasses worth 10¢ a quart can you buy for $1.20?

8. At $16 a ton, how many tons of hay can you buy with $720?

9. A farmer lost $750 on a farm which he sold for $5870. How much would he have received for the farm, if in selling he had gained $380?

10. A man paid $85 for a buggy and three times as much for a driving horse. How much money did the horse and carriage together cost?

EXERCISE

1. In a village school the attendance was Monday 138, Tuesday 145, Wednesday 136, Thursday 143, Friday 146. Find the total attendance for the week.

2. Which is worth more, and how much more, a farm of 640 acres valued at $25 per acre or 35 building lots valued at $450 each?

3. A tailor has a piece of cloth containing 145 yards. How many yards will be left after cutting from it 24 suits, if each suit takes 5 yards?

4. A clerk receives $65 a month for the first four months of the year, $75 per month for the next four months, and $85 per month for the remainder of the year. How much money does he earn in a year?

5. A farmer had a flock of 120 sheep. He sold $\frac{1}{4}$ of them for $450. How many did he sell? How much did he receive for each sheep?

6. A city newspaper has 19,275 subscribers, 3486 of whom live outside the city. How many live in the city?

7. A dairy company buys 300 quarts of milk daily from the farmers. How many gallons of milk does this company buy in a week?

8. A man bought a house for $3675 and sold it for $4250. How much did he gain?

9. A merchant pays $1260 a year for rent of store, $1600 to one clerk, $1275 to another, $1540 to his bookkeeper, and $687 for other expenses. What are the expenses of his business for one year?

10. If 2 acres of wheat produce 70 bushels, what will 12 acres produce?

EXERCISE

1. A young man earns $105 per month and spends $48 per month. How much will he save in 2 years?

2. A rancher has 328 horses. He keeps 150 of them and sells the remainder at $125 per head. How much does he get for them?

3. There are 69 eggs in a box. How many will be left after 4 dozen of them are sold?

4. A man bought a sofa for $73 and two chairs at $22.50 each. He gave the clerk 12 ten-dollar bills. How much change should he receive?

5. A carload of lemons consisting of 2950 boxes was sold at $2.35 per box. Find the value of the carload.

6. Find the cost of sending 28,500 pounds of oranges from California to Edmonton at $1.15 per 100 pounds.

7. A farmer bought a house and lot in the city for $6000. As part payment he gave 124 steers valued at $45 each, and the balance he paid in cash. How much cash did he have to pay?

8. In 1 ream of paper there are 480 sheets. How many sheets are there in 947 reams?

9. How many apples will an orchard containing 387 trees produce, if the average yield is 1269 apples for each tree?

10. How many yards of sheeting are there in 389 bales, each bale containing 25 pieces and each piece 43 yards?

EXERCISE

1. A sheep buyer bought 247 sheep at $15.75 each and 123 more at $14.50 each. How much did he pay for all the sheep?

2. A grocer mixed 78 pounds of tea costing 45 cents per pound, 65 pounds costing 42 cents per pound, and 39 pounds costing 55 cents per pound. What is the mixture worth? If he sold this mixture at 60 cents per pound, how much did he gain?

3. A merchant had 26 pieces of cloth of 54 yards each, which he sold at 45 cents per yard. How much did he get for the cloth?

4. A flour mill grinds 125 barrels of 196 pounds each, per day. How many pounds will this mill grind in 2 weeks of 6 days each?

5. How much will it cost to build 628 miles of railroad at $7500 per mile?

6. A farmer sold 58 cows at $74 each and received in payment $3750 cash and a second-hand motor car. What was the value of the motor car?

7. A farmer sold 76 hens at 95 cents each, 23 ducks at $1.15 each, and 48 turkeys at $4.25 each. How much money did he get for his fowl?

8. If a dairy cow eats 35 pounds of silage a day, how many pounds of silage will it take to feed a herd of 24 cows for 30 days?

9. A man receives a salary of $2500 per year. He pays $35 per month house rent, $55 per month for food and clothing, and $260 per year for other expenses. How much does he save each year?

10. I bought 8 pounds of sugar at 15 cents a pound, 4 dozen eggs at 55 cents a dozen, 5 pounds of tea at 65 cents per pound, and 2 dozen oranges at 60 cents a dozen. What was the amount of my bill?

EXERCISE

1. A man bought 320 acres of land at $25 per acre. He paid $5500 cash. How much does he still owe?

2. How many inches are in 278 yards?

3. A farmer sold a load of wheat containing 21 bags of 2 bushels in each bag at $1.95 per bushel. How much did he get for the load?

4. A grain buyer bought 2850 bushels of oats at 68 cents per bushel and sold the oats at 75 cents per bushel. How much money did he make?

5. At a daily wage of $4.25, how much will 20 men earn in two weeks?

6. A farmer bought a motor car costing $1875. In payment for the car he gave 12 young horses valued at $95 each and the balance in money. How much money did he pay?

7. A merchant goes to the bank to get small change. How many 10-cent pieces will he get for three 2-dollar bills? How many 5-cent pieces will he get for two 5-dollar bills?

8. If to send a telegram costs 25 cents for the first 10 words and 3 cents for each additional word, what is the cost of a telegram of 18 words?

9. A boy has a paper route with 48 customers. The paper sells at 15 cents per week. At the end of the week he collected $5.10. How much is still owing him on his week's sales?

10. John received two 10-dollar bills for a Christmas present. He bought a pair of boots costing $4.75, a pair of skates costing $2.15, 3 pairs of stockings at 75 cents a pair, and 4 shirts at $1.35 each. How much money has he left?

EXERCISE

1. A gallon of maple syrup cost $2.00. At the same price what will a pint of it cost?

2. How many days are there in 1032 hours?

3. A farmer using two binders can cut 25 acres of wheat per day. How long will it take to cut his crop of 650 acres?

4. A cattle buyer bought 24 head of steers for $1080. What was the average price per head?

5. A traveller stopped at a hotel 8 days and was charged $28.00. What day-rate did this hotel charge?

6. How many years are in 6708 weeks?

7. A barrel of flour weighs 196 pounds. How many barrels will it take to hold 406,700 pounds of flour?

8. There were 156 bananas in a bunch. How many dozen bananas were there?

9. How many yards are in 3888 inches?

10. How many pounds of beef at 30 cents per pound can be bought for $5.40?

EXERCISE

1. A train travels 840 miles in a day. How many miles per hour does the train travel?

2. If a horse eats 2 quarts of oats in a day, how long will 3 pecks last him?

3. A lady bought 6 chairs and a table for $120. If the table cost $48, what was the price of each chair?

4. A family's milk supply for a week cost $2.10. How many quarts per day do they use, if the price of a quart is 15 cents?

5. Find the wages of a laborer who has worked 504 hours at $3.50 per day of 8 hours each.

6. At a sheep sale 48 sheep were sold for $672. Find the average sale price per sheep.

7. A man earns $123.50 a month. How much does he earn per day, if he works 26 days per month?

8. A man with $3008 bought as many horses as possible at $145 each, and invested the remainder in sheep at $12 each. How many horses and how many sheep did he buy?

9. A clerk's salary is $95 per month, and his expenses are $39 per month. How long will it take him to save $504?

10. A canning factory ships 45,000 cans of fruit in boxes which hold 3 dozen cans. How many boxes will be required?

Accuracy and Time Tests

Add:

Give 5 marks for each correct answer and find how many marks you can make in 5 minutes; in 10 minutes.

	a	*b*	*c*	*d*	*e*
1.	98,636	32,908	98,756	7,938	83,948
	41,684	6,783	4,689	856	76,495
	74,849	91,876	987	69,594	94,783
	85,872	65,394	95	8,457	58,798
	98,637	9,548	75,823	96,783	68,869
	29,468	83,679	9,438	9,658	89,557

f	*g*	*h*	*i*	*j*
$435.50	$968.38	$897.78	$396.85	$78.49
296.85	257.45	676.93	8.74	596.27
927.44	98.47	784.67	85.97	923.85
633.29	9.63	687.89	963.45	49.68
379.86	.85	836.78	858.56	486.99
543.75	795.98	458.65	7.63	6.75
897.55	627.67	239.48	85.46	35.85

2. Add:

(*a*) 6472+8733+4639+8454+9658+8963

(*b*) 721+6434+8705+97+896+8+573+2563

(*c*) 15+8756+7805+66,782+4987+8768

(*d*) 1525+920+96+837+6874+79+9

(*e*) 7+89+897+9284+576+87+37+658

(*f*) $3127.24+$918.30+$309.43+$9.48+$100.49

(*g*) $976.45+$8.75+$856.09+$77.43+$6.84+$768.94

(*h*) $1002.80+$15.65+$763.97+$5.88+$97.38+$928.54

3. Dictate the following numbers for the pupils to add:

(*a*) 405, 9367, 8029, 7008, 25,039, 88, 768, 1001, 101.
(*b*) 98, 827, 5099, 8888, 6003, 8, 596, 76, 2002.
(*c*) 7805, 66,782, 4987, 65, 605, 20,098, 5609, 8008.
(*d*) $37.95, $906.88, $3856.45, $2008.68, $9.08, $686.

Add:

4.

a	*b*	*c*	*d*	*e*	*f*
6472	2762	1617	2650	7583	27,845
8733	8756	8743	4062	3847	67,832
4633	9783	7284	8705	785	74,281
4854	4578	9621	9030	8764	68,432
569	432	978	999	5938	3,687
8674	9876	8465	2897	898	9,699

g	*h*	*i*	*j*	*k*
6,758	958	89	45,849	8976
4,367	5,863	8,756	89,763	2145
47,823	127	983	48,297	6389
68,421	6,434	65,782	93,826	8547
79,893	7,895	9	58,643	9872
50,387	66,786	17	86,578	5988
5,648	4,987	874	78,947	4365
79	8,768	78	25,644	7898

5. Multiply:

(*a*) 8396 by 98
(*b*) 9439 by 76
(*c*) 7385 by 96
(*d*) 6804 by 79
(*e*) 59,403 by 258
(*f*) 68,946 by 374
(*g*) 469,382 by 708
(*h*) 87,143 by 687
(*i*) 203,806 by 9008
(*j*) 695,836 by 96
(*k*) 74,382 by 3052
(*l*) 89,675 by 745
(*m*) $28.75 by 68
(*n*) $67.56 by 95
(*o*) $909.74 by 325
(*p*) $2080.55 by 49

6. Subtract:

a	*b*	*c*	*d*
3,946,275	2,095,643	8,605,037	7,032,050
2,897,328	1,987,296	5,986,395	6,984,736

e	*f*	*g*	*h*
$4362.95	$3000.25	$5306.09	$10,083.55
2976.28	1964.37	4968.27	9,998.68

7. Subtract and test your answers:

a	*b*	*c*	*d*	*e*
$258.25	$598.27	$306.00	$827.55	$428.62
199.48	399.48	229.43	538.68	247.83

f	*g*	*h*	*i*	*j*
$1790.73	$335.50	$2396.00	$5008.23	$6029.45
895.87	38.65	1847.38	4959.38	4976.86

k	*l*	*m*	*n*	*o*
$302.25	$805.07	$1000.00	$500.10	$1032.55
9.88	88.88	638.27	7.88	897.68

8. Multiply. Find how many correct answers you can get in 10 minutes; in 5 minutes:

(*a*) 744 by 635
(*b*) 895 by 637
(*c*) 972 and 843
(*d*) 5946 by 76
(*e*) 8972 by 97
(*f*) 4963 by 86
(*g*) 34,073 by 758
(*h*) 29,304 by 879
(*i*) 23,567 by 597
(*j*) 88,388 by 789
(*k*) 85,474 by 5093
(*l*) 3798 by 6070
(*m*) 89,638 by 5004
(*n*) 3678 by 7068
(*o*) 8964 by 20,903
(*p*) 73,519 by 4735

9. Divide:

(*a*) 87,468 by 64
(*b*) 13,853 by 45
(*c*) 730,821 by 49
(*d*) 419,421 by 99
(*e*) 80,634 by 144
(*f*) 39,298 by 801
(*g*) 80,157 by 346
(*h*) 600,805 by 196
(*i*) 876,905 by 379
(*j*) 293,854 by 467
(*k*) 395,603 by 683
(*l*) 200,356 by 758
(*m*) $796.92 by 229
(*n*) $696.87 by 267
(*o*) 407,886 by 471
(*p*) 311,812 by 548

CHAPTER VI

DENOMINATE NUMBERS AND THE COMPOUND RULES

What unit of measure does the grocery man use in measuring the sugar he sells? What unit of measure does the dry goods merchant use in selling cloth? What unit of measure does a farmer use in estimating the amount of grain he has? What unit of measure does the dairy man use in selling milk? What unit of measure do you use in finding the amount of money you have?

What is the unit, and how often is the unit repeated in 8 feet? in 4 ounces? in 6 dozen? in 20 cents? in 3 gallons? in 2 hours?

Measuring a quantity is the process of finding how many times the fixed unit of that quantity is contained in it.

These concrete numbers, 8 feet, 4 ounces, etc., in which the unit of measure has a fixed value established by law or custom, are called *denominate numbers*.

A denominate number composed of units of only one denomination, as 2 feet, 4 tons, 5 hours, is called a *simple denominate number*.

A denominate number containing units of two or more denominations each of which may be expressed in terms of the other, as 3 feet 4 inches, 5 hours 30 minutes, 2 gallons 3 quarts, is called a *compound denominate number*.

Canadian Money

Canadian money is the legal currency of the Dominion of Canada. It is composed of *dollars*, *cents*, and *mills*.

The *dollar* is the unit and is denoted by the symbol **$**.

10 mills = 1 cent
100 cents = $1

In writing a sum of money dollars are separated from cents by a *point*. Thus $6.75 is read six dollars and seventy-five cents. Any number of cents less than ten, when written with dollars, occupies the second place to the right of the *point*, and the first place to the right of the point is occupied by a zero, thus 4 dollars and five cents is written $4.05. The mill is one-tenth of a cent, and is written one place to the right of the cents; thus, $3.775 is read 3 dollars, 77 cents, and 5 mills.

The present silver coins of the Dominion are the fifty-cent piece, the twenty-five cent piece, the ten-cent piece, and the five-cent piece. The only copper coin is the one-cent piece. The mill is not coined and is used only in certain computations.

ORAL EXERCISES

1. How many cents are there in $3.16? in $4.25? in $2.05? in $9.50? in $10.05?

2. How many cents are equal to a five-dollar bill? to a dollar bill and 25 cents? to a ten-dollar bill and 10 cents? to a two-dollar bill and 5 cents?

