Practice Coach PLUS

Coached Instruction Supplement

Mathematics 3

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Whole numbers are the numbers 0, 1, 2, 3, 4, 5, and so on. Digits are used to write numbers.

The number 61,243 has five digits. Each digit’s value is based on its position in the number. This is called its place value. A place-value chart can be used to show the value of each digit in a number.

<table>
<thead>
<tr>
<th>Ten Thousands</th>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

So 61,243 has 6 ten thousands, 1 thousand, 2 hundreds, 4 tens, and 3 ones.

The place-value system is based on 10s.
Example 1
What number do the models show?

Strategy  
Skip count each group of blocks. Write the value of each group of blocks from greatest to least place-value position.

Step 1  
Skip count the thousands.

1,000; 2,000; 3,000

There are 3 thousands. Write a 3 in the thousands place and a comma to separate the thousands and hundreds places.

3,

Step 2  
Skip count the hundreds.

100, 200, 300, 400

There are 4 hundreds. Write a 4 in the hundreds place.

3,4

Step 3  
Skip count the tens.

10, 20, 30, 40, 50

There are 5 tens. Write a 5 in the tens place.

3,45

Step 4  
Count the ones.

There are 2 ones. Write a 2 in the ones place.

3,452

Solution  
The models show the number 3,452.
Example 2
A singer’s new song was downloaded 8,495 times in one day. What is the value of the digit 9 in the number 8,495?

Strategy  Use a place-value chart.

Step 1 Write the number in the chart.

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>4</td>
<td>9</td>
<td>5</td>
</tr>
</tbody>
</table>

Step 2 Find the value of the digit 9.

The digit 9 is in the tens place.
The value of the digit is 9 tens, or 90.

Solution  The value of the digit 9 in 8,495 is 9 tens, or 90.

Numbers can be written in different forms.

Base-ten numerals: 28,495

Number name: twenty-eight thousand, four hundred ninety-five

Expanded form: \(20,000 + 8,000 + 400 + 90 + 5\)

Example 3
What is the number name for 81,173?

Strategy  Use place value.

Step 1 Read the value of the digits to the left of the comma.

81 thousands = 81,000
Write 81,000 in words, then insert a comma.

eighty-one thousand,

Step 2 Read the value of the digits to the right of the comma.

1 hundred, 7 tens, 3 ones = 173
Write 173 in words.

one hundred seventy-three
Step 3  Write the number name.

*eighty-one thousand, one hundred seventy-three*

**Solution**  The number name for 81,173 is eighty-one thousand, one hundred seventy-three.

**Example 4**
Andy said the model shows between 400 and 500. Is he correct?

![Model Image]

**Strategy**  Count the tens and hundreds.

**Step 1**  Count the tens. There are 4 tens.
There are not enough tens to make an additional hundred.

**Step 2**  Count the hundreds. There are 5 hundreds.
The number is greater than 500 and less than 600.

**Solution**  Andy is incorrect.
What number do the models show?

Write the number using base-ten numerals and its number name.

Write the number in base-ten numerals. Count the models.

There are _______ thousands. There are _______ tens.

There are _______ hundreds. There are _______ ones.

Write the number in a place-value chart.

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The number in base-ten numerals is ________________.

Write the number name.

Write the thousands part in words. ________________________________

Write the hundreds part in words. ________________________________

Write the tens part in words. ________________________________

Write the ones part in words. ________________________________

The number name is ____________________________________________.
Compare and Order Whole Numbers

Getting the Idea

You can compare and order whole numbers by looking at their place values. To compare numbers, use the following symbols:

- $>$ means is greater than.
- $<$ means is less than.
- $=$ means is equal to.

Example 1

Which symbol makes this statement true? Write $>$, $<$, or $=$.

$5,358 \bigcirc 5,385$

Strategy

Line up the digits on the ones place. Then compare the digits from left to right.

Step 1

Line up the digits on the ones place.

5,358
5,385

Step 2

Compare the greatest place: thousands.

5,358
5,385

Since 5 = 5, compare the next greatest place: hundreds.

Step 3

Compare the hundreds.

5,358
5,385

Since 3 = 3, compare the next greatest place: tens.
Step 4  Compare the tens.

\[
\begin{align*}
5,358 \\
5,385 \\
5 < 8
\end{align*}
\]

So 5,358 is less than 5,385. Use the symbol $<$.  

**Solution**  \[ 5,358 \, \textless \, 5,385 \]  

**Example 2**

Is 357 closer to 300 or 400?

**Strategy**  **Compare 357 to 350.**

**Step 1**  Make a number line from 300 to 400 by 50s.

\[ 300 \quad 350 \quad 400 \]

**Step 2**  Determine if 357 is to the left or right of 350.

It is to the right of 350.

**Step 3**  Compare the digits in the greatest place: hundreds.

\[
\begin{align*}
357 \\
350
\end{align*}
\]

Since \(3 = 3\), compare the next greatest place: tens.

**Step 4**  Compare the tens.

\[
\begin{align*}
357 \\
350
\end{align*}
\]

Since \(5 = 5\), compare the next greatest place: ones.

**Step 5**  Compare the ones.

\[
\begin{align*}
357 \\
350 \\
7 > 0
\end{align*}
\]

So, 357 is greater than 350.

Since 357 is greater than 350, it is closer to 400.

**Solution**  **The number 357 is closer to 400 than 300.**
Example 3

The table below shows the highest elevations in four U.S. states.

<table>
<thead>
<tr>
<th>State</th>
<th>Elevation (in feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Georgia</td>
<td>4,784</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>4,973</td>
</tr>
<tr>
<td>Vermont</td>
<td>4,393</td>
</tr>
<tr>
<td>West Virginia</td>
<td>4,863</td>
</tr>
</tbody>
</table>

Order these states from greatest to least elevation.

**Strategy**  
Line up the digits on the ones place. Compare the digits from left to right.

**Step 1**  
Line up the digits on the ones place.

4,784  
4,973  
4,393  
4,863

**Step 2**  
Compare the digits in the greatest place: thousands.

All the digits have a 4 in the thousands place.
Move on to the hundreds place.

**Step 3**  
Compare the hundreds place of the numbers.

9 is greater than 8, 7, or 3. So 4,973 is the greatest number.
8 is greater than 7 or 3. So 4,863 is the second greatest number.
7 is greater than 3. So 4,784 is the next greatest number.
3 is less than 9, 8, or 7. So 4,393 is the least number.

**Step 4**  
Order the numbers from greatest to least.

4,973; 4,863; 4,784; 4,393

**Step 5**  
Replace the numbers in the list with their states.

Oklahoma, West Virginia, Georgia, Vermont

**Solution**  
From greatest to least elevation, the order of the states is Oklahoma, West Virginia, Georgia, and Vermont.
Coached Example

Order the following numbers from greatest to least.

7,736   7,175   7,742

Write the numbers by lining up the digits on the ones place.

_____________________________

_____________________________

_____________________________

Compare the digits from left to right.

Compare the thousands place.
   All of the thousands digits are ________.

Compare the hundreds place.
   7 hundreds ○ 1 hundred

So, the least number is _______________.

Compare the tens place of the remaining two numbers.
   3 tens ○ 4 tens

So, the greatest number is _______________.

The numbers written from greatest to least are

__________________, ________________, ________________.
Using addition properties can make it easier for you to add numbers. The commutative property of addition says that changing the order of the addends does not change the sum.

\[ \begin{array}{c}
0 & + & 0 & = & 0 & + & 0 \\
2 & + & 4 & = & 4 & + & 2 \\
6 & = & 6 
\end{array} \]

Example 1
Which number makes this sentence true?

\[ 12 + 18 = 18 + \square \]

Strategy Use the commutative property of addition.

The commutative property of addition says that changing the order of the addends does not change the sum.

\[ 12 + 18 = 30 \]
\[ 18 + 12 = 30 \]

Solution The number 12 makes the sentence true.
The **associative property of addition** says that changing the grouping of the addends does not change the sum.

For example, \((4 + 3) + 5 = 4 + (3 + 5)\).

\[
(4 + 3) + 5 = 7 + 5 \\
7 + 5 = 12
\]

\[
4 + (3 + 5) = 4 + 8 \\
4 + 8 = 12
\]

**Example 2**

Find the sum.

\[3 + (17 + 6) = \square\]

**Strategy**  Use the associative property of addition.

**Step 1**  Change the grouping of the addends.

Use mental math.

Think: \(3 + 17 = 20\)

\[3 + (17 + 6) = (3 + 17) + 6\]

**Step 2**  Find the sum.

\[
(3 + 17) + 6 \\
20 + 6 = 26
\]

**Solution**  \(3 + (17 + 6) = 26\)

The **identity property of addition** says that the sum of any addend and 0 is that addend.

For example, \(9 + 0 = 9\) and \(0 + 17 = 17\).
Example 3
What number goes in the □ to make the sentence true?

\[ 0 + \square = 23 \]

**Strategy**  Use the identity property of addition.

**Step 1**
Look at the numbers in the number sentence \( 0 + \square = 23 \).
The addend is 0. The sum is 23.

**Step 2**
Find the other addend.
Use the identity property of addition.
When an addend is added to 0, the sum is the addend.

\[ 0 + 23 = 23 \]

**Solution**

\[ 0 + 23 = 23 \]

---

Coached Example

If \( 4 + 9 = 13 \), what is the missing addend in the number sentence below?

\[ \square + 4 = 13 \]

What is the sum in the number sentence \( 4 + 9 = 13 \)?
\[ \square + 4 = 13 ? \]

What is the sum in the number sentence \( \square + 4 = 13 \)?
\[ \square + 4 = 13 ? \]

Are the sums the same?
\[ \square + 4 = 13 ? \]

What are the two addends in the number sentence \( 4 + 9 = 13 \)?
\[ \square + 4 = 13 ? \]

What property of addition says that adding the addends in a different order does not change the sum?

\[ \square + 4 = 13 ? \]

What is the missing addend in the number sentence \( \square + 4 = 13 \)?

The missing addend is _________.

---

15
A number **pattern** is a series of numbers or symbols that follows a rule. The rule describes how the numbers are related.

The numbers in this pattern increase.

Rule: Add 5.

\[
\begin{align*}
20 & \quad 25 & \quad 30 & \quad 35 & \quad 40 & \quad 45 \\
\end{align*}
\]

The numbers in this pattern decrease.

Rule: Subtract 2.

\[
\begin{align*}
60 & \quad 58 & \quad 56 & \quad 54 & \quad 52 & \quad 50 \\
\end{align*}
\]

**Example 1**

What is the next number in this pattern?

\[
3 \quad 6 \quad 9 \quad 12 \quad ?
\]

**Strategy** Decide if the numbers increase or decrease.

Find the rule of the pattern.

**Step 1**

Do the numbers increase or decrease?

The numbers increase.

**Step 2**

Find how many are between the first two numbers in the pattern.

Think: \(3 + ? = 6\)

\[
3 + 3 = 6
\]

Try adding 3 to each number.

**Step 3**

Find the rule.

\[
\begin{align*}
3 + 3 &= 6 \\
6 + 3 &= 9 \\
9 + 3 &= 12 \\
\end{align*}
\]

Each number is 3 more than the number before it.

The rule is to add 3.
Step 4  Find the next number in the pattern.
Use the rule. Add 3 to 12.

\[ 12 + 3 = 15 \]

Solution  The next number in this pattern is 15.

You can find many patterns in an addition table.
For example, the sums in each row increase by 1 as you go from left to right.

<table>
<thead>
<tr>
<th>+</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
</tbody>
</table>

There are even number patterns and odd number patterns.

An **even number** can be separated into two equal groups. An even number has 0, 2, 4, 6, or 8 in the ones place.

An **odd number** has 1 left over after being separated into two equal groups. An odd number has 1, 3, 5, 7, or 9 in the ones place.

When adding a number to itself, the sum is always an even number. For example, \( 1 + 1 = 2 \), \( 2 + 2 = 4 \), \( 3 + 3 = 6 \), and so on. The boldface numbers in the table show this pattern.

When adding an even number to an odd number, the sum is always an odd number. For example, \( 3 + 6 = 9 \) and \( 7 + 4 = 11 \).
Example 2
Julia saw these mailboxes along one side of Poplar Street.

Which is most likely to be the number on the next mailbox?
Are the numbers on the mailboxes odd or even?

**Strategy**  Find the rule of the pattern.

**Step 1**  Do the numbers increase or decrease?
   - The numbers increase.

**Step 2**  Find how many are between the first two numbers in the pattern.
   - Think: \(25 + ? = 27\)
   
   \[
   25 + 2 = 27
   \]
   - Try adding 2 to each number.

**Step 3**  Find the rule.
   - \(25 + 2 = 27\)
   - \(27 + 2 = 29\)
   - \(29 + 2 = 31\)
   - \(31 + 2 = 33\)
   - Each number is 2 more than the number before it.
   - The rule is to add 2.

**Step 4**  Use the rule to find the next number.
   - \(33 + 2 = 35\)

**Step 5**  Decide if the numbers are odd or even.
   - All of the numbers have 1, 3, 5, 7, or 9 in the ones place.
   - So, the numbers are odd numbers.

**Solution**  The number on the next mailbox is most likely 35.
The numbers are all odd numbers.
Example 3
What is the missing number in this pattern?

\[22 \quad 18 \quad 14 \quad 10 \quad ? \quad 2\]

**Strategy**

Find the rule of the pattern.

**Step 1**
Do the numbers increase or decrease?

The numbers decrease.

**Step 2**
Find how many are between the first two numbers in the pattern.

Think: \[22 - ? = 18\]

\[22 - 4 = 18\]

Try subtracting 4 from each number.

**Step 3**
Find the rule.

\[22 - 4 = 18\]
\[18 - 4 = 14\]
\[14 - 4 = 10\]

Each number is 4 less than the number before it.

The rule is to subtract 4.

**Step 4**
Use the rule to find the missing number.

Subtract 4 from 10.

\[10 - 4 = 6\]

**Step 5**
Check to make sure the missing number is correct.

Subtract 4 from 6 to make sure the next number is 2.

\[6 - 4 = 2\]

**Solution**
The missing number in this pattern is 6.
Coached Example

What is the next number in this pattern?

34  31  28  25  22  ?

Are the numbers in the pattern odd or even?

Do the numbers in the pattern increase or decrease? _______________

Find how many are between the first two numbers.

31 is _______ less than 34.

Try subtracting _______ from each number.

34 – _______ = _______
31 – _______ = _______
28 – _______ = _______
25 – _______ = _______

The rule is ___________________________.

Use the rule to find the next number in the pattern.

22 – _______ = _______

The next number in the pattern is __________.

Decide if the numbers are odd or even.

Look at the ________________ digit in each number.

The even numbers in the pattern are ________, ________, and ________.
The odd numbers in the pattern are ________, ________, and ________.

The numbers in the pattern are both ______________ and ______________.
Getting the Idea

When you **add**, you combine quantities.

Here are the parts to an addition sentence.

\[
\begin{align*}
43 & \quad + \quad 25 & = \quad 68 \\
\text{addend} & \quad \text{addend} & \quad \text{sum}
\end{align*}
\]

You can write an addition problem in a column. Line up the digits on the ones place. Then add from right to left. When the sum of a column is 10 or greater, **regroup** 10 of one unit to 1 of the next greatest unit.

**Example 1**

Keisha has 231 trading cards. Her brother has 467 trading cards.

How many trading cards do they have in all?

