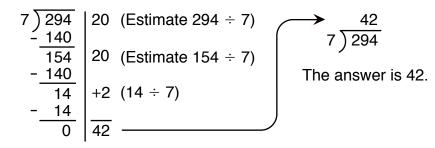# LETTER HOME

Division

Dear Family Member:

In this unit, your child will learn to divide large numbers by one-digit divisors. Students estimate quotients (the answer to a division problem) and use their knowledge of multiplication facts and multiples of ten to find answers to problems such as $378 \div 6$.

> 6 x 60 = 360 and 6 x 70 = 420. 378 is between 360 and 420, but it is closer to 360. So the answer must be between 60 and 70, but probably closer to 60.
>
> Ming

Students explore division using equal sharing and area models. Both ways of looking at division build their understanding of the operation before they learn a paper-and-pencil algorithm. When students have a solid understanding of division, they make fewer mistakes, retain their learning longer, and can think more flexibly to solve problems.
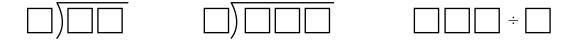
The paper-and-pencil method taught by *Math Trailblazers*^{TM} for long division is somewhat different from the way long division is traditionally taught in the United States. This method, called the partial quotients division method, builds on a conceptual understanding of division. It is often easier for students to learn and is more flexible than the traditional method. Both methods involve making estimates, but the partial quotients method allows underestimates so it does not involve as much erasing and recalculating as the traditional method sometimes does. This increases accuracy. This method can easily be extended to solve problems with larger divisors.

$$
\begin{array}{r|l}
7\overline{)294} & 20 \quad \text{(Estimate } 294 \div 7) \\
-140 & \\
\hline
154 & 20 \quad \text{(Estimate } 154 \div 7) \\
-140 & \\
\hline
14 & +2 \quad (14 \div 7) \\
-14 & \\
\hline
0 & 42 \\
\end{array}
\qquad
\begin{array}{r} 42 \\ 7\overline{)294} \end{array}
$$

The answer is 42.

The partial quotients division method is often easier for children to learn.

As we work together in class, these are some ways that you can help your child at home:

Play the Division Digits Game. In this game students draw numbers from a set of Digit Cards 0–9 and place the digits on a division playing board. The winner makes the largest quotient. Directions are in the *Student Activity Book*.

☐)☐☐   ☐)☐☐☐   ☐☐☐ ÷ ☐

Compare Strategies. Encourage your child to show you how he or she is learning division. Show him or her your method for division. Compare them.

Learn the Partial Quotients Method. This method is often called the Forgiving Method because you can underestimate and still solve the problem efficiently. The partial quotient method is described here.
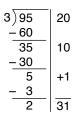
Partial Quotients Method

As an example, let's divide 95 by 3. Think of dividing 95 objects, such as marbles, into groups of 3. How many groups will there be? (Or, think of putting the objects into 3 groups. How many will be in each group?)

```
    3)95    20
     −60
      35
```

Now divide the remaining 35 marbles by 3. Let's estimate that 35 ÷ 3 is about 10. Since 3 × 10 = 30, write
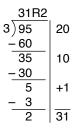
```
    3)95    20
     −60
      35
     −30    10
       5
```

Since 3 "goes into" 5 one time, write

```
    3)95    20
     −60
      35    10
     −30
       5    +1
     − 3
       2    31
```

Since 2 divided by 3 does not give us a whole number, there are 2 marbles left over. This is the remainder.

Add up the number of 3s we took away: 20 + 10 + 1 = 31. So, 95 divided by 3 is 31 with remainder 2. We write this one top of the problem, as in the traditional division method.

```
      31R2
    3)95    20
     −60
      35    10
     −30
       5    +1
     − 3
       2    31
```

As students become familiar with the partial quotients method, they make better estimates to keep the number of steps at a minimum. Below is another way to do this problem using this method. Note that this time, making the highest possible estimates (without overestimating) results in the same number of steps as the traditional method. If the highest estimate is made each time, the two methods are essentially the same.

```
      31R2
    3)95    30
     −90
       5    1
     − 3
       2    31
```

The partial quotients method allows students to underestimate as they develop their estimation skills. However, when students overestimate, they have to erase, just as with the traditional method.

Math Facts and Mental Math

This unit concludes the systematic review and assessment of the division facts in fourth grade.

Division Facts. Students review the division facts for all the groups to maintain and increase fluency and to learn to apply multiplication and division strategies to larger numbers.

You can help your child review these facts using the flash cards that are sent home or by making a set of flash cards from index cards or scrap paper. Study facts in small groups each night. As your child goes through the flash cards, put the cards in three stacks: Facts I Know Quickly, Facts I Can Figure Out, and Facts I Need to Learn.