3. How many cents are there in one dollar and a half? in one dollar and a quarter? in five dollars and a half?

4. How many dollars and cents are there in 375 cents? in 525 cents? in 910 cents? in 1025 cents? in 605 cents?

5. How many two-dollar bills are equal to 600 cents? to 800 cents? to 1000 cents?

6. How many ten-cent pieces are there is $2? in $3? in $5?

7. How many cents are equal to 3 ten-dollar bills? to two five-dollar bills? to 4 ten-dollar bills?

8. How many five-cent pieces are there in $2? in one dollar and a half? in two dollars and a quarter?

Reduction.

The process of changing the units of one denomination to units of another denomination of a denominate number without changing its value is called *reduction.*

Which is the unit of greater value, $1 or 1 cent? Which is the unit of greater weight, 1 pound or 1 ounce? Which is the unit of greater length, 1 foot or 1 yard?

Changing a given unit to a smaller unit is called *reduction to a lower denomination* or *reduction descending.*

Changing a given unit to a larger unit is called *reduction to a higher denomination* or *reduction ascending.*

EXERCISE

Reduce to cents, and read:

1. $5; $7.36; $17.04.
2. $29.18; $414.36; $200.09.
3. $361.07; $500.75; $1000.10.
4. $11,875.63; $3647.29; $76,841.06.
5. $20,063.07; $10,101.01; $20,025.05.

Reduce to dollars and cents, and read:

6. 368 cents; 700 cents; 1236 cents.

7. 3605 cents; 7008 cents; 50,205 cents.

8. 54,168 cents; 400,709 cents; 684,007 cents.

9. 300,041 cents; 280,014 cents; 340,001 cents.

British or Sterling Money

4 farthings (far.)	= 1 penny (1*d.*)
12 pence	= 1 shilling (1*s.*)
20 shillings	= 1 pound (£1)

£1 sterling = $4.86⅔; 1*s.* = 24⅓ cents; 21*s.* = 1 guinea; 5*s.* = a crown

ORAL EXERCISE

1. How many far. are there in 3*d.*? in 5*d.*? in 8*d.*? in 6¼*d.*?

2. How many pence are there in 12 far.? in 16 far.? in 20 far.?

3. How many pence in 2*s.*? in 3*s.*? in 5*s.*? in 8*s.*? in 4⅓*s.*?

4. How many pence in 1*s.* 3*d.*? in 2*s.* 10 *d.*? in 5*s.* 8*d.*? in 8*s.* 4*d.*?

5. How many shillings in £1 12*s.*? in £2 10*s.*? in £5? in £4 8*s.*?

6. How many shillings are there in 24*d.*? in 48*d.*? in 30*d.*? in 64*d.*?

7. How many shillings and pence are there in 28*d.*? in 42*d.*? in 54*d.*? in 66*d.*?

8. How many pounds and shillings are there in 50*s.*? in 68*s.*? in 84*s.*? in 90*s.*? in 96*s.*?

Example: Reduce £6 5*s*. 3*d*. to pence.

£6 = 6 × 20*s*. = 120*s*.
£6 5*s*. = 120*s*. + 5*s*. = 125*s*.
125*s*. = 125 × 12*d*. = 1500*d*.
125*s*. 3*d*. = 1500*d*. + 3*d*.
= 1503*d*.
£6 5*s*. 3*d*. = 1503*d*.

£6 5*s*. 3*d*.
6
20
120(*s*.)
5(*s*.)
125(*s*.)
12
1500(*d*.)
3(*d*.)
1503(*d*.)

Example: Reduce 3679 farthings to pounds, shillings, and pence.

3679 far. = (3679 ÷ 4)*d*. = 919*d*. 3 far.
919*d*. = (919 ÷ 12)*s*. = 76*s*. 7*d*.
76*s*. = £(76 ÷ 20) = £3 16*s*.
Hence 3679 far. = £3 16*s*. 7*d*. 3 far.

4)3679 (far.)
12) 919 − 3 far.
20) 76 − 7*d*.
£3 − 16*s*.
£3 16*s*. 7*d*. 3 far.

EXERCISE

Reduce:

1. 7*s*. 8*d*. to pence.
2. £1 3*s*. to farthings.
3. 7145*d*. to £ *s*. *d*.
4. 6185*s*. to £ *s*.
5. £10 6*d*. to pence.
6. £2 6*s*. 8*d*. to pence
7. 3910 far. to £, etc.
8. 7163*d*. to £, etc.
9. £191 9*s*. 11*d*. 3 far. to farthings.
10. £3 6*s*. 10*d*. 2 far. to farthings.

Table of Weight — Avoirdupois Weight

16 drams (dr.)	= 1 ounce	(oz.)
16 ounces	= 1 pound	(lb.)
100 pounds	= 1 hundredweight	(cwt.)
20 hundredweight	= 2000 pounds = 1 ton	(T.)

The ton of 2000 lb. is sometimes called the *short ton* to distinguish it from a ton of 2240 lb. called a *long ton*, which is frequently used in weighing mining products. In Great Britain the long ton is used, and 1 cwt. = 112 lb., also 14 lb. = 1 stone.

Goldsmiths still use an old table of Troy weight for weighing gold, silver, platinum, and precious stones; and doctors use Apothecaries' weight in medicinal prescriptions.

These tables are given for reference only.

Troy Weight

20 grains	= 1 pennyweight	(dwt.)
20 pennyweights	= 1 ounce	(oz.)
12 ounces	= 1 pound	(lb.)

Apothecaries' Weight

20 grains	= 1 scruple	(sc.)
3 scruples	= 1 dram	(dr.)
8 drams	= 1 ounce	(oz.)
12 ounces	= 1 pound	(lb.)

The ounce and pound of Apothecaries' weight are the same as in Troy weight.

The avoirdupois pound contains 7000 grains, the Troy pound 5670 grains.

A *carat* is a unit of weight used in weighing diamonds and is approximately equal to 3.086 troy grains. The term *carat* is also used to express the number of parts of pure gold in articles of jewellery. Thus, if 14 parts out of 24 parts are pure gold, and the remaining 10 parts are alloy, the gold is said to be 14 carats fine.

ORAL EXERCISE

1. How many ounces are there in 2 lb.? in 1 lb. 8 oz.? in 3 lb. 4 oz.?

2. How many pounds are there in 32 oz.? in 20 oz.? in 48 oz.? in 40 oz.?

3. What part of a pound is 4 oz.? is 8 oz.? is 12 oz.?

4. How many tons are there in 4000 lb.? in 3000 lb.? in 7000 lb.?

5. What part of a ton is 500 lb.? is 1000 lb.? is 1500 lb.?

6. How many hundredweight in 600 lb.? in 350 lb.? in 425 lb.? in 475 lb.?

7. How many tons in 40 cwt.? in 50 cwt.? in 65 cwt.?

Example: Reduce 3 T. 6 cwt. 51 lb. 7 oz. to ounces.

3 T. 6 cwt. 51 lb. 7 oz.

20
60 (cwt.)
6
66 (cwt.)
100
6600 (lb.)
51
6651 (lb.)

6651 (lb.)
16
106416 (oz.)
7
106423 oz.

Example: Reduce 147,658 oz. to T., cwt., lb.

16)147658
100) 9228 – 10 oz.
20) 92 – 28 lb.
4 T. – 12 cwt.

4 T. 12 cwt. 28 lb. 10 oz.

EXERCISE

Reduce:

1. 4 T. 32 lb. 9 oz. to ounces.
2. 5 lb. 6 oz. to ounces.
3. 21,645 oz. to cwt., lb., oz.
4. 2 T. 5 cwt. 4 oz. to ounces.
5. 76,385 oz. to tons, etc.
6. 3 cwt. 81 lb. 5 oz. to oz.
7. 51,649 lb. to tons, etc.
8. 8643 oz. to cwt., etc.

9. I bought two loads of coal, one weighing 4600 pounds and the other 4400 pounds. At $8 per ton, what did the coal cost me?

10. A teamster hauled a load of stone weighing 2¼ tons. Find the weight of the load in pounds.

11. A load of hay weighed 4360 pounds, and the wagon weighed 1360 pounds. Find the value of the hay at $20 per ton.

12. A farmer sold his hogs weighing 7800 pounds at $9.50 per hundredweight. How much money did he get from this sale?

13. An ice company retails ice at 40¢ per cwt. What does the company get for 3 tons of ice?

14. An ice company stores 360 tons of ice during the winter. If each of its customers uses on the average 1200 pounds a season, how many customers could it supply?

Table of Length or Linear Measure

12 inches (in.)	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
5½ yards, or 16½ feet	= 1 rod (rd.)
320 rods, or 1760 yards, or 5280 feet	= 1 mile (mi.)
80 chains	= 1 mile

The Dominion standard unit of length is the yard.

The mile used in the above table is called a *statute mile.* The geographical or nautical mile, also called a *knot,* is equal to 1.15 statute miles. The knot is used in estimating the speed of vessels.

Gunter's chain is used in measuring land. It is 22 yards in length and is divided into 100 links, each link being 7.92 inches long.

Sailors use the *fathom* (6 ft.) and *cable length* (120 fathoms) for measuring depths.

The hand (the breadth of the hand and thumb), used in measuring the height of horses at the shoulder, is 4 inches.

EXERCISE

1. Measure and give the length and width of the top of your desk, the length and width of your arithmetic, the width of your class room door, the width of the windows, the length and width of your class room.

2. Estimate the length of a foot and of a yard on the blackboard and then measure the distance marked to find how accurate your judgment is.

3. Estimate the length of a rod on the floor of your class room and then measure the distance marked.

4. Estimate the width of the street or road and then measure these widths.

5. How far do you live from school?

6. What building is about a mile from your school?

Note. — Pupils should make many estimates and measurements in order to develop skill in estimating short distances.

ORAL EXERCISE

1. How many feet are there in 5 yd.? in 8 yd.? in 3 yd.? 2 ft.?

2. How many inches are there in 6 ft.? in 3 ft. 4 in.? in 7 ft. 6 in.? in 2 yd.? in 2 yd. 1 ft.?

3. What part of a yard is 18 in.? 9 in.? 27 in.? 4 in.?

4. What part of a mile is 80 rd.? 240 rd.? 880 yd.?

5. How many feet are in 48 in.? in 30 in.? in 52 in.? in 99 in.?

6. A road is a chain wide. How many feet wide is it?

EXERCISE

1. What would be the cost of picture moulding around a room 12 ft. long and 10 ft. wide, at 15¢ per foot?

2. A horse is 16 hands high. How many feet high is he?

3. A harbor is 6 fathoms 4 ft. deep. Express this depth in feet.

4. How many fathoms are there in 48 yards?

5. A class of 40 pupils bought 30 yards of ribbon for class colors to be divided equally among them. How many inches of ribbon will each pupil get?

6. How many tons of steel rails will it take for a mile of railroad, if the rails average 70 lb. to the yard?

7. How many bolts, each 7 in. long, can be cut from a bar of iron 14 ft. in length?

8. A train runs at the rate of 60 ft. per second. What is this rate in miles per hour?

9. Find the cost of 9 yd. 2 ft. of pipe, weighing 4 lb. to the foot, at 40¢ a pound.

10. How many feet of wire are needed to build a fence 4 wires high around a lot 24 yd. wide and 32 yd. long?

11. A city block is 440 ft. long. How many blocks are there to a mile?

12. How many steps, each 2 ft. 6 in. long, will a boy take in walking ½ mile?

Reduce:

1. 2 mi. 45 rd. to rods.
2. 84 yd. 1 ft. to inches.
3. 12 fathoms 1 ft. to feet.
4. 7845 in. to yards, etc.
5. 4562 rd. to miles.
6. 17 chains to inches.
7. 145 yd. 1 ft. 6 in. to in.
8. 7689 in. to chains.

Surface Measure or Square Measure

Observe the outside of a box, the outside of a sheet of paper, the outside of a football, the outside of a board.

The outside of anything is called its surface.

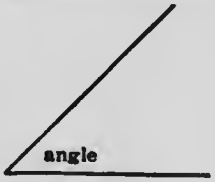
How many surfaces are there on a sheet of paper? on a box? on a football?

A surface has length and width only.

Find the length and width of a page of your arithmetic, of the top of your desk, of the top of the teacher's desk.

The length and width of a surface are called its *dimensions*.

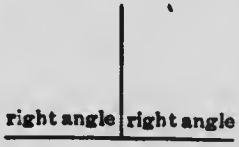
Find the dimensions of the door of your class room, of one of the window panes, of the floor of your class room.



The difference in direction of two straight lines is called an *angle*.

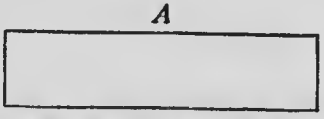
Examine the angles formed by these two straight lines.

Compare these angles with one another. Compare one of them with the angle at the corner of a page of this book.



The angle formed by two straight lines meeting in a square corner is called a *right angle*.

Examine Figure A. How many sides has it. What kind of angle is each of the four angles?

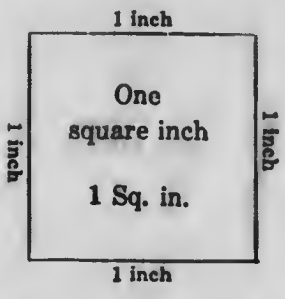


A figure enclosed by four straight lines, with each of its angles a right angle, is called a *rectangle*.

Draw rectangles with the following dimensions; 4 in. by 3 in., 5 in. by 2 in., 6 in. by 3 in.

A rectangle which is longer than wide is called an *oblong*.

A rectangle with all its sides equal is a *square*.



A rectangle 1 in. long and 1 in. wide is a *square inch*, and any surface equal in area to this, no matter what its shape may be, is a square inch.

Draw on the blackboard a rectangle one foot long and one foot wide, or a square foot. Divide it into square inches. How many of these square inches are in one row along one side?

How many such rows of squares are in the square foot?

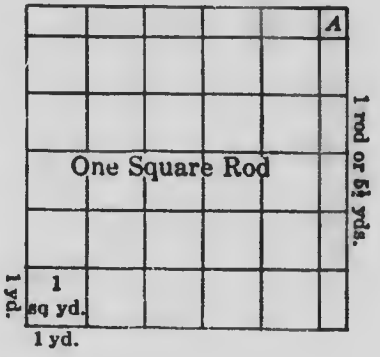
How many square inches are in a square foot?

The number of square inches in a square foot is found by multiplying the number of square inches in the row of squares on one side by the number of such rows.

Draw a square yard on the blackboard and divide it into square feet. How many square feet make a square yard?

Using an inch to represent a yard, draw a square to represent a square rod.

As each inch represents a yard in length, a square inch in your drawing will represent a square yard.



How many entire squares representing square yards are in the figure?

What part of a square yard is the small square marked A?

