

Name \_\_\_\_\_

## Estimate Quotients Using Multiples

Find two numbers the quotient of  $142 \div 5$  is between. Then estimate the quotient.

You can use multiples to estimate. A **multiple** of a number is the product of a number and a counting number.

**Step 1** Think: What number multiplied by 5 is about 142?

Since 142 is greater than  $10 \times 5$ , or 50, use counting numbers 10, 20, 30, and so on to find multiples of 5.

**Step 2** Multiply 5 by multiples of 10 and make a table.

Counting Number	10	20	30	40
Multiple of 5	50	100	150	200

**Step 3** Use the table to find multiples of 5 closest to 142.

$20 \times 5 = \underline{100}$       ← 142 is between 100 and 150.

$30 \times 5 = \underline{150}$

142 is closest to 150, so  $142 \div 5$  is about 30.

Find two numbers the quotient is between. Then estimate the quotient.

1.  $136 \div 6$

between \_\_\_\_\_ and \_\_\_\_\_

about \_\_\_\_\_

2.  $95 \div 3$

between \_\_\_\_\_ and \_\_\_\_\_

about \_\_\_\_\_

3.  $124 \div 9$

between \_\_\_\_\_ and \_\_\_\_\_

about \_\_\_\_\_

4.  $238 \div 7$

between \_\_\_\_\_ and \_\_\_\_\_

about \_\_\_\_\_



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# Remainders

Use counters to find the quotient and remainder.

$$9 \overline{)26}$$

- Use 26 counters to represent the dividend, 26.
- Since you are dividing 26 by 9, draw 9 circles. Divide the 26 counters into 9 equal-sized groups.



- There are 2 counters in each circle, so the quotient is 2. There are 8 counters left over, so the remainder is 8.

$$\begin{array}{r} 2 \text{ r}8 \\ 9 \overline{)26} \end{array}$$

Divide. Draw a quick picture to help.

$$7 \overline{)66}$$

- Use 66 counters to represent the dividend, 66.
- Since you are dividing 66 by 7, draw 7 circles. Divide 66 counters into 7 equal-sized groups.



- There are 9 counters in each circle, so the quotient is 9. There are 3 counters left over, so the remainder is 3.

$$\begin{array}{r} 9 \text{ r}3 \\ 7 \overline{)66} \end{array}$$

Use counters to find the quotient and remainder.

1.  $6 \overline{)19}$

2.  $3 \overline{)14}$

Divide. Draw a quick picture to help.

3.  $39 \div 4$

4.  $29 \div 3$

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## Interpret the Remainder

When you solve a division problem with a remainder, the way you interpret the remainder depends on the situation and the question.

<p><b>Way 1: Write the remainder as a fraction.</b> Callie has a board that is 60 inches long. She wants to cut 8 shelves of equal length from the board and use the entire board. How long will each shelf be?</p> <p>Divide. <math>60 \div 8</math>      <u>7 r4</u></p> <p>The remainder, 4 inches, can be divided into 8 equal parts.</p> <p style="text-align: center;"> <math>\frac{4}{8}</math> ← remainder  <math>\frac{8}{8}</math> ← divisor         </p> <p>Write the remainder as a fraction.</p> <p>Each shelf will be <math>\frac{7\frac{4}{8}}</math> inches long.</p>	<p><b>Way 2: Drop the remainder.</b> Callie has 60 beads. She wants to make 8 identical bracelets and use as many beads as possible on each bracelet. How many beads will be on each bracelet?</p> <p>Divide. <math>60 \div 8</math>      <u>7 r4</u></p> <p>The remainder is the number of beads left over. Those beads will not be used. Drop the remainder.</p> <p>Callie will use <u>7</u> beads on each bracelet.</p>
<p><b>Way 3: Add 1 to the quotient.</b> Callie has 60 beads. She wants to put 8 beads in each container. How many containers will she need?</p> <p>Divide. <math>60 \div 8</math>      <u>7 r4</u></p> <p>The answer shows that Callie can fill 7 containers but will have 4 beads left over. She will need 1 more container for the 4 leftover beads. Add 1 to the quotient.</p> <p>Callie will need <u>8</u> containers.</p>	<p><b>Way 4: Use only the remainder.</b> Callie has 60 stickers. She wants to give an equal number of stickers to 8 friends. She will give the leftover stickers to her sister. How many stickers will Callie give to her sister?</p> <p>Divide. <math>60 \div 8</math>      <u>7 r4</u></p> <p>The remainder is the number of stickers left over. Use the remainder as the answer.</p> <p>Callie will give her sister <u>4</u> stickers.</p>