For the Facts I Need to Learn, work on strategies for figuring them out. Good strategies include:

Start with the multiplication fact. If your child does not know the multiplication fact related to the division fact, start by developing strategies to solve that multiplication fact.

Turn-around facts. To solve 28 ÷ 7. I know 7 × 4 = 28. So, 28 ÷ 7 = 4.

Reasoning from known facts. To solve 32 ÷ 4. I know 32 ÷ 2 = 16. So, 32 ÷ 4 is half of 16. 32 ÷ 4 = 8.

For Facts I Can Figure Out, use the flash cards to practice the facts for fluency.

For Facts I Know Quickly, help your child use mental math strategies to multiply 10s and 100s: 2400 ÷ 60 = 40, 480 ÷ 6 = 80, 24,000 ÷ 400 = 60.

Sincerely,

Unit 12: Home Practice

Part 1 Triangle Flash Cards: All the Division Facts

Look at your *Division Facts I Know* charts. Take home your Triangle Flash Cards for all the facts you have not circled. You can make new cards using the *Blank Triangle Flash Cards*. With the help of a family member, use the cards to study a small group of facts each night. Your teacher will tell you when the test on all the facts will be given.

To quiz you on a division fact, your family member can cover one of the smaller numbers. (One of the smaller numbers is circled. The other has a square around it.) Use the two uncovered numbers to solve a division fact.

Ask your family member to mix up the division facts you still need to study. He or she should sometimes cover the circled number and sometimes cover the number in the square.

Part 2 Create a Fraction

You may use your own fraction chart or the *Fraction Chart* in the *Student Guide* Reference Section to help you solve these problems.

A. Write a fraction that is larger than $\frac{1}{2}$, but smaller than $\frac{3}{4}$. _____

B. Write a fraction that is a little bit smaller than $\frac{1}{8}$. _____

C. Write a fraction that is double $\frac{1}{10}$. _____

D. Write a fraction that is much larger than $\frac{1}{3}$, but smaller than $\frac{11}{12}$. _____

Part 3 Prizes

The children's hospital plans to spend $100 on stuffed animals for prizes for a raffle. The tiny ones are 10¢, the medium ones cost $2.00, and the large ones cost $5. They will buy some of each kind. (There are many solutions to this problem. If you need more work space, use a separate sheet of paper.)

1. How many of each can they buy?

2. What strategy or strategies did you use to solve this problem?

3. How did you check your answer to see if it was correct?

4. Show another solution to this problem.

Part 4 Solving Problems

Choose appropriate methods and tools to solve the following problems. Explain how you solved each problem.

1. Over a four-day period, Frank watched 325 minutes of TV. He watched 60 minutes of TV on Monday, 45 minutes on Tuesday, and 75 minutes on Wednesday.

   A. How many minutes did he watch on Thursday?

   B. About how many hours of TV did he watch on Thursday?

2. On Monday, Shannon watched 4 times the amount of TV as Luis.

   A. If Luis watched TV for 45 minutes, how many minutes did Shannon watch?

   B. How many hours did Shannon watch?

3. Mrs. Dewey watched 45 minutes of TV on Monday, 35 minutes on Tuesday, and 1 hour on Wednesday. She did not watch TV on Thursday. What is the mean number of minutes of TV watched by Mrs. Dewey over the four-day period?

4. **A.** $60 \times 62 =$ **B.** $57 \times 73 =$

   C. $67 \times 56 =$ **D.** $85 \times 94 =$

5. Show or tell how you know your answer to Question 4D is reasonable.

Part 5 Working with Remainders

Show how you solved each of the following problems. Explain how any remainders affected your answer.

1. Nine cereal boxes fit into one crate. How many crates are needed for 30 boxes of cereal?

2. Twenty-one children try out for two teams. The children decided that anyone who is not selected will be an umpire. There are three umpires. How many children are on each of the two teams?

3. Mrs. Roberts collected a total of $273 from the 90 students who are going on a field trip. Each student brought in $3. Is the total of $273 the correct amount? Explain.

4. Irma wants to read her 453-page book in 9 days. If she reads about the same number of pages each night, how many should she read a night?

Part 6 Multiplication and Division Practice

Use paper and pencil or mental math to solve the following problems. If you need more space to show your work, you may use a separate sheet of paper. Estimate to make sure your answers are reasonable. Use the *Multiplication* and *Division Strategies Menus* in the Reference section of the *Student Guide*.