How many oblongs are in the figure?

How many of these oblongs are equal to one full square or square yard?

To how many square yards are all the oblongs equal?

How many square yards are in the figure? How many square yards are in a square rod?

The dimensions of a surface are given in linear units. If the dimensions are given in inches, the unit of measurement of the surface is the square inch. If the dimensions are given in feet, the unit of measurement is the square foot, etc.

The distance around a surface is called the *perimeter* of the surface.

Table of Surface Measure or Square Measure

144 square inches (sq. in.)	= 1 square foot	(sq. ft.)
9 square feet	= 1 square yard	(sq. yd.)
30¼ square yards	= 1 square rod	(sq. rd.)
160 square rods	= 1 acre	(A.)
4840 square yards	= 1 acre	(A.)
640 acres	= 1 square mile	(sq. mi.)

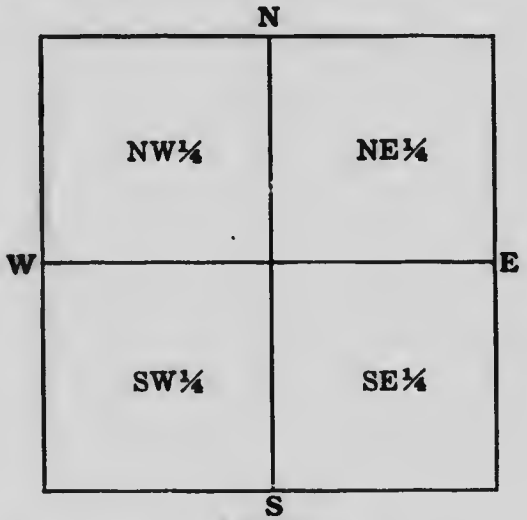
10,000 square links = 1 square chain

10 square chains = 4840 sq. yd. = 160 sq. rd. = 1 A.

Measurement of land in the Prairie Provinces.

A section is a tract of land 320 rods or 1 mile square and therefore contains 1 square mile or 640 acres. It is divided into half sections which are designated North, South, East, or West halves, or into quarter sections which are designated N.E., S.E., N.W., and S.W. quarters.

The Western Provinces have been surveyed and divided into *townships* by a system of parallel lines running east



A Section

and west and another system of parallel lines running north and south. A township is a tract of land six miles

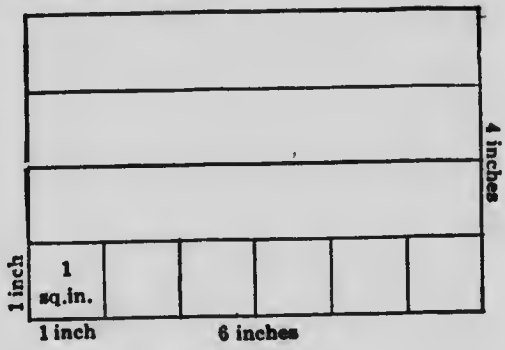
31	32	33	34	35	36
30	29	28	27	26	25
19	20	21	22	23	24
18	17	16	15	14	13
7	8	9	10	11	12
6	5	4	3	2	1

A Township

square and therefore contains 36 sections. These are numbered as in the figure.

To find the area of any rectangular surface.

To find the area, or number of square inches, in a rectangle 6 inches long and 4 inches wide.



How many square inches are in one row along the side of the rectangle?

How many such rows complete the rectangle?

How many square inches are in the four rows?

How many square inches are in the rectangle?

Area of rectangle $= 4 \times 6$ sq. inches or $4 \times 6 \times 1$ sq. in.
$= 24$ sq. inches.

The number of square units in the area of any rectangular surface is equal to the product of the number of linear units in its length and the number of linear units in its width.

Draw a rectangle 8 in. by 3 in. and find its area.

ORAL EXERCISE

1. How many acres are in a half section? in a quarter section? in three quarters of a section? in a section and a half?

2. What is the area of the floor of a room 10 ft. wide and 12 ft. long?

3. What is the area of a blackboard 4 ft. wide and 15 ft. long?

4. What is the area of a sheet of paper 6 in. wide and 12 in. long?

5. A garden is 8 rods wide and 14 rods long. What is its area?

EXERCISE

Reduce:

1. 8 sq. yd. to square inches.
2. 9 sq. yd. 10 sq. ft. to square inches.
3. 17,856 sq. in. to square feet.
4. 36,847 sq. in. to square yards.
5. 5 A. 40 sq. rd. to square rods.
6. 7845 sq. rd. to acres.
7. 17 sq. yd. 97 sq. in. to square inches.
8. 2 quarter sections to square rods.
9. 20 sq. chains to square feet.
10. 4800 sq. rd. to square chains.

EXERCISE

1. A room is 12 ft. long, 10 ft. wide, and 9 ft. high. How many square feet are in the two end walls? in the two side walls? in the ceiling? in the floor?

How many square yards of carpet will be needed to cover the floor?

2. Find the cost of painting both sides of a tight board fence 8 ft. high and 120 ft. long at 25¢ per 10 sq. ft.

3. How much will it cost to fence a rectangular farm 240 rd. long and 80 rd. wide, at 75¢ per rd.? How many acres does this farm contain?

4. How many acres are in a rectangular field 40 rd. long and 22 rd. wide?

5. What is the shape of a quarter section? What are its dimensions?

6. A man owns the N.W. $\frac{1}{4}$ and the S. $\frac{1}{2}$ of Section 4 in a certain township. How many acres has he? How much will it cost to enclose this land with a fence at 50¢ per rod?

7. What is the W. ½ and the S. E. ¼ of Section 6 worth at $20 per acre?

8. Find the dimensions of the floor of your class room and then find the area of the floor. What unit do you use?

9. Measure and find the area of a pane of glass in the school window. What unit of measurement do you use?

ORAL EXERCISE

1. How many square feet are in 9 square yards? in 12 square yards?

2. How many square yards are in 48 sq. ft.? in 69 sq. ft.? in 84 sq. ft.?

3. How many square rods are in half an acre? in a quarter of an acre?

4. Calculate the value of the land in a township at $25 per acre.

5. How far is it by road in any township from:

(*a*) the south-west corner of section 1 to the north-west corner of section 13?

(*b*) the south-east corner of section 2 to the north-west corner of section 21?

(*c*) the north-west corner of section 18 to the north-east corner of section 36?

6. A rural school house is situated at the S.E. corner of Section 16. How far will children have to walk to school whose home is situated on the S.W. corner of Section 2 in the same township as the school?

Cubic or Solid Measure

Examine a covered box or a brick.

Measure the length, width, and depth of the box or brick.

A body having three dimensions, length, width, and depth, is called a *solid*.

The space it occupies is called its *volume*.

Examine the faces of a covered box, of a brick. How many faces has each? What is the shape of each face?

A solid bounded by six rectangular faces is called a *rectangular solid*.

The lines in which the faces meet are called *edges*.

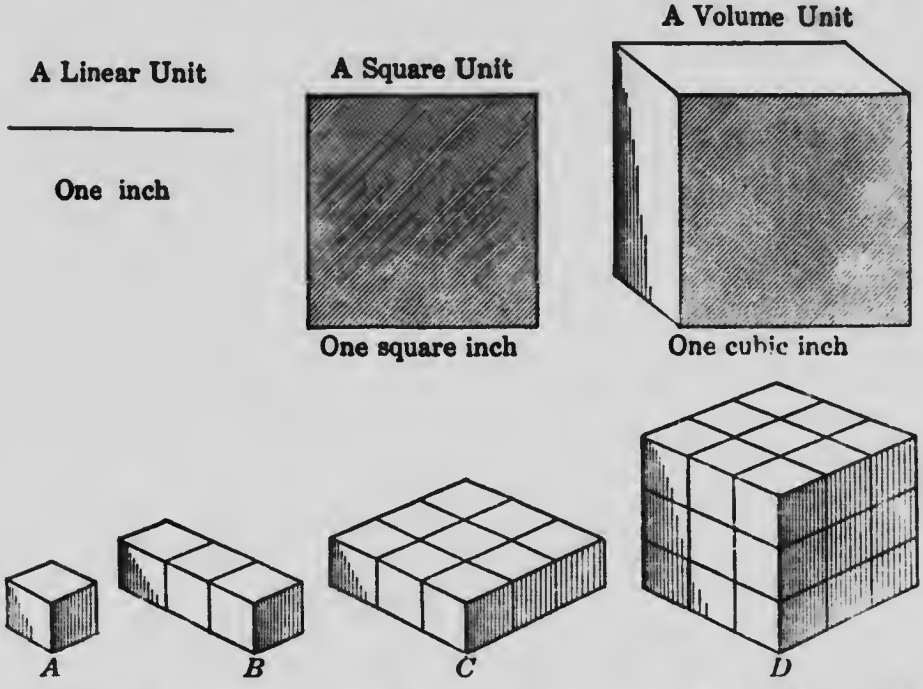
How many edges has a rectangular solid?

Examine a rectangular solid all of whose faces are square.

Measure the dimensions of this solid.

A rectangular solid, all of whose faces are square, or whose dimensions are equal, is called a *cube*.

A cube whose dimensions are each one inch is called an *inch cube* or a cubic inch, and any space equal in volume to this cube, no matter what its shape may be, is a cubic inch.



If A is one cubic inch, what is the volume of B? of C? of D?

Block B is three times as long as Block A and therefore its volume is 3×1 cubic inch.

Block C is 3 times as wide as Block B and therefore its volume is $3 \times 3 \times 1$ cubic inch.

Block D is 3 times as thick (high) as Block C and therefore its volume is $3 \times 3 \times 3 \times 1$ cubic inch or 27 cubic inches.

ORAL EXERCISE

How many cubic inches are in rectangular solids of the following dimensions:

1. (*a*) 4 in. long, 1 in. wide, and 1 in. thick?
   (*b*) 4 in. long, 2 in. wide, and 1 in. thick?
   (*c*) 4 in. long, 2 in. wide, and 3 in. thick?
   (*d*) 5 in. long, 4 in. wide, and 2 in. thick?
   (*e*) 6 in. long, 3 in. wide, and 4 in. thick?

2. How many cubic inches are in:
   (*a*) a brick 8 in. long, 4 in. wide, 2 in. thick?
   (*b*) a piece of scantling, 20 in. long, 3 in. wide, and 2 in. thick?

Find the number of cubic inches in a cube 12 in. long, 12 in. wide, and 12 in. thick. Express these dimensions in feet.

A cube whose dimensions are each 1 foot is called a cubic foot.

How many cubic inches are in a cubic foot?

Find the number of cubic feet in a rectangular block of ice 3 ft. long, 2 ft. wide, and 1 ft. thick.

Find the number of cubic feet in a rectangular block of stone 5 feet long, 3 ft. wide, and 2 ft. thick.

Draw a cubic yard upon the blackboard. Subdivide it into cubic feet. How many cubic feet are in a cubic yard?

If the dimensions of a rectangular solid are given in inches, the unit of measure is a cubic inch, if in feet, the unit of measure is a cubic foot, etc., the unit of measure and volume being named in corresponding terms of cubic measure.

Table of Cubic or Solid Measure

1728 cubic inches (cu. in.)	= 1 cubic foot (cu. ft.)
27 cubic feet	= 1 cubic yard (cu. yd.)
128 cubic feet	= 1 cord (cd.)

A cord is a pile of wood or stone equal to the volume of a rectangular solid 4 ft. wide, 4 ft. high, and 8 ft. long.

EXERCISE

Reduce:

1. 7689 cu. ft. to cords.
2. 8469 cu. in. to cu. ft.
3. 78 cu. ft. 640 cu. in. to cu. in.
4. 17 cu. yd. 12 cu. ft. to cu. in.
5. 637,684 cu. in. to cu. yd.
6. 6,414,596 cu. in. to cu. ft.
7. 6 cu. yd. 12 cu. ft. 18 cu. in. to cu. in.
8. 34,625 cu. in. to cu. yd.

EXERCISE

1. A room is 12 ft. long, 10 ft. wide, and 9 ft. high. How many cubic feet of air does it contain?
2. A basement is 16 ft. long and 12 ft. wide. What is the area of the floor of the basement? If the basement is 8 ft. deep, how many cubic feet does it contain?

3. In excavating for a cellar 20 ft. long and 18 ft. wide, dirt is removed to a depth of 9 ft. How many cubic feet of dirt are removed? How many cubic yards are removed?

4. A concrete floor 3 in. thick is put in a basement 24 ft. by 18 ft. How many cubic yards of concrete are in the floor?

5. A coal bin is 20 ft. long, 14 ft. wide, and 6 ft. deep. If a ton of coal occupies 35 cubic feet, how many tons of coal will the bin hold?

6. How many cubic feet of water will a cistern hold which is 5 feet square and 8 feet deep?

7. How many cords of wood are in a pile of 4-foot wood, 6 feet high, and 48 feet long?

8. In building up a lawn it was necessary to fill in a space 90 ft. by 60 ft. with dirt to an average depth of 1 foot. What will the dirt cost at 55 cents per cubic yard?

9. A class room is 30 ft. long, 24 ft. wide, and 12 ft. high, and accommodates 40 pupils. How many cubic feet of air space are provided for each pupil?

Measure of Capacity

2 pints (pt.)	= 1	quart (qt.)
4 quarts	= 1	gallon (gal.)
2 gallons	= 1	peck (pk.)
4 pecks	= 1	bushel (bu.)

The measure of capacity is used in measuring *liquids*, water, milk, oil, alcohol, etc., and *dry articles*, grain, fruit, roots, lime, etc. In measuring liquids the peck and bushel measures are not used, but these are used in measuring dry articles. The gallon, containing 10 pounds of distilled water,

is the standard measure of capacity. Its capacity is 277.274 cubic inches.

A cubic foot of water weighs 1000 oz., or 62½ lb.

A cubic foot contains 6¼ gallons.

One gallon of pure water weighs 10 lb.

In measuring the capacity of cisterns and reservoirs, the barrel containing 31½ gallons, or the hogshead containing 63 gallons, is used.

The following table shows the weight of a bushel of the articles named:

Wheat	60 lb.	Beans	60 lb.
Oats	34 lb.	Onions	50 lb.
Barley	48 lb.	Beets	60 lb.
Peas	60 lb.	Parsnips	60 lb.
Rye	56 lb.	Turnips	60 lb.
Corn	56 lb.	Potatoes	60 lb.
Flax seed	56 lb.	Carrots	60 lb.
Clover seed	60 lb.		

ORAL EXERCISE

1. How many pints are in 4 qt. 1 pt.?

2. How many gallons are in 24 pt.? in 40 pt.? in 36 pt.?

3. In 2 gal. of milk, how many pints are there?

4. If you feed a horse 8 qt. of oats a day, how many days will 1 bu. of oats last?

5. A quart is what part of a gallon? A pint is what part of a gallon? A quart is what part of a peck? A gallon is what part of a bushel?

