LESSON 22

Texas Essential Knowledge and Skills

(5.3)(C) use division to solve problems with whole numbers (up to two-digit divisors and three-digit dividends without technology), including interpreting the remainder.

(5.15)(B) relate informal language to mathematical language.

(5.16)(B) explain the solution process.

• Division With and Without Remainders

Power Up

facts Power Up F

count aloud Count up and down by 50s between 0 and 500.
Count up and down by 500s between 0 and 2000.

mental math

a. **Number Sense:** 10 × 5

b. **Number Sense:** 10 × 25

c. **Number Sense:** 5 × 50 plus 7 × 5

d. **Number Sense:** 4 × 56

e. **Number Sense:** 3 × 56

f. **Money:** Lanna spent $1.50 for a notebook and 25¢ for an eraser. How much did she spend altogether?

g. **Time:** The driving time to the campsite is 180 minutes. If the family stops for 30 minutes to eat lunch, how long will it take them to reach the campsite?

h. **Number Sense:** Start with 6, × 6, − 1, ÷ 5, + 1, ÷ 2

problem solving Choose an appropriate problem-solving strategy to solve this problem. Copy this subtraction problem and fill in the missing digits:

$$\begin{array}{r} 4\_6 \\ -\ \_1\_ \\ \hline 237 \end{array}$$

New Concept

Division and multiplication are inverse operations. We can use division to find a missing factor. Then we can use multiplication to check our division. We show this below:

$$\begin{array}{r} 7 \\ 5\overline{)35} \end{array} \qquad \begin{array}{r} 7 \\ \times\ 5 \\ \hline 35 \end{array}$$ check

Visit www.SaxonMath.com/Int5Activities for a calculator activity.

Instead of writing a separate multiplication problem, we can show the multiplication as part of the division problem. After dividing to get 7, we multiply 7 by 5 and write the product under the 35. This shows that there are exactly 7 fives in 35.

$$\begin{array}{r} 7 \\ 5\overline{)35} \\ 35 \end{array}$$

Not all division problems have a whole-number quotient. Consider this question:

> *If 16 pennies are divided among 5 children, how many pennies will each child receive?*

If we try to divide 16 into 5 equal groups, we find that there is no whole number that is an exact answer.

$$\begin{array}{r} ? \\ 5\overline{)16} \end{array}$$

To answer the question, we think, "What number of fives is close to but not more than 16?" We answer that question with the number 3. We write "3" above the box and multiply to show that 3 fives is 15. Each child will get 3 pennies.

$$\begin{array}{r} 3 \\ 5\overline{)16} \\ 15 \end{array}$$

Now we subtract 15 from 16 to show how many pennies are left over. The amount left over is called the **remainder.** Here the remainder is 1, which means that one penny will be left over.

$$\begin{array}{r} 3 \\ 5\overline{)16} \\ -15 \\ \hline 1 \end{array}$$

How we deal with remainders depends upon the question we are asked. For now, when we answer problems written with digits and division symbols, we will write the remainder at the end of our answer with the letter "R" in front, as shown at right.

$$\begin{array}{r} 3\text{ R }1 \\ 5\overline{)16} \\ -15 \\ \hline 1 \end{array}$$

Discuss How could we check that the answer is correct?

Example 1

Fifty trading cards are to be placed in protective pages. Each page can display 8 cards. How many pages can be filled? What is the least number of pages that is needed to protect all the cards?

We begin by rewriting the problem with a division box. We think, "What number of eights is close to but not more than 50?" We answer "6" and then multiply 6 by 8 to get 48. We subtract to find the amount left over and write this remainder at the end of the answer.

$$\begin{array}{r} 6 \text{ R } 2 \\ 8\overline{)50} \\ -48 \\ \hline 2 \end{array}$$

Now we interpret the answer. The number 6 means that **6 pages** can be filled, protecting 48 cards. The remainder 2 means that there are 2 extra cards. These 2 cards are placed on another page that is not filled, so **7 pages** are needed to protect all the cards.

Example 2

At an amusement park, 16 people are waiting in line for a water ride. Each boat holds 6 people.

a. What is the least number of boats that are needed for everyone to ride? How do you know?

b. If two boats arrive at the loading dock, how many people will have to wait for a ride?

c. If three boats arrive at the loading dock, how many boats can be completely filled?

We divide 16 people into groups of 6 and then interpret the answer.

$$\begin{array}{r} 2 \text{ R } 4 \\ 6\overline{)16} \\ -12 \\ \hline 4 \end{array}$$

a. The answer 2 R 4 means 16 people can form 2 groups of 6 and there will be 4 extra people, so **3 boats** are needed for everyone to ride.

b. Two boats can carry 12 people, so **4 people** have to wait.

c. **Two boats** can be completely filled.

Thinking Skill

Discuss

If you can divide a number by 4 without getting a remainder, can you divide the number by 2 without getting a remainder? Explain.