**Strategy**   Add to find how many cards in all.

**Step 1**   Write the addition problem in a column. Line up the addends by place value.

\[
\begin{align*}
231 & \\
+ \quad 467 & \\
\hline
\end{align*}
\]

**Step 2**   Add the ones.

\[
\begin{align*}
1 \text{ one} & + \quad 7 \text{ ones} = \quad 8 \text{ ones} \\
231 & \\
+ \quad 467 & \\
\hline
\quad 8
\end{align*}
\]
Step 3  Add the tens.

\[ 3 \text{ tens} + 6 \text{ tens} = 9 \text{ tens} \]

\[ \begin{array}{c}
231 \\
+ 467 \\
\hline
98
\end{array} \]

Step 4  Add the hundreds.

\[ 2 \text{ hundreds} + 4 \text{ hundreds} = 6 \text{ hundreds} \]

\[ \begin{array}{c}
231 \\
+ 467 \\
\hline
698
\end{array} \]

Solution  Keisha and her brother have 698 trading cards in all.

Example 2
What is the sum of 524 + 197?

Strategy  Rewrite the addition problem in a column. Then add from right to left.

Step 1  Add the ones.

\[ 4 \text{ ones} + 7 \text{ ones} = 11 \text{ ones} \]

Regroup 11 ones as 1 ten and 1 one.

\[ \begin{array}{c}
1 \\
524 \\
+ 197 \\
\hline
1
\end{array} \]

Step 2  Add the tens. Remember to include the 1 regrouped ten.

\[ 1 \text{ ten} + 2 \text{ tens} + 9 \text{ tens} = 12 \text{ tens} \]

Regroup 12 tens as 1 hundred and 2 tens.

\[ \begin{array}{c}
11 \\
524 \\
+ 197 \\
\hline
21
\end{array} \]
Step 3  Add the hundreds. Remember to include the 1 regrouped hundred.

\[ 1 \text{ hundred} + 5 \text{ hundreds} + 1 \text{ hundred} = 7 \text{ hundreds} \]

\[
\begin{align*}
11 \\
524 \\
+ 197 \\
\hline
721
\end{align*}
\]

Solution  \( 524 + 197 = 721 \)

You can use mental math to add numbers that end in 0. Use place value.

For example:

\[
620 + 10 =
\]

\[620 + 1 \text{ ten} = 630\]

\[
620 + 300 =
\]

\[620 + 3 \text{ hundreds} = 920\]

Example 3

What is 400 + 200?

Strategy  Use mental math.

Step 1  Which place value is being added?

hundreds

Step 2  Mentally add.

\[400 + 200 = 600\]

Solution  \( 400 + 200 = 600 \)
Example 4
What is 295 + 349?

Strategy  Add to one addend what you subtract from the other.

Step 1  Add 5 to 295 and subtract 5 from 349.
        295 + 5 = 300
        349 – 5 = 344

Step 2  Add the new addends mentally.
        300 + 344 = 644

Solution  295 + 349 = 644

Coached Example

Rhea has 275 pennies in her jar. Tyler has 429 more pennies in his jar. How many pennies does Tyler have in his jar?

275 + 429 = □

Change the first addend.
What number do you need to add to 275 to get 300? __________

Change the second addend.
What number do you need to subtract from 429 to keep the sum the same? __________

Mentally add the new addends.
_____ + _____ = _____

Tyler has ________ pennies in his jar.
When you subtract, you take away from a quantity. Here are the parts of a subtraction sentence.

\[
\begin{array}{ccc}
479 & \quad & 236 \\
\end{array}
\]

\[
\begin{array}{c}
\text{minuend} \\
\text{subtrahend} \\
\text{difference}
\end{array}
\]

You can write a subtraction problem in a column. Line up the digits on the ones place. Then subtract from right to left. Sometimes you may need to regroup.

**Example 1**

Jeff invited 62 guests to his party. 28 guests are adults. The rest are children. How many children did Jeff invite to his party?

**Strategy** Subtract to find how many guests are children.

**Step 1** Write a subtraction problem in a column. Line up the digits on the ones place.

\[
\begin{array}{c}
512 \\
62 \\
- 28
\end{array}
\]

Since 8 is greater than 2, regroup 1 ten as 10 ones.

**Step 2** Subtract the ones.

\[
\begin{array}{c}
12 \text{ ones} - 8 \text{ ones} = 4 \text{ ones} \\
512 \\
62 \\
- 28 \\
4
\end{array}
\]
Step 3 Subtract the tens.

\[
\begin{align*}
5 \text{ tens} &- 2 \text{ tens} = 3 \text{ tens} \\
12 &\\
\cancel{0} \cancel{2} &\\
- \ 2 \ 8 &\\
\underline{3 \ 4}
\end{align*}
\]

Solution Jeff invited 34 children to his party.

You can use addition to check the difference.

\[
\begin{align*}
5 \text{ 1 2} & 1 \\
\cancel{0} \cancel{2} & 3 \ 4 \\
- \ 2 \ 8 & \ + \ 2 \ 8 \\
\underline{3 \ 4} & \ 
\underline{6 \ 2}
\end{align*}
\]

Example 2

Aaron is reading a trilogy. He read 346 pages of the second book. He has 487 more pages to read to finish the book. The first book has 637 pages. How many more pages does the second book have than the first book?

Strategy First, add to find the number of pages in the second book. Then subtract to find how many more pages are in the second book.

Step 1 Write an addition sentence to find the number of pages in the second book.

Add the ones, then the tens, then the hundreds.
Regroup as needed.

\[
\begin{align*}
1 \text{ 1} &\\
346 &\\
{+ \ 487} &\\
\underline{833}
\end{align*}
\]

Aaron’s second book has 833 pages.
Step 2  Write a subtraction sentence to find how many more pages are in the second book.

Subtract the ones, then the tens, then the hundreds.
Regroup as needed.

\[
\begin{array}{c}
12 \\
7 \underline{\ + 3} \\
8 \underline{+ 7} \\
\underline{\ - 6 \ 3 \ 7} \\
1 \ 9 \ 6
\end{array}
\]

Solution  The second book has 196 more pages than the first book.

You can use mental math to subtract a multiple of 10, 100, or 1,000.
Here are some examples.

When you subtract 750 \( - 10 \), only the digit in the tens place of 750 will change. It will decrease by 1.

\[
750 - 10 = 740
\]

When you subtract 750 \( - 200 \), only the digit in the hundreds place of 750 will change. It will decrease by 2.

\[
750 - 200 = 550
\]

Example 3
What is 900 \( - 300 \)?

Strategy  Use mental math.

Step 1  Which place value will be subtracted?

hundreds

Step 2  Subtract mentally.

\[
900 - 300 = 600
\]

Solution  \( 900 - 300 = 600 \)
Example 4

Emily’s family is driving 903 miles to reach their vacation site. They have already driven 289 miles. How many more miles does Emily’s family have left to drive?

Strategy  Count up.

Step 1  Count up from 289 to 290.
        \[289 + 1 = 290\]

Step 2  Count up from 290 to 300.
        \[290 + 10 = 300\]

Step 3  Subtract mentally.
        \[903 - 300 = 603\]

Step 4  Add the numbers you counted up to the difference.
        \[1 + 10 + 603 = 614\]

Solution  Emily’s family has 614 more miles to go.

Coached Example

Diane counted 245 beads into a bowl. Zoe counted 10 less than Diane. How many beads did Zoe count?

Write a subtraction number sentence for the problem.

\[\underline{245} - \underline{235} = \square\]

Use mental math.

How many tens in 10? ______

Which digit will change in 245 when you subtract 1 ten? ______________

The digit in the tens place is ______. It will decrease by ______.

Mentally subtract.

Zoe counted _____________ beads.
You can **round** a number to the nearest ten or hundred.

**Example 1**
The dance recital was 73 minutes long. To the nearest ten minutes, about how long was the dance recital?

**Strategy** Use a number line. Round to the nearest ten.

**Step 1**
Make a number line from 70 to 80.

Find 73 on the number line.

```
| 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
```

**Step 2**
Decide if 73 is closer to 70 or to 80.

73 is closer to 70 than to 80.

Round 73 down to 70.

**Solution** To the nearest ten, the dance recital was about 70 minutes long.
Example 2
John is reading a book with 247 pages. To the nearest ten, about how many pages long is the book?

**Strategy**  
Use a number line to help you round to the nearest ten.

**Step 1**  
Make a number line from 240 to 250. 
Find 247 on the number line.

```
240 241 242 243 244 245 246 247 248 249 250
```

**Step 2**  
Decide if 247 is closer to 240 or 250.

247 is closer to 250. 
Round 247 up to 250.

**Solution**  
To the nearest ten, the book is about 250 pages long.

You can also use **rounding rules** to round numbers. 
When you use rounding rules, look at the place to the right of the place you are rounding to.

- **If** the digit is less than 5 (1, 2, 3, or 4), round down.
- **If** the digit is 5 or greater (5, 6, 7, 8, or 9), round up.

Example 3
A basket has 193 apples. To the nearest hundred, about how many apples are in the basket?

**Strategy**  
Use rounding rules to round to the nearest hundred.

**Step 1**  
The digit in the hundreds place is 1. 
The digit to the right of the hundreds place is 9.

193

**Step 2**  
Use rounding rules.

9 > 5, so round up. 
193 rounded to the nearest hundred is 200.

**Solution**  
To the nearest hundred, there are about 200 apples in the basket.
Lesson 7: Round Whole Numbers

Which is the greater number?

742 rounded to the nearest hundred
718 rounded to the nearest ten

Round 742 to the nearest hundred.

The digit in the hundreds place is __________.
The digit to the right of the rounding place is __________.

4 5

Should you round 742 up or down? ______________

To the nearest hundred, 742 rounds to ____________.

Round 718 to the nearest ten.

The digit in the tens place is __________.
The digit to the right of the rounding place is __________.

8 5

Should you round 718 up or down? ______________

To the nearest ten, 718 rounds to ____________.

Compare the rounded numbers.

__________ < ____________

__________ rounded to the nearest ____________ is the greater number.
You can estimate sums or differences in problems. An estimate is a number close to the exact answer.

**Example 1**
Estimate the sum.

\[ 42 + 38 + 54 \]

**Strategy**
Round each number to the greatest place. Then add.

**Step 1**
Find the greatest place of each number.

The greatest place of each number is the tens place.

**Step 2**
Round each number to the nearest ten.

- 42 rounds down to 40 because 2 < 5.
- 38 rounds up to 40 because 8 > 5.
- 54 rounds down to 50 because 4 < 5.

**Step 3**
Add the rounded numbers.

\[ 40 + 40 + 50 = 130 \]

**Solution**
The estimated sum of 42 + 38 + 54 is 130.

**Example 2**
Polk Elementary School has 413 students. Grant Elementary School has 278 students. About how many more students attend Polk Elementary School than Grant Elementary School?

**Strategy**
Decide if you need an exact answer or an estimate. Then solve.

**Step 1**
Decide if you need an exact answer or an estimate.

The problem asks “about how many,” so estimate.
Step 2  Round each number to the greatest place.
The greatest place of each number is the hundreds place.
413 rounds down to 400 because 1 < 5.
278 rounds up to 300 because 7 > 5.

Step 3  Decide if you need to add or subtract.
The problem asks “about how many more,” so subtract.
400 − 300 = 100

Solution  About 100 more students attend Polk Elementary School than Grant Elementary School.

You can use estimation to check if an answer is reasonable, or if the answer makes sense.

Example 3
Molly has $87 in her wallet. She bought a pair of pants for $32. She said she has about $30 left. Is Molly’s answer reasonable?

Strategy  Round each number to the greatest place. Then subtract.

Step 1  Decide how to solve the problem.
Estimate to see if Molly’s answer is reasonable.
“She has about $30 left” tells you to subtract.
Estimate the difference of $87 − $32.

Step 2  Round each amount to the nearest ten dollars. Then subtract.
$87 rounds up to $90. $32 rounds down to $30.
$90 − $30 = $60

Step 3  Compare the difference to Molly’s answer.
$60 is not close to $30.

Solution  Molly’s answer is not reasonable.
When you solve a problem, it is helpful to estimate the answer before you find the exact answer. Then use the estimate to check if the exact answer is reasonable.

**Example 4**

Yesterday, a museum had 718 visitors. Today, the museum had 95 more visitors than yesterday. How many visitors did the museum have today?

**Strategy**  
Find an estimate first.  
Then compare the estimate to the exact answer.

**Step 1**  
Decide how to solve the problem.  
“95 more visitors than yesterday” tells you to add.

**Step 2**  
Estimate the sum of $718 + 95$.  
$718$ rounds down to $700$.  
$95$ rounds up to $100$.  
$700 + 100 = 800$  
The answer should be about $800$.

**Step 3**  
Find the exact sum of $718 + 95$.  

```
   718
+   95
```

```
   813
```

**Step 4**  
Compare the exact answer to the estimate.  
$813$ is close to $800$.  
The answer is reasonable.

**Solution**  
The museum had $813$ visitors today.
Mr. Mitchell bought a computer that cost $482. He also bought a printer that cost $117. How much did Mr. Mitchell spend in all?

Decide how to solve the problem.

“How much did Mr. Mitchell spend in all?” tells you to ____________.

Estimate the sum of $__________ + $__________.

Round each number to the greatest place.

$482 rounds up to $__________.

$117 rounds down to $__________.

Add the rounded amounts.

$__________ + $__________ = $__________

The answer should be about $__________.

Find the exact sum.

Compare the exact answer to the estimate.

Is the exact amount close to the estimate? __________

Is your exact answer reasonable? __________

Mr. Mitchell spent $__________ in all.
Getting the Idea
You can use multiplication to combine equal groups. An array shows equal groups of objects in rows and columns.

Here are the parts of a multiplication sentence.

\[ 3 \times 2 = 6 \]

factor \hspace{1cm} factor \hspace{1cm} product

Example 1
Write a multiplication sentence for this array.

\[ 4 \times 7 = 28 \]

Solution \hspace{1cm} The array shows the multiplication sentence \( 4 \times 7 = 28 \).
Repeated addition is adding the same number many times. 
Repeated addition and multiplication have the same result. 
You can use repeated addition to solve a multiplication problem.

**Example 2**
How many stars are there in all?

\[ 3 \times 4 = \square \]

![Stars](image)

**Strategy** Use repeated addition.

**Step 1** Count the number of stars in each group. Count the number of equal groups.
- There are 4 stars in each group.
- There are 3 equal groups.

**Step 2** Use repeated addition.
- Add 4 three times to find the total.
  \[ 4 + 4 + 4 = 12 \]

**Solution** There are 12 stars in all.

\[ 3 \times 4 = 12 \]
Example 3
How many pencils are there in all?

Write an addition sentence and a multiplication sentence.

Strategy  Use repeated addition.

Step 1  Count the number of pencils in each group. Count the number of equal groups.
There are 3 pencils in each group.
There are 5 equal groups.

Step 2  Write an addition sentence.
Add 3 five times to find the total.
\[3 + 3 + 3 + 3 + 3 = 15\]

Step 3  Write a multiplication sentence.
5 groups of 3 equals 15.
\[5 \times 3 = 15\]

Solution  There are 15 pencils in all.
\[3 + 3 + 3 + 3 + 3 = 15\]
\[5 \times 3 = 15\]
You can use a rectangular area model to show multiplication.

**Example 4**
What multiplication sentence does this rectangular area model show?

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</table>
Coached Example

Reiko put 2 cookies on each plate.

How many cookies are there in all?

Count the number of cookies on each plate.
There are ________ cookies on each plate.

Count the number of plates.
There are ________ plates.

Write an addition sentence.
______ + ______ + ______ + ______ + ______ + ______ = ______

Write a multiplication sentence.
______ groups of ________ equals ________.
______ × ________ = ________

There are ________ cookies in all.
There are many strategies you can use to solve multiplication problems.

