Keely Miller  
FLA 518  
Final Project  
July 31, 2008

Working with Decimals: Using Estimation to Check Sums and Differences
6th Grade Mathematics

Target Group: These lessons are intended for use in a mainstream classroom with integrated English Language Learners

Source of Written Reading Materials:

Source of Lessons:


Learning Goals:
1. I want my students to know how to round decimals.
2. I want my students to know how to estimate sums and differences with decimals.
3. I want my students to know how to add and subtract decimals.
Lesson 1
Lesson 3.4 ~ Rounding Decimals

<table>
<thead>
<tr>
<th>Content/Knowledge Goals</th>
<th>Language Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Students will round decimals to the given place value.</td>
<td>1. In small groups, students will discuss and explain how to round decimals to the given place value.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance Indicators</th>
<th>Task: Rounding Decimals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 5: Nearly Fluent</td>
<td>Discuss and explain in small groups how to round decimals to a given place value with or without a number line.</td>
</tr>
<tr>
<td>Level 4: Intermediate</td>
<td>Discuss and explain in small groups how to round decimals to a given place value with the aid of a place value chart.</td>
</tr>
<tr>
<td>Level 3: Emergent Speech</td>
<td>Discuss and explain in small groups how to round decimals to a given place value with the aid of a place value chart and sentence starters.</td>
</tr>
<tr>
<td>Level 2: Early Production</td>
<td>Discuss and explain in small groups how to round decimals to the given place value with the aid of a place value chart, flow chart and functional expression.</td>
</tr>
<tr>
<td>Level 1: Pre-production</td>
<td>In a one to one setting, explain how to round decimals to the given place value with the assistance of a place value chart, iconic flow chart, and functional expression.</td>
</tr>
</tbody>
</table>

These are specifically addressed in the “Your Turn Now” section of the lesson.
### Lesson 3.4 ~ Rounding Decimals

#### Functional/Notational Chart

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expression</th>
<th>Words/Phrases</th>
<th>Grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall</td>
<td>Rules for Rounding with a number line</td>
<td>I would round _______ to _______</td>
<td>(1) Any number; zero to infinity</td>
<td>Nouns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1) (2) because it is closer to</td>
<td>(2) Any number; zero to infinity</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>_______.</td>
<td>(3) Any number; zero to infinity</td>
<td></td>
</tr>
<tr>
<td>Recall</td>
<td>Rules for Rounding</td>
<td>If the digit is _______</td>
<td>(4) 4 or less</td>
<td>Nouns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4) (5) then round _______.</td>
<td>5 or greater</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5)</td>
<td>down</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>up</td>
<td></td>
</tr>
<tr>
<td>Demonstrate</td>
<td>Rules for Rounding</td>
<td>The digit to the right is _______</td>
<td>(6) numbers zero through nine</td>
<td>Nouns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(6) so</td>
<td>7) down</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>round _______ to _______.</td>
<td>8) up</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The use of these expressions can be seen in the completion of “Your Turn Now”
Revised Lesson 3.4
Rounding Decimals

Prior to teaching this lesson, the content and language objectives are written on the board.

Anticipatory Set (10 minutes):
Students will enter the classroom to find the “Do Now” displayed on the overhead. This display will be the blank copy of the KWL chart found on page seven. While waiting for all students to arrive, instruct those students present to think about what they already know about rounding. Once everyone is present, let students know that they will be completing a KWL Chart on rounding decimals. As a class, complete the K (what we know) and the W (what we want to know) portion of the chart.
**Be sure to include all responses, even those that may not be correct, these will be clarified throughout the lesson.

Teaching (30 minutes):
Once the K and W sections of the chart are completed, the teacher will review the content and language objectives with the students. At this time, the teacher will ask students to state in their own words what these objectives means. This allows for the teacher to assess student understanding of the objectives. Once this is completed, the teacher will distribute copies of “Lesson 3.4 - Rounding Decimals Introduction” found on page eight. This handout will be utilized as a listening guide for the review part of the lesson. The teacher will review rounding and place value at this time. Students should have a working knowledge of rounding whole numbers as this was covered at the beginning of the school year. During this time, the teacher should also demonstrate the difference between “closer” and “further” as well as “greater than” and “less than” to the Level 1 and Level 2 ELLs to ensure that the students understand the concept of rounding.

