Name _____

Using Patterns to Divide Mentally

R 7-1

When dividing numbers that end in zero, you can use basic division facts, as well as patterns, to help you divide mentally. For example:

	Find 210 ÷ 7.	Find 4,200 ÷ 6.
What You **Think**	First, find the basic fact. **210** ÷ **7** = **21** ÷ **7** = **21** tens ÷ **7** = 3 tens or 30	Find the basic fact. **4,200** ÷ **6** = **42** ÷ **6** = **42** hundreds ÷ **6** = 7 hundreds or 700
What You **Write**	210 ÷ 7 = 30	4,200 ÷ 6 = 700

Divide. Use mental math.

1. 250 ÷ 5 = _____

2. 7,200 ÷ 9 = _____

3. 200 ÷ 4 = _____

4. 28,000 ÷ 7 = _____

5. 810 ÷ 9 = _____

6. 50,000 ÷ 5 = _____

7. Number Sense What basic fact would you use to help solve 450,000 ÷ 9? _____

8. In 1 week there are 7 days. How many weeks are in 210 days? _____

9. How many weeks are there in 420 days? _____

Name _____

Estimating Quotients

R 7-2

Estimate 460 ÷ 9.

You can use compatible numbers.

Ask yourself: What is a number close to 460 that could be easily divided by 9? Try 450.

450 ÷ 9 = 50

So, 460 ÷ 9 is about 50.

You can also estimate by thinking about multiplication.

Ask yourself: Nine times what number is about 460?

9 × 5 = 45, so 9 × 50 = 450.

So, 460 ÷ 9 is about 50.

50 is a good estimation for this problem.
Because 450 is less than 460, the estimated answer is an underestimate, that is, the actual answer is greater than 50.
An overestimate for this problem would be 540 ÷ 9 = 60.

Estimate each quotient. Tell whether you found an overestimate or an underestimate.

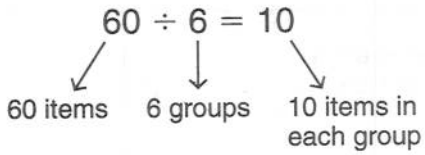
1. 165 ÷ 4 _____
2. 35 ÷ 4 _____
3. 715 ÷ 9 _____
4. 490 ÷ 8 _____
5. 512 ÷ 5 _____
6. 652 ÷ 8 _____
7. 790 ÷ 9 _____
8. 200 ÷ 7 _____
9. 311 ÷ 6 _____
10. **Number Sense** Find an overestimate and an underestimate for 313 ÷ 5. _____

Name _____

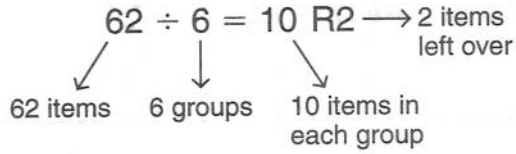
Dividing with Remainders

R 7-3

When you divide, you can think of putting items into groups. For example:



Sometimes there are items left over. In division, the number of "leftover" items is called the *remainder*. For example:



Divide. You may use counters or pictures to help.

1. $4\overline{)34}$

2. $8\overline{)65}$

3. $9\overline{)75}$

4. $6\overline{)28}$

5. $5\overline{)14}$

6. $9\overline{)37}$

7. Number Sense In division, why should the remainder not be greater than the divisor?

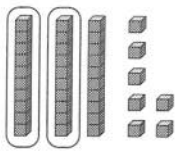
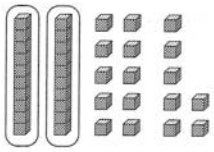
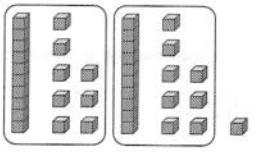
_____

Name _____

Two-Digit Quotients

R 7-4

Here is how to divide two-digit quotients.

Find 37 ÷ 2.	What You **Show**	What You **Think**	What You **Write**
Step 1 Divide the tens.		There is 1 ten in each group and 1 ten left over.	1 2)37 -2 1
Step 2 Regroup by bringing down the ones.		Trade the extra ten for ten ones. The one ten and 7 ones make 17 ones.	1 2)37 -2 17
Step 3 Divide the ones.		There are 8 ones in each group and 1 one left over.	18 R1 2)37 -2 17 -16 1

Use counters or draw pictures. Tell how many books are on each shelf and how many books are left over.

1. 66 books
5 shelves _____

2. 78 books
4 shelves _____

Divide. You may use counters or pictures to help.

3. $4\overline{)95}$

4. $2\overline{)57}$

5. $3\overline{)89}$

6. Number Sense You have 43 marbles. You divide them equally among some sacks. How many sacks must you use to get fewer than 8 marbles in each sack? _____

Name _____

Dividing Two-Digit Numbers

R 7-5

You can find two-digit quotients by breaking apart the problem and dividing tens, then ones.