For example, to find the product of $6 \times 6 = \square$:

You can use skip counting.

6, 12, 18, 24, 30, 36

You can use repeated addition.

$6 + 6 + 6 + 6 + 6 + 6 = 36$

You can use a multiplication table.

The factors are along the top row and down the first column on the left. The products fill out the rest of the table.

So, $6 \times 6 = 36$.

<table>
<thead>
<tr>
<th>Factors</th>
<th>0</th>
<th>1</th>
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<th>3</th>
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You can use the multiplication table to find the product of 0 and a factor. Look at the products for 0 in the multiplication table.

Notice that any number times 0 is equal to 0.

For example, $3 \times 0 = 0$. 
You can also use the multiplication table to find the product of 1 and a factor. Look at the products for 1 in the multiplication table. Notice that any number times 1 is that number. For example, $9 \times 1 = 9$.

**Example 1**
Find the product.

$5 \times 10 = \square$

**Strategy** Use a multiplication table.

Look at the 5s row. Find the 10s column.

Now, find the box where the row and the column meet.

The number inside the box, 50, is the product.

**Solution** $5 \times 10 = 50$

When you multiply any whole number by 10, the product is the whole number with a zero written in the ones place. For example, $5 \times 10 = 50$.

**Example 2**
Find the product.

$4 \times 2 = \square$

**Strategy** Use skip counting.

Use a number line to skip count by 2s four times.

![Number line](image)

**Solution** $4 \times 2 = 8$
When you multiply by 2, you can use doubling to find the product.

**Example 3**  
How many cookies are there in all?

![Image of cookies](image)

**Strategy**  
Use doubling.

**Step 1**  
Look at the picture.
- There are 2 plates.
- Each plate has 6 cookies.

**Step 2**  
Double 6.
- \(6 + 6 = 12\)

**Step 3**  
Write a multiplication sentence.
- 2 groups of 6 equals 12.
- \(2 \times 6 = 12\)

**Solution**  
There are 12 cookies in all.

\[2 \times 6 = 12\]

You can double a multiplication fact you already know to find a new fact.

\[
\begin{align*}
6 \times 6 &= 36 \\
3 \times 6 &= 18 \\
3 \times 6 &= 18
\end{align*}
\]
Example 4
Find the product.

\[ 8 \times 7 = \square \]

**Strategy** Double a known fact.

**Step 1** One of the factors is 8.

8 is a double of 4.

**Step 2** Think of a known fact: \( 4 \times 7 \).

\[ 4 \times 7 = 28 \]

**Step 3** 8 is the double of 4, so double the product of \( 4 \times 7 \).

\[ 28 + 28 = 56, \text{ so } 8 \times 7 = 56. \]

**Solution** \( 8 \times 7 = 56 \)

You can find a missing factor or product in a multiplication problem using a variety of strategies. A missing number can be represented by a box (\( \square \)) or a letter (\( x \)).

Example 5
Find the missing factor.

\[ \square \times 3 = 15 \]

**Strategy** Use skip counting.

**Step 1** Use a number line to skip count by 3s.

Skip count by 3 until you reach 15.
Step 2  Count the number of times you skip counted.

You skip counted 5 times.
5 is the missing factor.

Solution  \[ 5 \times 3 = 15 \]

Coached Example

Write a multiplication sentence for this model.

How many rows are there? _______
How many squares are in each row? _______
Use skip counting to find the total number of squares.

______, _______, _______

The model shows the multiplication sentence ______ \( \times \) _____ = _____.


Multiplication Patterns

Getting the Idea

If you add the same number to itself over and over, you are creating a pattern. Since multiplication is another way to do repeated addition, you can use multiplication as a shortcut.

Example 1

There are 5 pieces of paper in each pile.

Write a multiplication sentence to show the total number of pieces in 6 piles.

Strategy  Relate repeated addition to multiplication.

Step 1  Find the number of pieces in 6 piles.

There are 5 pieces in each pile. The rule is add 5.

\[
\begin{align*}
5 & \quad 10 & \quad 15 & \quad 20 & \quad 25 & \quad 30 \\
\end{align*}
\]

\[+ 5 \quad + 5 \quad + 5 \quad + 5 \quad + 5 \]

\[
\begin{align*}
5 & \quad 10 & \quad 15 & \quad 20 & \quad 25 & \quad 30 \\
\end{align*}
\]
Step 2  Use multiplication to show the total number of pieces.

\[ \text{number of piles} \times \text{pieces in each pile} = \text{total} \]

\[
\begin{array}{ccc}
1 & \times & 5 \\
2 & \times & 5 \\
3 & \times & 5 \\
4 & \times & 5 \\
5 & \times & 5 \\
6 & \times & 5 \\
\end{array}
\]

= 5  
= 10  
= 15  
= 20  
= 25  
= 30

Solution  The sentence \(6 \times 5 = 30\) shows the total number of pieces in 6 piles.

You can use a table to show number patterns. Each pair of numbers in the table follows the same rule. Use the rule to find a missing number or continue a pattern.

For example, the table below shows that 1 bicycle has 2 tires, 2 bicycles have a total of 4 tires, 3 bicycles have a total of 6 tires, and 4 bicycles have a total of 8 tires. How many tires do 5 bicycles have?

<table>
<thead>
<tr>
<th>Bicycle Tires</th>
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<tbody>
<tr>
<td><strong>Number of Bicycles</strong></td>
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The rule of the table is multiply the number of bicycles by 2 to find the total number of tires.

Rule: \(\text{number of bicycles} \times 2 = \text{total number of tires}\)

Use the rule to find how many tires 5 bicycles have.

\[5 \times 2 = 10\]

So, 5 bicycles have 10 tires.
Example 2
This table shows the total amount of milk needed to make different numbers of cakes.

<table>
<thead>
<tr>
<th>Number of Cakes</th>
<th>Cups of Milk</th>
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<tbody>
<tr>
<td>1</td>
<td>3</td>
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<tr>
<td>2</td>
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<td>4</td>
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</table>

How many cups of milk in all are needed to make 5 cakes?

**Strategy**  **Find the rule.**

**Step 1** Find the number of cups of milk for 1 cake.
3 cups of milk are needed for 1 cake.

**Step 2** Look at the pattern for the rest of the numbers.
As the number of cakes increases by 1, the cups of milk increase by 3.

**Step 3** Find the rule.
The rule is number of cakes \( \times \) 3 cups = total cups of milk.

**Step 4** Use the rule to find the total cups of milk for 5 cakes.
5 cakes \( \times \) 3 cups = 15 cups

**Solution** 15 cups of milk are needed to make 5 cakes.
There are many patterns in a multiplication table.

For example, look at the products in the 4 row.

The numbers increase by 4 as you go from left to right.

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</tbody>
</table>

The bold numbers are the products of two equal factors, such as $3 \times 3 = 9$.

Notice the products as you move diagonally from top left to bottom right. The numbers alternate between odd and even numbers.

Notice also that the products on one side of the diagonal are the same as the products on the other side of the diagonal.

For example, $7 \times 2 = 14$ and $2 \times 7 = 14$. 
Example 3
When you multiply a number by 6, the product will always be an even number.

Show the product of $6 \times 3$ as the sum of two equal addends.

**Strategy**  
Find the product and split it into two equal parts.

**Step 1**  
Find the product of $6 \times 3$.

$6 \times 3 = 18$

**Step 2**  
Show 18 as the sum of two equal addends.

“Two equal addends” means the addends are the same.

Think: $? + ? = 18$

$9 + 9 = 18$

**Solution**  
The product of $6 \times 3$ can be shown as $9 + 9 = 18$. 
Coached Example

This table shows the total number of legs for different numbers of spiders.

<table>
<thead>
<tr>
<th>Number of Spiders</th>
<th>Number of Legs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>24</td>
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<td>40</td>
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<td>7</td>
<td>56</td>
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</tbody>
</table>

How many legs in all do 9 spiders have?

One spider has ___________ legs.

Find the rule.

The rule is number of spiders \( \times \) ___________ = total number of legs.

Use the rule to check the numbers in the table.

\[
1 \times \_\_\_\_\_\_\_\_ = 8 \\
3 \times \_\_\_\_\_\_\_\_ = 24 \\
5 \times \_\_\_\_\_\_\_\_ = 40 \\
7 \times \_\_\_\_\_\_\_\_ = 56
\]

Use the rule to find the total number of legs that 9 spiders have.

\[
9 \times \_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_
\]

Nine spiders have ___________ legs in all.
With word problems, look carefully to see if there are equal groups. If so, you can write a multiplication sentence to solve the problem.

When you write a multiplication sentence, remember to use a symbol or letter to represent the unknown number.

**Example 1**

In a classroom, there are 3 rows of student desks. There are 6 student desks in each row.

How many student desks are in the classroom?

**Strategy** Write a multiplication sentence. Then multiply.

**Step 1** Write a multiplication sentence.

There are 3 rows. There are 6 desks in each row.

number of rows $\times$ number in each row = total number

$$3 \times 6 = \Box$$

**Step 2** Multiply.

$$3 \times 6 = 18.$$ 

**Solution** There are 18 student desks in the classroom.
Example 2
Mr. Cole bought 5 T-shirts. Each T-shirt costs $5.

How much did Mr. Cole spend in all on T-shirts?

Strategy
Write a multiplication sentence. Then multiply.

Step 1
Write a multiplication sentence. Use the symbol $ for the product.

5 shirts at $5 each = 5 groups of 5

$5 \times 5 = \square$

Step 2
Multiply.

$5 \times 5 = 25.$

Solution
Mr. Cole spent $25 on 5 T-shirts.
Example 3
Three groups signed up to hike on a trail. Each group has 7 people. How many people in all are on the trail?

Strategy  Write a multiplication sentence. Then multiply.

Step 1  Write a multiplication sentence.
3 groups of 7 people = 3 groups of 7
3 × 7 = □

Step 2  Multiply.
3 × 7 = 21.

Solution  There are 21 people on the trail in all.

Multiplication can be used to compare.

Example 4
Sally’s ribbon is 4 inches long. Tania’s ribbon is 6 times as long as Sally’s. How long is Tania’s ribbon?

Strategy  Write a multiplication sentence. Then use repeated addition.

Step 1  Write a multiplication sentence.
You know Sally’s ribbon is 4 inches long and Tania’s ribbon is 6 times as long.
6 times as long as 4 is the same as 6 × 4.
6 × 4 = □

Step 2  Multiply.
6 × 4 = 24.

Solution  Tania’s ribbon is 24 inches long.
Example 5
Daniel has 2 fish tanks. He has 12 fish in each tank. James has fewer fish than Daniel. Together they have 32 fish. How many fish does James have?

Strategy  Write number sentences to model the problem.

Step 1  First, find the number of fish Daniel has.
Write and solve a multiplication sentence.
Use the symbol □ for the product.
You know Daniel has 2 fish tanks with 12 fish in each tank.
\[ 2 \times 12 = □ \]
\[ 2 \times 12 = 24 \]

Step 2  Next, find the number of fish James has.
Write and solve a subtraction sentence.
Use the symbol □ for the difference.
You know that together they have 32 fish.
\[ 32 - 24 = □ \]
\[ 32 - 24 = 8 \]

Solution  James has 8 fish.

Coached Example
At Buddy’s Bakery a cookie costs $2. A cake costs 4 times as much as a cookie. How much does a cake cost at Buddy’s Bakery?

Write a multiplication sentence.
A cookie costs $___________ and a cake costs ___________ times as much.

\[ _________ \times _________ = □ \]
\[ _________ \times _________ = _________. \]

A cake costs $___________ at Buddy’s Bakery.
You can use multiplication properties to help you learn basic facts.

The **commutative property of multiplication** says that changing the order of factors does not change the product.

\[
\begin{align*}
3 \times 4 &= 12 \\
4 \times 3 &= 12
\end{align*}
\]

**Example 1**
What number makes the sentence true?

\[2 \times 5 = \square \times 2\]

**Strategy**  Use the commutative property of multiplication.

The commutative property of multiplication says that changing the order of factors does not change the product.

\[2 \times 5 = 10, \text{ so } 5 \times 2 = 10\]

**Solution**  The number 5 makes the sentence true.
You can use the commutative property to learn multiplication facts. Look at the shaded row and column in the multiplication table below. The multiplication facts for 3s have the same factors and products. This is true for all multiplication facts. For example, when you know the multiplication fact $3 \times 6 = 18$, you also know the multiplication fact $6 \times 3 = 18$.

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The **distributive property of multiplication** says that multiplying a sum by a factor is the same as multiplying each addend by the factor and adding the products.

For example, use the distributive property to find $4 \times 8$.

Rename one of the factors as the sum of two addends. $4 \times (5 + 3)$

Multiply the other factor by each addend. $(4 \times 5) + (4 \times 3)$

Add the products. $20 + 12 = 32$
Example 2
Find the product.

\[ 6 \times 9 = \square \]

**Strategy**  Use the distributive property of multiplication.

**Step 1** Rename one of the factors as the sum of two numbers.
Distribute the factor 6 to both numbers.

\[ 6 \times 9 \]
\[ 6 \times (5 + 4) \]
\[ (6 \times 5) + (6 \times 4) \]

**Step 2** Multiply each fact.

\[ (6 \times 5) + (6 \times 4) \]
\[ 30 + 24 \]

**Step 3** Add the products.

\[ 30 + 24 = 54 \]

**Solution** \[ 6 \times 9 = 54 \]
Example 3
Karen can’t remember the product for $8 \times 9$, so she breaks the factor 9 into $4 + 5$. What is $8 \times (4 + 5)$?

**Strategy** Use the distributive property.

**Step 1** Distribute the factor 8 to both numbers inside the parentheses.

\[
8 \times (4 + 5) = (8 \times 4) + (8 \times 5)
\]

**Step 2** Multiply each fact.

\[
(8 \times 4) + (8 \times 5) = 32 + 40
\]

**Step 3** Add the products.

\[
32 + 40 = 72
\]

**Solution**

\[
8 \times 9 = 8 \times (4 + 5) = 72
\]

Coached Example

\[
4 \times 9 = 36. \text{ What is the product of } 9 \times 4? \]

Look at $4 \times 9 = 36$.

The factors are _________ and _________.

Look at $9 \times 4 = \square$.

The factors are _________ and _________.

The factors are the same, but the order of the factors is different.

The commutative property of multiplication says that changing the ________________ of the factors does not change the product.

So, $9 \times 4 = \square$.

The product of $9 \times 4$ is _________.


A multiple of 10 is the product of 10 and any number.
All numbers with a 0 in the ones place are multiples of 10, such as 10, 40, and 800.
You can use models to help you multiply multiples of 10.

Example 1
Find the product.

\[ 6 \times 20 = \square \]

Strategy  Use models.
Step 1  Show 6 groups of 2 tens.

Step 2  Count the tens.
There are 12 tens.
12 tens = 120

Solution  \[ 6 \times 20 = 120 \]
You can also use a basic fact and place value to find $6 \times 20$.

Think about the basic fact $6 \times 2 = 12$.

$6 \times 2 \text{ ones} = 12 \text{ ones} = 12$

$6 \times 2 \text{ tens} = 12 \text{ tens} = 120$

**Example 2**

Multiply.

$3 \times 90 = \square$

**Strategy** Use a multiplication fact and place value.

**Step 1** Think of a basic fact.

$3 \times 9 = 27$

**Step 2** Use place value.

$3 \times 9 \text{ ones} = 27 \text{ ones} = 27$

$3 \times 9 \text{ tens} = 27 \text{ tens} = 270$

**Solution** $3 \times 90 = 270$
Example 3
Each marching band has 40 members.
How many members are in 5 marching bands?

Strategy Use a basic fact and mental math.