The teacher will distribute copies of “Example 1 - Using a Number Line” found on pages nine through eleven. Be sure that the copies are distributed appropriately, as they are designed for different levels of proficiency. The teacher will model completion of Example 1 on an overhead transparency. Through classroom discussion, a flow chart provided on the listening guide will be completed/filled in. During the completion of the flow chart, the teacher should be checking for understanding through the use of retells and questioning. Once the flow chart is complete, students will participate in a guided practice exercise through the use of small group interactions. These groups are predetermined by the teacher prior to the lesson. Groups will be required to complete the “Your Turn Now - Rounding with a Number Line” handout on pages twelve through sixteen. Again, these worksheets are leveled, so it is important that they are distributed according to student needs.

The above process will be repeated with “Example 2 - Rounding Decimals” found on pages seventeen through nineteen and “Your Turn Now - Rounding Decimals” found on pages twenty through twenty-four.
Closure (10 minutes):
Once students have completed the above activities, the teacher will pull the class back together to complete the L (what we've learned) portion of the KWL chart. This will act as an additional assessment tool for the teacher. The teacher will also hold a brief review of the content and language objectives.

Independent Practice:
For homework, the teacher will have students complete problems 11-21 in textbook. This is to be collected and reviewed the following day. Areas that show need for further review should be discussed in depth the following day.

******Although the lesson does not specifically indicate this, a place value chart is on display in the classroom throughout the school year in addition to a number (numerical representation, object representation, word representation) word wall.
Descriptive Narrative

There are a number of strategies that can be utilized when making lessons more comprehensible for our English Language Learners. I have selected just a few of them for this particular part of the lesson.

To begin with, I decided to change the way the lesson began. Originally, the lesson began with a warm up that hardly related to the lesson objectives. By starting with the KWL Chart, I gave students a chance to activate a shared history, and build background. Additionally, the KWL chart acted as a visual way of organizing the students' thoughts. Finally, students are able to negotiate meaning through interactive classroom discussion. They are able to "bounce" ideas off of one another to build understanding.

The text in this series is slightly overwhelming. Time is spent at the beginning of the lesson reviewing vocabulary that is necessary for the class. This is done through the use of icons, gestures, and paraphrasing. Rather than have students get over stimulated by the information presented in the text, I chose to cut and paste the material that was made available. This is apparent in the listening guides. The examples used for modeling and "Your Turn Now" come directly from the text book. Finally, the two flow charts developed in the modeling section will help students visualize and organize the information provided during the whole group discussion.

There is a great deal of discussion/teacher talk in this lesson. It's important that, when teaching this lesson, you keep the following modifications in mind. Adjust the speed of your talk, pausing frequently and repeating key ideas. This will allow ELLs time to process the information being presented to them. Also, refer to the listening guides while modeling the lesson. This will allow students to make a more concrete connection to the material being presented both through visualization and writing. Finally, be sure to check for understanding continually throughout the lesson. Don't ask the students if they understand, because they won't say they don't. But rather, ask them to restate/paraphrase what is being asked of them, or have them demonstrate what they have learned.

All of the strategies provided here should make this lesson more accessible to the English Language Learner.
KWL
Rounding Numbers

What is 8647 rounded to the nearest hundred?
8647 (hundred)

\[ 8547 \approx 8600 \]

<table>
<thead>
<tr>
<th>What I KNOW</th>
<th>What I WANT to know</th>
<th>What I LEARNED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lesson 3.4 - Rounding Decimals Introduction
Listening Guide Levels 1-5

<table>
<thead>
<tr>
<th>Place Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thousands</td>
</tr>
<tr>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lesson Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Word</strong></td>
</tr>
<tr>
<td>Place Value</td>
</tr>
<tr>
<td>Round</td>
</tr>
<tr>
<td>Close</td>
</tr>
<tr>
<td>Further</td>
</tr>
<tr>
<td>Greater than</td>
</tr>
<tr>
<td>Less than</td>
</tr>
</tbody>
</table>
Example 1 ~ Using a Number Line
Listening Guide ~ Level 3 or above

Round 3.87 to the nearest tenth.
Example 1 - Using a Number Line

Listening Guide - Level 2

Round 3.87 to the nearest tenth.

Create a _______

the point.

Which number is the point closer to?

This becomes your _______

Word Bank

number line    plot

ask    answer
Example 1 ~ Using a Number Line
Listening Guide ~ Level 1

Round 3.87 to the nearest tenth.

Create a number line.

Plot the point.