Find 85 ÷ 5.
Estimate: 100 ÷ 5 = 20.

$$\begin{array}{r} 17 \\ 5\overline{)85} \\ -5 \\ \hline 35 \\ -35 \\ \hline 0 \end{array}$$

Check: 17 × 5 = 85.
The answer checks.

Find 55 ÷ 3.
Estimate: 60 ÷ 3 = 20.

$$\begin{array}{r} 18\text{ R1} \\ 3\overline{)55} \\ -3 \\ \hline 25 \\ -24 \\ \hline 1 \end{array}$$

Check: 18 × 3 = 54.
54 + 1 = 55
The answer checks.

Find 83 ÷ 7.
Estimate: 84 ÷ 7 = 12.

$$\begin{array}{r} 11\text{ R6} \\ 7\overline{)83} \\ -7 \\ \hline 13 \\ -\ 7 \\ \hline 6 \end{array}$$

Check: 11 × 7 = 77.
77 + 6 = 83
The answer checks.

1.

$$\begin{array}{r} 2\square \\ 3\overline{)81} \\ -\square \\ \hline \square 1 \\ -\square\square \\ \hline 0 \end{array}$$

2.

$$\begin{array}{r} 1\square \\ 4\overline{)76} \\ -\square \\ \hline \square\square \\ -\square\square \\ \hline 0 \end{array}$$

3. $3\overline{)91}$

4. $4\overline{)86}$

5. $2\overline{)75}$

Name _____

PROBLEM-SOLVING SKILL **R 7-6**

Interpreting Remainders

Muffins A parents' association was arranging muffins on plates for a bake sale. Each plate holds 6 muffins. There were 89 muffins baked for the sale.

When you solve a problem using division, the real-world situation tells you how to make sense of the remainder. For example:

Read and Understand

How many plates will be filled?

Plan and Solve

Divide: $89 \div 6 = 14$ R5

The muffins will fill 14 plates.

Look Back and Check

14 plates will have 6 muffins each. There will be some muffins left over.

Read and Understand

How many muffins will be on the plate that is not filled?

Plan and Solve

Divide: $89 \div 6 = 14$ R5

There will be 5 muffins on the plate that is not filled.

Look Back and Check

The remainder of 5 tells us that there are 5 extra muffins for another plate.

Solve.

The natural history museum has a hands-on mineral presentation. Each time the presentation is given, 8 students are permitted in the presentation area. One day, 100 students from Westbrook school were at the museum to see the presentation.

1. How many times must the presentation be given if all of the students see the presentation? _____

2. How many groups of 8 will see the presentation? _____

Name _____

Dividing Three-Digit Numbers

R 7-7

Find 454 ÷ 3.

Estimate: 450 ÷ 3 = 150.

Step 1

Divide the hundreds.

$$\begin{array}{r} 1 \\ 3\overline{)454} \\ -3 \\ \hline 1 \end{array}$$

Multiply.
Subtract.
Compare. $1 < 3$

Step 2

Bring down the tens and divide.

$$\begin{array}{r} 15 \\ 3\overline{)454} \\ -3 \\ \hline 15 \\ -15 \\ \hline 0 \end{array}$$

Multiply.
Subtract.
Compare. $0 < 3$

Step 3

Bring down the ones and divide.

$$\begin{array}{r} 151\ \text{R1} \\ 3\overline{)454} \\ -3 \\ \hline 15 \\ -15 \\ \hline 04 \\ -\ 3 \\ \hline 1 \end{array}$$

Multiply.
Subtract.
Compare. $1 < 3$

Check

Multiply the quotient by the divisor and add the remainder.

$$\begin{array}{r} 1 \\ 151 \\ \times\ 3 \\ \hline 453 \end{array} \qquad \begin{array}{r} 453 \\ +\ 1 \\ \hline 454 \end{array}$$

The answer checks.

1. $5\overline{)349}$ = ☐ 9 R ☐

$$\begin{array}{r} \square\,9\ \text{R}\square \\ 5\overline{)3\ 4\ 9} \\ -\square\,\square \\ \hline \square\,\square \\ -\ \square\,\square \\ \hline \square \end{array}$$

2. $6\overline{)1\ 6\ 9}$ = 2 ☐ R ☐

$$\begin{array}{r} 2\,\square\ \text{R}\square \\ 6\overline{)1\ 6\ 9} \\ -\square\,\square \\ \hline \square\,\square \\ -\ \square\,\square \\ \hline \square \end{array}$$

3. $7\overline{)378}$

4. $5\overline{)227}$

5. $6\overline{)513}$

6. Number Sense When looking at the divisor and the dividend, how can you tell where to begin dividing?

_____

_____

Name _____

Zeros in the Quotient

R 7-8

Find 956 ÷ 9.