6. What is the weight of 4 bu. of potatoes? of 3 bu. of oats? of 2 bu. of barley?

7. How many gallons are in 1 bu. 2 pk.? in 3 pk. 2 gal.?

EXERCISE

Reduce:

1. 7684 pt. to bushels, etc.
2. 84 gal. 3 qt. to pints.
3. 36 bu. 3 qt. 1 pt. to pints.
4. 2695 pt. to gallons.
5. 8 bu. 2 pk. to quarts.
6. 200 pt. to gallons.
7. 154 gal. 1 qt. 1 pt. to pints.
8. 3685 lbs. of wheat to bu.

EXERCISE

1. Find the weight in tons of 400 bushels of potatoes.
2. How many bushels are in 3 tons of wheat?
3. A grocer bought 6 tons of potatoes at $20 per ton and retailed them at 75¢ per bushel. What is his profit on the sale of these potatoes?
4. A caterer buys his ice cream at $1.20 per gallon. He serves 5 dishes per quart at 10¢ per dish. What is his profit on one gallon of ice cream?
5. A family uses 2 qt. 1 pt. of milk per day. What would their milk cost for the month of November at 10¢ a quart?
6. Find the cost of 2 gal. 1 qt. of cream at 10¢ per pint.
7. A farmer feeds his horses each 4 qt. of oats three times a day. How many bushels will it take to feed a team 8 days?
8. How many gallons of water will a tank 6 ft. square and 2 ft. deep hold?

Measure of Time

60 seconds (sec.)	= 1 minute	(min.)
60 minutes	= 1 hour	(hr.)
24 hours	= 1 day	(da.)
7 days	= 1 week	(wk.)
12 calendar months or 365 days	= 1 year	(yr.)
366 days	= 1 leap year	

The leap years are those that contain the number 4 an exact number of times; as, 1904, 1908, 1912, 1916, etc.

But of the even hundreds, only those that contain 400 an exact number of times are leap years. The year 1900 was not a leap year, but the year 2000 will be.

The number of days in each month may be remembered by means of the following lines:

Thirty days have September,
April, June, and November;
February has twenty-eight alone —
All the rest have thirty-one;
But leap year coming once in four
February then has one day more.

The civil day begins and ends at 12 o'clock midnight.

A.M. denotes time before noon; M. denotes noon; and P.M. denotes time after noon.

100 years is a century.

ORAL EXERCISE

1. How many days are in three weeks? in 2 weeks 6 days? in 5 weeks 3 days?

2. How many hours are in 3 days? in 2 days 2 hours?

3. How many weeks are in 35 days? in 84 days? in 45 days?

4. How many days are in July, August, and September?

5. How many seconds are in five minutes? in 2 minutes 10 seconds?

6. How many minutes are in 120 seconds? in 360 seconds? in 90 seconds?

EXERCISE

Reduce:

1. 17 hr. 15 min. to seconds.

2. 2 da. 16 hr. to seconds.

3. 36,841 seconds to days, etc.
4. 5 da. 15 hr. 20 min. to minutes.
5. 12 hr. 35 min. 20 sec. to seconds.
6. 425 hr. to weeks, etc.
7. 1 wk. 1 hr. to seconds.
8. 168,456 seconds to weeks, etc.
9. Name the first five leap years of this century.
10. How many days are there from Jan. 25 to Mar. 10, 1918?
11. How many minutes are in the school day?

Circular or Angular Measure

Circular or angular measure is used to measure the size of circles and angles.

There are 360 degrees (360°) in a circumference of a circle and therefore 90° in a quarter of the circumference. This part of the circumference lies between the arms of a right angle at the centre of the circle.

The right angle *AOB* (Fig. 2) is also measured in degrees (90°).

A part of the circumference is called an *Arc*. The arc of the circumference cut off by the arms of a right angle at the centre is called a *Quadrant*.

Fig. 1

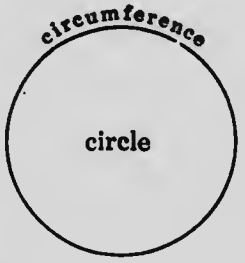
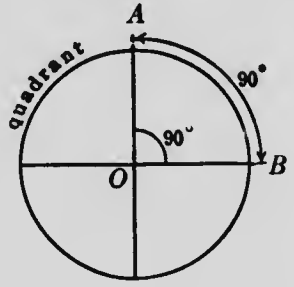


Fig. 2



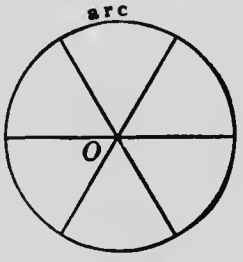


Fig. 3

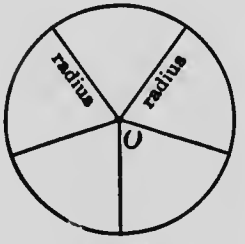


Fig. 4

In Figure 3 what part of the circumference is each arc? What part of 360° is each angle at the centre?

In Figure 4 what part of the circumference is each arc? What part of 360° is each angle at the centre?

If two lines (radii) are drawn joining the ends of an arc to the centre of the circle, there will be just as many degrees in the angle formed as there are degrees in the arc.

Table of Circular or Angular Measure

60 seconds (″) = 1 minute (′)
60 minutes = 1 degree (°)
90 degrees = 1 right angle, or quadrant
360 degrees = 1 circumference

Circular or angular measure is used to determine latitude, longitude, direction, the positions of vessels at sea, etc.

A degree of the circumference of the earth at the equator contains 60 geographical miles or 69.16 statute miles.

ORAL EXERCISE

1. How many degrees are $\frac{1}{2}$ of a circumference? in $\frac{1}{3}$ of a circumference? in $\frac{1}{8}$ of a circumference?

2. How many degrees are between the hands of a clock at 6 o'clock? at 1 o'clock? at 3 o'clock? at 4 o'clock?

3. How many degrees are in 3 quadrants?

4. When a star is directly overhead, how many degrees is it from the western horizon?

5. How many minutes are in 1° 20′? in 3°? in 2° 10′?

EXERCISE

Reduce:

1. 568′ 19″ to seconds.
2. 5° 17′ 18″ to seconds.
3. 76,895″ to degrees, etc.
4. 843″ to minutes.
5. 1 circumference 1° 1′ to minutes.
6. 2 quadrants 10° 20′ to seconds.

MISCELLANEOUS TABLES

Table of Units in Counting

12 things = 1 dozen (doz.)
12 dozen = 1 gross (gro.)
12 gross = 1 great gross
20 things = 1 score (sco.)

Table of Paper Measure

24 sheets = 1 quire
20 quires = 1 ream

For convenience in counting, 500 sheets are often called a ream.

196 lbs. of flour = 1 barrel (bbl.)
200 lbs. pork = 1 barrel

EXERCISE

1. How many sheets are in 1 ream? in 2 quires? in 5 quires?
2. How many quires are in ½ ream? in 10 reams? in 48 sheets? in 72 sheets?
3. A box of paper containing 1 quire cost 60¢. What is the cost per sheet?
4. A stationer bought blotting paper at 80¢ a quire, and sold it at 5¢ a sheet. What was his profit?

5. Find the cost of 240 dozen penholders at $3.00 per gross.

6. Find the cost of 3 gross 9 dozen buttons at 9¢ a dozen.

7. A stationer bought a ream (500 sheets) of blotting paper 18 in. by 24 in. for $75. He cut each sheet into small blotters, 4 in. by 9 in., which he sold at 3 for 5¢. What was his profit?

EXERCISE

1. A hardware merchant bought 3¼ dozen handsaws at $24 per dozen and retailed them at $3.10 each. How much did he gain on the sale of these saws?

2. In walking a five-mile race a man stepped 40 inches. How many steps did he take?

3. A ton of ice, when cut into blocks and well packed, occupies 40 cu. ft. How many tons of ice can be packed into a space 60 ft. by 40 ft. by 25 ft.?

4. How many square inches of paper will cover the surface of a block of wood in the form of a cube, each edge of which is one foot?

5. How many bricks 4 in. wide and 8 in. long will it take to pave a walk 30 ft. long and 4 ft. wide?

6. How many cubic yards of earth must be excavated to make a basement 30 ft. long, 18 ft. wide, and 8 ft. deep?

7. A cold storage plant uses 4500 lbs. of ice each week. How much will the ice cost for a year (52 weeks) at $5 per ton?

8. In a tank which is 6 ft. long and 4 ft. wide the water is 8 in. deep. How many gallons of water are in the tank?

9. One field is 40 rods square, another field is 80 rd. long and 20 rd. wide. Compare the areas of these fields.

Find the length of fence required to enclose each of these fields.

10. How many feet of picture moulding will it take to go around a room 12 ft. long and 9 ft. wide?

EXERCISE

1. How many square yards of paving will it take to pave a street 60 ft. wide and 315 ft. long?

2. A field of wheat 80 rd. long and 40 rd. wide yields 25 bushels to the acre. At $1.80 per bushel, find the value of the wheat from this field.

3. A rug, 4 yd. long and 3 yd. wide, is placed on the floor of a room 16 ft. long and 10 ft. wide. Find the number of square feet of floor uncovered.

4. How many square feet of wire netting are needed to enclose a chicken run 8 ft. wide and 16 ft. long with wire netting 6 ft. high?

5. How many tiles 2 inches square will be required to cover a bathroom floor 6 ft. by 8 ft.?

6. A metal ceiling is put in a hall 42 ft.$\times$60 ft. Find the cost of the ceiling at $1.20 per square yard.

7. A side of bacon weighs 9 lbs. 12 oz., and a ham weighs 12 lbs. 4 oz. Find the cost of both, if bacon is worth 48¢ a pound and ham 40¢ a pound.

8. If you study 45 minutes at home each day your school is in operation, how many hours of home study will you do during the school year (200 days)?

9. A merchant buys pencils at $4.80 per gross and sells them at 5¢ each. What is his profit on 10 dozen?

10. What part of the circumference of a circle is an arc of 60°?

COMPOUND RULES

Addition of Compound Denominate Numbers

Simple Number	*Denominate Number*
423	
4 hundreds 2 tens 3 units	4 bushels 2 pecks 3 gallons

In simple numbers ten units of each order always make one unit of the next order, while in compound denominate numbers the number of units of a lower denomination required to make one unit of the next higher order varies with the denomination we are using.

HUNDREDS	TENS	UNITS
5	2	6
3	1	4
7	2	8
6	4	9
21 hundreds	9 tens	27 units

27 units = 2 tens + 7 units.
9 tens + 2 tens = 11 tens = 1 hundred + 1 ten.
21 hundreds + 1 hundred = 22 hundreds.
21 hundred 9 tens 27 units = 22 hundreds 1 ten 7 units = 2217.

YARDS	FEET	INCHES
5	2	6
3	1	4
7	2	8
6	4	9
21 yards	9 feet	27 inches

27 in. = 2 ft. + 3 in.
9 ft. + 2 ft. = 11 ft. = 3 yd. + 2 ft.
21 yd. + 3 yd = 24 yd.
21 yd. 9 ft. 27 in. = 24 yd. 2 ft. 3 in.

EXPLANATION. — The like units are written in columns. The sum of the inches is 27 in. or 2 ft. 3 in. Write the 3 in. under the inches column and add the 2 ft. to the feet column. The sum of the feet column is 11 ft. or 3 yd. 2 ft. Write the 2 ft. under the feet column and add the 3 yd. to the yards column. The sum of the yards column is 24 yd. Hence the sum is 24 yd. 2 ft. 3 in.

EXERCISE

Add:

1.

5 lbs.	9 oz.
3	8
6	12

2.

2 bu.	2 pk.	4 qt.
6	3	6
8	1	5

3.

20 cwt.	87 lbs.	11 oz.
16	12	66
19	43	13

4.

8 hr.	15 min.	28 sec.
3	20	12
6	27	30
9	30	42

5.

10 bu.	1 pk.	1 qt.	1 pt.
2	3	6	0
5	2	3	1
3	3	1	1
15	2	4	0

6.

4 yd.	1 ft.	9 in.
5	2	2
3	2	7
0	2	10
1	1	11

7. Find the sum of: 1 wk. 2 da. 13 hr. 40 min. 30 sec; 2 wk. 6 da. 10 hr. 8 min. 3 sec.; 5 da. 22 hr. 55 min. 45 sec.; 4 hr. 1 min. 15 sec; 1 wk. 2 da. 4 hr. 5 min.

8. The lengths of the blackboards in a schoolroom are 4 yd. 1 ft. 8 in., 3 yd. 9 in., and 3 yd. 2 ft. 5 in. Find the total length of the three boards.

9. A man walked 17 mi. 360 yd. on Monday; 21 mi. 840 yd. on Tuesday; 18 mi. 748 yd. on Wednesday; 16 mi. 1289 yd. on Thursday; 20 mi. 196 yd. on Friday; and 7 mi. 1348 yd. on Saturday. How far did he walk during the week?

10. A merchant has five piles of wood. In the first there are 89 cd. 100 cu. ft.; in the second, 119 cd. 84 cu. ft.; in the third, 248 cd. 68 cu. ft.; in the fourth, 389 cd. 16 cu. ft.; and in the fifth, 548 cd. 112 cu. ft. How much wood does he own?

11. A farmer sold seven loads of wheat, the loads weighing as follows: 65 bu. 36 lbs., 63 bu. 48 lbs., 66 bu. 28 lbs., 65 bu. 43 lbs., 66 bu. 50 lbs., 65 bu. 54 lbs., 64 bu. 30 lbs. How much wheat did he sell?

12. A farm consists of eight fields, their areas being as follows: 11 A. 3456 sq. yd. 6 sq. ft.; 10 A. 2454 sq. yd. 3 sq. ft.; 12 A. 4500 sq. yd. 13 A. 3650 sq. yd.; 14 A. 7 sq. ft.; 12 A. 1456 sq. yd. 8 sq. ft.; 9 A. 784 sq. yd. 6 sq. ft.; 15 A. 2705 sq. yd. 3 sq. ft. Find the area of the farm.

Subtraction of Compound Denominate Numbers

From 723 take 235.

7 hundreds	2 tens	3 units	=	6 hundreds	10 tens	13 units
2	3	5		2	3	5
				4 hundreds	7 tens	8 units

478.

From 7 bu. 2 pk. 3 qt. take 2 bu. 3 pk. 5 qt.

7 bu.	2 pk.	3 qt.	=	6 bu.	5 pk.	11 qt.
2	3	5		2	3	5
				4 bu.	2 pk.	6 qt.