Ask: Which number is the point closer to?

This becomes your answer.
Your Turn Now – Rounding with a Number Line

Level 5

Using a number line, round the decimal to the given place value. Then explain to your partner how you got your answer.

1. 1.3 (nearest one)  
2. 2.8 (nearest one)

3. 3.74 (nearest tenth)  
4. 3.86 (nearest tenth)
Your Turn Now - Rounding with a Number Line
Level 4

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Ones</th>
<th>And</th>
<th>Decimals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hundred Thousands</td>
<td>Ten Thousands</td>
<td>Thousands</td>
<td>Hundreds</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

Using a number line, round the decimal to the given place value. Then explain to your partner how you got your answer.

1. 1.3 (nearest one)
2. 2.8 (nearest one)
3. 3.74 (nearest tenth)
4. 3.86 (nearest tenth)
Your Turn Now - Rounding with a Number Line

Level 3

<table>
<thead>
<tr>
<th>Thousands</th>
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</tr>
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</tr>
<tr>
<td>8</td>
<td>4</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

Using a number line, round the decimal to the given place value. Then explain to your partner how you got your answer.

1. 1.3 (nearest one)  
   I would round 1.3 to ________ because it is closer to ________.

2. 2.8 (nearest one)  
   I would round 2.8 to ________ because it is closer to ________.

3. 3.74 (nearest tenth)  
   I would round 3.74 to ________ because it is closer to ________.

4. 3.86 (nearest tenth)  
   I would round 3.86 to ________ because it is closer to ________.
**Your Turn Now ~ Rounding with a Number Line**

**Level 2**

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Ones</th>
<th>And</th>
<th>Decimals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hundred Thousands</td>
<td>Ten Thousands</td>
<td>Thousands</td>
<td>Hundreds</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

1. **Create a number line.**  
   **Plot the point.**  
   **Ask:** Which number is the point closer to?  
   **This becomes your answer.**

Using a number line, round the decimal to the given place value. Then explain to your partner how you got your answer.

1. 1.3 (nearest one)  
2. 2.8 (nearest one)

I would round 1.3 to ________  
because it is closer to ________.

I would round 2.8 to ________  
because it is closer to ________.

3. 3.74 (nearest tenth)  
4. 3.86 (nearest tenth)

I would round 3.74 to ________  
because it is closer to ________.

I would round 3.86 to ________  
because it is closer to ________.
Your Turn Now ~ Rounding with a Number Line
Level 1

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Ones</th>
<th>And</th>
<th>Decimals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hundred Thousands</td>
<td>Ten Thousands</td>
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<tr>
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</tr>
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</table>

Create a number line.  
Plot the point.  
Ask: Which number is the point closer to?  
This becomes your answer.

Using a number line, round the decimal to the given place value. Then explain to your partner how you got your answer.

1. 1.3 (nearest one)  
2. 2.8 (nearest one)

I would round 1.3 to _________  
because it is closer to _________.

I would round 2.9 to _________  
because it is closer to _________.

3. 3.74 (nearest tenth)  
4. 3.86 (nearest tenth)

I would round 3.74 to _________  
because it is closer to _________.

I would round 3.86 to _________  
because it is closer to _________.
Example 2 ~ Rounding Decimals

Listening Guide ~ Levels 3 or above

Round 3.23 to the nearest tenth.

3.23
Example 2 ~ Rounding Decimals

Listening Guide ~ Level 2

Round 3.23 to the nearest tenth.

3.23

_________________ the place value you are rounding to.

Look to the ________ of the underlined digit.

If the number is __________, round the underlined number __________. Drop the remaining numbers.

If the number is __________, the underlined number stays the __________. Drop the remaining numbers.

Word Bank

underline  right  5 or greater
up  4 or less  same
Example 2 ~ Rounding Decimals
Listening Guide ~ Level 1

Round 3.23 to the nearest tenth.

3.23

Underline the place value you are rounding to.

Look to the right (→) of the underlined digit.

If the number (#) is 5 or greater (≥), round the underlined number up (↑). Drop the remaining numbers (#).

If the number (#) is 4 or less (<), the underlined number(#) stays the same. Drop the remaining numbers.
Your Turn Now – Rounding Decimals
Level 5

Without using a number line, round the decimal to the given place value. Then, explain to your partner how you got your answer.