Step 1
Decide how to solve the problem.
Find 5 groups of 40.
So, find $5 \times 40$.

Step 2
Use a basic fact and place value.
Think: $5 \times 4 = 20$
$5 \times 4$ ones $= 20$ ones $= 20$
$5 \times 4$ tens $= 20$ tens $= 200$

Solution There are 200 members in 5 marching bands.

Coached Example
Rachel made 30 bags of treats. She put 5 treats in each bag.
How many treats did Rachel bag in all?

Decide how to solve the problem.
Find 30 groups of __________.
So, find __________ $\times$ __________.

Use a basic fact.
Think: $3 \times 5 = $ __________

Use place value.
__________ ones $\times 5 = $ __________ ones $= $ __________
__________ tens $\times 5 = $ __________ tens $= $ __________

Rachel bagged __________ treats in all.
Multiply Three Numbers

Getting the Idea

Sometimes you may have to multiply three factors to find a product. When this happens, first multiply two of the factors, and then multiply the product of those two factors by the third factor.

For example, find the product of $6 \times 3 \times 4$.

First multiply two factors.

$6 \times 3 = 18$

Then multiply the product of the two factors by the other factor.

$18 \times 4 = 72$

So, $6 \times 3 \times 4 = 72$.

You can use models to find the product of 3 factors.

Example 1

Find the product.

$2 \times 3 \times 5 = \square$

Strategy Use models.

Step 1 Multiply two factors.

2 rows of 3 counters

$2 \times 3 = 6$

Step 2 Multiply the product by the other factor.

2 rows of 3 counters 5 times

$6 \times 5 = 30$

Solution $2 \times 3 \times 5 = 30$
Another way to multiply $2 \times 3 \times 5$ is to use the commutative property. Remember, the commutative property says that you can multiply factors in any order, and the product will not change.

Multiply $2 \times 3 \times 5$.

Change the order of factors 3 and 5. $2 \times 5 \times 3$

Multiply. $10 \times 3 = 30$

So, $2 \times 3 \times 5 = 30$.

You can also group 3 factors in different ways to help you multiply.

The **associative property of multiplication** says that changing the grouping of the factors does not change the product.

For example, $(2 \times 4) \times 3 = 2 \times (4 \times 3)$.

$(2 \times 4) \times 3 = 8 \times 3$  
$2 \times (4 \times 3) = 2 \times 12$

$8 \times 3 = 24$  
$2 \times 12 = 24$

**Example 2**

Find the product.

$(7 \times 5) \times 2 = \square$

**Strategy**  
Use the associative property of multiplication.

**Step 1**  
Change the grouping of the factors.  
Use mental math. Think: $5 \times 2 = 10$

$(7 \times 5) \times 2 = 7 \times (5 \times 2)$

**Step 2**  
Multiply inside the parentheses.  
$7 \times (5 \times 2)$  
$7 \times 10$

**Step 3**  
Multiply the product by the other factor.  
$7 \times 10 = 70$

**Solution**  
$(7 \times 5) \times 2 = 70$
Find the product.

\[(6 \times 2) \times 3 = \]

Use the associative property of multiplication.

Change the grouping of the factors to help you multiply.

\[(6 \times 2) \times 3 = \text{________} \times (\text{________} \times \text{________})\]

Multiply inside the parentheses.

\[(\text{________} \times \text{________}) = \text{________}\]

Multiply the product by the other factor.

\[\text{________} \times \text{________} = \text{________}\]

\[(6 \times 2) \times 3 = \text{________}\]
Understand Division

Getting the Idea

You can use **division** to find the number of equal groups or the number in each equal group.

Here are the parts of a division sentence.

\[ \frac{6}{3} = 2 \]

- **dividend**
- **divisor**
- **quotient**

Example 1

Find the quotient.

\[ 18 \div 2 = \square \]

**Strategy**  **Draw a picture.**

**Step 1** Make 18 circles to show 18.

Make 2 equal groups.

\[
\begin{array}{ccc}
\bigcirc & \bigcirc & \bigcirc \\
\bigcirc & \bigcirc & \bigcirc \\
\bigcirc & \bigcirc & \bigcirc \\
\bigcirc & \bigcirc & \bigcirc \\
\bigcirc & \bigcirc & \bigcirc \\
\end{array}
\]

**Step 2** Count how many are in each group.

There are 9 circles in each group.

**Solution**  \[ 18 \div 2 = 9 \]
You can use **repeated subtraction** to find the quotient.

**Example 2**
Find the quotient.

\[ 12 \div 3 = \square \]

**Strategy** Use repeated subtraction.

**Step 1** Start with 12. Subtract 3 until you reach 0.

\[
\begin{align*}
12 - 3 &= 9 \\
9 - 3 &= 6 \\
6 - 3 &= 3 \\
3 - 3 &= 0 \\
\end{align*}
\]

**Step 2** Count the number of times you subtracted 3.
You subtracted 4 times.

**Solution** \[ 12 \div 3 = 4 \]

You can use an array to find the number of equal groups.

**Example 3**
What division facts does this array of dimes show?

![Array of dimes](image)

**Strategy** Count the number of dimes, rows, and dimes in each row.

**Step 1** Count the total number of dimes.
There are 32 dimes.
Step 2 Count the number of rows.
There are 4 rows.

Step 3 Count the number of dimes in each row.
There are 8 dimes in each row.

Step 4 Write the division facts.
\[
\begin{array}{ccc}
32 & \div & 4 \\
\text{total number of dimes} & \text{number of rows} & \text{number in each row}
\end{array}
\]
\[
\begin{array}{ccc}
32 & \div & 8 \\
\text{total number of dimes} & \text{number in each row} & \text{number of rows}
\end{array}
\]

Solution The array of dimes shows \(32 \div 4 = 8\) and \(32 \div 8 = 4\).

Example 4
What division facts does this area model show?

Strategy Count the number of squares, rows, and squares in each row.

Step 1 Count the total number of squares.
There are 27 squares in all.

Step 2 Count the number of rows.
There are 3 rows of squares.

Step 3 Count the number of squares in each row.
There are 9 squares in each row.

Step 4 Write the division facts.
\[27 \div 3 = 9\] and \[27 \div 9 = 3\]

Solution The area model shows \(27 \div 3 = 9\) and \(27 \div 9 = 3\).
Multiplication and division are **inverse operations**, or opposites.

Inverse operations undo each other. So you can use a multiplication fact to solve a division fact, or a division fact to solve a multiplication fact.

A **fact family** is a group of related facts that use the same numbers.

Here is the fact family for 2, 3, and 6.

\[
\begin{align*}
3 \times 2 &= 6 \\
2 \times 3 &= 6 \\
6 \div 3 &= 2 \\
6 \div 2 &= 3
\end{align*}
\]

**Example 5**

These two sentences are in the same fact family.

\[
\begin{align*}
3 \times \square &= 15 \\
15 \div \square &= 3
\end{align*}
\]

What number makes both sentences true?

**Strategy**  
Make an array to show the sentences.

**Step 1**
Draw 15 counters in 3 rows.

\[
\begin{array}{ccc}
\circ & \circ & \circ \\
\circ & \circ & \circ \\
\circ & \circ & \circ \\
\end{array}
\]

**Step 2**
Find the missing number in \(3 \times \square = 15\).

3 rows of 5 counters equal 15.

\(3 \times 5 = 15\)

**Step 3**
Find the missing number in \(15 \div \square = 3\).

The 15 counters are in 3 equal rows of 5.

\(15 \div 5 = 3\)

**Solution**  
The number 5 makes both sentences true.

\[
\begin{align*}
3 \times 5 &= 15 \\
15 \div 5 &= 3
\end{align*}
\]
Coached Example

What multiplication-division fact family does this picture show?

How many equal groups of hats are there? __________
How many hats are in each group? __________
How many hats are there in all? __________

Write the multiplication facts for this picture.

\[ 4 \times ______ = ______ \\
_______ \times _______ = ______

Write the division facts for this picture.

\[ 24 \div ______ = ______ \\
_______ \div _______ = ______

Division Facts

Getting the Idea

There are many strategies you can use to solve division problems.

- Use a related division or multiplication fact.
- Use a multiplication table.
- Skip count backward.
- Use repeated subtraction.
- Make a model.

Example 1

Find the quotient.

\[ 40 \div 8 = \square \]

**Strategy** Use a related multiplication fact.

**Step 1** Look at the numbers in the division problem.

40 and 8

**Step 2** Use a related multiplication fact.

Think: \( 8 \times ? = 40 \)

\[ 8 \times 5 = 40 \]

**Step 3** Multiplication and division are inverse operations.

So, \( 40 \div 8 = 5 \).

**Solution** \( 40 \div 8 = 5 \)
You can use a multiplication table to help you with basic division facts.

**Example 2**

Find the quotient.

\[ 36 \div 9 = \square \]

**Strategy**

*Use a multiplication table.*

**Step 1**

Look at the 9s row.

Find 36.

**Step 2**

From 36, go to the top to find which column it is in.

It is in the 4s column.

The quotient is 4.

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**Solution**

\[ 36 \div 9 = 4 \]
You can also use skip counting to solve division problems. Start from the total and skip count backward until you reach 0.

**Example 3**
Find the quotient.

\[ 15 \div 5 = \square \]

**Strategy**  **Skip count backward.**

- **Step 1**  Skip count backward by 5s from 15 to 0.

\[ \begin{array}{cccccccccccccccccc}
0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 & 15 & 16 & 17 & 18 & 19 & 20 \\
\end{array} \]

- **Step 2**  Count how many times you skip counted backward.  
  You skip counted 3 times.

**Solution**  \[ 15 \div 5 = 3 \]

You can use repeated subtraction to solve division problems.

**Example 4**
Find the quotient.

\[ 27 \div 9 = \square \]

**Strategy**  **Use repeated subtraction.**

- **Step 1**  Start with 27. Subtract 9 until you reach 0.
  \[ \begin{array}{ll}
  27 - 9 &= 18 \\
  18 - 9 &= 9 \\
  9 - 9 &= 0 \\
  \end{array} \]

- **Step 2**  Count how many times you subtracted the number 9.  
  The number 9 was subtracted 3 times.

**Solution**  \[ 27 \div 9 = 3 \]
Coached Example

Write the division facts for this array.

Count the rows, the number of dots in each row, and the total number of dots.

How many rows? ______________
How many dots in each row? ____________
How many dots in all? ____________

Write the division facts.

___________ ÷ ____________ = ____________

___________ ÷ ____________ = ____________
Division Word Problems

Getting the Idea

With word problems, look carefully to see if a total is shared equally. If so, you can write a division sentence to solve the problem.

When you write a division sentence, remember to use a symbol or letter to represent the unknown number.

Example 1
Tony wants to share 12 pencils equally among 3 friends. How many pencils will each friend get?

Strategy  Write a division sentence for the problem. Then divide.

Step 1  Write a division sentence. Use the symbol $\square$ for the quotient.

There are 12 pencils. There are 3 friends.

\[
\frac{\text{total number of pencils}}{\text{number of friends}} = \text{number of pencils each friend will get}
\]

\[
12 \div 3 = \square
\]

Step 2  Divide.

\[
12 \div 3 = 4
\]

Solution  The three friends will get 4 pencils each.
Example 2
Casey picked 20 apples. She gave 4 apples each to some friends. She does not have any apples left. How many friends received apples from Casey?

Strategy Write a division sentence. Then divide.

Step 1 Write a division sentence. Use \( \square \) for the quotient.
There are 20 apples. Each friend got 4 apples.

\[
\text{total number of apples} \div \text{number of apples in each group} = \text{number of friends}
\]

\[20 \div 4 = \square\]

Step 2 Divide.

\[20 \div 4 = 5\]

Solution Five friends received 4 apples each from Casey.
Example 3
Mr. Frey has 24 students. He seated the students at 4 tables. Each table had the same number of students. How many students were at each table?

Strategy  Write a division sentence. Then divide.

Step 1  Write a division sentence. Use □ for the quotient.

There are 24 students in all. There are 4 equal groups of students.

\[
\text{total number} \div \text{number of groups} = \text{number in each group}
\]

\[
24 \div 4 = □
\]

Step 2  Divide.

\[
24 \div 4 = 6.
\]

Solution  Six students were at each table.

Coached Example
A dozen flowers costs $28 and a plant costs $7. How many times as much does a dozen flowers cost as a plant?

Write a division sentence.

You know a dozen flowers costs $_________ and a plant costs $_________.

\[
\text{_________} \div \text{_________} = □
\]

\[
28 \div 7 = \text{_________}.
\]

A dozen flowers costs _________ times as much as a plant.
Fractions

Getting the Idea

A fraction names part of a whole. The numerator is the top number in a fraction. It tells the number of equal parts included in the fraction.

The denominator is the bottom number in a fraction. It tells the total number of equal parts that make up the whole.

The circle shows 3 equal parts.

Each part is \( \frac{1}{3} \) of the circle.

\[
\frac{\text{number of shaded parts}}{\text{total number of equal parts}} = \frac{2}{3}
\]

\( \frac{2}{3} \) of the circle is shaded.

The fraction \( \frac{2}{3} \) is read as two-thirds.

Example 1

What part of the hexagon is shaded?

How is the fraction read?

Strategy  
Find the denominator and the numerator.

Step 1  
Count the total number of parts.

There are 6 parts. This is the denominator.

Step 2  
Count the number of shaded parts.

There are 2 shaded parts. This is the numerator.

Step 3  
Write the fraction.

\[
\frac{\text{numerator}}{\text{denominator}} = \frac{2}{6}
\]

Solution  
\( \frac{2}{6} \) of the hexagon is shaded. It is read as two-sixths.
A fraction with 1 as its numerator is called a **unit fraction**.

All fractions are built from unit fractions, such as $\frac{1}{6}$.

For example, the number line below shows one whole from 0 to 1.

The whole is broken into 6 equal parts. Each equal part is $\frac{1}{6}$ of the whole.

There is a point located at $\frac{4}{6}$. So there are 4 parts of $\frac{1}{6}$ in $\frac{4}{6}$.

The number line shows a point at $\frac{4}{6}$.

The rectangle shows $\frac{4}{6}$ parts shaded.

The fraction $\frac{4}{6}$ is built by combining 4 of the unit fraction $\frac{1}{6}$.

**Example 2**

What fraction is located at point $A$ on the number line?

**Strategy**  
Find how many equal parts the number line is divided into. Then find the denominator and the numerator.

**Step 1**  
Count the number of equal parts between 0 and 1. There are 8 parts. This is the denominator.

**Step 2**  
Count the number of parts between 0 and point $A$. There are 5 parts. This is the numerator.

**Step 3**  
Write the numerator over the denominator. 

$$\frac{\text{numerator}}{\text{denominator}} = \frac{5}{8}$$

**Solution**  
Point $A$ is located at $\frac{5}{8}$ on the number line.
The figure below represents a sandwich that was served for lunch. The shaded part shows the amount of the sandwich that was eaten.

What fraction of the sandwich was eaten?

How many equal parts make up the figure? __________

This is the _________________________ of the fraction.

How many parts of the figure are shaded? __________

This is the _________________________ of the fraction.

Write the fraction.

numerator __________ denominator

So, __________ of the sandwich was eaten.
Fractions are a part of a whole. If you shade all parts, you can show a whole, or 1.

For example, the square below is divided into fourths. Each part is $\frac{1}{4}$, and all four parts shaded show $\frac{4}{4}$.

Example 1
Kendra drew a rectangle. She wants to show the fraction $\frac{6}{6}$.

How can she show $\frac{6}{6}$ using her rectangle?