EXPLANATION. — Like units are written in columns. Since we cannot subtract 5 qt. from 3 qt. we take 1 pk. (8 qt.) of the 2 pk. 8 qt. + 3 qt. = 11 qt. and 11 qt. − 5 qt. = 6 qt. Since we cannot subtract 3 pk. from 1 pk. we take 1 bu (4 pk.) of the 7 bu.; 4 pk. + 1 pk. = 5 pk.; 5 pk. − 3 pk. = 2 pk. 6 bu. − 2 bu. = 4 bu. The difference is therefore 4 bu. 2 pk. 6 qt.

EXERCISE

1. From 8 gal. take 2 gal. 3 qt.
2. Take 3 lb. 8 oz. from 5 lb.
3. One board is 15 ft. long; another is 12 ft. 10 in. long. How much is one longer than the other?

4. A rectangular room is 8 yd. 1 ft. long and 5 yd. 2 ft. wide. How much does its length exceed its width?

5. Subtract:

(*a*)

7 mi.	1 yd.	1 ft.	3 in.
1	1	2	7

(*b*)

69 A.	10 sq. yd.	3 sq. ft.
10	15	7

(*c*)

£43	11*s.*	10*d.*
15	14	6

6. A farmer had 200 bu. of wheat and sold 28 bu. 2 pk. 5 qt. 1 pt. to one man, and as much to another. How much wheat has he left?

7. From a barrel of water containing 54 gallons, a person took 12 gal. 3 qt. one day, and 9 gal. 2 qt. 1 pt. another. How much was left?

8. From 29 sq. yd. 128 sq. in. subtract 16 sq. yd. 5 sq. ft. 140 sq. in.

9. A grocer has 1 cwt. 18 lb. of sugar in one barrel, 96 lb. in another, and 1 cwt. 61 lb. in a third. After selling 1 cwt. 90 lb., how much will he have left?

10. A bicycle rider has a journey of 300 mi. to go. The first day he rides 75 mi. 48 rd.; the next, 83 mi. 175 rd.; the next, 68 mi. 163 rd. How far has he yet to ride?

EXERCISE

1. How much must be added to 5 A. 785 sq. yd. 5 sq. ft. to make 10 A.?

2. A speaker began a speech at 9 hr. 28 min. 40 sec. after noon and ended 11 hr. 4 min. 25 sec. after noon. How long did he speak?

3. The angles of a triangle contain 180°. One angle measures 36° 14′ 56″ and another 80° 56′. Find the third angle.

4. From a 12-acre field four lots were sold. The first contained 2400 sq. yd., the second 3216 sq. yd., the third 2525 sq. yd., and the fourth 2845 sq. yd. How much of the field remained unsold?

5. Find the number of seconds from 25 min. past 9 in the morning to 6 min. past 11 in the morning.

6. A farmer came to town with 25 bu. of potatoes. He sold 5 bu. 1 pk. 1 gal. to one man, 6 bu. 3 pk. to a second, 7 bu. 1 gal. to a third, and 4 bu. 1 pk. 1 gal. to a fourth. What quantity had he left?

7. A bought 10 T. of coal, but his bin held only five loads. The first weighed 1984 lbs., the second 1 T. 112 lbs., the third 1 T. 247 lbs., the fourth 1 T. 356 lbs., and the fifth 1978 lbs. How much coal has he yet to receive?

8. From 25 yd. of ribbon a storekeeper sold to one customer 3 yd. 1 ft. 6 in., to another 5 yd. 2 ft. 3 in., and to a third 7 yd. How many yards remained?

9. A wood dealer had 125 cd. of wood. He sold 7 loads. The first measured 1 cd. 112 cu. ft., the second 1 cd. 60 cu. ft., the third 1 cd. 75 cu. ft., the fourth 1 cd. 15 cu. ft., the fifth 1 cd. 95 cu. ft., the sixth 1 cd. 108 cu. ft., and the seventh 1 cd. 36 cu. ft. How much wood had he left?

10. A cistern is full and holds 1250 gal. of water; 120 cu. ft. are drawn out. How many gallons remain in the cistern?

11. A rode 400 mi. on his bicycle in six days. On Monday he rode 50 mi. 1250 yd. 2 ft. 6 in.; on Tuesday, 55 mi. 1 ft. 9 in.; on Wednesday, 60 mi. 360 yd. 9 in.; on Thursday,

72 mi. 1450 yd.; on Friday, 63 mi. 1375 yd. 1 ft. 6 in. How far did he ride on Saturday?

12. A wood merchant had 1000 cords of firewood in stock. On Monday he sold 12 cd. 28 cd. ft.; on Tuesday, 42 cd. 78 cd. ft.; on Wednesday, 57 cd. 80 cd. ft. How much firewood had he left?

Compound Multiplication

Multiply 327 by 9.

3 hundreds	2 tens	7 units		3 hundreds	2 tens	7 units
		9				9
27 hundreds	18 tens	63 units		29 hundreds	4 tens	3 units

Multiply 3 yd. 2 ft. 7 in. by 9.

3 yd.	2 ft.	7 in.		3 yd.	2 ft.	7 in.
		9				9
27 yd.	18 ft.	63 in.		34 yd.	2 ft.	3 in.

EXPLANATION. — 9 times 7 in. = 63 in. = 5 ft. 3 in.

Write the 3 in. under the denomination inch and add the 5 ft. to the product, 9 times 2 ft.

9 times 2 ft. = 18 ft.
18 ft. + 5 ft. = 23 ft. = 7 yd. 2 ft.

Write the 2 ft. under the denomination feet and add the 7 yd. to the product, 9 times 3 yd.

9 times 3 yd. = 27 yd.
27 yd. + 7 yd. = 34 yd.

The entire product is therefore 34 yd. 2 ft. 3 in.

EXERCISE

1. Multiply 2 hr. 8 min. by 7; 2 ft. 3 in. by 3; 5 mi. 100 yd. by 7.

2. Multiply 4 lbs. 9 oz. by 6; 15 yd. 9 in. by 4; 10 yd. 18 in. by 2.

3. Multiply 18 cwt. 16 lbs. 9 oz. by 5; 10 da. 20 hr. 30 min. 40 sec. by 7.

4. A watch gains 1 min. 17 sec. in a day. How much will it gain in a week?

5. The side of a square plot of ground is 30 yd. 2 ft. 8 in. Find the perimeter of the plot.

6. If a cubic foot of water weighs 62 lbs. 8 oz., what is the weight of the water in a tank that contains 42 cu. ft.?

7. A farmer has 250 acres to plow. He has had 4 teams plowing for 20 days. If each team plowed 2 A. 4 sq. rd. per day, how much remains to be plowed?

8. On a voyage a steamer sailed 15 mi. 680 yd. 2 ft. each hour. The voyage lasted two days. How far did the steamer sail during this time?

9. The height of the first story in a city office building is 14 ft. 8 in., and the height of each story above the first is 10 ft. 9 in. If the building is an eight-story building, what is its height?

10. 4 bars of iron, each 4 ft. 5 in. long, are cut from a bar 20 ft. 6 in. long. What length of bar is left?

11. A commercial traveller motors 6 da. a week for 2 weeks. The first week he averages 6 gal. 2 qt. of gasoline per day, and the second week 8 gal. 3 qt. per day. How much gasoline does he use in the two weeks?

12. If 3 gal. 2 qt. 1 pt. leak out of a water pipe in 1 hr., what will be the waste in 3 days?

13. Find the weight of 10 loads of hay, each load averaging 1 T. 8 cwt. 30 lbs.

14. A farmer owns a cow that gives an average of 4 gal. 2 qt. of milk daily during the month of April. He sells the milk at 5¢ a quart. How much money does this cow earn for the farmer during the month?

Compound Division

Divide 18 in. by 6; 24 bu. by 8; 60 min. by 12. What kind of number is the divisor in each case? What kind of number is the quotient in each case?

Divide 18 in. by 6 in; 24 bu. by 8 bu.; 60 min. by 12 min. What kind of number is the divisor in each case? What kind of number is the quotient in each case?

Division of a Compound Number by an Abstract Number.

Divide 18 yd. 1 ft. 8 in. by 4.

$$4\overline{)\,18 \text{ yd. } 1 \text{ ft. } 8 \text{ in.}}$$
$$4 \text{ yd. } 1 \text{ ft. } 11 \text{ in.}$$

EXPLANATION. — Arrange as in ordinary division of simple numbers.
18 yd. ÷ 4 = 4 yd. with remainder 2 yd., or 6 ft.
6 ft. + 1 ft. = 7 ft. 7 ft. ÷ 4 = 1 ft. with remainder 3 ft., or 36 in.
36 in. + 8 in. = 44 in. 44 in. ÷ 4 = 11 in.
The quotient is, therefore, 4 yd. 1 ft. 11 in.

Division of a Compound Number by Another Compound Number.

Divide 20 yd. 12 in. by 3 yd. 14 in.

Reduce:

20 yd. 12 in. = 732 in.
3 yd. 14 in. = 122 in.

20 yd. 12 in. ÷ 3 yd. 14 in. = 732 in. ÷ 122 in. = 6.

EXERCISE

Divide:

1. 10 yd. 2 ft. by 8.
2. 5 mi. 240 rd. by 8.
3. 4 gal. 2 qt. by 3.
4. 112 T. 16 cwt. 66 lbs. by 7.
5. 40 cu. yd. 10 cu. ft. by 18.
6. 3 cu. yd. 3 cu. ft. by 6.
7. 3 gal. 1 pt. by 5.
8. 36 lbs. 12 oz. by 21.
9. 78 mi. 18 yd. 1 ft. 4 in. by 8.
10. 445 T. 15 lbs. 13 oz. by 57.

EXERCISE

Divide:

1. 11 ft. 9 in. by 3 ft. 11 in.
2. 20 yd. 12 in. by 3 yd. 14 in.
3. 697 lbs. 7 oz. by 60 lbs. 10 oz.
4. 69 bu. 3 pk. 6 qt. by 6 bu. 3 pk. 6 qt.
5. 55 ft. 6 in. by 6 ft. 2 in.
6. 80 bu. 2 pk. 4 qt. by 13 bu. 3 pk. 5 qt.

EXERCISE

1. How many jars, each holding 2 gal. 3 qt. 1 pt., can be filled from a tank holding 71 gal. 3 qt. 1 pt.?

2. The perimeter of a square is 6 ft. 3 in. Find the length of the side.

3. A man walks at the rate of one mile in 19 min. How many miles can he walk in 1 hr. 54 min.?

4. A fruit grower has 84 bu. of apples to market in barrels. If each barrel holds 3 bu. 2 pk., how many barrels will it take?

5. How often can 2 ft. 8 in. be taken from 8 yd.?

6. A herd of cattle ate 6 T. 19 cwt. 87 lbs. of hay in a week. How long will 34 T. 19 cwt. 35 lbs. last them?

7. A and B start from points 30 mi. 500 yd. apart to meet each other. A walks at the rate of 3 mi. 368 yd. per hr. and B at the rate of 3 mi. 555 yd. per hr. How far are they apart at the end of 4 hours?

8. If both sides of a railroad are fenced with wire worth 5¢ per rod, find the cost per mile of the wire in the fence, the fence being 5 wires high.

9. A train 440 ft. long runs past a post in 12 seconds. How many miles an hour is it running?

10. An ocean steamer burns coal at the rate of 1 T. 2 cwt. for every 25 miles. How many tons are needed for a voyage of 3750 miles?

11. From a 40-acre field of alfalfa 3 crops were harvested in one year. The average yield per acre for each crop was 2750 lbs. What was the year's yield off this field worth at $25 per ton?

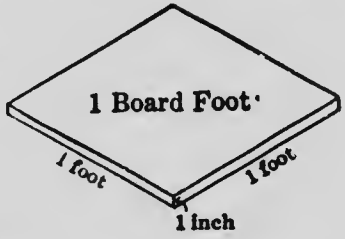
CHAPTER VII

APPLICATION OF DENOMINATE NUMBERS, PRACTICAL PROBLEMS, REVIEW

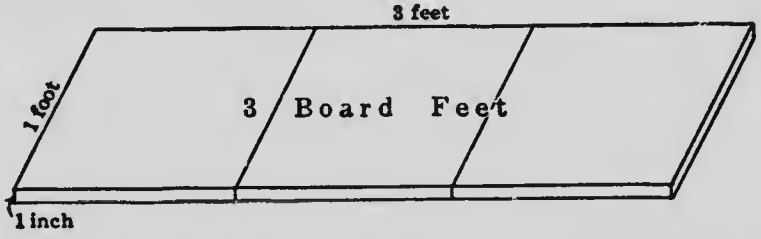
Lumber Measure

The unit of lumber measure is the *board foot*, which is a piece of board 1 foot long, 1 foot wide, and 1 inch or less in thickness.

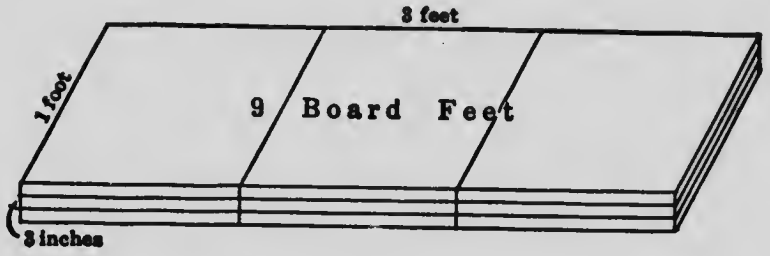
If a board is one inch or less in thickness, the number of board feet it contains is the number of square feet in one surface of the board.



Note. — Lumber less than one inch in thickness is reckoned as if it were an inch. If lumber is $1\frac{1}{2}''$ in thickness, the number of board feet is $1\frac{1}{2}$ times the number of square feet on one surface of the board. If the lumber is $2''$ in thickness, the number of board feet is 2 times the number of square feet on one surface of the board, etc.



A board 3 feet long, 1 foot wide, and 1 inch thick contains 3 board feet.



A board 3 feet long, 1 foot wide, and 3 inches thick would contain 9 board feet. That is, the number of board feet is three times the number of square feet on one side of the board.

A board 18 feet long, 6 inches wide, and 2 inches thick would contain $(18\times\frac{1}{2})\times 2$ board feet or 18 board feet.

A board 12 feet long, 4 inches wide, and 3 inches thick would contain $(12\times\frac{1}{3})\times 3$ board feet or 12 board feet.

Rule. — To find the number of board feet multiply the number of feet in the length by the number of feet in the width by the number of inches in the thickness.