1. **A.** $267 \times 7 =$ **B.** $6004 \times 8 =$ **C.** $30 \times 58 =$ **D.** $73 \times 400 =$
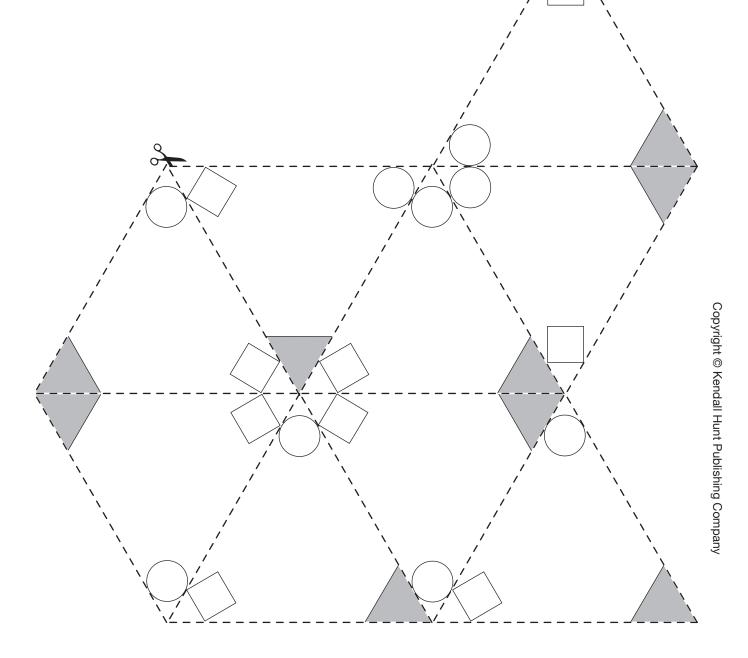
   E. $780 \div 8 =$ **F.** $269 \div 3 =$ **G.** $379 \div 2 =$ **H.** $467 \div 6 =$

2. Choose a problem from Question 1 and show how to solve it using mental math.

3. Explain your estimation strategy for Question 1E.

4. Write Question 1H as a multiplication problem using the divisor, quotient, and remainder in your answer.

Blank Triangle Flash Cards

- Make a flash card for each fact that is not circled on your *Division Facts I Know* charts. Write the product in the shaded corner of each triangle. Then cut out the flash cards.
- Your partner chooses one card at a time and covers one corner.
- To quiz you on a division fact, your partner covers the number in the square or the number in the circle. Solve a division fact with the two uncovered numbers.
- Repeat the directions for your partner.

Division Facts I Know

- **Circle the facts you know well.**
- **Keep this table and use it to help you divide.**
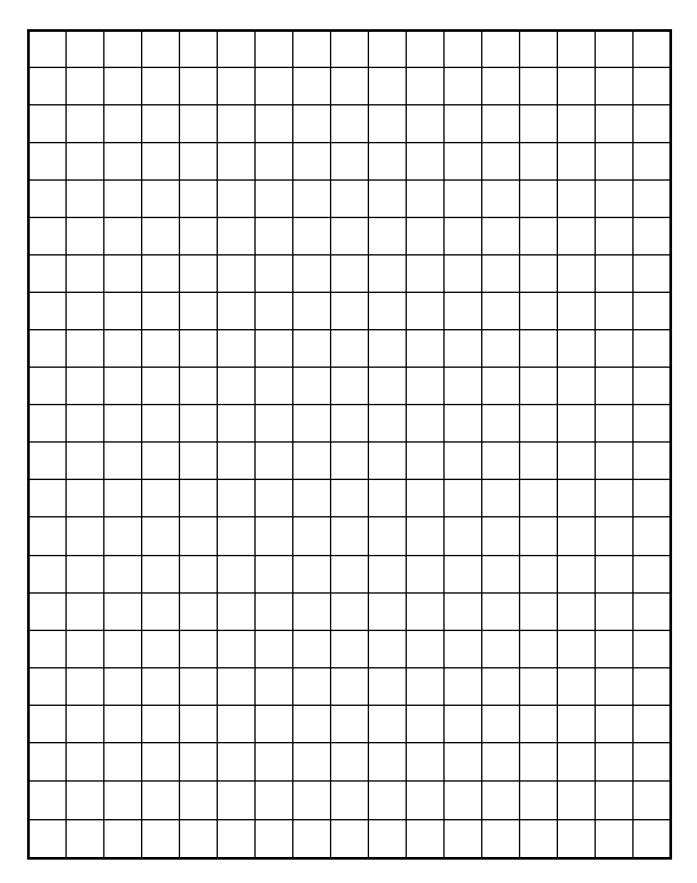- **As you learn more facts, you may circle them too.**

DIVISOR

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

Small Multiplication Tables

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Digit Cards 0-9

4	9
3	8
2	7
1	6
0	5