**Strategy**  
Divide the rectangle into sixths. Shade 6 parts.

**Step 1**  
Divide Kendra’s rectangle into 6 equal parts.

**Step 2**  
Shade 6 parts of the rectangle. The entire rectangle should be shaded since $\frac{6}{6} = 1$.

**Solution**  
The answer is shown in Step 2.
You can use a number line to show a whole. This number line is from 0 to 1. There are four equal parts between 0 and 1. Each part represents $\frac{1}{4}$. So, $\frac{4}{4} = 1$.

Example 2
How can you show $\frac{6}{6}$ as a whole on a number line?

**Strategy**  Draw a number line.

**Step 1**  Draw a number line from 0 to 1.

```
   0   1
   0   1   2   3   4   5   6
   6   6   6   6   6   6   6
```

**Step 2**  Divide the number line into 6 equal parts.

```
   0   1   2   3   4   5   6
   0   1   2   3   4   5   6
```

Label each part.

So, $\frac{6}{6} = 1$.

**Solution**  $\frac{6}{6}$ is shown as a whole on the number line in Step 2.
You can show any whole number as a fraction.

When a whole number is the numerator and 1 is the denominator, the fraction is equal to the whole number. For example, \( \frac{2}{1} = 2 \).

**Example 3**
Mrs. Clark asked her class to write 8 as a fraction. What should her students write?

**Strategy** Write the whole number over 1.

Write 8 as the numerator.

Write 1 as the denominator.

\( \frac{8}{1} \) is the same as 8.

**Solution** Mrs. Clark’s students should write \( \frac{8}{1} \).

---

**Coached Example**

Write a fraction and a whole number for the shaded part of the square below.

Write a fraction for the square.

How many equal parts are in the square? _________

How many equal parts are shaded? _________

What fraction does the square show? _________

What whole number does the square show? \( \frac{4}{4} = \) _________

**The fraction is _________ and the whole number is _________**.
Equivalent Fractions

Getting the Idea

Fractions can have different numerators and denominators and have the same value. These fractions name the same parts of a whole and are called equivalent fractions.

For example, the picture below shows the equivalent fractions $\frac{2}{3}$ and $\frac{4}{6}$.

Example 1

Write two equivalent fractions that name the shaded parts of the circle.

Strategy

Look at the shaded parts of the circle in two ways.

Step 1

Count the number of equal parts and the number of shaded parts.

There are 4 equal parts. There are 2 shaded parts.

So, $\frac{2}{4}$ of the circle is shaded.

Step 2

Look at the shaded parts another way.

The two shaded parts are half of the circle.

One half of the circle is shaded.

So, $\frac{1}{2}$ of the circle is shaded.

Solution

The fractions $\frac{1}{2}$ and $\frac{2}{4}$ are equivalent fractions that name the shaded parts of the circle.
Example 2

Are $\frac{1}{2}$ and $\frac{4}{8}$ equivalent fractions?

Strategy Use fraction strips.

Step 1 Use the fraction strips for $\frac{1}{2}$ and $\frac{1}{8}$.

They are the same length, so the fractions are equivalent.

$\frac{1}{2} = \frac{4}{8}$

Solution Yes, $\frac{1}{2}$ and $\frac{4}{8}$ are equivalent fractions.

You can use a number line to find equivalent fractions.

The fractions $\frac{1}{2}$ and $\frac{3}{6}$ are at the same point on the number lines.

So, $\frac{1}{2} = \frac{3}{6}$. 
Example 3
Rachael drew the number lines below.

Which fraction is equivalent to $\frac{2}{6}$?

Strategy Find the fraction at the same point on the number line as $\frac{2}{6}$.

Find $\frac{2}{6}$ on the number line.
$\frac{1}{3}$ is at the same point as $\frac{2}{6}$.
So, $\frac{1}{3} = \frac{2}{6}$.

Solution $\frac{1}{3}$ is equivalent to $\frac{2}{6}$.

Coached Example

Evan thinks that $\frac{2}{4}$ and $\frac{4}{8}$ are equivalent fractions. Is Evan correct?

Draw number lines showing fourths and eighths.

Label the fourths. Then label the eighths.

Are $\frac{2}{4}$ and $\frac{4}{8}$ at the same point on the number line? ________________

Evan is ________________.
$\frac{2}{4}$ and $\frac{4}{8}$ ________________ equivalent fractions.
You can use models and number lines to help you compare fractions.

Use these symbols when comparing fractions.

> means is greater than.

< means is less than.

= means is equal to.

You can compare fractions that have the same numerator or the same denominator.

When you compare, it is important that the wholes are the same size.

For example, \( \frac{1}{3} \) is less than \( \frac{1}{2} \) as is shown on the number lines below.

However, \( \frac{1}{3} \) of a watermelon is a greater amount than \( \frac{1}{2} \) of an orange, because a watermelon is larger than an orange.
Example 1
Which symbol makes this sentence true? Write >, <, or =.
\[
\frac{5}{8} \quad \bigcirc \quad \frac{3}{8}
\]

Strategy  
Use fraction strips to compare \( \frac{5}{8} \) and \( \frac{3}{8} \).

Step 1  
Show \( \frac{5}{8} \) and \( \frac{3}{8} \) with fraction strips.

\[
\begin{array}{cccc}
\frac{1}{8} & \frac{1}{8} & \frac{1}{8} & \frac{1}{8} \\
\frac{1}{8} & \frac{1}{8} & \frac{1}{8} & \frac{1}{8}
\end{array}
\]

Step 2  
Compare the fractions.
\( \frac{5}{8} \) has 5 parts. \( \frac{3}{8} \) has 3 parts.
5 parts is more than 3 parts.
So, \( \frac{5}{8} \) is greater than \( \frac{3}{8} \).

Solution  
\( \frac{5}{8} \geq \frac{3}{8} \)

When you compare fractions with the same denominators, the fraction with the greater numerator is the greater fraction.
In Example 1, 5 is greater than 3, so \( \frac{5}{8} \) is greater than \( \frac{3}{8} \).

When you compare fractions with the same numerators, the fraction with the lesser denominator is the greater fraction.
For example, all the fractions shown below have 1 as their numerator.
As the number of equal parts (the denominator) increases, the size of each part decreases.

\[
\begin{array}{cccc}
\frac{1}{2} & > & \frac{1}{3} & > & \frac{1}{4} & > & \frac{1}{8}
\end{array}
\]
Example 2
Which symbol makes this sentence true? Write >, <, or =.
\[
\frac{2}{3} \bigcirc \frac{2}{8}
\]

Strategy  Compare the denominators.

Step 1  The numerators are the same.

Step 2  Compare the denominators.
\[3 < 8\]
The lesser denominator is the greater fraction.
\[\frac{2}{3}\] is the greater fraction.

Step 3  Choose the correct symbol.
> means is greater than.

Solution  \[
\frac{2}{3} \bigcirc \frac{2}{8} 
\]

Example 3
Ted read \(\frac{2}{4}\) of his book. Lisa read \(\frac{2}{3}\) of the same book. Who read the greater amount of the book?

Strategy  Compare the denominators.

Step 1  Both of the numerators are 2.

Step 2  Compare the denominators.
\[4 > 3\]
The fraction with the lesser denominator is the greater fraction.
\[\frac{2}{3} > \frac{2}{4}\]

Solution  Lisa read more of the book.
Here are the fractions from Example 3 on number lines.

\[
\begin{array}{cccc}
0 & 1 & \cdots & 1 \\
\hline
\frac{0}{3} & \frac{1}{3} & \cdots & \frac{3}{3} \\
\frac{0}{4} & \frac{1}{4} & \cdots & \frac{4}{4}
\end{array}
\]

The fraction farther to the right is the greater fraction.
The fraction farther to the left is the lesser fraction.

Coached Example

Callie drew a circle. Callie shaded \(\frac{1}{2}\) of the circle. Will shaded \(\frac{1}{4}\) of the circle. Who shaded more of the circle?

Draw number lines divided into halves and fourths.
Draw points at \(\frac{1}{2}\) and \(\frac{1}{4}\) on the number lines.

\[
\begin{array}{cccc}
0 & 1 & \cdots & 1 \\
\hline
\frac{0}{3} & \frac{1}{3} & \cdots & \frac{3}{3} \\
\frac{0}{4} & \frac{1}{4} & \cdots & \frac{4}{4}
\end{array}
\]

Compare the fractions.
The fraction farther to the right is the ____________________ fraction.
So, __________ > __________.
__________________ shaded more of the circle than ________________.
Time

Getting the Idea

A clock is used to tell and measure time.
On an analog clock, the short hand points to the **hour**.
The long hand points to the **minute**.
The minute hand moves to the next number every 5 minutes.
The hour hand moves to the next number every 60 minutes or 1 hour.

Example 1
The clock shows the time that Aiden’s bus picks him up for school.

At what time does Aiden’s bus pick him up?

**Strategy**  Look at the hands of the clock.

**Step 1**  Look at the short hand to tell the hour.

The hand is between 8 and 9, so it is after 8 o’clock.

**Step 2**  Look at the long hand to tell the minutes.

The minute hand is between 2 and 3.
Skip count the minutes by 5s from 8:00 to 8:10.
Then count the minutes by 1s from 8:10 to the minute hand.
It is 12 minutes past the hour.

**Solution**  Aiden’s bus picks him up at 8:12.

The time on the clock can be read as eight twelve or twelve minutes past eight.
Example 2
The clock shows the time that Margie got home from school today.

![Clock Image]

At what time did Margie get home from school?

**Strategy**  Look at the hands of the clock.

**Step 1**  Look at the hour hand.
- It is between 3 and 4, so it is after 3 o’clock.

**Step 2**  Look at the minute hand.
- When the minute hand points to the 7, it is 35 minutes past the hour.
- The minute hand points to the second mark after 7.
- Count forward 2 minutes from 35.
- It is 37 minutes past the hour.

**Solution**  Margie got home at 3:37 today.

The time on the clock is read as three thirty-seven or thirty-seven minutes past three or twenty-three minutes to four.

Midnight is 12:00 A.M. Noon is 12:00 P.M.
The hours between midnight and noon are called **A.M.**
The hours between noon and midnight are called **P.M.**

**Elapsed time** is the amount of time from the start to the finish of an event.
For example, you started a quiz at 10:04 A.M. and finished the quiz at 10:15 A.M.
The elapsed time is 11 minutes.
Example 3
Regina started writing in her journal at 4:15 P.M. She finished writing at 4:45 P.M. How much time was Regina writing in her journal?

Strategy  Use an analog clock. Skip count.

Step 1  Show 4:15 on the clock. Then move the minute hand to 4:45.

Step 2  Skip count by 5s.

5, 10, 15, 20, 25, 30
So, 30 minutes, or $\frac{1}{2}$ hour, has passed.

Solution  Regina was writing in her journal for 30 minutes, or $\frac{1}{2}$ hour.

You can use a number line to help you add or subtract to solve word problems involving time.

Last night, Rose weeded her garden for 15 minutes. Then she watered for 18 minutes. How much time did she tend to her garden? Show the problem on a number line.

15 minutes + 18 minutes = 33 minutes
Rose tended to her garden for 33 minutes last night.
Example 4
Nia studied 45 minutes for her spelling test. Mike studied 15 minutes for the same test. How much longer did Nia study than Mike?

Strategy  Use a number line.

Step 1  Make a number line from 0 to 60.
   Draw a point at 45 minutes.
   Draw another point at 15 minutes.

Step 2  Count back or subtract to find the difference in times.

45 minutes − 15 minutes = 30 minutes

Solution  Nia studied 30 minutes longer for the math test than Mike.
Alyssa got up at 7:10 A.M. She has to be ready by 7:55 A.M. for the bus. How much time does Alyssa have to get ready before the bus arrives?

Use a number line to find the time difference.

7:10 A.M. is ________ minutes after 7, so make a point at ________ minutes.

7:55 A.M. is ________ minutes after 7, so make another point at ________ minutes.

Find the time difference.

Count back on the number line or subtract.

55 minutes − 10 minutes = ________ minutes

Alyssa has ________ minutes to get ready before the bus arrives.
Mass

Getting the Idea

Mass is the measure of the amount of matter in an object. The table shows two units of mass in the metric system.

<table>
<thead>
<tr>
<th>Metric Units of Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kilogram (kg) = 1,000 grams (g)</td>
</tr>
</tbody>
</table>

Use these benchmarks to estimate mass.

A paper clip has a mass of about 1 gram.

A pair of sneakers has a mass of about 1 kilogram.

To measure the mass of an object, you can use a scale or a balance.

Below are two scales and a balance.
You can measure mass using grams or kilograms.

**Example 1**
Each mass on the right side of the scale is 1 gram.

What is the mass of the ping-pong ball?

**Strategy**  Use a balance. Experiment with gram masses until the trays are even.

**Step 1** Make sure the scale is leveled.
   When the scale is leveled, the mass is equal on both sides.

**Step 2** Find the total amount of mass on the right side of the scale.
   There are 3 masses.
   Each is 1 gram.
   So, the total mass is 3 grams.

**Solution** The ping-pong ball has a mass of about 3 grams.
**Example 2**

Which is the better estimate for the mass of a laptop computer?

- 2 grams
- 2 kilograms

**Strategy** Use benchmarks to find the best estimate.

**Step 1**
Compare 2 grams to a benchmark.
- 1 paper clip is about 1 gram.
- 2 paper clips are about 2 grams.
- 2 grams is too little mass.

**Step 2**
Compare 2 kilograms to a benchmark.
- A pair of sneakers is about 1 kilogram.
- 2 pairs of sneakers are about 2 kilograms.
- 2 kilograms is about right for the mass of a laptop.

**Solution** A laptop computer has a mass of about 2 kilograms.

**Example 3**

Tyson, a Rottweiler, has a mass of 43 kilograms. Louie, a bulldog, is 18 kilograms lighter than Tyson. What is Louie’s mass, in kilograms?

**Strategy** Draw a diagram.

**Step 1**
Draw a diagram.

**Step 2**
Subtract.

\[
\begin{array}{r}
43 \\
- 18 \\
\hline \\
25 \\
\end{array}
\]

**Step 3**
Use addition to check your answer.

\[25 + 18 = 43\]

The answer is correct.

**Solution** Louie has a mass of 25 kilograms.
Example 4
A cherry has a mass of 7 grams. Pat ate 9 cherries. How many grams of cherries did Pat eat in all?

**Strategy** Draw a diagram.

**Step 1**
Draw a diagram.

```
    7 7 7 7 7 7 7 7 7
? total mass
```

**Step 2** Multiply.

\[ 9 \times 7 = 63 \]

**Solution** Pat ate 63 grams of cherries in all.

---

Coached Example

This watermelon has a mass of 20 kilograms.

Mr. Lopez cut the watermelon into 5 equal pieces. What is the mass, in kilograms, of each piece?

Draw a bar diagram.

```
    20
```

To find the mass of each piece, use \[ \frac{20}{5} \].

Find \[ 20 \div 5 = \square \].

Divide.

\[ \square \div \square = \square \]

The mass of each piece is \[ \square \] kilograms.
Capacity

**Getting the Idea**

Capacity is the measure of how much a container can hold.

The table shows two units of capacity in the metric system.

<table>
<thead>
<tr>
<th>Metric Units of Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 liter (L) = 1,000 milliliters (mL)</td>
</tr>
</tbody>
</table>

Use these benchmarks to estimate capacity.

A dropper has a capacity of about 10 milliliters.

A beaker has a capacity of 500 milliliters, or $\frac{1}{2}$ liter.

A sports bottle has a capacity of about 1 liter.

Below are some containers with different capacities.

- 4 liters
- 2 liters
- 1 liter
- 250 milliliters
You can measure capacity using milliliters or liters.