In making out a bill of lumber the number of pieces are entered first, followed by the thickness and width expressed in inches and the length in feet. In billing 7 pieces, 2 inches thick, 8 inches wide, and 16 feet long, the form would be:

7 pcs. $2''\times 8''-16'$ ($''$ is used to denote inches and $'$ is used to denote feet).

The price of lumber is generally quoted as so much per one thousand feet. The letter M is used to denote one thousand feet.

15 pieces of No. 1 fir, 2 inches thick, 6 inches wide, and 14 feet long at \$60.00 per thousand would appear in a bill in this form:

15 pcs. $2''\times 6''-14'$ #1 Fir @ \$60.00 per M.

EXERCISE

1. Find the number of board feet in the following:
   (*a*) A board 12 ft. long, 12 in. wide, and 2 in. thick.
   (*b*) A board 16 ft. long, 9 in. wide, and 2 in. thick.
   (*c*) A board 18 ft. long, 4 in. wide, and 1 in. thick.
   (*d*) A board 14 ft. long, 6 in. wide, and 3 in. thick.

2. How many feet, board measure, are in 12 planks, 16 ft. long, 9 in. wide, and 2 in. thick?

3. How many feet, board measure, are in 100 scantlings, 18 ft. long, 4 in. wide, and 4 in. thick?

4. How much inch lumber will be required to fence a rectangular lot 66 ft. wide by 120 ft. long with a close board fence 6 ft. high?

5. Find the number of feet, board measure, of lumber in

10 pcs. $2'' \times 4'' - 12'$
15 pcs. $3'' \times 9'' - 16'$
12 pcs. $4'' \times 4'' - 18'$
20 pcs. $2'' \times 6'' - 14'$

6. How many feet of lumber are in a load containing 50 pieces 18 ft. long, 8 in. wide, and 3 in. thick and 100 pieces 16 ft. long, 9 in. wide, and 1 in. thick?

7. At \$40.00 per M find the cost of the following:

20 pcs. $1'' \times 12'' - 15'$
50 pcs. $2'' \times 6'' - 12'$
40 pcs. $4'' \times 4'' - 15'$
100 pcs. $3'' \times 4'' - 18'$
200 pcs. $2'' \times 9'' - 16'$

8. At \$30 per M what will it cost to lay a floor in a shed 15 ft. wide and 20 ft. long with plank 2 in. thick?

9. How many feet of lumber will be required to floor a bridge 100 ft. long and 12 ft. wide with 3 in. plank?

10. Find the cost of 500 scantlings 18 ft. long 4 in. wide, and 3 in. thick at $35 per M.

Carpeting

Carpet is sold by the linear yard and is usually 27 or 36 in. wide. The number of yards required for a given room depends on the way the strips are to run, lengthwise or crosswise, and the amount of waste in matching. A carpet dealer will not cut a strip lengthwise, and therefore a fractional part of a strip cannot be bought.

Example:

A room is 18 yards long and 13 yards wide. Determine the number of strips (*a*) running lengthwise, (*b*) running crosswise, the carpet being 36 inches wide. Also determine the number of yards required. Draw a diagram.

There will be 13 strips 18 yards long = 234 yards

There will be 18 strips 13 yards long = 234 yards

Suppose the carpet was 27 inches wide, determine the number of strips in each case and the number of yards of carpet required.

There will be $\frac{13\times36}{27}=17\frac{1}{3}$ or 18 strips required, each 18 yards long.

There will be $\frac{18\times36}{27}=24$ strips required, each 13 yards long.

What width of carpet will have to be turned under in each case?

EXERCISE

1. How many yards of carpet 27 in. wide will be required for rooms whose dimensions are:

(*a*) 27 ft. by 21 ft.?

(*b*) 15 ft. by 12 ft.?

(*c*) 18 ft. by 24 ft.?

(*d*) 26 ft. by 36 ft.?

2. Find the cost of carpeting rooms whose dimensions are:

(*a*) 18 ft. by 20 ft. with carpet 3 ft. wide at $1.20 a yard.

(*b*) 20 ft. by 24 ft. with carpet 30 in. wide at 90 ct. a yd.

(*c*) 15 ft. by 17 ft. 6 in. with carpet 3 ft. wide at $1.00 a yd.

3. How many strips of carpet 36 in. wide are needed for a room 21 ft. × 15 ft. (*a*) if the strips run lengthwise? (*b*) if they run crosswise?

4. How many strips of carpet 27 in. wide are needed for a square room 18 ft. long?

5. A rectangular room is 40 ft. wide. How many strips of oilcloth 60 in. wide are needed to cover it, the strips running lengthwise?

6. A rectangular room is 22 ft. 6 in. long and 18 ft. wide. Find the cost of covering it with oilcloth at 95 ct. per sq. yd.

7. At $1.20 per yd. it costs $57.60 to carpet a room 16 ft. wide with carpet 27 in. wide. Find the length of the room.

8. Find the cost of carpeting a stairway of 14 steps, each step having a 7-inch rise and a 10-inch tread, the carpet to cost $1.10 per yard and two extra yards being allowed for the landing.

Plastering, Painting, etc.

Plastering, painting, and kalsomining, etc., are usually measured by the square yard. There is no uniform custom as to deductions for openings and baseboard. Sometimes one-half the area of the doors and windows is allowed in estimating the cost of the labor. A full allowance is made for the openings in estimating the quantity of materials.

EXERCISE

1. How many square yards of plastering are in the ceiling of a rectangular room 18 ft. by 16 ft.?

2. How many square yards of plastering are in the walls and ceiling of a rectangular room 22 ft. by 18 ft. and 12 ft. high?

3. Find the cost of plastering the walls of a rectangular room, 30 ft. by 24 ft. and 15 ft. high at 21 ct. per sq. yard.

4. At 23 cents per sq. yd. it costs $22.08 to plaster the ceiling of a room 24 ft. wide. What is the length of the room?

5. A room is 26 ft. long, 18 ft. wide, and 12 ft. high; it has 3 doors, each 7 ft. by 4 ft., and 4 windows, each 6 ft. by 3 ft. A baseboard a foot wide runs around the room. Find the area of the plaster (*a*) in the walls; (*b*) in the walls and ceiling.

6. At 25 ct. per sq. yd. find the cost of plastering the walls and ceiling of a rectangular room 24 ft. by 21 ft. and 12 ft. high, making no allowance for deductions.

7. By how much would the cost of plastering the room in the last example be reduced if there are 3 doors, 8 ft. by 4 ft., and 3 windows, 7 ft. by 4 ft.?

8. It costs $108 to plaster the walls of a hall 15 ft. high at 27 ct. per sq. yd. Find the perimeter of the hall.

9. At 35 ct. per square yard find the cost of plastering the walls of a rectangular room 25 ft. by 20 ft. and 10 ft. high, there being 2 doors, 7 ft. by 5 ft., 3 windows, 6 ft. by 3 ft. and one window 5 ft. by 4 ft., deducting for windows and doors.

10. A house is 40 ft. long, 35 ft. wide, and 20 ft. high. A gallon of paint covers 300 sq. ft. of surface with two coats. At $4.20 per gallon find the cost of the paint required to give two coats to the outside walls.

Papering

Papering is much like carpeting, it being necessary to match patterns. In practice the exact cost of papering a room is seldom determined. The approximate cost is given, making a liberal allowance for matching and for doors and windows, etc.

Wall paper is sold in single rolls 8 yards long, or in double rolls 16 yards long. It is usually 18 inches wide. Fractional parts of a roll are not sold, and the dealer will not cut a strip lengthwise. Borders are sold by the linear yard.

A paper hanger usually measures around a room, making a deduction for the doors and windows. If the paper is 18 inches wide, two vertical strips are required for each yard of the distance. No allowance for matching the pattern is necessary for the first strip. In the succeeding strip the size of the pattern somewhat determines the allowance for matching.

EXERCISE

1. How many yards of paper 18 in. wide will be required for a room 20 ft. long, 15 ft. wide, and 9 ft. high?

2. How many square feet of plain paper will be required for a room 18 ft. 9 in. long and 15 ft. 3 in. wide, and 8 ft. high?

3. How many yards of paper 18 inches wide will paper the ceiling of a rectangular room 24 ft. by 21 ft.?

4. Find the cost of papering the walls and ceiling of a room 30 ft. by 24 ft. and 12 ft. high with paper 18 in. wide, at 25 cts. per roll of 8 yd.

5. How many rolls of paper 18 in. wide will paper the walls and ceiling of a rectangular room 27 ft. by 18 ft. and 12 ft. high?

Roofing

Shingles are considered to average 4 inches in width and are generally laid 4 in., 4½ in., 5 in., or 5½ in. to the weather. Shingles are put up in bundles of 250 to the bundle. Roofing is usually estimated by the *square* of 100 sq. ft. It is found that, allowing for waste, four bundles of shingles, or 1000 shingles, laid 4 inches to the weather will cover a *square* or 100 sq. ft. When laid 4½ inches to the weather 900 shingles are required to cover the same area.

The following table gives approximately the number of shingles required to cover a square of roofing with the distances laid to the weather.

Inches to the weather.	*Number to cover a square*
4	1000 or 4 bundles
4½	900 or 3⅗ bundles
5	800 or 3⅕ bundles
5½	700 or 2⅘ bundles

EXERCISE

1. Find the number of shingles required to cover a rectangular surface 40 ft. by 20 ft., the shingles being laid 4 in. to the weather.

2. Find the number of shingles required to cover the two sides of the gable roof of a barn 60 ft. long, each slope being 25 feet wide. The shingles are laid 5 in. to the weather.

3. How many thousand shingles are required for a barn with a gable roof 50 ft. long, each slope being 20 ft. wide? The shingles are laid 4 in. to the weather.

4. It requires 18 bunches of shingles to cover a gable roof 25 ft. long. How wide is each slope, the shingles being laid 4½ in. to the weather?

5. At 15 ct. per square foot what will be the cost of a tin roof for a building 36 ft. long and 19 ft. 6 in. wide?

6. What will be the difference in cost between a gravel roof at 40 cts. per sq. yd., and a tin roof at 10 ct. per sq. ft., the roof being 45 ft. long and 16 ft. wide?

7. Find the cost of tinning a porch roof 32 ft. long 7 ft. 6 in. wide at 12 ct. per sq. ft.

8. How many bunches of shingles laid 5 in. to the weather will be required to shingle a barn 60 ft. long with rafters 30 ft. long?

9. The dimensions of the roof of a house are 40 ft. by 20 ft. The house has a summer kitchen with roof dimensions of 20 ft. by 15 ft. Find the cost of shingles to cover the two roofs at $4.50 per bunch, if the shingles are laid 4 in. to the weather.

BILLS, ACCOUNTS, AND RECEIPTS

Bills

REGINA, Aug. 25, 1919.

MR. JAMES BROWN,
40 Arthur Street.

Bought of JONES BROS., 245 King St.
STAPLES AND FANCY GROCERIES, FRUITS, etc.

TERMS: Cash Phone 3124

10 lb. Coffee	$.65	$6.50	
25 lb. Sugar	.12	3.00	
16 lb. Lard	.40	6.40	
5 lb. Ham	.55	2.75	
6 lb. Cream of Wheat	.10	.60	
			$19.25

Received payment
JONES BROS.

The above is a common form of a *bill* of goods bought at a store.

Examine the bill of goods.

(1) Where were the goods bought?

(2) When were the goods bought?

(3) Who bought the goods?

(4) Who sold the goods?

(5) What quantities of goods were bought and at what price?

(6) What did the whole cost?

A bill should give the following information:

(1) The name and address of the purchaser.

(2) The name and address of the firm from whom the goods are bought.

(3) The date of purchase.

(4) The name and amount of each article sold, the price and amount of each sale, and the total amount of all sales.

(5) When the bill is paid, the words "Received payment" or "Paid" and the firm's name should be written at the foot of the bill by some one authorized to do this.

To receipt a bill means to write or stamp the words "Received payment" or "Paid" at the foot of the bill, followed by the name of the person or firm to whom the money is due.

To foot a bill means to find the total amount of all sales.

EXERCISE

Make out, foot, and receipt bills for the following sales, supplying dates, names, and addresses when not given:

1. Mrs. S. Brown bought of R. Walker & Co. 10 yds. of silk at \$2.75; 12 yds. of flannel at 75 cts.; 2 pairs of gloves at \$1.50; 1 tablecloth at \$4.50; 2 doz. handkerchiefs at \$2.75.

2. James Taylor bought of Young & Bros. 5 quires of foolscap at 45 cts.; 5 exercise books at 10 cts.; 2 boxes writing paper at 65 cts.; 3 copying pencils at 15 cts.

3. George Harper bought of the Dominion Grocery Store 2 boxes of apples at $3.25; 4 doz. eggs at 45 cts.; $1\frac{1}{2}$ bushels of potatoes at $1.50; 6 packages of oatmeal at 20 cts.; 5 lbs. of cheese at 30 cts.

4. J. Simpson bought of the Royal Sporting Goods Store 3 baseballs at $1.25; 2 fishing rods at $3.45; 4 tennis balls at 45 cents; a catcher's mitt at $5.25.

5. Robert Reid bought of P. Burns & Co. $3\frac{1}{4}$ lbs. of porterhouse steak at 40 cents; 5 lbs. of bacon at 65 cents; $8\frac{1}{2}$ lbs. of pot-roast at 20 cents; leg of mutton, 7 lbs., at 35 cts.

What is meant by charging goods at a store?

What is meant by running an account at a store?

CALGARY, Nov. 1st, 1919

MR. E. J. SIMONS,
142 Centre Street,

In Account with

THE CALGARY FURNITURE STORE, LIMITED
Wholesale and Retail Dealers in Furniture, Carpets & House Furnishings

Oct.	4	1 Bed, Spring and Mattress	$ 95 40	
		1 Dresser	38 75	
Oct.	12	1 Dressing Table	35 50	
		2 Bed Room Chairs @ $6.50	13 00	
		1 Bed Room Rocker	7 00	
Oct.	25	1 Wilton Rug 9′×12′	105 00	
		4 Window Shades @ $2.15	8 60	
Oct.	26	Received on account		$200 00
		Balance due Nov. 1st, 1919		103 25

The above is a common form of an account.

A purchaser frequently does not pay cash for goods bought at a store, but a record of the purchases is kept by the firm to be paid for at the end of the month or at some other time. The record of the purchases and payments is called an *account.*

All records of the purchases, which to the purchaser is a debt, are called *debits* and are placed in one column of the account.

All records of money received from the purchaser on his account are called *credits* and are placed in another column of the account.

The difference between the sum of all the credits and the sum of all the debits is called the *balance* of the account.

When an account is sent to the purchaser it is said to be an *account rendered.*

What information for the purchaser should an account rendered contain?

