

## 6.9 Patterns in a Multiplication Table

Student Book page 196

### GOAL

Use number patterns in a table to multiply and divide.

### Problem

 How can you use patterns in a multiplication table to help you multiply and divide?

	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

column  
↓

row →

a) Look across the row that begins with 2.

Describe patterns you see.

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b) Look down the column that begins with 5.

Describe patterns you see.

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c) Look down the column that begins with 8.

Describe patterns you see.

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## 6.9 Patterns in a Multiplication Table

Student Book page 196

### GOAL

Use number patterns in a table to multiply and divide.



How can you use patterns in a multiplication table to multiply and divide?

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

Pattern 1: What do you notice when you multiply numbers by 0?

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Pattern 2: What do you notice when you multiply numbers by 1?

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Pattern 3: What happens when you divide a number by 1? Why?

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Pattern 4: What happens when you divide a number by itself? Why?

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Chapter 6  
**Lesson 9**

# Patterns in a Multiplication Table

## GOAL

Use number patterns in a table to multiply and divide.

1. Fill in the blanks in the multiplication table.  
 Look for patterns to help you.

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

2. Describe one pattern you noticed.
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## Division: Zero And One

**Directions:** Study the rules of division and the examples. Divide, then write the number of the rule you used to solve each problem.

**Examples:**

Rule 1:  $1 \overline{)5}$  Any number divided by 1 is that number.

Rule 2:  $5 \overline{)5}$  Any number except 0 divided by itself is 1.

Rule 3:  $7 \overline{)0}$  Zero divided by any number is zero.

Rule 4:  $0 \overline{)7}$  You cannot divide by zero.

$1 \overline{)6}$  Rule \_\_\_\_\_

$4 \div 1 = \underline{\quad}$  Rule \_\_\_\_\_

$7 \overline{)7}$  Rule \_\_\_\_\_

$9 \div 9 = \underline{\quad}$  Rule \_\_\_\_\_

$9 \overline{)0}$  Rule \_\_\_\_\_

$7 \div 1 = \underline{\quad}$  Rule \_\_\_\_\_

$1 \overline{)4}$  Rule \_\_\_\_\_

$6 \div 0 = \underline{\quad}$  Rule \_\_\_\_\_

**ZERO**  
**ONE**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

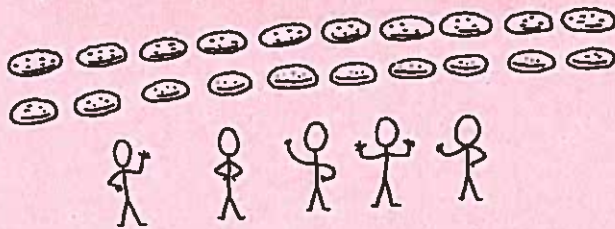
WORD PROBLEM

Maria has 4 friends coming over. She has a package of 20 cookies to share with them. How many cookies should each child, including Maria, get if they all share fairly?

BASICS BOX

Division is an operation that helps us to share an amount into equal groups. It is the opposite of multiplication. Multiplication helps us understand, solve, and even check division problems.

Maria has 20 cookies. She has to divide them among 5 people. We could solve with a picture:



We can write an equation like this:

$$\begin{array}{c} \text{divisor} \rightarrow 5 \overline{)20} \\ \swarrow \text{dividend} \end{array} \quad \text{OR} \quad \begin{array}{c} 20 + 5 = ? \\ \swarrow \text{dividend} \quad \nwarrow \text{divisor} \end{array}$$

If we think about division with multiplication we think  $20 \div 5 = \underline{\quad}$  is the same as  $5 \times \underline{\quad} = 20$ . We see that since  $5 \times 4 = 20$  then  $20 \div 5 = 4$ . So each child would get 4 cookies.

PRACTICE

Find the quotients.

1.  $18 \div 2 = \underline{\quad}$

2.  $12 \div 6 = \underline{\quad}$

3.  $42 \div 6 = \underline{\quad}$

4.  $9 \overline{)27}$

5.  $3 \overline{)24}$

6.  $5 \overline{)45}$

JOURNAL

What multiplication fact would help you solve  $56 \div 8 = ?$

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Introducing Division: One-Digit Divisors Without Remainders

Find the quotients.

