Name _____

Estimate Quotients Using Multiples

Find two numbers the whole-number quotient of 142 ÷ 5 is between. Then estimate the whole-number 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 × 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 × 5 = __100__

30 × 5 = __150__ ⟵ 142 is between __100__ and __150__.

142 is closer to __150__, so 142 ÷ 5 is about __30__.

Find two numbers the whole-number quotient is between.
Then estimate the whole-number quotient.

1. 136 ÷ 6

between _____ and _____

about _____

2. 95 ÷ 3

between _____ and _____

about _____

3. 124 ÷ 9

between _____ and _____

about _____

4. 238 ÷ 7
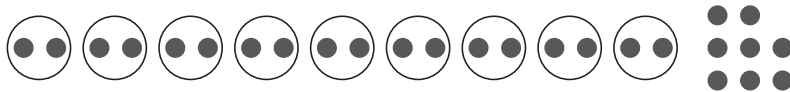
between _____ and _____

about _____

Name _____

Remainders

Use counters to find the whole-number quotient and remainder.

$$9\overline{)26}$$

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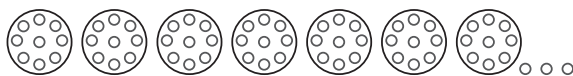 Divide the 26 counters into 9 equal-sized groups.

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

$$9\overline{)26}^{\,2\ r8}$$

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**.

$$7\overline{)66}^{\,9\ r3}$$

Use counters to find the whole-number quotient and remainder.

1. $6\overline{)19}$

2. $3\overline{)14}$

Divide. Draw a quick picture to help.

3. $39 \div 4$

_____

4. $29 \div 3$

_____

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.

Way 1: Write the remainder as a fraction.
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?

Divide. 60 ÷ 8   **7 r4**

The remainder, 4 inches, can be divided into 8 equal parts.

$$\frac{4}{8} \leftarrow \text{remainder} \\ \leftarrow \text{divisor}$$

Write the remainder as a fraction.

Each shelf will be __$7\frac{4}{8}$__ inches long.

Way 2: Drop the remainder.
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?

Divide. 60 ÷ 8   **7 r4**

The remainder is the number of beads left over. Those beads will not be used. Drop the remainder.

Callie will use __7__ beads on each bracelet.

Way 3: Add 1 to the whole-number quotient.
Callie has 60 beads. She wants to put 8 beads in each container. How many containers will she need?

Divide. 60 ÷ 8   **7 r4**

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 whole-number quotient.

Callie will need __8__ containers.

Way 4: Use only the remainder.
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?

Divide. 60 ÷ 8   **7 r4**

The remainder is the number of stickers left over. Use the remainder as the answer.

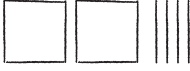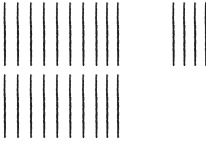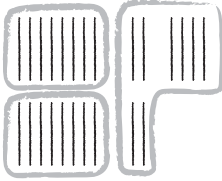Callie will give her sister __4__ stickers.

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?

Divide Tens, Hundreds, and Thousands

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

Divide. 240 ÷ 3

Use base-ten blocks.	Use place value.
Step 1 Draw a quick picture to show 240.	**Step 1** Identify the basic fact to use. Use __24 ÷ 3__.
Step 2 You cannot divide 2 hundreds into 3 equal groups. Rename 2 hundreds as tens. 240 = __24__ tens	**Step 2** Use place value to rewrite 240 as tens. 240 = __24__ tens
Step 3 Separate the tens into 3 equal groups to divide. There are 3 groups of __8__ tens. Write the answer. 240 ÷ 3 = __80__	**Step 3** Divide. 24 tens ÷ 3 = __8__ tens = __80__ Write the answer. 240 ÷ 3 = __80__

Use basic facts and place value to find the quotient.

1. 280 ÷ 4

    What division fact can you use?

    _____

    280 = _____ tens

    28 tens ÷ 4 = _____ tens

    280 ÷ 4 = _____

2. 1,800 ÷ 9

    What division fact can you use?

    _____

    1,800 = _____ hundreds

    18 hundreds ÷ 9 = _____ hundreds

    1,800 ÷ 9 = _____

3. 560 ÷ 7 = _____

4. 180 ÷ 6 = _____

5. 1,500 ÷ 5 = _____

6. 3,200 ÷ 4 = _____

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 whole-number quotient.