EXERCISE

Make out the following accounts, supplying dates, names, and addresses when not given, and balance each account:

1. Fred Drum bought of the Great West Hardware Co., Ltd., Regina, July 3rd, 1 kitchen range at $65.50, 8 stove pipe sections at 35 cts.; July 15th, 3 quarts of white paint at $1.10, 2 paint brushes at $1.25; July 20th, 25 lbs. of nails at 10 cts., 1 hammer at 95 cts., 1 hand saw at $1.80; July 28th, 2 hatchets at $1.35, 20 ft. of wire netting at 15 cts., 3 lbs. staples at 15 cts. Render this account on August 1st.

2. Chas. Smith bought of Marshall Wells Co., Sept. 3rd, 2 pairs of shoes at $8.50, 1 suit of clothes at $38.50; Sept. 10th, 1 rug at $85.75, 6 kitchen chairs at $1.50; Sept. 15th, 3 shirts at $2.25, 4 linen handkerchiefs at 30 cts., 4 collars at 25 cts.; Sept. 28th, 1 fall overcoat $45.00, 3 pairs of stockings at 75 cts. On Sept. 12th, Chas. Smith paid cash on account $35. Balance the account on October 1st.

3. James Hughes bought of the West End Grocery Store, June 1st, 15 lbs. sugar at 10 cts., 3 lbs. cheese at 35 cts., 5 lbs. raisins at 25 cts.; June 5th, 3 lbs. butter at 60 cts., 5 lbs. biscuits at 20 cts., 2 cans corn at 30 cts.; June 13th, 24 lbs. flour at 6 cts., 10 lbs. wheatlets at 10 cts., 2 doz. oranges at 60 cts. Render this account on July 1st. Receipt the account showing that James Hughes paid in full the account on July 2nd.

Another method of showing that money has been paid is by a formal receipt similar to those given below.

RECEIPT IN FULL OF ACCOUNT

Saskatoon, May 11th, 1918

Received from Samuel Jones _____

Fifteen ~~~~~ $\frac{30}{100}$ *Dollars*

in full of account.

$15.30 *Thomas Simpson.*

RECEIPT FOR RENT

Edmonton, May 19th, 1919

Received from Edward Cunningham

Forty-five $\frac{00}{100}$ *Dollars*

for rent to date.

$45.00 *William Reid.*

EXERCISE

1. George Wright paid Thomas Thompson $38.40 in full of account on May 30th, 1918. Write the receipt that Thomas Thompson would give.

2. Peter Duncan paid Wm. Creighton on Mar. 31st, 1919, $125.00 for rent of store for the month of April. Write the receipt.

3. Alice Hardy paid R. Francis, her music instructor, $8.00 on July 31st for one month's tuition. Write the receipt that R. Francis would give.

Farm Accounts

Every farmer finds it necessary to keep accurate accounts of his business transactions. Without these accurate accounts a farmer can tell only in a general way what farming activities are the most profitable. Certain stock that he is raising or certain crops that he is growing may not be profitable and may be producing an actual loss.

In order to find out the standing of his business, a merchant takes an inventory of his stock at least once a year. The farmer does the same. A farm inventory included the

value of the land, buildings, stock, machinery, grain, hay, household effects, cash in bank, Victory bonds, money loaned, etc. The values should be based on local market values.

FARM INVENTORY

480 acres of land and buildings at $40 per acre	$19,200.00
4 horses, aged, at $120 each	480.00
3 horses, 4 yr. old, at $180 each	540.00
2 horses, yearlings, at $80 each	160.00
6 milch cows at $75 each	450.00
30 two-year-old steers at $50 each	1,500.00
15 pigs at $25 each	375.00
6 brood sows at $35 each	210.00
120 hens at 75 ct. each	90.00
30 tons hay at $10.00 a ton	300.00
300 bu. oats at 50 ct. per bushel	150.00
500 bu. wheat at $1.60 per bushel	800.00
Machinery and tools	1,250.00
	$24,505.00

Make out an inventory of your father's farm.

A FARMER'S MONTHLY ACCOUNT

1919			RECEIPTS	EXPENDITURES
Feb.	1	Cash in bank	$ 540 80	$
	4	Sold 4 tons hay at $20	80 00	
	10	Sold 6 hogs at $30	180 00	
	15	Paid for hired labor		30 00
	20	Sold 450 bu. barley at 90 ct.	405 00	
	23	Bought 3 milch cows at $65		195 00
	25	Bought 6 lambs at $12		72 00
	27	Sold 2 tons hay at $20	40 00	
	28	Bought 1 ton bran at $25		25 00
	28	By balance		923 80
			$1245 80	$1245 80

An account showing the total cost of production, receipts, and profit on 100 acres of wheat.

1919			Receipts	Expenditures
Apr.	15	Plowing 100 acres	$	$ 250 00
	20	Harrowing 100 acres		75 00
	30	Seed wheat, 150 bu. at $2		300 00
	30	Drilling and seeding		175 00
Sep.	1	Cutting and stooking		125 00
	30	Threshing 2500 bushels		300 00
Oct.	10	Hauling to elevator		125 00
	20	Sold 2000 bushels at $1.90	3800 00	
Nov.	1	Sold 500 bushels for seed at $2.15	1075 00	
Dec.	15	Taxes		30 00
			4875 00	1380 00
			1380 00	
		Net Profit	$3495 00	

EXERCISE

1. Make out an account showing the net profit from a 50-acre field of oats, the cost of production and the receipts being as follows: April 10, plowing, 12 days at $6.50 per day; April 15, harrowing, $30.00, April 16, 100 bushels of seed oats at 75 ct.; April 25, drilling and seeding at $1.75 per acre; Sept. 5, cutting and stooking, $1.75 per acre; Oct. 10, threshing, 8 ct. per bushel, yield, 65 bushels per acre; Oct. 25, hauling to elevator, 5 ct. per bushel; Oct. 30, sold the entire crop at 70 ct. per bushel.

AGGREGATES AND AVERAGES

INTRODUCTORY EXERCISE

1. Mr. Reid brought home 16 apples in one parcel and 24 in another. He divided them equally between his two boys. How many had he to divide? How many will each boy receive?

2. A boy rode 10 mi. on Monday; 12 mi. on Tuesday; and 17 mi. on Wednesday. How far did he ride all together during these days? If he had ridden the same distance each day, how far would he have gone on Monday?

3. Find the sum of 7, 8, 0, 4, 5, and 6, and divide the sum by the number of quantities.

In the first example, 40 apples is called the *aggregate* of 16 apples and 24 apples, and 20 apples is the *average.*

In the second example, 39 miles is the *aggregate* of 10 mi., 12 mi., and 17 mi., and 13 mi. is the *average.*

In the third example, 30 is the *aggregate,* and 5 is the *average.*

The *Aggregate* of several quantities of the same kind is their sum.

The *Average* of several quantities is that quantity which substituted for each of them will produce an aggregate equal to that of the given quantities.

EXERCISE

Find the average of:

1. 16, 18, 26, 30, 36, 42, 50, and 56.

2. 17, 0, 20, 30, 70, 100, 27, 9, and 17.

3. 120, 340, 560, 780, 320, and 840.

4. Five pupils obtained the following marks at an examination: — 60, 36, 75, 21, and 80 respectively. What was their average mark?

5. There were 45 pupils at school on Monday; 43 on Tuesday; 47 on Wednesday: 45 on Thursday; and 40 on Friday. What was the average attendance for the week?

6. A man trolling caught four fish; the first weighed 12 lbs. 8 oz.; the second, 4 lbs. 10 oz.; the third, 7 lbs. 3 oz.; and the fourth, 9 lbs. 7 oz. Find their average weight.

7. The scores of a side at cricket were the following: 22, 14, 0, 16, 4, 3, 0, 18, 17, 5, and 11. Find the aggregate score and the average per man.

8. In a store the sales for one week were as follows: — $375, $450, $540, $370, $285, and $722. Find the average sale per day.

9. A farmer sold 4 loads of wheat from a 10-acre field; the first weighed 54 bu. 16 lbs.; the second, 57 bu. 37 lbs.; the third, 56 bu. 25 lbs.; and the fourth, 53 bu. 18 lbs. What was the average weight of each load, and the average yield per acre?

EXERCISE

1. The average weight of seven salmon was 9 lb. 5 oz. Find their aggregate weight.

2. The average rate of a train for five hours was 27 mi. 43 rd. Find the distance travelled during the five hours.

3. A grocer sold 5 lbs. of tea at 75¢ per pound and 2 lbs. at 47¢ per pound. What was the average price per pound?

4. Two purchases have been made of 15 lbs. at $2.50 per pound, and 25 lbs. at $1.80 per pound. What is the average price per pound?

5. In a factory the foreman receives $40 per week; of the workmen each of three receives $30, each of five $25, and each of eleven $20. What is the average weekly wage per man?

6. On Monday A rode 23 mi. 1634 yd.; on Tuesday, 25 mi. 625 yd.; on Wednesday, 32 mi. 1347 yd.; and on Thursday, 27 mi. 342 yd. How far did he ride in the four days, and what was his average daily journey?

Accuracy and Time Tests

1. Find how many of the following examples you can do in 10 minutes. In 5 minutes.

Add:

(*a*)	(*b*)	(*c*)	(*d*)
14,286	146,962	28,749	47,968
7,345	776	56,397	52,376
22,654	8,574	74,863	84,583
90,837	6,942	86,789	98,767
65,294	38,479	65,921	21,945
9,763	265,837	39,466	42,649
896	49,768	42,735	76,878
		98,648	89,536
			34,685

(*e*)	(*f*)	(*g*)
$7354.95	$14,708.85	$6495.87
78.64	86.48	9639.28
965.80	9,827.75	8769.75
2796.09	86,494.63	7424.63
12.75	897.28	6985.85
9.89	68.74	4396.29
487.63	7,493.86	8539.27
8594.15	29,847.95	5864.86
88.50	9.55	3487.25
495.27	784.69	

(*h*) 68+75+6937+948+8+79,486.

(*i*) 809+78+6938+54,769+69+80,392.

(*j*) 4968+875+6387+2547+88+9+69,848.

(*k*) 80,759+79,634+4976+98+675+8943+77.

2. Dictate the following numbers to the class to add:

(*a*) 86,032; 9597; 683; 85; 7309; 986; 95,489; 8008; 98.

(*b*) 396,287; 905,603; 7086; 58,697; 7787; 999; 83,098.

(*c*) 95,639; 58,808; 4989; 657; 86; 25,864; 787; 87.

(*d*) 84,907; 36,789; 39,876; 50,905; 78,009; 70,008; 55,090.

3. Multiply rapidly. Score 5 for each correct answer and see what score you can make in 5 minutes. In 10 minutes.

(*a*) 387 × 495	(*b*) 429 × 524	(*c*) 857 × 294	(*d*) 492 × 956	(*e*) 649 × 758
(*f*) 976 × 483	(*g*) 769 × 895	(*h*) 8765 × 4528	(*i*) 8219 × 7863	(*j*) 98,347 × 864
(*k*) 79,486 × 795	(*l*) 683,947 × 487	(*m*) \$500.64 × 405	(*n*) \$876.97 × 648	
(*o*) \$945.65 × 749	(*p*) \$876.89 × 658	(*q*) \$498.95 × 976	(*r*) \$614.92 × 809	
(*s*) \$975.27 × 345	(*t*) 86,563 × 7,090	(*u*) 678,964 × 8,006	(*v*) 8,093,848 × 706	

4. Divide. Score 10 for each correct answer and see what score you can make in 5 minutes. In 10 minutes.

(*a*) 14,758 ÷ 59	(*h*) 214,985 ÷ 606	(*o*) \$14,027.65 ÷ 349
(*b*) 28,639 ÷ 68	(*i*) 943,876 ÷ 573	(*p*) \$40,050.06 ÷ 563
(*c*) 20,273 ÷ 97	(*j*) 389,647 ÷ 859	(*q*) \$70,987.85 ÷ 877
(*d*) 68,258 ÷ 48	(*k*) 409,062 ÷ 685	(*r*) \$58,063.74 ÷ 496
(*e*) 843,962 ÷ 37	(*l*) 198,342 ÷ 784	(*s*) \$20,834.35 ÷ 635
(*f*) 479,628 ÷ 56	(*m*) 586,438 ÷ 982	(*t*) \$35,964.28 ÷ 438
(*g*) 563,849 ÷ 87	(*n*) 674,283 ÷ 839	(*u*) \$64,283.65 ÷ 98

5. A merchant's bank deposits for the week were: $983.75; $1185; $789.80; $899; $1089.45; $1296.85. What were the total deposits for the week?

6. The attendance at the Edmonton Fair for the week was: Tuesday 17,897, Wednesday 18,096, Thursday 18,986, Friday 21,659, Saturday 22,893. What was the total attendance during Fair week?

7. A family's expenses for a year were as follows: food $497.25, clothing $286, fuel $129.45, light and water $36.80, taxes and insurance $357.65, rent $420, medical fees $97.50, travelling expenses $198.75, other expenses $89.60. Find the total yearly expenses.

8. The following table gives the attendance of the eight grades of a city school for one week. Find the total attendance of each grade for the week, the total attendance of all the grades for each day, and the total attendance of all the grades for the week.

Grade	Monday	Tuesday	Wednesday	Thursday	Friday
I	2497	2509	2483	2518	2476
II	2183	2098	2157	2139	2096
III	1895	1874	1906	1929	1889
IV	1563	1507	1578	1609	1598
V	1288	1309	1315	1297	1276
VI	1037	1084	998	979	1018
VII	865	847	892	876	859
VIII	605	596	619	587	574

EXERCISE

1. From a barrel of oil containing 54 gallons a person drew 12 gal. 3 qt. one day and 9 gal. 2 qt. 1 pt. another. How much oil was left in the barrel?

2. What is the weight of 34 hogsheads of sugar each weighing 14 cwt. 45 lbs.?

3. Divide 69 bu. 3 pk. 6 qt. by 6 bu. 3 pk. 6 qt.

4. How many cords of wood can be stored in a shed 16 ft. long, 12 ft. wide, and 8 ft. high?

5. A young man earns $85 per month. He pays $28 per month for room and board. His clothing for the year costs him $128.50. His other expenses for the year amount to $87.75. How much does he save in a year?

6. The paper used in a club costs $7 a thousand sheets and the envelopes $3 a thousand. Find the cost of sending 100 invitations, each requiring a sheet of paper, an envelope, and a 2-cent stamp.

7. A grocer buys canned fruit at the rate of $7.20 per case of 24 cans. He retails this fruit at 45¢ per can. How much does he gain on the sale of 10 cases?