For some division problems, we can decide whether there will be a remainder before we begin dividing. Here we show three rows from a multiplication table. We show the rows for twos, fives, and tens. In each row all the numbers can be divided by the first number of the row without leaving a remainder.

	1	2	3	4	5	4	7	8	9	10
twos	2	4	6	8	10	12	14	16	18	20
fives	5	10	15	20	25	30	35	40	45	50
tens	10	20	30	40	50	60	70	80	90	100

Verify Are all the numbers in the "twos" row even or odd? Explain your answer.

Verify What do all the numbers in the "fives" row end in?

If a whole number ending in 5 or 0 is divided by 5, there will be no remainder. If a whole number divided by 5 does not end in 5 or 0, there will be a remainder.

Verify What do all the numbers on the "tens" row end in?

If a whole number ending in zero is divided by 10, there will be no remainder. If a whole number divided by 10 does not end in zero, there will be a remainder.

Example 3

Without dividing, decide which two division problems below will have a remainder.

A $2\overline{)16}$ **B** $5\overline{)40}$ **C** $10\overline{)45}$ **D** $2\overline{)15}$

Problem C will have a remainder because 45 does not end in zero. Only numbers ending in zero can be divided by 10 without a remainder.

Problem D will have a remainder because 15 is not even. Only even numbers can be divided by 2 without a remainder.

Lesson Practice

Divide. Write each answer with a remainder.

a. $5\overline{)23}$ **b.** $6\overline{)50}$ **c.** $37 \div 8$

d. $4\overline{)23}$ **e.** $7\overline{)50}$ **f.** $40 \div 6$

g. $10\overline{)42}$ **h.** $9\overline{)50}$ **i.** $34 \div 9$

j. **Analyze** Without dividing, decide which of these division problems will have a remainder.

$10\overline{)60}$ $5\overline{)44}$ $2\overline{)18}$

Verify Which of these numbers can be divided by 2 without a remainder?

25 30 35

Written Practice

Distributed and Integrated

*1 (12) **Represent** Draw two horizontal lines, one above the other. 4_6 4

Formulate For problems **2–4,** write an equation and find the answer.

***2.** (21) At a dinner party, each guest is to receive a bag of small gifts. How many gifts should be placed in each bag if there are 8 guests and 32 gifts altogether?

***3.** (16) Julissa started a marathon, a race of approximately 26 miles. After running 9 miles, about how far did Julissa still have to run to finish the race?

***4.** (11)  The state of Rhode Island has 384 miles of shoreline. The state of Connecticut has 618 miles of shoreline. Is 1000 miles a reasonable estimate for the sum of the lengths of the shorelines? Explain why or not.

5. (22) $56 \div 10$

6. (22) $20 \div 3$

7. (22) $7\overline{)30}$

8. (18) $3 \times 7 \times 10$

9. (18) $2 \times 3 \times 4 \times 5$

10. (17)
$$\begin{array}{r} \$394 \\ \times \quad 8 \\ \hline \end{array}$$

11. (17)
$$\begin{array}{r} 678 \\ \times \quad 4 \\ \hline \end{array}$$

12. (17)
$$\begin{array}{r} \$6.49 \\ \times \quad 9 \\ \hline \end{array}$$

13. (20) $\frac{63}{7}$

14. (20) $\frac{56}{8}$

15. (20) $\frac{42}{6}$

16. (17)
$$\begin{array}{r} \$4.08 \\ \times \quad 7 \\ \hline \end{array}$$

17. (17)
$$\begin{array}{r} 3645 \\ \times \quad 6 \\ \hline \end{array}$$

18. (17)
$$\begin{array}{r} 3904 \\ \times \quad 4 \\ \hline \end{array}$$

19. (15, 18) $8 \times 0 = 4n$

20. (14) $c - 462 = 548$

21. (13) $\$36.15 - \$29.81$

22. (10) $963 + a = 6000$

***23.** (20) Use words to show how this problem is read: $4\overline{)12}$

24. (2, 22)  Think of an odd number. Multiply it by 2. If the product is divided by 2, will there be a remainder? Explain your answer.

25. (1, 12) **Conclude** What are the next three terms in this counting sequence?

50, 40, 30, 20, 10, . . .

26. (22) Mr. Watkins has 10 quarters. If he gives each of his 3 grandchildren 3 quarters, how much money will he have left?

27. (7) Compare: 46,208 ◯ 46,028

***28.** (Inv. 2) How many $\frac{1}{4}$ circles equal a half circle?

***29.** (Inv. 2) The fraction $\frac{1}{4}$ is equivalent to:

a. what decimal?

b. what percent?

30. (22) Seventy-five chairs are to be placed in a large room and arranged in rows of ten. How many chairs will be in the last row?

Real-World Connection

The 129 fifth grade students plan to take a field trip to a local museum. An adult is required for every group of 9 students. How many adults must accompany the students? Write and solve an equation, and then explain your answer.