Step 2 Estimate using compatible numbers.

$216 \div 6$ $216 \div 6$
$\downarrow$ $\downarrow$
$180 \div 6 = 30$ $240 \div 6 = 40$

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 whole-number quotient.

1. $3\overline{)252}$ **2.** $6\overline{)546}$ **3.** $4\overline{)2{,}545}$

_____   _____   _____

4. $5\overline{)314}$ **5.** $2\overline{)1{,}578}$ **6.** $8\overline{)289}$

_____   _____   _____

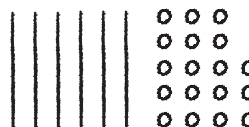# Division and the Distributive Property

Divide. 78 ÷ 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 tens ÷ 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 tens ÷ 6 and 18 ones ÷ 6. Your drawing shows the use of the Distributive Property.
78 ÷ 6 = $\underline{(60 \div 6)}$ + $\underline{(18 \div 6)}$

Step 4 Add the quotients to find 78 ÷ 6.

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

Use quick pictures to model the quotient.

1. 84 ÷ 4 = _____

2. 54 ÷ 3 = _____

3. 68 ÷ 2 = _____

4. 65 ÷ 5 = _____

5. 96 ÷ 8 = _____

6. 90 ÷ 6 = _____

Name _____

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 ÷ 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.

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

Step 2

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

4 is subtracted six times with 3 left.

27 ÷ 4

<u>6 r3</u>

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

Use repeated subtraction to divide.

1. 30 ÷ 4

_____

2. 24 ÷ 5

_____

3. 47 ÷ 7

_____

Name _____

Divide Using Partial Quotients

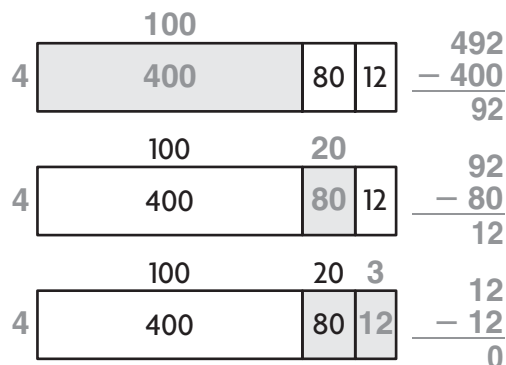You can use partial quotients to divide.

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.

Partial quotients

```
  4)492
   -400    100 × 4      100
    92
   -80      20 × 4       20
    12
   -12       3 × 4      + 3
     0                  ───
                        123
```

Use rectangular models to record partial quotients.

```
         100
   ┌──────────────┬──┬──┐      492
 4 │     400      │80│12│     -400
   └──────────────┴──┴──┘      ───
                                92

         100       20
   ┌──────────────┬──┬──┐       92
 4 │     400      │80│12│      -80
   └──────────────┴──┴──┘      ───
                                12

         100       20  3
   ┌──────────────┬──┬──┐       12
 4 │     400      │80│12│      -12
   └──────────────┴──┴──┘      ───
                                 0
```

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

Divide. Use partial quotients.

1.

```
3)657
```

_____ $100 \times$ ___   100

_____ $100 \times$ ___   _____

_____   ___ $\times$ ___   _____

_____   ___ $\times$ ___   +_____

Divide. Use rectangular models to record the partial quotients.
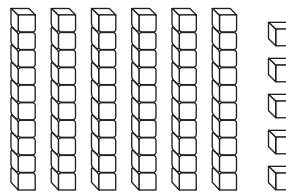
2. $852 \div 6 =$ _____

Name _____
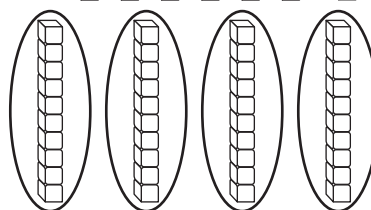
Model Division with Regrouping

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

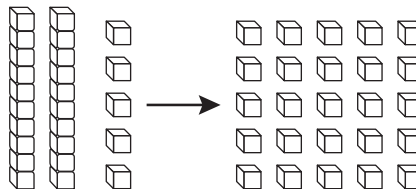**Use base-ten blocks to find the whole-number quotient 65 ÷ 4.**

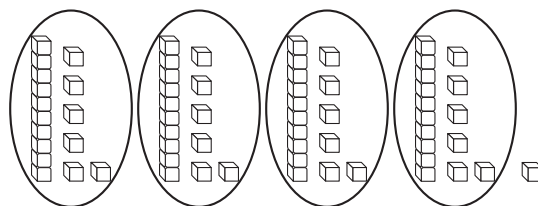**Step 1** Show 65 with base-ten blocks.