**Example 1**
Jill put water in the beaker.
How much water is in the beaker?

**Strategy**  
Find the amount of water in the beaker.

- **Step 1**  
  Look at the marks on the beaker.  
  Each mark is 100 milliliters.

- **Step 2**  
  Read the mark that the water comes up to.  
  The water stops at the 300-milliliter mark.

**Solution**  
There are 300 milliliters of water in the beaker.

**Example 2**
Which is the better estimate for the capacity of a can of juice?

- 300 liters
- 300 milliliters

**Strategy**  
Look at the units in the choices.  
Compare the units to the juice can.

- A can of juice holds less than 1 liter.
- So, the units must be milliliters.

**Solution**  
The capacity of a can of juice is about 300 milliliters.
**Example 3**

Dina has 400 milliliters of water in a beaker.

She poured some of the water out and now she has 100 milliliters left. How much water was poured out of the beaker?

**Strategy**  
**Draw a number line.**

**Step 1**  
Draw a number line and count down from 400 to 100.

```
400 mL
300 mL
200 mL
100 mL
0 mL
```

**Step 2**  
Draw arrows from 400 to 100 by 100s. Count down.

\[
400 - 100 = 300 \\
400 - 200 = 200 \\
400 - 300 = 100
\]

There were 300 milliliters of water poured.

**Solution**  
Dina poured out 300 milliliters of water.
Example 4
Erica bought 8 bottles of lemonade for a party. Each bottle contains 2 liters (L) of lemonade.

How many liters of lemonade did Erica buy in all?

**Strategy**  
Draw a number line.

**Step 1**  
Draw a number line.

**Step 2**  
Draw arrows for every 2 liters.  
Draw 8 arrows, one for each bottle.

There are 16 liters of lemonade.

**Solution**  
Erica bought 16 liters of lemonade in all.
Jared’s fish tank has 258 liters of water. He pumped out 65 liters to do a water change. How much water is left in the fish tank now?

Draw a bar model.

```
   258
    \\
65  ?

   Start
   258
   \\
   End
```

Write a subtraction sentence. Use □ for the difference.

\[ \underline{258} - \underline{65} = \Box \]

Find the difference.

Use addition to check your answer.

The fish tank has \underline{\ldots} liters of water left.
Perimeter

Getting the Idea

Perimeter is the distance around a figure. Perimeter is measured in units. Some units for measuring perimeter are inches, centimeters, feet, yards, and meters. You can add the lengths of the sides to find the perimeter of a figure.

Example 1

What is the perimeter of this triangle?

Strategy Use addition.

Step 1 Add the lengths of the sides.

\[ 3 + 4 + 5 = 12 \]

Step 2 Look at the units labeled on the triangle.

The units are inches.

Solution The perimeter of the triangle is 12 inches.
Some problems may not give the measurements of a figure. You will need to measure the lengths of the sides. Then add the lengths to find the perimeter.

**Example 2**
Laida used this figure to trace rectangles on a poster.

What is the perimeter of this rectangle, in centimeters?

**Strategy** Use a centimeter ruler to measure each side. Then add the measurements.

**Step 1** Measure the length of the rectangle.
- The length is 8 centimeters.
- Two sides of the rectangle are 8 centimeters long.

**Step 2** Measure the width of the rectangle.
- The width is 4 centimeters.
- Two sides of the rectangle are 4 centimeters long.

**Step 3** Add the measurements.
\[8 + 8 + 4 + 4 = 24\]

**Solution** The perimeter of the rectangle is 24 centimeters.
You can also use multiplication to find the perimeter of a figure with equal side lengths.

A square is a figure with 4 equal sides. To find the perimeter of a square, you can multiply 4 by the length of one side.

Perimeter of a square = 4 \times \text{length of side}

**Example 3**

What is the perimeter of this square?

```
+---+---+---+
| 9 |   | 9 |
+---+---+---+
| 9 |   | 9 |
+---+---+---+
| 9 |   | 9 |
```

**Strategy**  Use multiplication.

**Step 1**  Multiply 4 by the length of one side.

\[ 4 \times 9 = 36 \]

**Step 2**  Look at the units labeled on the square.

The units are centimeters.

**Solution**  The perimeter of the square is 36 centimeters.

You can write a number sentence to help you find the missing length in a perimeter problem.
Example 4
The triangle below has a perimeter of 26 inches.

What is the unknown side length?

**Strategy**  Write a number sentence. Then substitute the numbers you know.

**Step 1**  Use □ to represent the missing side length.

\[
\text{side length} + \text{side length} + \text{side length} = \text{Perimeter}
\]

\[
10 \quad + \quad 10 \quad + \quad \square \quad = \quad 26
\]

**Step 2**  Find the missing side length.

\[
10 \quad + \quad 10 \quad + \quad \square \quad = \quad 26
\]

\[
20 \quad + \quad \square \quad = \quad 26
\]

\[
20 \quad + \quad 6 \quad = \quad 26
\]

**Solution**  The missing side length is 6 inches.

Example 5
This hexagon has 6 equal sides. It has a perimeter of 42 meters.

What is the side length of the hexagon?

**Strategy**  Write a number sentence. Then substitute the numbers you know.
Step 1  Write a number sentence.
        Use □ to represent the missing side length.
        The hexagon has 6 equal sides.
        So, the perimeter is $6 \times$ the length of one side.
        Perimeter $= 6 \times □$

Step 2  Find the side length.
        Substitute the numbers you know.
        
        $42 = 6 \times □$
        Think: $6 \times ? = 42$
        $6 \times 7 = 42$
        The side length is 7 meters.

Solution  The side length of the hexagon is 7 meters.

Coached Example

What is the perimeter of this rectangle?

The rectangle has ________ sides.
Two sides of the rectangle are ________ inches long.
The other two sides of the rectangle are ________ inches long.
Add the measurements.
    ________ + ________ + ________ + ________ = ________
The perimeter of the rectangle is ________ inches.
**Getting the Idea**

**Area** is the number of **square units** needed to cover a figure. A square with a side length of 1 unit is a **unit square**. For example, 1 square inch is a square with side lengths of 1 inch. A square that has an area of 1 square centimeter has side lengths of 1 centimeter.

Other examples of square units are square feet and square meters.

To find the area, you can count the number of square units that cover the figure with no overlaps.

**Example 1**

Arthur used square tiles to make a rectangle. Each is a square with side lengths of 1 centimeter.

What is the area of the rectangle?

**Strategy**  **Count the number of square units that make up the rectangle.**

**Step 1** The rectangle is made up of 6 square tiles.
Step 2  Find the area.

Each \[ \square \] is 1 square centimeter.

So, 6 \[ \square \] are 6 square centimeters.

**Solution**  The area of the rectangle is 6 square centimeters.

**Example 2**
What is the area of the shaded rectangle?

**Strategy**  Count the number of shaded squares in each row. Then add.

**Step 1**  Count the number of rows and the shaded squares in each row.
There are 4 rows of shaded squares.
Each row has 6 shaded squares.

**Step 2**  Multiply.
\[ 4 \times 6 = 24 \]

**Step 3**  Write the units.
Each \[ \square \] = 1 square foot.
So, 24 \[ \square \] equal 24 square feet.

**Solution**  The area of the shaded rectangle is 24 square feet.
Example 3
How much greater is the area of the shaded rectangle in Example 2 than the area of the shaded rectangle below? The area of the shaded rectangle in Example 2 is 24 square feet.

Strategy  First, find the area of this rectangle. Then subtract from the area of the rectangle in Example 2.

Step 1  Count the number of rows and the shaded squares in each row. There are 3 rows of 5 shaded squares.

Step 2  Find the area and label the units.

Step 3  Subtract 15 square feet from the area of the rectangle in Example 2. The area of the rectangle in Example 2 is 24 square feet.

Solution  The area of the rectangle in Example 2 is 9 square feet greater than the area of the rectangle above.
Coached Example

What is the area of the shaded figure?

Count the number of rows and the shaded squares in each row.
There are ________ rows of shaded squares.
Each row has ________ shaded squares.
Multiply.

________ × ________ = ________

What are the units for the area? __________________ __________________

The area of the shaded figure is ________ square meters.
The area of a rectangle is the number of square units that cover the rectangle with no gaps or overlaps.

The rectangle below has 3 rows of squares.

You can multiply the length and the width to find the area.

5 inches \( \times \) 3 inches = 15 square inches

**Example 1**
What is the area of the shaded rectangle?

**Strategy** Use multiplication.

**Step 1** Count the number of rows and the number in each row.
There are 4 rows of 7 squares.
Step 2  Multiply.
\[4 \times 7 = 28\]

Step 3  Use the scale key to find what each \[\square\] represents.
Each \[\square\] equals 1 square centimeter.
So, \(28\) \(\square\) = 28 square centimeters.

Solution  The area of the rectangle is 28 square centimeters.

Example 2
The diagram below shows Toni’s bedroom floor. She is getting wall-to-wall carpet to cover the bedroom floor.

![Diagram of a bedroom floor with measurements](image)

How many square feet of carpet does Toni need to cover her bedroom floor?

Strategy  Find the length and the width. Then multiply.

Step 1  Find the length.
The length is 10 feet.

Step 2  Find the width.
The width is 8 feet.

Step 3  Multiply the length times the width.
\[10 \text{ feet} \times 8 \text{ feet} = 80 \text{ square feet}\]

Solution  Toni needs 80 square feet of carpet for her bedroom floor.
You can use the **distributive property** to find the area of a rectangle. Remember, the distributive property says that multiplying a sum by a factor is the same as multiplying each addend by the factor and adding the products.

**Example 3**
What is the area of a rectangle with width 3 inches and length 12 inches?

**Strategy**  Break the rectangle into two smaller rectangles and use the distributive property.

**Step 1**  Break the rectangle into two smaller rectangles.

![Rectangle Diagram]

**Step 2**  Rename one of the factors.

\[3 \times (10 + 2)\]

**Step 3**  Multiply the other factor by each addend.

\[(3 \times 10) + (3 \times 2)\]

**Step 4**  Add the products.

\[30 + 6\]

**Solution**  The area of the rectangle is 36 square inches.
Example 4
What is the area of a rectangle with width 5 centimeters and length 15 centimeters?

Strategy  Use the distributive property.

Step 1  Break the rectangle into 2 rectangles.

\[
\begin{align*}
5 \times 15 &= 5 \times (10 + 5) \\
(5 \times 10) + (5 \times 5) &= 50 + 25 = 75 \\
So, the area of the rectangle is 75 square centimeters.
\end{align*}
\]

Solution  The area of a rectangle with width 5 centimeters and length 15 centimeters is 75 square centimeters.
Example 5
What is the area of the figure below?

Key: □ = 1 square inch

Strategy  Break the figure into 2 rectangles. Find the area of each rectangle. Add to find the total area.

Step 1  Break the figure into rectangle A and rectangle B.

Key: □ = 1 square inch

Step 2  Multiply to find the area of each rectangle.
Rectangle A has a length of 3 inches and a width of 6 inches.
3 inches \( \times \) 6 inches = 18 square inches

Rectangle B has a length of 7 inches and a width of 4 inches.
7 inches \( \times \) 4 inches = 28 square inches

Step 3  Add to find the total area.
18 square inches + 28 square inches = 46 square inches

Solution  The area of the figure is 46 square inches.
Angelo wants to buy linoleum flooring for his rectangular kitchen. The kitchen is 5 meters long and 4 meters wide. How many square meters of flooring does Angelo need?

Draw and shade a rectangle on the grid to represent the kitchen floor.

Key: \(\square = 1 \text{ square meter}\)

How many squares did you shade? __________

Use multiplication to find the area.

You need to multiply the ________ times the ________.

\[ \text{length} \times \text{width} = \text{area} \]

The units for the area of the floor are __________. __________.

Angelo needs ________ square meters of flooring.
Rectangles can have the same perimeter, but different areas. They can also have the same areas, but different perimeters. These rectangles all have an area of 12 square units, but they have different perimeters.

Example 1
What are the perimeters and areas of these two shapes?

Strategy
Add the side lengths to find the perimeter. Multiply the side lengths to find the area.

Step 1
Find the perimeter and area of Shape A.
It has a length of 4 units. It has a width of 6 units.
The perimeter is $4 + 6 + 4 + 6 = 20$ units.
The area is $4 \times 6 = 24$ square units.
Step 2  Find the perimeter and area of Shape B.

- It has a length of 5 units. It has a width of 5 units.
- The perimeter is \(5 + 5 + 5 + 5 = 20\) units.
- The area is \(5 \times 5 = 25\) square units.

Solution  Both shapes have a perimeter of 20 units. Shape A has an area of 24 square units. Shape B has an area of 25 square units.

Example 2

Janelle labeled the rectangle below.

Make a rectangle with the same area as Janelle’s rectangle, but with a different perimeter.

Strategy  Use square tiles.

Step 1  Find the perimeter and area of Janelle’s rectangle.

- It has a length of 9 inches and a width of 2 inches.
- It has a perimeter of \(9 + 2 + 9 + 2 = 22\) inches.
- It has an area of \(9\) inches \(\times\) 2 inches \(= 18\) square inches.

Step 2  Use 18 square tiles to represent 18 square inches.

Make a different rectangle with 18 square tiles.

Step 3  Check that the perimeter is different.

- The shape has a length of 6 inches and a width of 3 inches.
- It has a perimeter of \(6 + 3 + 6 + 3 = 18\) inches.

Solution  A shape with a length of 6 inches and a width of 3 inches has the same area as, but a different perimeter than, Janelle’s rectangle.
Coached Example

Mark made a poster for the Science Fair. It was shaped like a rectangle and was 5 feet long and 2 feet wide.

What are the measurements of a rectangle with the same perimeter but different area than Mark’s poster?

Find the perimeter and area of Mark’s poster.

It has a length of ________ feet and a width of ________ feet.

Find the perimeter.

________ + ________ + ________ + ________ = ________ feet

Find the area.

________ feet × ________ feet = ________ square feet

Make a rectangle with the same perimeter but with a different area.

Key: □ = 1 square foot

Check that the area is different.

Your rectangle has a length of ________ feet and a width of ________ feet.

Find the area.

________ feet × ________ feet = ________ square feet

A rectangle with the same perimeter but different area than Mark’s poster has a length of ________ feet and a width of ________ feet.
Picture Graphs

Getting the Idea

A picture graph uses pictures or symbols to display and compare data. The key tells how many each symbol represents.

This graph shows the types of trees Miguel saw last week.

<table>
<thead>
<tr>
<th>Type of Tree</th>
<th>Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oak</td>
<td>♦♦♦♦♦♦♦♦♦♦</td>
</tr>
<tr>
<td>Pine</td>
<td>♦♦♦♦</td>
</tr>
<tr>
<td>Maple</td>
<td>♦♦♦♦♦</td>
</tr>
<tr>
<td>Elm</td>
<td>♦♦</td>
</tr>
</tbody>
</table>

Key: Each ♦ = 1 tree

Example 1

Use the picture graph above. How many oak trees did Miguel see?

**Strategy** Look in the row for oak. Use the key.

**Step 1** Find the row for oak. Count the symbols.

There are 9 symbols.

**Step 2** Use the key to find how many each symbol represents.

Each symbol equals 1 tree.

So 9 symbols equal 9 trees.

**Solution** Miguel saw 9 oak trees.
Example 2
The graph shows the number of books that some students read at the Read-A-Thon.

<table>
<thead>
<tr>
<th>Books Read at the Read-A-Thon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pete</td>
</tr>
<tr>
<td>Rosa</td>
</tr>
<tr>
<td>Emily</td>
</tr>
<tr>
<td>Tyrone</td>
</tr>
</tbody>
</table>

Key: Each  = 2 books

Who read the greatest number of books? How many books did that student read?

