

"Now I will try 2. Since  $8 \times 2 = 16$ , there is 1 marble left over. Then 737 divided by 8 is  $92 (50 + 30 + 10 + 2)$  with remainder 1. Each child gets 92 marbles with 1 left over."

$$\begin{array}{r} 92 \text{ R}1 \\ 8 \overline{) 737} \\ \underline{-400} \phantom{00} \\ 337 \\ \underline{-240} \phantom{00} \\ 97 \\ \underline{-80} \phantom{00} \\ 17 \\ \underline{-16} \phantom{00} \\ 1 \end{array}$$



Nila estimated to see if her answer was reasonable. She figured that 737 is a little less than 800 and  $800 \div 8 = 100$ , so the answer should be a little less than 100. Her answer of 92 R1 is reasonable.

Then Nila checked her work for accuracy using multiplication. She wanted to make sure that  $92 \times 8 + 1 = 737$ .

She multiplied using the compact method:

$$\begin{array}{r} 92 \\ \times 8 \\ \hline 736 \end{array}$$

Then she added the remainder:  $\begin{array}{r} 736 \\ + 1 \\ \hline 737 \end{array}$  She got back the dividend, so she knew she must have divided correctly.

1. Solve the following problems with the partial quotients method. Then use multiplication to check your answers for accuracy.

- A.  $8 \overline{) 901}$       B.  $617 \div 8$       C.  $4762 \div 4$

2. Solve these problems using the partial quotients method.

- A.  $4 \overline{) 856}$       B.  $7 \overline{) 256}$       C.  $5478 \div 9$

D. Show how you used estimation to check each answer for reasonableness.

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### Student Guide

#### Questions 1–9 (SG pp. 549–551)

Methods will vary.

1. A.  $112 \text{ R}5$ ;  $8 \times 112 = 896$ ;  $896 + 5 = 901$   
 B.  $617 \div 8 = 77 \text{ R}1$ ;  $8 \times 77 = 616$ ;  $616 + 1 = 617$   
 C.  $1190 \text{ R}2$ ;  $4 \times 1190 = 4760$ ;  $4760 + 2 = 4762$
2. A.  $856 \div 4 = 214$   
 B.  $256 \div 7 = 36 \text{ R}4$   
 C.  $5478 \div 9 = 608 \text{ R}6$   
 D. Responses will vary.
- 3.\* See Part 3 in the lesson.
4. A.  $562 \div 5 = 112 \text{ R}2$   
 B.  $667 \div 5 = 133 \text{ R}2$   
 C.  $274 \div 2 = 137$   
 D.  $527 \div 2 = 263 \text{ R}1$   
 E.  $413 \div 7 = 59$   
 F.  $792 \div 7 = 113 \text{ R}1$   
 G.  $341 \div 4 = 85 \text{ R}1$   
 H.  $987 \div 6 = 164 \text{ R}3$   
 I.  $684 \div 3 = 228$   
 J.  $459 \div 8 = 57 \text{ R}3$   
 K.  $2641 \div 9 = 293 \text{ R}4$   
 L.  $8128 \div 3 = 2709 \text{ R}1$
5. 4H:  $164 \times 6 = 984$ ,  $984 + 3 = 987$ ;  
 4L:  $2709 \times 3 = 8127$ ,  $8127 + 1 = 8128$
6. A. 10 bunches of eight  
 B. 8, 80 lollipops  
 C. 80 is the number of lollipops in 10 bunches of eight  
 D. 10 bunches of eight  
 E. 44 is the number of lollipops left over after 20 bunches have been made.  
 F. 5 bunches of eight  
 G. 25 bunches  
 H. 4 lollipops left over
7.  $363 \div 3 = 121$  toys

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### Student Guide - Page 549

3. Compare the following solutions to  $379 \div 5$ . Discuss how they are the same and how they are different. Discuss why some solutions use fewer steps.