First estimate: 900 ÷ 9 = 100.

Step 1

Divide the hundreds.

$$\begin{array}{r} 1 \\ 9\overline{)956} \\ -9 \\ \hline 0 \end{array}$$

Multiply.

Compare. $0 < 9$

Step 2

Bring down the tens and divide.

$$\begin{array}{r} 10 \\ 9\overline{)956} \\ -9 \\ \hline 05 \\ -\ 0 \\ \hline 5 \end{array}$$

Multiply.

Subtract.

Compare. $5 < 9$

5 can't be divided by 9. Place a zero in the quotient.

Step 3

Bring down the ones and divide.

$$\begin{array}{r} 106\ \text{R2} \\ 9\overline{)956} \\ -9 \\ \hline 05 \\ -\ 0 \\ \hline 56 \\ -54 \\ \hline 2 \end{array}$$

Multiply.

Subtract.

Compare. $2 < 9$

Check

Multiply the quotient by the divisor and add the remainder.

$$\begin{array}{r} 5 \\ 106 \\ \times\ 9 \\ \hline 954 \end{array} \qquad \begin{array}{r} 954 \\ +\ 2 \\ \hline 956 \end{array}$$

The answer checks.

Divide. Check your answer.

1. $7\overline{)742}$

2. $5\overline{)520}$

3. $2\overline{)813}$

4. $4\overline{)808}$

5. Number Sense Could 540 ÷ 3 be 18? Why or why not?

_____

_____

_____

_____

Name _____

Dividing Money Amounts

R 7-9

Find $1.68 ÷ 3.

Estimate: $1.50 ÷ 3 = $0.50, so $1.68 ÷ 3 should be close to $0.50.

Step 1

Divide the same way you would with whole numbers.

$$\begin{array}{r} 56 \\ 3\overline{)\$1.68} \\ -\ 15 \\ \hline 18 \\ -\ 18 \\ \hline 0 \end{array}$$

Step 2

Show the dollar sign and decimal point in the quotient. The decimal point should be moved straight up.

$$\begin{array}{r} \$0.56 \\ 3\overline{)\$1.68} \\ -\ 15 \\ \hline 18 \\ -\ 18 \\ \hline 0 \end{array}$$

Check

Multiply the quotient by the divisor.

$$\begin{array}{r} \$0.56 \\ \times\quad 3 \\ \hline \$1.68 \end{array}$$

The answer checks.

Divide. Check your answer.

1. $6\overline{)\$3.12$

2. $5\overline{)\$5.35$

3. $4\overline{)\$8.80$

4. $7\overline{)\$4.55$

5. Number Sense What is a good estimate for $4.21 ÷ 2?

_____

Name _____

PROBLEM-SOLVING STRATEGY **R 7-10**

Write a Number Sentence

The Painter Stephan spent $6.35 on paints for a painting on which he is working. He bought 5 tubes of paint. How much did each tube of paint cost?

Read and Understand

Step 1: What do you know? The 5 tubes of paint cost $6.35.

Step 2: What are you trying to find? How much each paint tube cost.

Plan and Solve

Step 3: What strategy will you use? Strategy: Write a number sentence.

Let t = cost of one tube of paint.

$\$6.35 \div 5 = t$

Solve for t.

$$\begin{array}{r} \$1.27 \\ 5\overline{)\$6.35} \\ -5 \\ \hline 13 \\ -10 \\ \hline 35 \\ -35 \\ \hline 0 \end{array}$$

So, each tube of paint costs $1.27.

Look Back and Check

Step 4: Is your answer reasonable? Yes, $5 \times \$1.27 = \$6.35$.

Solve the number sentence.

1. There are 364 students who will be taking a field trip. The students will ride on 7 buses. An equal number of students will ride on each bus. How many students will be on each bus?
   s = the number of students on each bus
   $364 \div 7 = s$ _____

Write a number sentence for the problem, then solve.

2. Sarah picked pears at her aunt's farm. She picked a total of 96 pears. She placed the pears into 8 baskets. How many pears did she place in each basket?

_____

_____

Name _____

Divisibility Rules

R 7-11

You can use special rules to tell if a number is divisible by 2, 3, 5, 9, or 10.

A whole number is divisible by	Example
2 if the ones digit is even.	2, 16, 238
3 if the sum of the digits is divisible by 3.	324 $3 + 2 + 4 = 9$, $9 \div 3 = 3$
5 if the number ends in 0 or 5.	605, 310
9 if the sum of the digits is divisible by 9.	747 $7 + 4 + 7 = 18$, $18 \div 9 = 2$
10 if the number ends in 0.	60, 120, 350

Test each number to see if it is divisible by 2, 3, 5, 9, or 10.