1. 5.29 (nearest tenth)  2. 7.096 (nearest hundredth)

3. 6.48 (nearest one)  4. 3.9876 (nearest thousandth)
Your Turn Now ~ Rounding Decimals
Level 4

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Ones</th>
<th>And</th>
<th>Decimals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hundred Thousands</td>
<td>Ten Thousands</td>
<td>Thousands</td>
<td>Hundreds</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

Without using a number line, round the decimal to the given place value. Then, explain to your partner how you got your answer.

1. 5.29 (nearest tenth)  
2. 7.096 (nearest hundredth)  
3. 6.48 (nearest one)  
4. 3.9876 (nearest thousandth)
# Your Turn Now ~ Rounding Decimals

## Level 3

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Ones</th>
<th>And</th>
<th>Decimals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hundred Thousands</td>
<td>Ten Thousands</td>
<td>Thousands</td>
<td>Hundreds</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

Without using a number line, round the decimal to the given place value. Then, explain to your partner how you got your answer.

1. 5.29 (nearest tenth)  
   The digit to the right is __________.  
   so I rounded ___________.

2. 7.096 (nearest hundredth)  
   The digit to the right is __________.  
   so I rounded ___________.

3. 6.48 (nearest one)  
   The digit to the right is __________.  
   so I rounded ___________.

4. 3.9876 (nearest thousandth)  
   The digit to the right is __________.  
   so I rounded ___________.


Your Turn Now — Rounding Decimals

Level 2

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Ones</th>
<th>And</th>
<th>Decimals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hundred Thousands</td>
<td>Ten Thousands</td>
<td>Thousands</td>
<td>Hundredths</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

Underline the place value you are rounding to.

Look to the right of the underlined digit.

If the number is 5 or greater, round the underlined number up. Drop the remaining numbers.

If the number is 4 or less, the underlined number stays the same. Drop the remaining numbers.

Without using a number line, round the decimal to the given place value. Then explain to your partner how you got your answer.

1. 5.29 (nearest tenth)

   The digit to the right is __________
   so I rounded __________.

2. 7.096 (nearest hundredth)

   The digit to the right is __________
   so I rounded __________.

3. 6.48 (nearest one)

   The digit to the right is __________
   so I rounded __________.

4. 3.9876 (nearest thousandth)

   The digit to the right is __________
   so I rounded __________.
Your Turn Now — Rounding Decimals

Level 1

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Ones</th>
<th>And</th>
<th>Decimals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hundred Thousands</td>
<td>8</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

- Underline the place value you are rounding to.
- Look to the RIGHT (→) of the underlined digit.
- If the number is 4 or less(<), the underlined number stays the same(=). Drop the remaining numbers.
- If the number is 5 or greater (>), round the underlined number up(↑). Drop the remaining numbers.

Without using a number line, round the decimal to the given place value. Then explain to your partner how you got your answer.

1. 5.29 (nearest tenth)  
   The digit to the right is ________  
   so I rounded ________.

2. 7.096 (nearest hundredth)  
   The digit to the right is ________  
   so I rounded ____________.

3. 6.48 (nearest one)  
   The digit to the right is ________  
   so I rounded ________.

4. 3.9876 (nearest thousandth)  
   The digit to the right is ________  
   so I rounded ____________.
Lesson 2
Lesson 3.5 - Decimal Estimation

<table>
<thead>
<tr>
<th>Content/Knowledge Goal</th>
<th>Language Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Students will use rounding to estimate the sums and differences of mathematical problems that include decimals.</td>
<td>1a. Students will read sections of text to formulate their understanding of the decimal estimation. 1b. In small groups, students will discuss and explain how to estimate sums and differences of decimals.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task</th>
<th>Level 5 Nearly Fluent</th>
<th>Level 4 Intermediate</th>
<th>Level 3Speech Emergent</th>
<th>Level 2 Early Production</th>
<th>Level 1 Pre-production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading: Estimation of sums and differences of decimals</td>
<td>Interpret data presented in charts and text from grade-level textbook.</td>
<td>Interpret data presented in charts and text from grade-level textbook with highlighted text.</td>
<td>Interpret data presented in charts and text from grade-level textbook with modified text (cut and paste).</td>
<td>Interpret data presented in charts and text from grade-level textbook with modified text (cut and paste/iconic representation).</td>
<td>Interpret data presented in charts and text from grade-level textbook with modified text (cut and paste/iconic representation/word to word dictionary).</td>
</tr>
<tr>
<td>Speaking: Estimation of sums and differences of decimals</td>
<td>Discuss and explain in small groups how to estimate sums and differences of decimals.</td>
<td>Discuss and explain in small groups how to estimate sums and differences of decimals with the aid of a word bank.</td>
<td>Discuss and explain in small groups how to estimate sums and differences of decimals with the aid of sentence starters.</td>
<td>In a small group, orally explain how to estimate sums and differences of decimals with the aid of a place value chart, sentence starters, and word bank.</td>
<td>In a one to one setting, explain how to estimate sums and differences of decimals with the assistance of a place value chart, sentence starters, and iconic representations.</td>
</tr>
</tbody>
</table>
**Lesson 3.5 - Decimal Estimation**
*Functional/Notational Chart*