1.  $1\overline{)9}$

8.  $20 \div 4 = \underline{\quad}$

2.  $6\overline{)48}$

9.  $8\overline{)64}$

3.  $6 \div 6 = \underline{\quad}$

10.  $6\overline{)36}$

4.  $21 \div 7 = \underline{\quad}$

11.  $28 \div 7 = \underline{\quad}$

5.  $5\overline{)30}$

12.  $14 \div 2 = \underline{\quad}$

6.  $3\overline{)15}$

13.  $8\overline{)56}$

7.  $9 \div 3 = \underline{\quad}$

14.  $5\overline{)25}$

Review.

15.  $3 \times 8 = \underline{\quad}$

18.  $25 \times 10 = \underline{\quad}$

16.  $7 \times 6 = \underline{\quad}$

19.  $50 \times 50 = \underline{\quad}$

17.  $4 \times 20 = \underline{\quad}$

20.  $500 \times 50 = \underline{\quad}$

## Scaffolding for Lesson 10, Question 2

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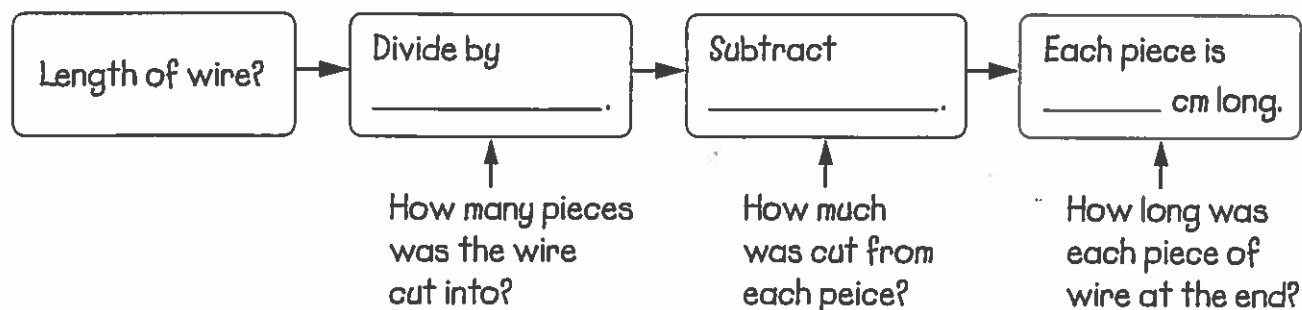
2. Ryan is making a wire sculpture. He cut a wire into 4 equal pieces. Then he cut 2 cm from each piece so each piece was 7 cm long. How long was the wire he started with?

### Understand the Problem

I need to figure out \_\_\_\_\_.

### Make a Plan

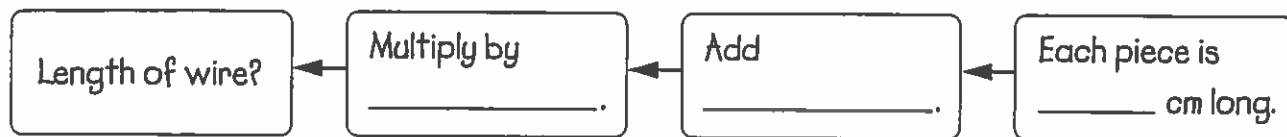
Use a diagram to represent each step of the problem.



Now work backwards to solve the problem.

### Carry Out the Plan

Draw a new diagram that shows the same steps of the problem in reverse order.



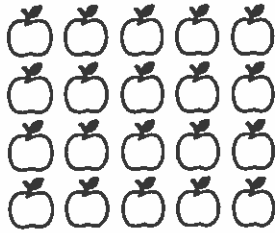
How long was the wire he started with? \_\_\_\_\_ cm

### Look Back

Check your answer.

# Division Concepts

Name \_\_\_\_\_



4 rows of 5 apples are 20 apples altogether.