$\begin{array}{r} 75\text{R}4 \\ 5 \overline{) 379} \\ \underline{100} \phantom{00} \\ 279 \\ \underline{200} \phantom{00} \\ 79 \\ \underline{50} \phantom{00} \\ 29 \\ \underline{25} \phantom{00} \\ 4 \overline{) 75} \end{array}$	$\begin{array}{r} 75\text{R}4 \\ 5 \overline{) 379} \\ \underline{150} \phantom{00} \\ 229 \\ \underline{100} \phantom{00} \\ 129 \\ \underline{100} \phantom{00} \\ 29 \\ \underline{25} \phantom{00} \\ 4 \overline{) 75} \end{array}$	$\begin{array}{r} 75\text{R}4 \\ 5 \overline{) 379} \\ \underline{250} \phantom{00} \\ 129 \\ \underline{100} \phantom{00} \\ 29 \\ \underline{25} \phantom{00} \\ 4 \overline{) 75} \end{array}$	$\begin{array}{r} 75\text{R}4 \\ 5 \overline{) 379} \\ \underline{350} \phantom{00} \\ 29 \\ \underline{25} \phantom{00} \\ 4 \overline{) 75} \end{array}$
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4. Solve the following problems using the partial quotients method. Think about what you observed in Question 3 to help keep the number of steps small. Check to be sure your answers are reasonable.

- A.  $562 \div 5$       B.  $667 \div 5$       C.  $274 \div 2$       D.  $2 \overline{) 527}$   
 E.  $7 \overline{) 413}$       F.  $792 \div 7$       G.  $4 \overline{) 341}$       H.  $987 \div 6$   
 I.  $3 \overline{) 684}$       J.  $459 \div 8$       K.  $2641 \div 9$       L.  $3 \overline{) 8128}$

5. Use multiplication to show that your answers to Questions 4H and 4L are correct.

#### ✓ Check-In: Questions 6-9

6. Sue has 204 lollipops. She is going to divide them into bunches of 8. How many bunches will she have? Will any lollipops be left over? Help Sue think through her solution.

- A. First try: \_\_\_\_\_ bunches of eight.  
 B. You have used  $10 \times$  \_\_\_\_\_, or \_\_\_\_\_ lollipops.  
 C. What does the 80 mean?  
 D. Second try: \_\_\_\_\_ bunches of eight.  
 E. What does the 44 mean?  
 F. Next try: \_\_\_\_\_ bunches of eight.  
 G. How many bunches of 8 lollipops does she have?  
 H. How many lollipops are left over?

7. Three stores gave 363 toys for prizes at the school fair. Each store gave the same number of toys. How many toys did each store give?

$$\begin{array}{r} 204 \text{ R}10 \\ 8 \overline{) 204} \\ \underline{-80} \phantom{00} \\ 124 \\ \underline{-80} \phantom{00} \\ 44 \\ \underline{-40} \phantom{00} \\ 4 \overline{) 25} \end{array}$$

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### Student Guide - Page 550

\* Answers and/or discussion are included in the lesson.

8. A. She will need 47 pages.  
 B. Jamie's answer is incorrect. She did not include the 2 leftover pictures.
9. A. Blanca and Nila both used the partial quotients method, but they used different initial partial quotients.  
 B. 20  
 C. 50  
 D. Answers will vary. Students may say they would start with 70, because  $5 \times 70 = 350$ , which is closer to 375.  
 E. Nila used fewer steps by starting with a partial quotient closer to the actual quotient.  
 F. Answers will vary. Students may start with a partial quotient of 60 or 70 to reduce steps.

**Homework (SG pp. 551–552)**

**Questions 1–23**

- 384 cookies
- Estimates will vary. Possible response: 30 pies in each oven. Round 173 to 180.  $180 \div 6 = 30$  pies.
- A good estimate would be  $500 \text{ loaves} \div 4 \text{ kinds} = 125 \text{ loaves of each kind}$ .  $400 \div 4 = 100$  and  $100 \div 4 = 25$ , so  $500 \div 4 = 125$ .

8. Jamie wants to create a photo album of 278 School Fair pictures. Six pictures fit on each album page.

A. How many pages will she need?  
 B. Look at Jamie's solution to the right. Do you agree with her answer? Why or why not?

9. Blanca and Nila organized 375 name tags into 5 groups on the welcome table. The girls used division to find out how many name tags to put in each group.

Blanca solved the problem this way:

$$\begin{array}{r} 75 \\ 5 \overline{)375} \phantom{0} \\ \underline{-100} \phantom{0} \\ 275 \phantom{0} \\ \underline{-200} \phantom{0} \\ 75 \phantom{0} \\ \underline{-50} \phantom{0} \\ 25 \phantom{0} \\ \underline{-25} \\ 0 \end{array}$$

Nila solved the problem this way:

$$\begin{array}{r} 75 \\ 5 \overline{)375} \phantom{0} \\ \underline{-250} \phantom{0} \\ 125 \phantom{0} \\ \underline{-100} \phantom{0} \\ 25 \phantom{0} \\ \underline{-25} \\ 0 \end{array}$$

"I will need 46 photo album pages."