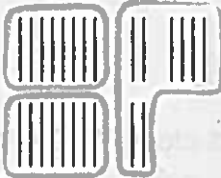
1. There are 35 students going to the zoo. Each van can hold 6 students. How many vans are needed?
2. Sue has 55 inches of ribbon. She wants to cut the ribbon into 6 equal pieces. How long will each piece be?

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## Divide Tens, Hundreds, and Thousands

You can use base-ten blocks, place value, and basic facts to divide.

**Divide.**  $240 \div 3$

Use base-ten blocks.	Use place value.
<p><b>Step 1</b> Draw a quick picture to show 240.</p> 	<p><b>Step 1</b> Identify the basic fact to use. Use <math>\underline{24} \div 3</math>.</p>
<p><b>Step 2</b> You cannot divide 2 hundreds into 3 equal groups. Rename 2 hundreds as tens.</p>  <p><math>240 = \underline{24}</math> tens</p>	<p><b>Step 2</b> Use place value to rewrite 240 as tens. <math>240 = \underline{24}</math> tens</p>
<p><b>Step 3</b> Separate the tens into 3 equal groups to divide.</p>  <p>There are 3 groups of <u>8</u> tens. Write the answer. <math>240 \div 3 = \underline{80}</math></p>	<p><b>Step 3</b> Divide. <math>24 \text{ tens} \div 3 = \underline{8}</math> tens <math>= \underline{80}</math></p> <p>Write the answer. <math>240 \div 3 = \underline{80}</math></p>

Use basic facts and place value to find the quotient.

1.  $280 \div 4$

What division fact can you use?

\_\_\_\_\_

$280 = \underline{\quad}$  tens

$28 \text{ tens} \div 4 = \underline{\quad}$  tens

$280 \div 4 = \underline{\quad}$

2.  $1,800 \div 9$

What division fact can you use?

\_\_\_\_\_

$1,800 = \underline{\quad}$  hundreds

$18 \text{ hundreds} \div 9 = \underline{\quad}$  hundreds

$1,800 \div 9 = \underline{\quad}$

3.  $560 \div 7 = \underline{\quad}$

4.  $180 \div 6 = \underline{\quad}$

5.  $1,500 \div 5 = \underline{\quad}$

6.  $3,200 \div 4 = \underline{\quad}$

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## Estimate Quotients Using Compatible Numbers

**Compatible numbers** are numbers that are easy to compute mentally. In division, one compatible number divides evenly into the other. Think of the multiples of a number to help you find compatible numbers.

**Estimate.**  $6\overline{)216}$

**Step 1** Think of these multiples of 6:

6    12    18    24    30    36    42    48    54

Find multiples that are close to the first 2 digits of the dividend.

18 tens and 24 tens are both close to 21 tens. You can use either or both numbers to estimate the quotient.

**Step 2** Estimate using compatible numbers.

$\begin{array}{r} 216 \div 6 \\ \downarrow \\ 180 \div 6 = 30 \end{array}$	$\begin{array}{r} 216 \div 6 \\ \downarrow \\ 240 \div 6 = 40 \end{array}$
----------------------------------------------------------------------------	----------------------------------------------------------------------------

So,  $216 \div 6$  is between 30 and 40.

**Step 3** Decide whether the estimate is closer to 30 or 40.

$216 - 180 = 36$        $240 - 216 = 24$

216 is closer to 240, so use 40 as the estimate.