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expression</th>
<th>Words/Phrases</th>
<th>Grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predict</td>
<td>Results to an addition or subtraction problem with decimals</td>
<td>I estimate the ________ of the (1) problem to be ________. (2)</td>
<td>(1) sum difference (2) numbers 0-infinity</td>
<td>Nouns</td>
</tr>
<tr>
<td>Explain</td>
<td>Results to an addition or subtraction problem with decimals</td>
<td>I got my estimation by rounding ________ to ________ and (3) ________ to ________. (4) (5) (6)</td>
<td>(3) numbers 0-infinity (4) numbers 0-infinity (5) numbers 0-infinity (6) numbers 0-infinity</td>
<td>Nouns Verbs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Then I ________ (7) the two numbers.</td>
<td>(7) added subtracted</td>
<td></td>
</tr>
</tbody>
</table>
Revised Lesson 3.5
Decimal Estimation

Prior to teaching the content and language objectives are written on the board.

Anticipatory Set (10 minutes):

Upon entering the classroom, students will be given a copy of the Anticipation/Reaction Guide on pages thirty through thirty-one. These are designed for the differing proficiency levels in the classroom, so be sure that they are distributed properly. Students are asked to complete the assignment independently. After five minutes, the teacher asks the students to pair up with their neighbor to discuss their results. After two to three minutes, the class is brought back together. The teacher asks the students if they have any questions, then goes on to explain that the worksheet will be reviewed in further detail at the close of class.

Teaching (30 minutes):

The teacher begins the lesson by reviewing the content and language objectives. The students are asked for their input as to how these will be accomplished in class, with a tie into the Anticipatory/Reaction Guide. The teacher then asks the students to open their textbook to page 130 and read "In the Real World." While students are completing this task, the teacher will also distribute the copies of "Modified Text Page 130" and "Discussion Guide" on pages thirty-two through forty of this lesson. Again, these should be distributed to the appropriate individuals as they are designed for differing proficiency levels.

The teacher then asks the students how they would go about solving the problems at the end of the "In the Real World" paragraph, being sure to point out the word "about" and discussing its meaning in detail for any ELL students.

The teacher then asks the students to read Example 1 on page 130 or on their handout, to see if they agree with the method used by the textbook. The teacher models how this is done on an overhead projector. Students are asked to work in pre-selected groups to complete the "Your Turn Now" found on page 130 in the text and on the "Modified Text Page 130." Those needing additional support may utilize the "Discussion Guide" that was distributed with the "Modified Text Page 130." During this time, the teacher is circulating around the classroom checking for understanding and re-teaching and clarifying when necessary.

The same is done for Examples 2-3 on page 131 in the text and "Modified Text Page 131" on pages forty-one through forty-five in designed lesson. Students may refer back to the "Discussion Guide" when answering the "Your Turn Now" problems.
Closure (10 minutes):

The class is brought back together once again. Students are asked to complete the reaction portion of the Anticipation/Reaction Guide. After two minutes, the teacher addresses any questions or concerns the students may have about the worksheet. The content and language objectives are reviewed once more to ensure that all required material was covered.

Independent Practice:

Students will be assigned text 132-133 numbers 6-14, 19-22. This assignment will be collected the following class. The teacher will address any questions prior to collecting the assignment. Once the assignment has been reviewed, re-teaching/clarifying will take place with those students requiring the additional help.
Descriptive Narrative

It is my intention to have my students activate their prior knowledge of rounding and estimation through the completion of the Anticipation/Reaction Guide. Rounding is a subject that was covered in the previous lesson, as well as, during the first part of the school year. Students were also introduced to estimation of whole numbers during the first part of the school year. Through the completion of the activity, students were able to activate their previous knowledge, and apply it to what they thought they would be learning during this lesson. The Anticipation/Reaction Guide is a great tool to utilize with ELLs because it introduces them to lesson content and vocabulary in a non-threatening manner by allowing them the opportunity to negotiate meaning and activate prior knowledge.