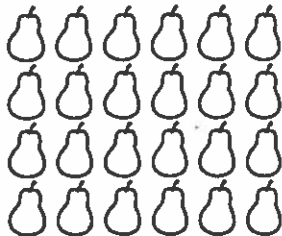
$$4 \times 5 = 20$$

$$5 \times 4 = 20$$

$$20 \div 4 = 5$$

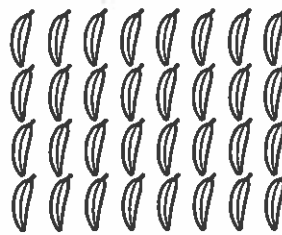
$$20 \div 5 = 4$$

## Complete the sentences.

1.  \_\_\_\_\_ rows of \_\_\_\_\_ pears are  
 \_\_\_\_\_ pears altogether.

$$\underline{\quad} \times \underline{\quad} = \underline{\quad} \quad \underline{\quad} \div \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} \times \underline{\quad} = \underline{\quad} \quad \underline{\quad} \div \underline{\quad} = \underline{\quad}$$

2.  \_\_\_\_\_ rows of \_\_\_\_\_ bananas are  
 \_\_\_\_\_ bananas altogether.

$$\underline{\quad} \times \underline{\quad} = \underline{\quad} \quad \underline{\quad} \div \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} \times \underline{\quad} = \underline{\quad} \quad \underline{\quad} \div \underline{\quad} = \underline{\quad}$$

If we share 20 apples among 4 people, each person gets 5 apples.

$$20 \div 4 = 5$$

If we share 20 apples among 5 people, each person gets 4 apples.

$$20 \div 5 = 4$$

## Complete.

3. If we share 32 bananas among 8 people, each person gets \_\_\_\_\_ bananas.

$$\underline{\quad} \div \underline{\quad} = \underline{\quad}$$

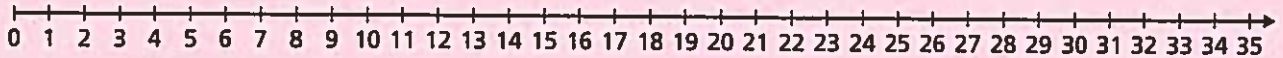
## Write a division sentence to show the sharing.

4. Share 45 oranges among 9 people. \_\_\_\_\_



## Chapter 10: Dividing Multi-Digit Numbers

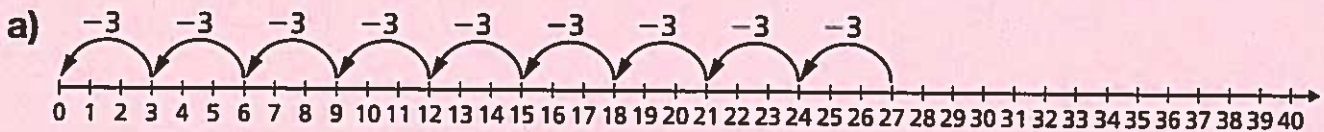
1. a) Skip count backwards by 4s from 32 to 0. Use the number line.



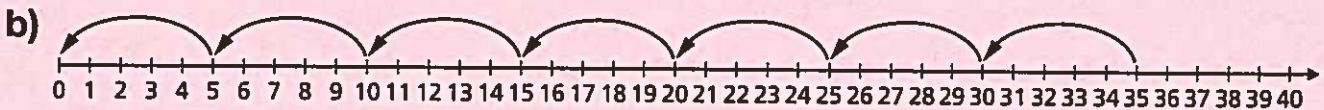
b) How many 4s did you count? \_\_\_\_\_

c)  $32 \div 4 =$  \_\_\_\_\_

2. What division does each number line show?



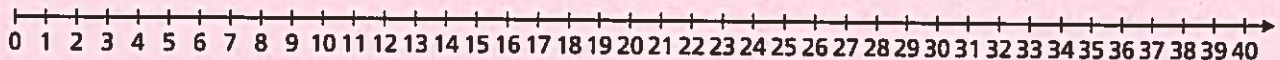
$27 \div$  \_\_\_\_\_  $=$  \_\_\_\_\_



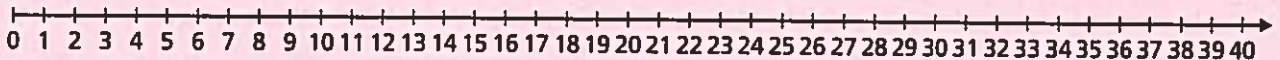
\_\_\_\_\_  $\div$  \_\_\_\_\_  $=$  \_\_\_\_\_