8. Find the area of a path 6 ft. wide all around the inside of a garden 24 yd. long by 16 yd. wide.

9. A milkman supplies 40 customers with milk. Each customer takes on an average 1 quart 1 pint of milk daily. How many gallons of milk does he sell in a week?

10. My watch gained 1 min. 15 sec. a day during the month of November. What was the difference between my time and the correct time at the end of the month?

11. A field containing 5 acres is divided into lots each 5 rd. frontage and 20 rd. deep. How many lots are there?

12. What will it cost to sod a lawn 90 ft. long and 21 ft. wide at 25¢ per square yard?

13. The charge for sending a telegram to a certain place is 40¢ for 10 words and 5¢ for each additional word. What would a telegram of 24 words cost?

14. A man bought a quantity of coal for $250 and by retailing it at $5.75 per ton gained $37.50. How many tons did he buy?

15. How many cubic feet of concrete are in a sidewalk 200 ft. long, 6 ft. wide, if the concrete is 4 in. thick?

16. How many square yards are in the walls of a room 30 ft. long, 24 ft. wide, and 9 ft. high?

17. At 65 cents per hour, what are a man's weekly wages, if he works 5 hours on Saturday and 8 hours on each of the other five days?

18. A lawn is 10 yards wide. How many times would a person go back and forth in cutting the grass with a lawn mower that cuts a strip 15 inches wide?

19. In walking around the promenade deck of a ship a person walks 660 ft. Find the number of miles a person walks in going around the deck 24 times.

20. A person riding on a train counted 40 telegraph poles every minute. If the poles are 2 rods apart, how many miles per hour was the train travelling?

21. The council built a roadway 4 miles long. Find the cost of the road, if one yard of road costs $1.75.

22. How much wire is left when 46 yd. 1 ft. 10 in. are taken from a coil containing 60 yd. 1 ft. 3 in.?

23. Find the cost of linoleum required to cover the floor of a kitchen 14 ft. long and 13 ft. 6 in. wide at 75¢ per square yard.

24. Find the cost of 10 planks each 16 ft. long, 15 in. wide, and 3 in. thick at $50 per M.

25. If 40 cu. ft. of coal weighs a ton, how many tons are there in a vein 200 yd. long, 180 yd. wide, and 5 ft. thick?

26. How many bushels of wheat worth \$1.75 per bushel must be grown on an acre to equal in value a crop of 50 bushels per acre of oats worth 70¢ per bushel?

27. If it requires 12 qt. of oats per day to feed a horse, how many days will 6 bu. 3 pk. last a team of horses?

28. Make out bills for the following purchases supplying dates, names, and addresses. Foot and receipt each bill.

(*a*) $3\frac{1}{2}$ lbs. of steak at 30¢; $14\frac{1}{2}$ lbs. of fish at 20¢; 1 turkey, 8 lbs., at 45¢; leg of mutton, 5 lbs., at 40¢.

(*b*) 7 yd. cotton at 15¢; 6 handkerchiefs at 25¢; 3 pairs gloves at \$1.25; 8 yd. muslin at 35¢; 12 yd. flannel at 25¢.

(*c*) 4 lbs. coffee at 55¢; 6 lbs. tea at 75¢; 7 lbs. lard at 40¢; $3\frac{1}{2}$ lbs. butter at 60¢; $8\frac{1}{2}$ lbs. cheese at 30¢; 4 doz. eggs at 45¢; $\frac{1}{2}$ gal. coal oil at 40¢.

29. A farmer sold 4 loads of wheat, the average weight of each load being 1740 lbs., at \$1.85 per bushel. How much did he get for the four loads?

30. Find the total cost of the following:

2640 lbs. of wheat at \$2.10 per bushel.
2210 lbs. of oats at 70¢ per bushel.
3600 lbs. of barley at 95¢ per bushel.
3960 lbs. of potatoes at \$1.75 per bushel.
7380 lbs. of turnips at 45¢ per bushel.

31. An elevator holds 2,400,000 bushels of wheat. Find in tons the capacity of the elevator.

32. A dealer buys lead pencils at \$6.50 per gross and sells them at 10 cents each. How much does he make on each gross of pencils?

33. A man builds a close board fence 6 ft. high of inch lumber about his garden which is 100 feet wide and 120 feet long. What will the lumber cost at $30 per M? Find the cost of painting both sides of the fence at 15 cents per square yard.

34. A field $\frac{1}{2}$ mile long and 40 rods wide is sowed in wheat. The average yield from this field was 30 bushels per acre. At $1.75 per bushel find the value of the wheat crop from this field.

35. A schoolroom is 30 ft. long, 24 ft. wide, and 10 ft. high, and accommodates 36 pupils. How many cubic feet of air space does this provide for each pupil?

ANSWERS

Exercise. Page 127

1. $2420.50
2. $1612.75
3. 78.75
4. 71 coins
5. $2.00
6. 33 hours
7. $1.35
8. $14.15

Exercise. Page 132. (First Exercise)

1. $828.75
2. 9916 bushels
3. $2760.00
4. 1824 miles
5. $195.00
6. $157.50
7. 14,402 lbs.

Exercise. Page 132. (Second Exercise)

1. 454,560 sheets
2. 195,559 yards
3. $6125
4. 1653 yards
5. 3,915,648 lbs.
6. $1,228,275
7. 263,952 apples
8. 61,275 yards

Exercise. Page 133

1. $1,246,420
2. $3,926,000
3. $17,982
4. 262,800 barrels
5. $7,932,245
6. 89,784 yards
7. 7,344 miles
8. $631.80

Exercise. Page 138

1. 1,412 cattle
2. $4938
3. $18,246
4. $1350
5. 2427 turkeys
6. 125 bushels
7. 8 days
8. 1,090 feet
9. $75
10. 36 bushels

Exercise. Page 139

1. 14 months
2. 367 acres
3. $405.00
4. $845
5. 15 weeks
6. $78
7. 1650 barrels
8. 12 months

Exercise. Page 139

1. $2.40
2. 54 cents
3. $56
4. $96
5. $100
6. $1.25
7. $28
8. $3225

Exercise. Page 146

3. $\frac{1}{2}$ yard
4. $2\frac{1}{3}$ feet
5. $6\frac{1}{8}$ hours
6. $2\frac{1}{4}$ feet
7. $1\frac{1}{8}$ yards
8. $4\frac{1}{4}$ yards
9. $\$2\frac{1}{2}$
10. $\frac{1}{4}$
11. $1.05; $1.95; $2.00; $2.20; $3.40
12. 110 yards

Exercise. Page 150.

4. 55 cents
5. 50 cents
6. $3.77
7. $8.75
8. $4.50
9. $2.82

Exercise. Page 151

1. $6.55
2. *a*. $61.20
   b. $32.80 Total $94.00
3. 112 lbs.
4. 80 acres
5. 385 acres
6. 60 cents
7. 3 gallons
8. 45 tons
9. $7000
10. $340

Exercise. Page 152

1. 708
2. Farm is worth $250 more.
3. 25 yards
4. $900
5. $15 each
6. 15,789
7. 525 gallons
8. $575
9. $6362
10. 420 bushels

Exercise. Page 153

1. $1368
2. $22,250
3. 21 eggs
4. $2.00
5. $693.50
6. $327.75
7. $420.00
8. 454,560 sheets
9. 491,103 apples
10. 418,175 yards

Exercise. Page 154

1. $5673.75
2. Mixture is worth $83.85
   Gain $25.35
3. $631.80
4. 294,000 lbs.
5. $4,710,000
6. $542
7. $302.65
8. 25,200 lbs.
9. $1160
10. $7.85

Exercise. Page 155

1. $2500
2. 10,008 inches
3. $81.90
4. $199.50
5. $1020.00
6. $735
7. 60 ten-cent pieces
   200 five-cent pieces
8. 49 cents
9. $2.10
10. $5.45

Exercise. Page 156

1. 25 cents
2. 43 days
3. 26 days
4. $45
5. $3.50
6. 129 years
7. 2075 barrels
8. 13 dozen
9. 108 yards
10. 18 lbs.

Exercise. Page 157

1. 35 miles
2. 12 days
3. $12
4. 2 quarts
5. $220.50
6. $14
7. $4.75
8. 20 horses, 9 sheep
9. 9 months
10. 1250 boxes

Exercise. Page 169

9. $36
10. 4500 lbs.
11. $30
12. $741.00
13. $24.00
14. 600

Exercise. Page 171

1. $6.60
2. 5 feet 4 inches
3. 40 feet
4. 24 fathoms
5. 27 inches
6. 61 tons 12 cwt.
7. 24 bolts
8. 40 miles 1600 yards
9. $46.40
10. 1344 feet
11. 12 blocks
12. 1056 steps

Exercise. Page 177

1. Ends 180 square feet
   Walls 216 square feet
   Ceiling and floor 120 sq. ft. each
   13⅓ yards of carpet
2. $48.00
3. $480.00
   120 acres
4. 5½ acres
5. Length ½ mile, width ½ mile
6. 480 acres, $640.00
7. $9600

Exercise. Page 181

1. 1080 cu ft.
2. Area 192 sq. ft.
   Volume 1536 cu. ft.
3. 3240 cu. ft.
4. 4 cu. yds.
5. 48 tons
6. 200 cu. ft.
7. 9 cords
8. $110.00
9. 216 cu. ft.

Exercise. Page 184

1. 12 tons
2. 100 bushels
3. $30.00
4. 80 cents
5. $7.50
6. $1.80
7. 6 bushels
8. 450 gallons

Exercise. Page 189

1. $32.90
2. 7920 steps
3. 1500 tons
4. 864 sq. in.
5. 540 bricks
6. 160 cu. yds.
7. $585
8. 100 gallons
9. Areas equal
   1st field 160 rods
   2d field 200 rods
10. 42 feet

Exercise. Page 190

1. 2100 sq. yds.
2. $900
3. 52 sq. ft.
4. 288 sq. ft.
5. 1728 tiles
6. $336
7. $9.58
8. 150 hours
9. $2.00
10. ⅛

Exercise. Page 192

7. 6 weeks 3 days 6 hours 50 min. 33 sec.
8. 11 yards 1 foot 10 inches
9. 101 miles 1261 yards
10. 1395 cords 124 cu. ft.
11. 458 bush. 49 lbs.
12. 99 acres 4488 sq. yds. 6 sq. feet

Exercise. Page 193

6. 142 bush. 2 pks. 5 qts.
7. 31 gal. 2 qt. 1 pt.
8. 12 sq. yd. 3 sq. ft. 132 sq. in.
9. 1 cwt. 85 lb.
10. 72 miles 254 rods

Exercise. Page 194

1. 4 acres 4054 sq. yd. 4 sq. ft.
2. 1 hour 35 min. 45 sec.
3. 62° 49′ 4″
4. 9 acres 3534 sq. yd.
5. 6060 seconds
6. 1 bushel 1 pk. 1 gal.
7. 4 tons 1323 lbs.
8. 8 yd. 2 ft. 3 in.
9. 114 cords 11 cu. ft.
10. 500 gallons
11. 97 miles 842 yds. 2 ft. 6 in.
12. 887 cords 70 cu. ft.

Exercise. Page 196

4. 8 min. 59 sec.
5. 123 yds. 1 ft. 8 in.
6. 2625 lbs.
7. 88 acres
8. 738 miles 992 yds.
9. 89 feet 11 inches
10. 2 feet 10 inches
11. 91 gal. 2 qts.
12. 261 gallons
13. 14 tons 3 cwt.
14. $27.00

Exercise. Page 199

1. 25 jars
2. 1 foot 8 inches
3. 6 miles
4. 24 barrels
5. 9 times
6. 5 weeks
7. 4 miles 328 yds.
8. $80.00
9. 25 miles
10. 165 tons
11. $4125

Exercise. Page 203

1. (*a*) 24 (*b*) 24 (*c*) 6 (*d*) 21 bd. ft.
2. 288 bd. ft.
3. 2400 bd. ft.
4. 2232 bd. ft.
5. 1188 bd. ft.
6. 3000 bd. ft.
7. $332.00
8. $18.00
9. 3600 bd. ft.
10. $315.00

Exercise. Page 204

1. (*a*) 84 yds. (*b*) 26⅔ yds.
   (*c*) 64 yds. (*d*) 138⅔ yds.
2. (*a*) $48.00 (*b*) $57.60
   (*c*) $39⅓
3. 5 strips; 7 strips
4. 8 strips
5. 8 strips
6. $42.75
7. 18 ft.
8. $9.47½

Exercise. Page 206

1. 32 sq. yds.
2. 150⅔ sq. yds.
3. $37.80
4. 36 feet
5. 812 sq. ft.; 1280 sq. ft.
6. $44.00
7. $5.00
8. 80 yds.
9. $29.40
10. $42.00

Exercise. Page 207

1. 141 yds.
2. 544 sq. ft.
3. 112 yds.
4. $14.00
5. 44 rolls

Exercise. Page 208

1. 8000 shingles
2. 24,000 shingles
3. 20,000 shingles
4. 10 feet
5. $105.30
6. $40.00
7. $28.80
8. 57½ bundles
9. $198.00

Exercise. Page 210

1. $49.50
2. $4.50
3. $13.25
4. $17.70
5. $8.70

Exercise. Page 212

1. $85.50
2. Balance $171.45
3. $10.84

Exercise. Page 216

1. $1494.50

Exercise. Page 217

1. 34½
2. 32⅔
3. 493½
4. 54⅔
5. 44
6. 8 lbs. 7 oz.
7. Aggregate 110; average 10
8. $457
9. Average weight 55 bu. 24 lbs.
   Average yield 22 bu. 9½ lbs.

Exercise. Page 218

1. 65 lbs. 3 oz.
2. 135 mi. 215 rds.
3. 67 cents
4. $2.06¼
5. $23.75
6. 109 mi. 428 yds.
   27 mi. 547 yds.

Exercise. Page 221

1. 31 gal. 2 qt. 1 pt.
2. 491 cwt. 30 lbs.
3. 10 times 18 qts. over
4. 12 cords
5. $467.25
6. $3.00
7. $36.00
8. 144 sq. yds.
9. 105 gals.
10. 37½ minutes
11. 8 lots
12. $52.50
13. $1.10
14. 50 tons
15. 400 cu. ft.
16. 108 sq. yds.
17. $29.25
18. 24 times
19. 3 miles
20. 15 miles
21. $12.320
22. 13 yd. 2 ft. 5 in.
23. $15.75
24. $30.00
25. 40,500 tons
26. 20 bushels
27. 9 days
28. (*a*) $9.55
    (*b*) $12.10
    (*c*) $16.15
29. $214.60
30. $380.00
31. 72,000 tons
32. $7.90
33. $79.20; $88.00
34. $2100.00
35. 200 cu. ft.