**Strategy**  Find the row with the most symbols. Use the key.

**Step 1**  Find the row with the most symbols.

The row for Emily shows 5 symbols.

Emily read the greatest number of books.

**Step 2**  Find the number of books Emily read.

Look at the key.

Each symbol equals 2 books.

**Step 3**  Multiply.

5 symbols × 2 books = 10 books

**Solution**  Emily read the greatest number of books.
She read 10 books.
Example 3
Monica asked some students about their favorite time of day. She recorded the data in the tally chart below.

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Tally</th>
<th>Number of Votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afternoon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evening</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Favorite Time of Day

Make a picture graph to show the same data.

Strategy Choose a key that would work easily with the numbers in the table.

Step 1 Make a chart with 3 rows for the picture graph. Write the title above the picture graph.

Favorite Time of Day

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key: __________ = __________________

Step 2 Decide on a number to use for the key.
Each picture will represent 2 students. Write the key at the bottom of the picture graph.

Step 3 Think of a picture to use for the key.
Use a ☺ to represent 2 students.
Step 4

Write the time of day in the first column.

Draw the correct number of symbols for each time of day.

Solution  The picture graph is shown in Step 4.

Coached Example

Vera enjoys practicing the piano. The picture graph shows the time she spent practicing for 4 days in October.

<table>
<thead>
<tr>
<th>Piano Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>October 4</strong></td>
</tr>
<tr>
<td><strong>October 5</strong></td>
</tr>
<tr>
<td><strong>October 6</strong></td>
</tr>
<tr>
<td><strong>October 7</strong></td>
</tr>
</tbody>
</table>

Vera practiced ________ more minutes on October 6 than on October 4.
Bar Graphs

Getting the Idea

A bar graph uses bars of different lengths to compare data. The scale tells how many each bar represents.

To read the value of a bar, find the line that lines up with the top of the bar. Follow that line to the scale to read the number.

This graph shows the number of students absent each day this week.

Example 1

This bar graph shows the number of different types of trees in Riverside Park.

How many maple trees are in Riverside Park?
Strategy  Read the value for the bar for maple trees.

Step 1  Find the bar for “maple” along the bottom of the graph.

Step 2  Look at the line that lines up with the top of the bar.
   Move to the left and read the number on the scale.
   It shows 6.

Solution  There are 6 maple trees in Riverside Park.

Example 2
The bar graph shows the number of members in four different clubs.

How many fewer members are in the math club than in the band?

Strategy  Find the number of members in each club.

Step 1  Find the number of members in band.
   The bar lines up halfway between 50 and 60.
   The bar lines up with 55.

Step 2  Find the number of members in the math club.
   The bar lines up with the number 30.

Step 3  Subtract to find the difference.
   \[55 - 30 = 25\]

Solution  There are 25 fewer members in the math club than in band.
Example 3
Isaac made this picture graph to show which pizza toppings his classmates prefer. Make a bar graph showing the same data.

**Strategy**  
Find the value for each topping.

**Step 1**  
Label the graph.
Write the title: Favorite Pizza Toppings.
Label the side of the graph. Use a scale of 2.
Label the bottom side with the names of the toppings.

**Step 2**  
Find the number of votes for each topping.
Each symbol represents 2 votes.
Extra cheese has 4 symbols. It has 8 votes.
Pepperoni has 6 symbols. It has 12 votes.
Mushrooms has 2 symbols. It has 4 votes.
Peppers has 4 symbols. It has 8 votes.

**Step 3**  
Draw the bars.

**Solution**  
The bar graph is shown in Step 3.
Students in the third grade voted on a school mascot.

How many more students voted for Bulldogs than for Lions?

Find the number of votes for Bulldogs.

The bar lines up with __________.

Find the number of votes for Lions.

The bar lines up with __________.

Subtract.

__________ – __________ = __________

So, __________ more students voted for Bulldogs than for Lions.
Length is the measure of how long, wide, or tall something is. An inch (in.) is a unit of length in the customary system. You can use a ruler to measure the length of small objects. Each mark on this ruler represents $\frac{1}{4}$ inch.

Example 1
To the nearest $\frac{1}{2}$ inch, what is the length of this crayon?

Strategy Use an inch ruler.

Step 1 Line up the left end of the crayon with the 0 mark on the ruler.
Step 2  Look at the right end of the crayon.
       It lines up with a mark between the 3 and the 4.
       The crayon is more than 3 inches long.

Step 3  Count the spaces past the 3-inch mark.
       The mark is 4 spaces after the 3-inch mark.
       So the crayon is $3\frac{1}{2}$ inches long.

Solution  The length of the crayon is $3\frac{1}{2}$ inches long.

Example 2
To the nearest $\frac{1}{4}$ inch, what is the length of the marker?

Strategy  Use an inch ruler.

Step 1  Line up the left end of the marker with the 0 mark on the ruler.

Step 2  Look at the right end of the marker.
       It lines up with a mark between the 4 and the 5.
       The marker is more than 4 inches long.

Step 3  Count the spaces past the 4-inch mark.
       The marker is $4\frac{3}{4}$ inches long.

Solution  The length of the marker is $4\frac{3}{4}$ inches.
**Centimeters (cm)** are units of length in the metric system. Each mark on this ruler represents 1 centimeter.

![Ruler with centimeters](image)

**Example 3**

What is the length of this pen to the nearest centimeter?

![Pen](image)

**Strategy** Use a centimeter ruler.

**Step 1** Line up the left end of the pen with the 0 mark on the ruler.

**Step 2** Look at the right end of the pen.
   - It lines up with a mark between 14 and 15.
   - The pen is more than 14 centimeters long.

**Step 3** Determine if the mark is closer to the 14 or 15.
   - It is closer to the 15.

**Solution** To the nearest centimeter, the length of the pen is 15 centimeters.
You can represent measurements on a number line.

The number line below is labeled from 0 to 10 inches.

It has 10 equal spaces between the numbered marks for inches.

Each mark is 1 inch apart. The point represents a length of 8 inches.

You can also show a measurement less than 1 on a number line.

**Example 4**
The point on the number line represents the length of a finger nail.

What is the length of the finger nail?

**Strategy**  Count the number of equal parts between 0 and 1.

Step 1 Read the number line.
   It is labeled from 0 to 1.
   There are 4 equal parts between 0 and 1.

Step 2 Decide what each mark represents.
   Since there are 4 equal parts, each mark is \( \frac{1}{4} \).

Step 3 Find the value of the point.
   The point is on the 2nd mark after the 0 mark.
   So the point is on \( \frac{2}{4} \) inch.

**Solution** The length of the finger nail is \( \frac{2}{4} \) inch.
In Example 4, notice that \( \frac{2}{4} \) is in the middle between 0 and 1. So \( \frac{2}{4} \) inch is the same as \( \frac{1}{2} \) inch.

Coached Example

The point on the number line represents the length of a worm.

![Number Line](image)

What is the length of the worm?

Read the number line.

The number line is labeled from ________ to ________.

What are the units of the numbers? _______________________

What does each mark represent? _______________________

Find the value of the point.

The point is on the ________ mark after the 0 mark.

So, the point is on ________ centimeters.

The length of the worm is ________ centimeters.
A line plot is a graph that uses Xs above a number line to record data. To read a line plot, count the number of Xs above the number on the number line.

Example 1
The line plot shows the number of books each student in Stephen’s class read.

Books Read by Students

<table>
<thead>
<tr>
<th>Number of Books</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

How many students read exactly 8 books?

Strategy Count the number of Xs above the number 8.

Step 1 Understand the line plot.
The number line shows the number of books.
Each X represents 1 student.

Step 2 Count the number of Xs above the number 8.
There are 3 Xs above the number 8.
So, 3 students read 8 books.

Solution Three students read exactly 8 books.
Some line plots show fractions, such as in measurements.

**Example 2**
Kevin measured some strings and recorded the data in the line plot below.

```
<table>
<thead>
<tr>
<th>String Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>X       X</td>
</tr>
<tr>
<td>X       X</td>
</tr>
<tr>
<td>X       X</td>
</tr>
</tbody>
</table>
```

Inches

How many strings are $\frac{1}{4}$-inch long?

**Strategy**  Count the number of Xs above the fraction $\frac{1}{4}$.

**Step 1**  Understand the line plot.
- The number line shows lengths from 0 to 1 inch.
- The Xs represent the number of strings.

**Step 2**  Count the number of Xs above the $\frac{1}{4}$-inch mark.
- There are 2 Xs above the $\frac{1}{4}$-inch mark.
- So, 2 strings are $\frac{1}{4}$-inch long.

**Solution**  Two strings are $\frac{1}{4}$-inch long.
Example 3
Tia measured the widths of some people’s index fingers. She made a table of the data. Make a line plot to show the data in the table.

<table>
<thead>
<tr>
<th>Index Finger Widths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width (in inches)</td>
</tr>
<tr>
<td>1/4</td>
</tr>
<tr>
<td>2/4</td>
</tr>
<tr>
<td>3/4</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

Strategy Make a number line. Record the data in the plot.

Step 1 Look at the widths.
The widths are $\frac{1}{4}$ inch, $\frac{2}{4}$ inch, $\frac{3}{4}$ inch, and 1 inch.

Step 2 Make a number line from 0 to 1 in fourths.
Label the number line.

Step 3 Find the number of fingers for each measurement.
- $\frac{1}{4}$-inch width – 3
- $\frac{2}{4}$-inch width – 5
- $\frac{3}{4}$-inch width – 5
- 1-inch width – 2

Step 4 Draw an X to represent each finger above each measurement.
Write a title for the line plot.

Solution The line plot is shown in Step 4.
Shanice measured some buttons and recorded the data in the line plot below.

Button Measurements

\[
\begin{array}{cccc}
X & X & X & X \\
X & X & X & X \\
X & X & X & X \\
\end{array}
\]

Inches

How many buttons are \( \frac{2}{4} \) inch long?

Understand the line plot.

The number line shows the lengths in ________________.
The Xs represent the number of ________________.

Find the number of buttons that are \( \frac{2}{4} \) inch long.

Count the number of Xs above the fraction \( \frac{2}{4} \) on the number line.

There are __________ Xs above \( \frac{2}{4} \) inch.

So, __________ buttons are \( \frac{2}{4} \) inch long.
A two-dimensional shape is a flat shape that has length and width. A circle is a two-dimensional shape made from a curve.

Polygons are two-dimensional shapes with straight sides. The polygons below are named by the numbers of sides and angles they have.

A triangle is a polygon with 3 sides and 3 angles.

A quadrilateral is a polygon with 4 sides and 4 angles.

A pentagon is a polygon with 5 sides and 5 angles.

A hexagon is a polygon with 6 sides and 6 angles.
An **octagon** is a polygon with 8 sides and 8 angles.

![Octagons](image)

**Example 1**
What is the name of this polygon?

![Hexagon](image)

**Strategy**  Find the number of sides.

**Step 1**
Count the number of sides.
There are 6 sides.

**Step 2**
Name the polygon with 6 sides.
A hexagon has 6 sides.

**Solution**  The polygon is a hexagon.

**Example 2**
Carlos drew a shape. It had more angles than a pentagon and fewer sides than an octagon. Which shape did Carlos draw?

![Shapes](image)

**Strategy**  Count the number of sides and angles in each shape.
Step 1  Think about the clues.
- The shape has more angles than a pentagon.
  A pentagon has 5 angles, so the shape has more than 5 angles.
- The shape has fewer sides than an octagon.
  An octagon has 8 sides, so the shape has less than 8 sides.

Step 2  Review the shape in each choice.
- Shape A has 4 sides and 4 angles. It is a quadrilateral.
- Shape B has 8 sides and 8 angles. It is an octagon.
- Shape C has 3 sides and 3 angles. It is a triangle.
- Shape D has 6 sides and 6 angles. It is a hexagon.

Step 3  Choose the correct shape.
- Look for the shape that has more than 5 angles and less than 8 sides.
  A hexagon has more than 5 angles and less than 8 sides.

Solution   Carlos drew a hexagon.

Example 3
Andrea drew some quadrilaterals on the cover of her art book.

Which shape could not be one of the shapes Andrea drew?

Strategy   Count the number of sides and angles in each shape.

Step 1  Review the shape in each choice.
- Shape A has 4 sides and 4 angles.
- Shape B has 4 sides and 4 angles.
- Shape C has 5 sides and 5 angles.
- Shape D has 4 sides and 4 angles.
Lesson 34: Two-Dimensional Shapes

Step 2  
Think about a quadrilateral.
A quadrilateral is a polygon with 4 sides and 4 angles.

Step 3  
Pick the shape that is not a quadrilateral.
Shape C is not a quadrilateral.

Solution  
Shape C could not be a shape that Andrea drew.

**Coached Example**

Which shape is an octagon?

Think about an octagon.
An octagon has ____________ sides and ____________ angles.

Review the shape in each choice.

Shape A has ____________ sides and ____________ angles.
Shape B has ____________ sides and ____________ angles.
Shape C has ____________ sides and ____________ angles.
Shape D has ____________ sides and ____________ angles.

Shape ____________ is an octagon.
## Getting the Idea

A **quadrilateral** is a polygon with 4 sides and 4 angles.

You can sort quadrilaterals by their side lengths and angles.

These quadrilaterals have at least one pair of opposite sides that are *parallel*.

Parallel sides remain the same distance apart and never meet.

### Quadrilaterals

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| Parallelogram | ![Parallelogram](image) | Opposite sides have the same length.  
Both pairs of opposite sides are parallel. |
| Rectangle   | ![Rectangle](image) | Opposite sides have the same length.  
Both pairs of opposite sides are parallel.  
The 4 angles are square corners. |
| Square      | ![Square](image) | All sides have the same length.  
Both pairs of opposite sides are parallel.  
The 4 angles are square corners. |
| Rhombus     | ![Rhombus](image) | All sides have the same length.  
Both pairs of opposite sides are parallel. |
| Trapezoid   | ![Trapezoid](image) | Exactly 1 pair of sides is parallel. |
Example 1
Which is the best name for this shape?

- A. quadrilateral
- B. rectangle
- C. rhombus
- D. square

Strategy

Think about the characteristics of each shape.

Step 1
Think about a quadrilateral.
A quadrilateral is a two-dimensional shape with 4 sides and 4 angles.
This shape is a quadrilateral.

Step 2
Think about a rectangle.
A rectangle is a quadrilateral with 4 sides and 4 angles.
Both pairs of opposite sides are parallel.
The 4 angles are square corners.
This shape is a rectangle.

Step 3
Think about a rhombus.
A rhombus is a quadrilateral with 4 sides and 4 angles.
Both pairs of opposite sides are parallel.
All sides have the same length.
This shape is a rhombus.
Step 4  Think about a square.
   A square is a quadrilateral with 4 sides and 4 angles.
   Both pairs of opposite sides are parallel.
   All sides have the same length.
   The 4 angles are square corners.
   This shape is a square.
   This is the best name for the shape.

Solution   The best name for this shape is square.

Example 2
What is the name for this shape?

Strategy   Look at the angles and the sides of the shape.

Step 1  Decide if the shape is a quadrilateral.
   The shape has 4 straight sides and 4 angles.
   It is a quadrilateral.

Step 2  Look at the sides of the shape.
   The shape has only 1 pair of parallel sides.
   So, the shape is not a parallelogram. It is a trapezoid.

Solution   The name for this shape is trapezoid.
Example 3
How are these shapes alike? How are these shapes different?
Name each shape.