A. How are Blanca's and Nila's solutions alike? How are they different?  
 B. What is Blanca's first partial quotient?  
 C. What is Nila's first partial quotient?  
 D. Which partial quotient would you start with? Why?  
 E. Who used fewer steps? How did she do that?  
 F. Can you solve this problem using fewer steps? If so, how?

**Homework**

- Twenty-four cookies fit on a pan at the Good-For-You Bakery. If the baker makes 16 pans of cookies, how many cookies does he bake?
- The Good-For-You Bakery has 6 ovens. If they bake 173 pies every day and bake about the same number of pies in each oven, estimate about how many pies are baked in each oven. Show or tell how you know.
- The bakery makes 4 different kinds of bread: whole wheat, rye, oatmeal, and cinnamon. They bake a total of 509 loaves of bread a day. If they bake about the same number of each type, estimate about how many loaves of each bread they bake.

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Paper-and-Pencil Division SG • Grade 4 • Unit 12 • Lesson 6 551

**Student Guide - Page 551**

Compute using the partial quotients method. Remember to check whether your answer seems reasonable.

4.  $4 \overline{)586}$       5.  $3 \overline{)904}$       6.  $819 \div 7$   
 7.  $128 \div 6$       8.  $9 \overline{)949}$       9.  $249 \div 5$

10. A. Pick one of Questions 4–9 and check the answer using multiplication.  
 B. Pick one of Questions 4–9 and show how to use estimation to show that your answer is reasonable.  
 C. Pick one of Questions 4–9 and write a story problem to match.
11. For a fund-raiser, the members of the Wilderness Club baked 789 chocolate chip cookies.  
 A. If they sell them in packages of 5, how many packages can they make?  
 B. The Wilderness Club sold 102 packages. How many cookies were left?
12. There are about 1700 grass plants in 2 square feet of a healthy lawn. About how many plants are in 1 square foot?
13. There are 8 single-family homes on Elm Street in Mathville. The families who live there spend a total of about \$1040 a year on grass care. If all the families spend about the same amount, about how much does each family spend?
14. In 2003, the same 8 families on Elm Street spent a total of about \$536 on flower gardens. If all the families each spent about the same amount, about how much did each family spend that year?
15. Five grass plants will produce about 1875 miles of roots in their lifetimes. About how many miles of roots will one plant produce?
16. A store sells tulip bulbs. The bulbs come in packages of 8. If they sold 216 bulbs, how many packages did they sell?
17.  $422 \div 8$       18.  $4 \overline{)601}$       19.  $6 \overline{)272}$   
 20.  $9 \overline{)6452}$       21.  $1708 \div 6$       22.  $588 \div 7$   
 23. Show or tell how you know your answer to Question 21 is reasonable.

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Play the Division Digits Game with a family member or classmate. Directions and cards are in the *Student Activity Book*.

Student Guide - Page 552

4. 146 R2  
 5. 301 R1  
 6. 117  
 7. 21 R2  
 8. 105 R4  
 9. 49 R4
10. A. Responses will vary. For Q# 9,  
 $49 \times 5 + 4 = 249$   
 B. Responses will vary. One possible strategy for Question 4 follows: 586 is a little less than 600.  $600 \div 4$  is 150, so the answer will be a little less than 150.  
 C. Stories will vary. One possible story for **Question 4** follows: There are 586 girls in the school. Each girl belongs to one of four clubs. There are almost the same number of girls in each club. How many girls are in each club? Two clubs will have one more girl than the others.
11. A. 157 packages with 4 cookies left over  
 B. 279 cookies;  $102 \times 5 = 510$  cookies;  
 $789 - 510 = 279$  cookies.
12. Estimates will vary. Between 800 and 900 or 850 plants.  $1600 \div 2 = 800$  and  $1800 \div 2 = 900$
13. Estimates will vary. Between \$100 and \$150; about \$125.00.  $\$800 \div 8 = \$100$  and  $\$1200 \div 8 = \$150$ .
14. Estimates will vary. Between \$60 and \$70; about \$65.00.  $8 \times \$60 = 480$  and  $8 \times \$70 = \$560$
15. Estimates will vary. Between 300 and 400; about 350 miles.  $1500 \div 5 = 300$  and  $2000 \div 5 = 400$
16.  $216 \div 8 = 27$  packages  
 17.  $422 \div 8 = 52$  R6  
 18.  $601 \div 4 = 150$  R1  
 19.  $272 \div 6 = 45$  R2  
 20.  $6452 \div 9 = 716$  R8  
 21.  $1708 \div 6 = 284$  R4  
 22.  $588 \div 7 = 84$   
 23. Round 284 to 300.  $6 \times 300 = 1800$ , 1708 is a little less than 1800 so 284 is reasonable.