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 whole-number quotient is __16 r1__.

Divide. Use base-ten blocks.

1. 37 ÷ 2

_____

2. 74 ÷ 3

_____

3. 66 ÷ 5

_____

Name _____

Place the First Digit

Divide. 763 ÷ 3 = ■

Step 1 Estimate. Then divide the hundreds.

Think: 3 × 1 hundred = 3 hundreds
     3 × 2 hundreds = 6 hundreds
     3 × 3 hundreds = 9 hundreds

3 × **3 hundreds** is greater than 7 hundreds.
Use **2 hundreds** as an estimate.

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

← Divide 7 hundreds by 3.
← Multiply. 3 × 2 hundreds
← Subtract.

Step 2 There is
1 hundred left over.
Regroup 1 hundred,
now there are 16 tens.
Divide the tens.

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

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

← Divide 16 tens by 3.
← Multiply. 3 × 5 tens
← Subtract.

Step 3 There is 1 ten
left over. Regroup 1 ten,
now there are 13 ones.
Divide the ones.

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

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

← Divide 13 ones by 3.
← Multiply. 3 × 4 ones
← Subtract.

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

$$\begin{array}{r} 254 \text{ r1} \\ 3\overline{)763} \end{array}$$ 1 < 3

Divide.

1. $2\overline{)531}$ **2.** $4\overline{)628}$ **3.** $9\overline{)349}$ **4.** $7\overline{)794}$

Divide by 1-Digit Numbers

Divide. 766 ÷ 6 = ■

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

$$\begin{array}{r} 1 \\ 6)\overline{766} \end{array}$$ ←—— The first digit is in the hundreds place.

Step 2 There is
1 hundred left over.
Regroup 1 hundred,
now there are 16 tens.
Divide the tens.

$$\begin{array}{r} 1 \\ 6)\overline{766} \\ -6\downarrow \\ \hline 16 \end{array}$$ ←—— 16 tens

$$\begin{array}{r} 12 \\ 6)\overline{766} \\ -6 \\ \hline 16 \\ -12 \\ \hline 4 \end{array}$$ ←—— Divide 16 tens by 6.

←—— Multiply. 6 × 2 tens
←—— Subtract.

Step 3 There are
4 tens left over.
Regroup 4 tens, now
there are 46 ones.
Divide the ones.

$$\begin{array}{r} 12 \\ 6)\overline{766} \\ -6 \\ \hline 16 \\ -12\downarrow \\ \hline 46 \end{array}$$ ←—— 46 ones

$$\begin{array}{r} 127 \\ 6)\overline{766} \\ -6 \\ \hline 16 \\ -12 \\ \hline 46 \\ -42 \\ \hline 4 \end{array}$$ ←—— Divide 46 ones by 6.

←—— Multiply. 6 × 7 ones
←—— Subtract.

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

$$\begin{array}{r} 127 \text{ r4} \\ 6)\overline{766} \end{array}$$ 4 < 6

Step 5 Use multiplication and addition to check
your answer.

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

←—— remainder
←—— dividend

Divide and check.

1. $4)\overline{868}$

2. $2)\overline{657}$

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

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
What do I need to find? I need to find the number of __students__ who will ride on each bus.	I can model the number of students in all using a bar model. { 72 | 84 } 156
What information do I need to use? There are __72__ third graders and __84__ fourth graders. There will be __4__ buses.	I can model the number of buses and divide to find the number of students on each bus. { 39 | 39 | 39 | 39 } 156
How will I use the information? I will make a bar model for each step. I will add __72 and 84__ to find the total number of students. I will divide by __4__ to find how many students will ride on each bus.	So, __39__ students will ride on each bus.

1. 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?

2. 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?