3. Show each division on a number line. Write the quotient.

a)  $40 \div 5 =$  \_\_\_\_\_



b)  $28 \div 4 =$  \_\_\_\_\_



4. Write a division sentence for each model.

a)  $\begin{matrix} \bigcirc \bigcirc & \bigcirc \bigcirc & \bigcirc \bigcirc \\ \bigcirc \bigcirc & \bigcirc \bigcirc & \bigcirc \bigcirc \end{matrix}$

$12 \div$  \_\_\_\_\_  $=$  \_\_\_\_\_

b)  $\begin{matrix} \bigcirc \bigcirc \bigcirc & \bigcirc \bigcirc \bigcirc \\ \bigcirc \bigcirc \bigcirc & \bigcirc \bigcirc \bigcirc \end{matrix}$

\_\_\_\_\_  $\div$  \_\_\_\_\_  $=$  \_\_\_\_\_

5. Use the multiplication sentence to calculate the quotient.

a)  $2 \times 7 = 14$ , so  $14 \div 7 =$  \_\_\_\_\_

c)  $9 \times 5 = 45$ , so  $45 \div 9 =$  \_\_\_\_\_

b)  $8 \times 6 = 48$ , so  $48 \div 6 =$  \_\_\_\_\_

d)  $5 \times 7 = 35$ , so  $35 \div 5 =$  \_\_\_\_\_

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

5. Use one fact to calculate another product.

- a)  $5 \times 3 = 15$ , so  $6 \times 3 =$  \_\_\_\_\_      d)  $6 \times 6 = 36$ , so  $6 \times 7 =$  \_\_\_\_\_  
b)  $3 \times 6 = 18$ , so  $4 \times 6 =$  \_\_\_\_\_      e)  $7 \times 7 = 49$ , so  $8 \times 7 =$  \_\_\_\_\_  
c)  $4 \times 5 = 20$ , so  $4 \times 6 =$  \_\_\_\_\_      f)  $8 \times 9 = 72$ , so  $9 \times 8 =$  \_\_\_\_\_

6. 9 cars are carrying 4 students each. How many students are in the cars?

7. Use doubles to complete the products.

- a)  $5 \times 3 = 15$ , so  $5 \times 6 =$  \_\_\_\_\_      d)  $6 \times 4 = 24$ , so  $6 \times 8 =$  \_\_\_\_\_  
b)  $7 \times 3 = 21$ , so  $7 \times 6 =$  \_\_\_\_\_      e)  $7 \times 4 = 28$ , so  $7 \times 8 =$  \_\_\_\_\_  
c)  $8 \times 3 = 24$ , so  $8 \times 6 =$  \_\_\_\_\_      f)  $8 \times 4 = 32$ , so  $8 \times 8 =$  \_\_\_\_\_

8. How many days are in 6 weeks?

9. Calculate.

- a)  $4 \times 4 =$  \_\_\_\_\_      d)  $7 \times 7 =$  \_\_\_\_\_  
b)  $5 \times 5 =$  \_\_\_\_\_      e)  $8 \times 8 =$  \_\_\_\_\_  
c)  $6 \times 6 =$  \_\_\_\_\_      f)  $9 \times 9 =$  \_\_\_\_\_

10. Use one fact to complete another product.

- a)  $4 \times 10 = 40$ , so  $4 \times 9 =$  \_\_\_\_\_      d)  $10 \times 9 = 90$ , so  $9 \times 9 =$  \_\_\_\_\_  
b)  $5 \times 10 = 50$ , so  $5 \times 9 =$  \_\_\_\_\_      e)  $10 \times 7 = 70$ , so  $9 \times 7 =$  \_\_\_\_\_  
c)  $6 \times 10 = 60$ , so  $6 \times 9 =$  \_\_\_\_\_      f)  $10 \times 8 = 80$ , so  $9 \times 8 =$  \_\_\_\_\_

11. Calculate.

- a)  $7 \times 8 =$  \_\_\_\_\_      c)  $6 \times 0 =$  \_\_\_\_\_  
b)  $9 \times 3 =$  \_\_\_\_\_      d)  $2 \times 8 =$  \_\_\_\_\_

12. The computer room has 8 tables. Each table seats 7 students.  
How many students can sit at the tables in the computer room?