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**Teacher Guide**

**Paper-and-Pencil Division Quiz**

**Questions 1–6 (TG pp. 1–3)**

1. 136 DVDs;  $816 \text{ DVDS} \div 6 \text{ sections} = 136 \text{ DVDs per section}$
2. 48 tables;  $286 \div 6 = 47 \text{ R}4$ . That is 47 tables with 4 students left over. Another table is needed to seat these 4 students. The answer is reasonable because  $6 \times 50 = 300$ ; 286 is a bit smaller than 300 so the answer should be a bit smaller than 50.
3. **A.**  $219 \div 5 = 43 \text{ R}4$   
**B.**  $973 \div 3 = 324 \text{ R}1$
4. Explanations will vary. Possible response:  $900 \div 3 = 300$  so an answer a little larger than 300 is reasonable.
5.  $324 \times 3 + 1 = 973$


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Name \_\_\_\_\_ Date \_\_\_\_\_

**Paper-and-Pencil Division Quiz**

**Answer the questions using any method you choose, except calculators. Show your work and how you know your answer is reasonable.**

1. A video store has 816 DVDs in 6 sections. If each section contains the same number of DVDs, how many DVDs are in each section?
  
  
  
  
  
  
  
  
  
  
2. The eighth-grade class at Sunny Valley Middle School is having a luncheon. The restaurant will use tables that seat 6 people each. There are 286 eighth-grade students. How many tables will they need? Explain your answer.



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TG • Grade 4 • Unit 12 • Lesson 6 Assessment Master

**Teacher Guide - Page 1**

Name \_\_\_\_\_ Date \_\_\_\_\_

3. Solve the following problems using the partial quotients method.

**A.**  $5 \overline{)219}$

**B.**  $3 \overline{)973}$

4. Show how you know your answer to Question 3B is correct by using multiplication.

5. Write a multiplication sentence for your answer to Question 3B. Include the divisor, the quotient, and the remainder.

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Assessment Master TG • Grade 4 • Unit 12 • Lesson 6 2

**Teacher Guide - Page 2**

# Answer Key • Lesson 6: Paper-and-Pencil Division

Name \_\_\_\_\_ Date \_\_\_\_\_

6. A. Martin solved  $729 \div 7$  using the column method, which he called the "fair shares" method. Show how his solution would look if he had used the partial quotients method. Use the same estimates that Martin used.

4	4	4	4	4	4	4
10	10	10	10	10	10	10
50	50	50	50	50	50	50
20	20	20	20	20	20	20
20	20	20	20	20	20	20
1	2	3	4	5	6	7

$20 + 20 + 50 + 10 + 4 = 104 \text{ R}1$

$7 \times 4 = 28$	$29 - 28 = 1$
$7 \times 10 = 70$	$99 - 70 = 29$
$7 \times 50 = 350$	$449 - 350 = 99$
$7 \times 20 = 140$	$589 - 140 = 449$
$7 \times 20 = 140$	$729 - 140 = 589$

$29 - 28 = 1$
$99 - 70 = 29$
$449 - 350 = 99$
$589 - 140 = 449$
$729 - 140 = 589$

$7 \overline{)729}$	20
<u>140</u>	
589	<input type="text"/>
- 140	
<u>449</u>	50
- 350	
<u>99</u>	10
- 70	
<u>29</u>	<input type="text"/>
<u>28</u>	
<u>1</u>	

B. Show how Martin could have solved the problem using fewer steps.  
Hint: think about the division facts.

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3 TG • Grade 4 • Unit 12 • Lesson 6 Assessment Master

6. A. 
$$\begin{array}{r} 7 \overline{)729} \quad 20 \\ \underline{140} \\ 589 \quad \boxed{20} \\ \underline{-140} \\ \boxed{449} \quad \boxed{50} \\ \underline{-350} \\ \boxed{99} \quad 10 \\ \underline{-70} \\ \boxed{29} \quad \boxed{4} \\ \underline{28} \\ \boxed{1} \quad \underline{104} \end{array}$$

B. 
$$\begin{array}{r} 104 \text{ R}1 \\ 7 \overline{)729} \quad 100 \\ \underline{700} \\ 29 \quad 4 \\ \underline{28} \\ \boxed{1} \quad \underline{104} \end{array}$$

A first estimate of 100 should be an easy one for students to see:  $7 \times 100 = 700$ .