1. 20 _____

2. 88 _____

3. 63 _____

4. 45 _____

5. 65 _____

6. 303 _____

7. 510 _____

8. 603 _____

9. 105 _____

10. 654 _____

11. Number Sense If a number is divisible by 10, is it always divisible by 2? Explain.

_____

_____

_____

_____

_____

_____

Name _____

Finding Averages

R 7-12

Follow these steps to find the average, or mean, of 13, 15, 14, and 18.

Step 1 Add the numbers: 13 + 15 + 14 + 18 = 60.

Step 2 Count how many numbers are in the group. 4

Step 3 Divide: 60 (the total of the numbers) ÷ 4 (how many numbers in the group) = 15 (the average, or mean, of the numbers)

Find the average, or mean, of each set of data.

1. 25, 13, 24, 34 _____
2. 16, 15, 17 _____
3. 7, 10, 9, 10 _____
4. 4, 7, 6, 7, 11 _____
5. 13, 17, 18, 20 _____
6. 30, 35, 39, 36 _____
7. **Number Sense** What are two numbers that have an average of 50?

   _____

8. What was the average temperature of the four times shown in the chart? _____

Time	Temperature
9:00 A.M.	60°F
11:00 A.M.	62°F
1:00 P.M.	64°F
3:00 P.M.	74°F

Name _____

Dividing by Multiples of 10

R 7-13

You can use basic facts to divide by multiples of 10.

There are rules for the number of zeros in the quotient.

Here are two examples:

420 ÷ 70 =

What is the basic fact that will help solve this problem?

42 ÷ 7 = 6

Notice that there are no zeros in the numbers in the basic fact.

You can apply the following rule.

the number of zeros in the quotient = the number of zeros in the divisor − the number of zeros in the dividend

So, 420 ÷ 70 = 6.

400 ÷ 50 =

What is the basic fact that will help solve this problem?

40 ÷ 5 = 8

In this case, there is a zero in the number 40 in the basic fact.

You can apply the following rule.

the number of zeros in the quotient = one less than the number of zeros in the divisor − the number of zeros in the dividend

So, 400 ÷ 50 = 8.

Divide. Use mental math.

1. 80 ÷ 40 = _____
2. 810 ÷ 90 = _____
3. 2,400 ÷ 6 = _____
4. 2,500 ÷ 5 = _____
5. 210 ÷ 30 = _____
6. 1,200 ÷ 20 = _____
7. **Number Sense** What basic fact would you use to solve 4,500 ÷ 90? _____
8. There are 540 students at Middlebury school. The students are arranged into 9 teams for a sports event. How many students are on each team?

_____

Name _____

Dividing with Two-Digit Divisors

R 7-14

When you divide with a two-digit divisor, an estimate is an important first step.

Find 228 ÷ 24.

Step 1 Find a reasonable estimate. You can use compatible numbers or rounding to do so.

225 ÷ 25 = 9, so 9 is a good estimate.

Step 2 Divide using the estimate.

$$\begin{array}{r} 9 \text{ R12} \\ 24\overline{)228} \\ -216 \\ \hline 12 \end{array}$$

Step 3 Check your work.

$$\begin{array}{r} 24 \\ \times\ 9 \\ \hline 216 \end{array} \qquad \begin{array}{r} 216 \\ +\ 12 \\ \hline 228 \end{array}$$

The answer checks. 228 is the dividend.

Estimate each quotient. Then divide.

1. $12\overline{)264}$

2. $16\overline{)336}$

3. $45\overline{)810}$

4. $63\overline{)819}$

5. $21\overline{)672}$

6. $31\overline{)372}$

7. Number Sense What is a good estimate for 345 ÷ 26? _____

Name _____

PROBLEM-SOLVING APPLICATION **R 7-15**

The Appalachian Trail

Hiking Trip Lee and his family are planning a hiking trip on the Appalachian Trail. They are packing food in 3 lb bundles. How many bundles could they make with 51 lb of food?

What strategy can you use to solve this problem? Write a number sentence.

$51 \div 3 = b$. b = the number of food bundles

$$\begin{array}{r} 17 \\ 3\overline{)51} \\ -3 \\ \hline 21 \\ -21 \\ \hline 0 \end{array}$$

They can pack 17 food bundles.

1. The Appalachian Trail goes through 14 states. There are about 78 mi of Appalachian Trail in Georgia, about 68 mi in New Jersey, and about 82 mi in Massachusetts. What is the average number of miles of trail in these 3 states?

_____

2. There are about 560 mi of trail in Virginia. If a person planned to hike 8 mi per day, how many days would it take to hike the Virginia portion of the trail? Write a number sentence, then solve the problem.

_____

_____

3. Use divisibility rules to see if the total number of miles of Appalachian Trail (2,168 mi) is divisible by 2, 3, 5, 9, or 10.

_____

_____