## Divisibility Rules

A number is divisible...  
 by 2 if the last digit is 0 or even (2, 4, 6, 8).  
 by 3 if the sum of all digits is divisible by 3.  
 by 4 if the last two digits are divisible by 4.  
 by 5 if the last digit is a 0 or 5.  
 by 10 if the last digit is 0.

**Example:** 250 is divisible by 2, 5, 10

**Directions:** Tell what numbers each of these numbers is divisible by.

3,732 \_\_\_\_\_

439 \_\_\_\_\_

50 \_\_\_\_\_

444 \_\_\_\_\_

7,960 \_\_\_\_\_

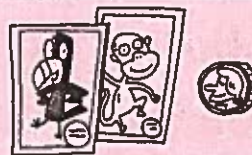
8,212 \_\_\_\_\_

104,924 \_\_\_\_\_

2,345 \_\_\_\_\_

**Ricardo Cardenza**, President

Cardenza Collector Card and Coin Company



Dear Students:

I'm having a little problem. I seem to have a lot of packs of Favorite Socks of All Time cards left over. Why, I don't know. I thought they would sell out overnight.

As a reward to my loyal employees in the factory, I decided to give these cards to the workers who run the presses the cards were printed on. I want to give each worker a fair share of the cards, but I'm having trouble because the numbers are not coming out even. Actually, the first one for Press A did come out even, and I filled in the chart. But the rest are a problem. Help!



Favorite Socks of All Time Cards					
	Printing Press	Number of Cards	Number of Workers	Cards for Each Worker	Leftovers
	A	25	5	5	0
1.	B	30	5		
2.	C	30	4		
3.	D	45	8		
4.	E	71	8		
5.	F	100	6		
6.	G	100	5		
7.	H	127	7		

As always, thanks for your help.

Sincerely,

*Ricardo Cardenza*

Name: \_\_\_\_\_

Date: \_\_\_\_\_

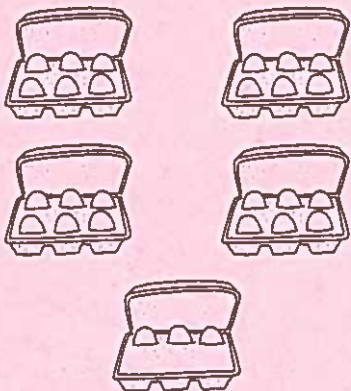
WORD PROBLEM

Max is putting eggs into cartons. He has 27 eggs. Each carton holds 6 eggs. How many cartons will he fill? Will there be any eggs left over?

BASICS BOX

Sometimes when we divide we don't end up with completely equal groups. We have extras or leftovers. These extras are called the *remainder*.

Max has 27 eggs. If he puts them in containers of 6, it would look like this.



We see he can fill 4 cartons, but he will have 3 extra eggs.

$$\begin{array}{r} 4 \text{ r}3 \\ 6 \overline{) 27} \\ \underline{24} \\ 3 \end{array} \quad \rightarrow \text{ This is how we write the remainder.}$$

Remember: The remainder should always be less than the divisor.

PRACTICE

Find the quotients.

1.  $4 \overline{) 23}$

5.  $4 \overline{) 15}$

2.  $5 \overline{) 27}$

6.  $3 \overline{) 26}$

3.  $6 \overline{) 47}$

7.  $8 \overline{) 79}$

4.  $2 \overline{) 13}$

8.  $4 \overline{) 29}$

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List and explain all the steps for dividing 17 by 3.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Single-Digit Divisors with Remainders

Find the quotients.

1.  $2\overline{)19}$

8.  $8\overline{)49}$

2.  $5 \div 2 = \underline{\quad}$

9.  $8\overline{)26}$

3.  $20 \div 6 = \underline{\quad}$

10.  $66 \div 7 = \underline{\quad}$

4.  $7\overline{)55}$

11.  $8 \div 5 = \underline{\quad}$

5.  $4\overline{)19}$

12.  $6\overline{)34}$

6.  $37 \div 6 = \underline{\quad}$

13.  $8\overline{)45}$

7.  $50 \div 8 = \underline{\quad}$

14.  $23 \div 5 = \underline{\quad}$

Review.