![Shape A](square) ![Shape B](quadrilateral)

**Strategy**  
**Compare the sides and angles.**

**Step 1**  
Count the number of sides and angles.
- Shape A has 4 sides and 4 angles.
- Shape B has 4 sides and 4 angles.
- Both shapes are quadrilaterals.

**Step 2**  
See if there are square corners.
- Shape A has 4 square corners.
- Shape B does not have any square corners.

**Step 3**  
Look at the sides.
- Shape A has 4 equal sides.
- Both pairs of opposite sides are parallel.
- Shape B has neither equal sides nor parallel sides.

**Step 4**  
Name the shapes.
- Shape A is a square.
- Shape B is a quadrilateral.

**Solution**  
The shapes are alike because both are quadrilaterals.  
The shapes are different because Shape A has 2 pairs of parallel sides and 4 square corners. Shape A is a square. Shape B is a quadrilateral.
Which shape is a rectangle, but is not a square?

Think about a rectangle.
A rectangle has ____________ sides and ____________ square corners.
The opposite sides of a rectangle have the _______________________ length.
Both pairs of opposite sides of a rectangle are ________________________.

Think about a square.
A square is a special rectangle with 4 _______________________ sides.
Shape ____________ and Shape ____________ have 4 square corners.
Only Shape ____________ does not have equal sides.

**Shape ____________ is a rectangle but is not a square.**
Area of Shapes

Getting the Idea

Remember, area is the number of square units that cover a two-dimensional shape with no overlaps.

Example 1

What is the area of this rectangle?

![Rectangle grid]

Key: $\square = 1$ square inch

Strategy Use multiplication.

Step 1 Find the number of rows and the number in each row.
There are 4 rows. There are 5 squares in each row.

Step 2 Multiply.

$4 \times 5 = 20$

Step 3 Find the units.

Each square equals 1 square inch.
So, 20 squares equal 20 square inches.

Solution The area of the rectangle is 20 square inches.

You can also use repeated addition to find the area of a rectangle.

In Example 1 there are 4 rows with 5 squares in each row.

$5 + 5 + 5 + 5 = 20$
You can write a fraction to describe part of the area of a shape.

Remember, the numerator is the top number in a fraction. The denominator is the bottom number in a fraction.

**Example 2**

Peter made a diagram of his vegetable garden. The garden is in the shape of a rectangle. There are 4 equal rows of vegetables.

<table>
<thead>
<tr>
<th>Peter’s Garden</th>
</tr>
</thead>
<tbody>
<tr>
<td>peppers</td>
</tr>
<tr>
<td>eggplant</td>
</tr>
<tr>
<td>squash</td>
</tr>
<tr>
<td>beans</td>
</tr>
</tbody>
</table>

What fraction of the garden are peppers?

**Strategy**  Write a fraction to describe the part of the rectangle that is peppers.

**Step 1**  Find the denominator of the fraction.

- The total number of rows is the denominator of the fraction.
- There are 4 equal rows.
- The denominator of the fraction is 4.

**Step 2**  Find the numerator of the fraction.

- There is 1 row of peppers.
- The numerator of the fraction is 1.

**Step 3**  Write the fraction for the part of the garden that is peppers.

- There is 1 row of peppers. There are 4 equal rows.
- So, peppers are $\frac{1}{4}$ of the area of the whole garden.

**Solution**  Peppers are $\frac{1}{4}$ of the garden.
Example 3
Carmen drew the shape below. She shaded 1 equal part.

Write a fraction to describe the area of the shape that is shaded.

**Strategy**  
Find the denominator and numerator of the fraction.

**Step 1**  
Find the denominator of the fraction.
- The shape has 2 equal parts.
- So, the denominator of the fraction is 2.

**Step 2**  
Find the numerator of the fraction.
- There is 1 shaded part.
- So, the numerator of the fraction is 1.

**Step 3**  
Write the fraction.
- There is 1 shaded part. There are 2 equal parts.
- So, \( \frac{1}{2} \) of the shape is shaded.

**Solution**  
\( \frac{1}{2} \) of the shape is shaded.
Annie painted a wall in her room. She painted 2 equal parts white. She painted the other equal part blue. What fraction describes the area of the wall that is painted blue?

Use a model.

Draw a rectangle. Make 3 equal parts.

Shade one part.

Write a fraction to describe the shaded part of the rectangle.

Find the denominator of the fraction.

How many equal parts are there? __________

Find the numerator of the fraction.

How many shaded parts are there? __________

Write the fraction.

What fraction names the shaded part of the rectangle? __________

The fraction ________ describes the area of the wall that is painted blue.


### Answer Key

#### Lesson 1

**Coached Example**

There are **3** thousands. There are **2** tens.

There are **6** hundreds. There are **4** ones.

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3</strong></td>
<td><strong>6</strong></td>
<td><strong>2</strong></td>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>

The number in base-ten numerals is **3,624**.

Write the thousands part in words. **three thousand**

Write the hundreds part in words. **six hundred**

Write the tens part in words. **twenty**

Write the ones part in words. **four**

The number name is **three thousand, six hundred twenty-four**.

#### Lesson 2

**Coached Example**

7,736

7,175

7,742

All of the thousands digits are **7**.

7 hundreds > 1 hundred

So, the least number is **7,175**.

3 tens < 4 tens

So, the greatest number is **7,742**.

The order from greatest to least is **7,742, 7,736, 7,175**.

#### Lesson 3

**Coached Example**

What is the sum in the number sentence

\[ 4 + 9 = 13? 13 \]

What is the sum in the number sentence

\[ \square + 4 = 13? 13 \]

Are the sums the same? **yes**

What are the two addends in the number sentence

\[ 4 + 9 = 13? 4 \text{ and } 9 \]

What property of addition says that adding the addends in a different order does not change the sum? **commutative property**

What is the missing addend in the number sentence

\[ \square + 4 = 13? 9 \]

The missing addend is **9**.

#### Lesson 4

**Coached Example**

Do the numbers increase or decrease? **decrease**

31 is 3 less than 34.

Try subtracting 3 from each number.

34 \(-\) 3 = 31

31 \(-\) 3 = 28

28 \(-\) 3 = 25

25 \(-\) 3 = 22

The rule is **subtract 3**.

Use the rule to find the next number in the pattern.

22 \(-\) 3 = 19

The next number in the pattern is **19**.

Look at the **ones** digit in each number.

The even numbers in the pattern are **34, 28, and 22**.

The odd numbers in the pattern are **31, 25, and 19**.

The numbers in the pattern are both **odd** and **even**.

#### Lesson 5

**Coached Example**

What number do you add to 275 to get 300? **25**

What number do you need to subtract from 429 to keep the sum the same? **25**

300 + 404 = 704

Tyler has **704** pennies in his jar.

#### Lesson 6

**Coached Example**

245 \(-\) 10 = \[ \square \]

How many tens in 10? **1 ten**

Which digit will change in 245 when you subtract 1 ten? **the tens digit or 4**

The digit in the tens place is **4**. It will decrease by **1**.

Zoe counted **235** beads.
Lesson 7
Coached Example
The digit in the hundreds place is 7.
The digit to the right of the rounding place is 4.
4 < 5
Should you round 742 up or down? down
To the nearest hundred, 742 rounds to 700.
The digit in the tens place is 1.
The digit to the right of the rounding place is 8.
8 > 5
Should you round 718 up or down? up
To the nearest ten, 718 rounds to 720.

Lesson 8
Coached Example
“How much did Mr. Mitchell spend in all?” tells you to add.
Estimate the sum of $482 + $117.
$482 rounds up to $500.
$117 rounds down to $100.
Add the rounded amounts.
$500 + $100 = $600
The answer should be about $600.
Find the exact sum.
\[
\begin{align*}
482 \\
+ 117 \\
599
\end{align*}
\]
Is the exact amount close to the estimate? yes
Is your exact answer reasonable? yes
Mr. Mitchell spent $599 in all.

Lesson 9
Coached Example
There are 2 cookies on each plate.
There are 6 plates.
\[
2 + 2 + 2 + 2 + 2 + 2 = 12
\]
6 groups of 2 equals 12.

Lesson 10
Coached Example
How many rows are there? 3
How many squares are in each row? 4
Use skip counting to find the total number of squares.
4, 8, 12
The model shows the multiplication sentence
3 \times 4 = 12.

Lesson 11
Coached Example
One spider has 8 legs.
The rule is number of spiders \times 8 = total number of legs.
1 \times 8 = 8
3 \times 8 = 24
5 \times 8 = 40
7 \times 8 = 56
Use the rule to find the total number of legs that 9 spiders have.
9 \times 8 = 72
Nine spiders have 72 legs in all.

Lesson 12
Coached Example
A cookie costs $2 and a cake costs 4 times as much.
\[
2 \times 4 = \text{(blank)}
\]
A cake costs $8 at Buddy’s Bakery.

Lesson 13
Coached Example
The factors are 4 and 9.
The factors are 9 and 4.
The commutative property of multiplication says that changing the order of the factors does not change the product.
So, 9 \times 4 = 36.
The product of 9 \times 4 is 36.
Lesson 14
Coached Example
Find 30 groups of 5.
So, find $30 \times 5$.
Think: $3 \times 5 = 15$
$3$ ones $\times 5 = 15$ ones $= 15$
$3$ tens $\times 5 = 15$ tens $= 150$
Rachel bagged 150 treats in all.

Lesson 15
Coached Example
$(6 \times 2) \times 3 = 6 \times (2 \times 3)$
$(2 \times 3) = 6$
$6 \times 6 = 36$
$(6 \times 2) \times 3 = 36$

Lesson 16
Coached Example
How many equal groups of hats are there? 4
How many hats are in each group? 6
How many hats are there in all? 24
$4 \times 6 = 24$
$6 \times 4 = 24$
$24 \div 6 = 4$
$24 \div 4 = 6$

Lesson 17
Coached Example
How many rows? 3
How many dots in each row? 6
How many dots in all? 18
$18 \div 3 = 6$
$18 \div 6 = 3$

Lesson 18
Coached Example
You know a dozen flowers costs $28 and a plant costs $7.
$28 \div 7 = 4$
$28 \div 7 = 4$.
A dozen flowers costs 4 times as much as a plant.

Lesson 19
Coached Example
How many equal parts make up the figure? 8
This is the denominator of the fraction.
How many parts of the figure are shaded? 3
This is the numerator of the fraction.
$\frac{3}{8}$
So, $\frac{3}{8}$ of the sandwich was eaten.

Lesson 20
Coached Example
How many equal parts are in the square? 4
How many equal parts are shaded? 4
What fraction does the square show? $\frac{4}{4}$
What whole number does the square show? $\frac{4}{4} = 1$
The fraction is $\frac{4}{4}$ and the whole number is 1.

Lesson 21
Coached Example
Are $\frac{2}{4}$ and $\frac{4}{8}$ at the same point on the number line? yes
Evan is correct.
$\frac{2}{4}$ and $\frac{4}{8}$ are equivalent fractions.

Lesson 22
Coached Example
The fraction farther to the right is the greater fraction.
So, $\frac{1}{2} > \frac{1}{4}$
Callie shaded more of the circle than Will.
Lesson 23
Coached Example
7:10 A.M. is 10 minutes after 7, so make a point at 10 minutes.
7:55 A.M. is 55 minutes after 7, so make another point at 55 minutes.
Students’ number lines should show points at 10 and 55.
55 minutes − 10 minutes = 45 minutes
Alyssa has 45 minutes to get ready before the bus arrives.

Lesson 24
Coached Example
The watermelon was cut into 5 equal pieces.
To find the mass of each piece, use division.
Find $20 \div 5 = \square$.
Divide.
$20 \div 5 = 4$
The mass of each piece is 4 kilograms.

Lesson 25
Coached Example
$258 - 65 = \square$
Find the difference.

\[
\begin{array}{c}
115 \\
-83 \\
\hline
32
\end{array}
\]
Use addition to check your answer.

\[
\begin{array}{c}
1 \\
+65 \\
\hline
193
\end{array}
\]
The fish tank has 193 liters of water left.

Lesson 26
Coached Example
The rectangle has 4 sides.
Two sides of the rectangle are 7 inches long.
The other two sides of the rectangle are 3 inches long.
Add the measurements.
$7 + 7 + 3 + 3 = 20$
The perimeter of the rectangle is 20 inches.

Lesson 27
Coached Example
There are 5 rows of shaded squares.
Each row has 6 shaded squares.
$5 \times 6 = 30$
What are the units for the area? square meters
The area of the shaded figure is 30 square meters.

Lesson 28
Coached Example
Draw and shade a rectangle on the grid to represent the kitchen floor.
Check students’ drawings. Students should draw and shade a 4 unit by 5 unit rectangle on the grid.
How many squares did you shade? 20
You need to multiply the length times the width.
$5 \times 4 = 20$
The units for the area of the floor are square meters.
Angelo needs 20 square meters of flooring.

Lesson 29
Coached Example
It has a length of 5 feet and a width of 2 feet.
$5 + 2 + 5 + 2 = 14$ feet
$5$ feet $\times 2$ feet $= 10$ square feet
Make a rectangle with the same perimeter but with a different area.
Rectangles may vary. Possible rectangles:
4 feet $\times$ 3 feet; 1 foot $\times$ 6 feet; 3 feet $\times$ 4 feet
Check that the area is different.
Your rectangle has a length of 4 feet and a width of 3 feet.
$4$ feet $\times$ 3 feet $= 12$ square feet
A rectangle with the same perimeter but different area than Mark’s poster has a length of 4 feet and a width of 3 feet.
Lesson 30
Coached Example
There are 2 symbols for October 4.
There are 6 symbols for October 6.
There are 4 more symbols for October 6 than for October 4.
Each symbol represents 5 minutes.
Multiply the number of symbols by the number of minutes each symbol represents.
\[ 4 \times 5 = 20 \]
Vera practiced 20 more minutes on October 6 than on October 4.

Lesson 31
Coached Example
Find the number of votes for Bulldogs.
The bar lines up with 40.
Find the number of votes for Lions.
The bar lines up with 15.
\[ 40 - 15 = 25 \]
So, 25 more students voted for Bulldogs than for Lions.

Lesson 32
Coached Example
The number line is labeled from 0 to 10.
What are the units of the numbers? centimeters
What does each mark represent? 1 centimeters
The point is on the 6th mark after the 0 mark.
So the point is on 6 centimeters.
The length of the worm is 6 centimeters.

Lesson 33
Coached Example
The number line shows the lengths in inches.
The Xs represent the number of buttons.
Count the number of Xs above the fraction \(\frac{2}{4}\) on the number line.
There are 4 Xs above \(\frac{2}{4}\) inch.
So, 4 buttons are \(\frac{2}{4}\) inch long.

Lesson 34
Coached Example
An octagon has 8 sides and 8 angles.
Shape A has 0 sides and 0 angles.
Shape B has 6 sides and 6 angles.
Shape C has 8 sides and 8 angles.
Shape D has 4 sides and 4 angles.
Shape C is an octagon.

Lesson 35
Coached Example
Think about a rectangle.
A rectangle has 4 sides and 4 square corners.
The opposite sides of a rectangle have the same length.
Both pairs of opposite sides of a rectangle are parallel.
A square is a special rectangle with 4 equal sides.
Shape F and Shape G have 4 square corners.
Only Shape F does not have equal sides.
Shape F is a rectangle but is not a square.

Lesson 36
Coached Example
Draw a rectangle. Make 3 equal parts.
Shade one part.
Check students' answers. Students should shade 1 part of the rectangle.
Find the denominator of the fraction.
How many equal parts are there? 3
Find the numerator of the fraction.
How many shaded parts are there? 1
What fraction names the shaded part of the rectangle? \(\frac{1}{3}\)
The fraction \(\frac{1}{3}\) describes the area of the wall that is painted blue.