**Use compatible numbers to estimate the quotient.**

1.  $3\overline{)252}$

\_\_\_\_\_

2.  $6\overline{)546}$

\_\_\_\_\_

3.  $4\overline{)2,545}$

\_\_\_\_\_

4.  $5\overline{)314}$

\_\_\_\_\_

5.  $2\overline{)1,578}$

\_\_\_\_\_

6.  $8\overline{)289}$

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## Division and the Distributive Property

**Divide.**  $78 \div 6$

Use the Distributive Property and quick pictures to break apart numbers to make them easier to divide.

**Step 1** Draw a quick picture to show 78.



**Step 2** Think about how to break apart 78.

You know  $6 \text{ tens} \div 6 = 10$ , so use  $78 = 60 + 18$ . Draw a quick picture to show 6 tens and 18 ones.



**Step 3** Draw circles to show  $6 \text{ tens} \div 6$  and  $18 \text{ ones} \div 6$ . Your drawing shows the use of the Distributive Property.

$$78 \div 6 = \underline{(60 \div 6)} + \underline{(18 \div 6)}$$



**Step 4** Add the quotients to find  $78 \div 6$ .

$$\begin{aligned} 78 \div 6 &= (60 \div 6) + (18 \div 6) \\ &= \underline{10} + \underline{3} \\ &= \underline{13} \end{aligned}$$

Use quick pictures to model the quotient.

1.  $84 \div 4 = \underline{\quad}$

2.  $54 \div 3 = \underline{\quad}$

3.  $68 \div 2 = \underline{\quad}$

4.  $65 \div 5 = \underline{\quad}$

5.  $96 \div 8 = \underline{\quad}$

6.  $90 \div 6 = \underline{\quad}$

## Divide Using Repeated Subtraction

You can use repeated subtraction to divide. Use repeated subtraction to solve the problem.

Nestor has 27 shells to make bracelets. He needs 4 shells for each bracelet. How many bracelets can he make?

**Divide.**  $27 \div 4$

Write  $4 \overline{)27}$ .

**Step 1**

Subtract the divisor until the remainder is less than the divisor. Record a 1 each time you subtract.

$$\begin{array}{r}
 4 \overline{)27} \\
 \underline{-4} \quad 1 \\
 23 \\
 \underline{-4} \quad 1 \\
 19 \\
 \underline{-4} \quad 1 \\
 15 \\
 \underline{-4} \quad 1 \\
 11 \\
 \underline{-4} \quad 1 \\
 7 \\
 \underline{-4} \quad 1 \\
 3
 \end{array}$$

So, Nestor can make 6 bracelets. He will have 3 shells left.

**Step 2**

Count the number of times you subtracted the divisor, 4.

4 is subtracted six times with 3 left.

$$\begin{array}{r}
 27 \div 4 \\
 \underline{6 \text{ r}3}
 \end{array}$$

Use repeated subtraction to divide.

1.  $30 \div 4$

2.  $24 \div 5$

3.  $47 \div 7$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



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## Divide Using Partial Quotients

You can use partial quotients to divide.

**Divide.**  $492 \div 4$

**Step 1** Subtract greater multiples of the divisor. Repeat if needed.

**Step 2** Subtract lesser multiples of the divisor. Repeat until the remaining number is less than the divisor.

**Step 3** Add the partial quotients.

$4 \overline{)492}$	Partial quotients	
$- 400$	↓	↓
$92$	$100 \times 4$	$100$
$- 80$	$20 \times 4$	$20$
$12$	$3 \times 4$	$+ 3$
$- 12$		$123$
$0$		

**Use rectangular models to record partial quotients.**

100				
4	400	80	12	$492$ $- 400$ $92$
		20		
4	400	80	12	$92$ $- 80$ $12$
		20	3	
4	400	80	12	$12$ $- 12$ $0$

$$\underline{100} + \underline{20} + \underline{3} = \underline{123}$$

**Divide. Use partial quotients.**

1.  $3 \overline{)657}$

\_\_\_\_\_  $100 \times$  \_\_\_\_\_  $100$

\_\_\_\_\_  $100 \times$  \_\_\_\_\_

\_\_\_\_\_  $\times$  \_\_\_\_\_

\_\_\_\_\_  $\times$  \_\_\_\_\_  $+$  \_\_\_\_\_

**Divide. Use rectangular models to record the partial quotients.**

2.  $852 \div 6 =$  \_\_\_\_\_

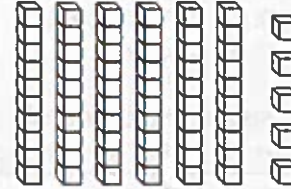
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## Model Division with Regrouping