15.  $16 \div 4 = \underline{\quad}$

18.  $11 \times 6 = \underline{\quad}$

16.  $54 \div 9 = \underline{\quad}$

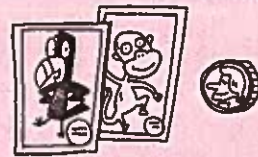
19.  $125 \times 10 = \underline{\quad}$

17.  $30 \times 3 = \underline{\quad}$

20.  $60 \times 100 = \underline{\quad}$

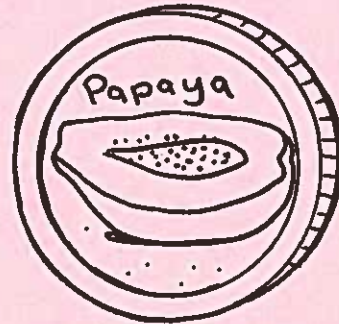
**Ricardo Cardenza**, President

Cardenza Collector Card and Coin Company



Dear Students:

Sorry to share more bad news, but Favorite Fruit Commemorative Coins have not been the big sellers we'd hoped. We've got great coins, like Papaya, Mango, Grapefruit, and all of the classics. I don't understand the poor sales, but that's the way it is.



Since we've got a lot left, we're going to be giving them away as a bonus to people who order our Little League Team cards. Little Leaguers like fruit, right? Now, I've got to figure out how many coins to give to each team. Assistance, please!

**Favorite Fruit Commemorative Coins**

	Team	Number of Coins	Number of Players	Coins per Player	Leftovers
1.	Ocelots	124	11		
2.	Skunks	143	16		
3.	Lemurs	436	4		
4.	Wombats	88	11		
5.	Pythons	124	17		
6.	Toads	205	15		
7.	Beetles	109	13		

Thanks,

*Ricardo Cardenza*

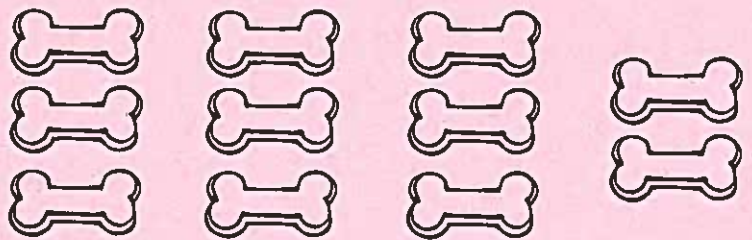
## Division: Remainders

Division is a way to find out how many times one number is contained in another number. For example,  $28 \div 4 = 7$  means that there are seven groups of four in 28. The dividend is the larger number that is divided by the smaller number, or divisor. The quotient is the answer in a division problem. The remainder is the amount left over. The remainder is always less than the divisor.

**Directions:** Study the example. Find each quotient and remainder.

**Example:**

There are 11 dog biscuits.  
Put them in groups of 3.  
There are 2 left over.



$$\begin{array}{r} 3 \\ 3 \overline{)11} \\ \underline{-9} \\ 2 \text{ remainder} \end{array} \quad \begin{array}{r} 3 \text{ r } 2 \\ 3 \overline{)11} \end{array}$$

**Remember:** The remainder must be less than the **divisor**!

$$3 \overline{)13}$$

$$4 \overline{)17}$$

$$6 \overline{)32}$$

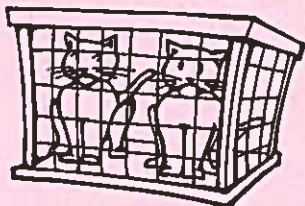
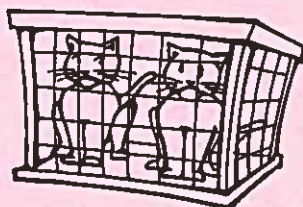
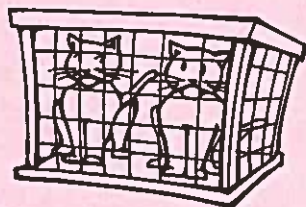
$$5 \overline{)26}$$

$9 \div 4 = \underline{\quad}$

$12 \div 5 = \underline{\quad}$

$26 \div 4 = \underline{\quad}$

$49 \div 9 = \underline{\quad}$



The pet store has 7 cats.  
Two cats go in each  
cage. How many cats  
are left over? \_\_\_\_\_