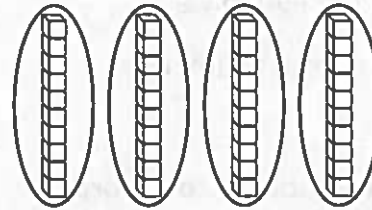
You can use base-ten blocks to model division with regrouping.

**Use base-ten blocks to find the quotient  $65 \div 4$ .**

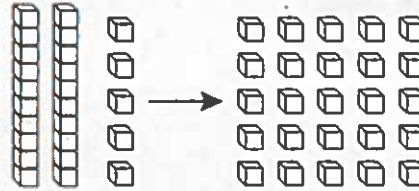
**Step 1** Show 65 with base-ten blocks.



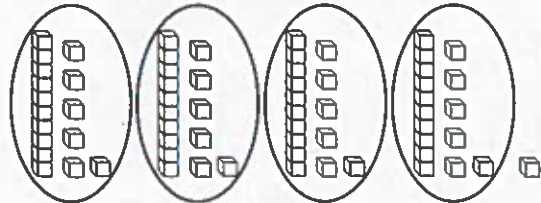
**Step 2** Draw 4 circles to represent dividing 65 into 4 equal groups. Share the tens equally among the 4 groups.



**Step 3** Regroup leftover tens as ones.



**Step 4** Share the ones equally among the 4 groups.



There are 1 ten(s) and 6 one(s) in each group with 1 left over.

So, the quotient is 16 r1.

**Divide. Use base-ten blocks.**

1.  $37 \div 2$

\_\_\_\_\_

2.  $74 \div 3$

\_\_\_\_\_

3.  $66 \div 5$

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# Place the First Digit

Divide.  $763 \div 3 = \square$

**Step 1** Estimate. Then divide the hundreds.

**Think:**  $3 \times 1$  hundred = 3 hundreds  
 $3 \times 2$  hundreds = 6 hundreds  
 $3 \times 3$  hundreds = 9 hundreds

$3 \times 3$  hundreds is too large.

Use 2 hundreds as an estimate.

$$\begin{array}{r} 2 \\ 3 \overline{)763} \\ \underline{-6} \\ 1 \end{array}$$

← Divide 7 hundreds by 3.  
 ← Multiply.  $3 \times 2$  hundreds  
 ← Subtract.

**Step 2** Bring down the tens digit. Then divide the tens.

$$\begin{array}{r} 2 \\ 3 \overline{)763} \\ \underline{-6} \downarrow \\ 16 \end{array}$$

← Bring down the 6.

$$\begin{array}{r} 25 \\ 3 \overline{)763} \\ \underline{-6} \\ 16 \\ \underline{-15} \\ 1 \end{array}$$

← Divide 16 tens by 3.  
 ← Multiply.  $3 \times 5$  tens  
 ← Subtract.

**Step 3** Bring down the ones digit. Then divide the ones.

$$\begin{array}{r} 25 \\ 3 \overline{)763} \\ \underline{-6} \\ 16 \\ \underline{-15} \downarrow \\ 13 \end{array}$$

← Bring down the 3.

$$\begin{array}{r} 254 \\ 3 \overline{)763} \\ \underline{-6} \\ 16 \\ \underline{-15} \\ 13 \\ \underline{-12} \\ 1 \end{array}$$

← Divide 13 ones by 3.  
 ← Multiply.  $3 \times 4$  ones  
 ← Subtract.

**Step 4** Check to make sure that the remainder is less than the divisor. Write the answer.

$$\begin{array}{r} 254 \text{ r}1 \\ 3 \overline{)763} \end{array} \quad 1 < 3$$

Divide.

1.  $2 \overline{)531}$

2.  $4 \overline{)628}$

3.  $9 \overline{)349}$

4.  $7 \overline{)794}$

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## Divide by 1-Digit Numbers

Divide.  $766 \div 6 = \square$

**Step 1** Use place value to place the first digit.  
**Think:** 7 hundreds can be shared among 6 groups without regrouping.

$$\begin{array}{r} 1 \\ 6 \overline{)766} \end{array}$$

**Step 2** Bring down the tens digit. Then divide the tens.

$$\begin{array}{r} 1 \\ 6 \overline{)766} \\ - 6 \phantom{0} \\ \hline 16 \phantom{0} \end{array}$$

← Bring down the 6.

$$\begin{array}{r} 12 \\ 6 \overline{)766} \\ - 6 \phantom{0} \\ \hline 16 \phantom{0} \\ - 12 \phantom{0} \\ \hline 4 \phantom{0} \end{array}$$

← Divide 16 tens by 6.

← Multiply.  $6 \times 2$  tens  
← Subtract.

**Step 3** Bring down the ones digit. Then divide the ones.

$$\begin{array}{r} 12 \\ 6 \overline{)766} \\ - 6 \phantom{0} \\ \hline 16 \phantom{0} \\ - 12 \phantom{0} \\ \hline 46 \phantom{0} \end{array}$$

← Bring down the 6.

$$\begin{array}{r} 127 \\ 6 \overline{)766} \\ - 6 \phantom{0} \\ \hline 16 \phantom{0} \\ - 12 \phantom{0} \\ \hline 46 \phantom{0} \\ - 42 \phantom{0} \\ \hline 4 \phantom{0} \end{array}$$

← Divide 46 ones by 6.

← Multiply.  $6 \times 7$  ones  
← Subtract.

**Step 4** Check to make sure that the remainder is less than the divisor. Write the answer.

$$\begin{array}{r} 127 \text{ r}4 \\ 6 \overline{)766} \end{array} \quad 4 < 6$$

**Step 5** Use multiplication and addition to check your answer.

$$\begin{array}{r} 127 \\ \times 6 \\ \hline 762 \\ + 4 \\ \hline 766 \end{array}$$

Divide and check.

1.  $4 \overline{)868}$

2.  $2 \overline{)657}$

3.  $7 \overline{)8,473}$

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## Problem Solving • Multistep Division Problems

There are 72 third graders and 84 fourth graders going on a field trip. An equal number of students will ride on each of 4 buses. How many students will ride on each bus?

Read the Problem	Solve the Problem								
<p><b>What do I need to find?</b></p> <p>I need to find the number of <u>students</u> who will ride on each bus.</p>	<p>I can model the number of students in all using a bar diagram.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center; width: 50px;">72</td> <td style="text-align: center; width: 50px;">84</td> </tr> </table>	72	84						
72	84								
<p><b>What information do I need to use?</b></p> <p>There are <u>72</u> third graders and <u>84</u> fourth graders. There will be <u>4</u> buses.</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td colspan="2" style="text-align: center;">156</td> </tr> </table> <p>I can model the number of buses and divide to find the number of students on each bus.</p>	156							
156									
<p><b>How will I use the information?</b></p> <p>I will make a bar diagram for each step. I will add <u>72 and 84</u> to find the total number of students. I will divide by <u>4</u> to find how many students will ride on each bus.</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center; width: 50px;">39</td> <td style="text-align: center; width: 50px;">39</td> <td style="text-align: center; width: 50px;">39</td> <td style="text-align: center; width: 50px;">39</td> </tr> </table> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td colspan="4" style="text-align: center;">156</td> </tr> </table> <p>So, <u>39</u> students will ride on each bus.</p>	39	39	39	39	156			
39	39	39	39						
156									

- Miranda has 180 beads for making jewelry. She buys 240 more beads. She wants to store the beads in a case with 6 sections. She wants to put the same number of beads in each section. How many beads should Miranda put in each section?

- All 203 students at Polk School eat lunch at the same time. One day 19 students were absent. If 8 students sit at each table in the lunchroom, how many tables were used that day at lunch?