While teaching this lesson, it is important for the teacher to realize the number of strategies that are utilized to enhance the learning for the ELLs in the classroom. Because reading is an important part of language development, I determined that the material presented in the text was important for my students to be reading. Therefore, I used the text that was provided, but provided modifications to the text at varying proficiency levels. These modifications provide the students with the support necessary to make the text meaningful to them. They included simple cut and paste of current materials to eliminate any unnecessary information to including iconic representations and symbols of key terms.

In addition to the text modifications, it is important for the teacher to model the steps required to complete the required mathematical computations. Math can be tricky to “describe in words,” therefore, it is important that the students “see how” to complete the problems. This is done when the teacher models the completion of each Example on the overhead. The teacher is also responsible for checking for student understanding throughout the classroom discussion by using higher level thinking questions and hand gestures.

Finally, the teacher is responsible for making classroom talk comprehensible. This is done with the use of frequent pauses and repetitions of important points. Also, the “talk” goes along with the materials found in the text. So, although there is not an official listening guide, students can get information from the existing text and modified text. Word walls are also important within this classroom. At the beginning of the school year, a word wall was created to represent the numbers one through 100, and another one was created to include the different types of terminology and key words for math operations.
Lesson 3.5 - Decimal Estimation
Anticipation/Reaction Guide
Level 3 and above

Topic: Decimal Estimation (≈)

Directions: At the start of class (8:20 a.m.) complete the anticipation column with true (√) or false (X). At the end of class (9:00 a.m.) complete the reaction column with true (√) or false (X).

<table>
<thead>
<tr>
<th>Anticipation</th>
<th>Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>___________</td>
<td>_________</td>
</tr>
<tr>
<td>1. 7.5 + 8.2 ≈ 16</td>
<td>_________</td>
</tr>
<tr>
<td>___________</td>
<td>_________</td>
</tr>
<tr>
<td>2. 13.71 – 5.29 ≈ 8</td>
<td>_________</td>
</tr>
<tr>
<td>___________</td>
<td>_________</td>
</tr>
<tr>
<td>3. $20.00 - $13.21 ≈ $7.00. This estimate is low because I rounded $13.21 down to $13.00.</td>
<td>_________</td>
</tr>
<tr>
<td>___________</td>
<td>_________</td>
</tr>
<tr>
<td>4. You have $10.00 to spend at the movies. You want to buy a ticket for $6.74 and candy for $4.50. Do you have enough money? (yes/no)</td>
<td>_________</td>
</tr>
</tbody>
</table>

What do you think we will be learning about during this lesson?

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
Lesson 3.5 ~ Decimal Estimation  
Anticipation/Reaction Guide  
Level 1 & 2  

**Topic:** Decimal Estimation (≈)  

**Directions:** At the start of class (8:20 a.m.) complete the anticipation column with true (✔) or false (✗). At the end of class (9:00 a.m.) complete the reaction column with true (✔) or false (✗).  

<table>
<thead>
<tr>
<th>Anticipation</th>
<th>Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 7.5 + 8.2 ≈ 16</td>
<td>✔️</td>
</tr>
<tr>
<td>2. 13.71 − 5.29 ≈ 8</td>
<td>✔️</td>
</tr>
<tr>
<td>3. $20.00 − $13.21 ≈ $7.00. This estimate (≈) is low (✗) because I rounded $13.21 down to $13.00.</td>
<td>✔️</td>
</tr>
<tr>
<td>4. You have $10.00 to spend at the movies. You want to buy a ticket for $6.74 and candy for $4.50. Do you have enough money ($)? (yes/no)</td>
<td>✔️</td>
</tr>
</tbody>
</table>

What do you think we will be learning about during this lesson?
The table shows the number of people, in millions, who participated in five sports in a recent year. About how many people played soccer? About how many more females participated in bicycling than in golf?

One way to estimate a sum or a difference is to use rounding.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycling</td>
<td>22.9</td>
<td>20.6</td>
</tr>
<tr>
<td>Golf</td>
<td>21.8</td>
<td>5.7</td>
</tr>
<tr>
<td>Hiking</td>
<td>14.9</td>
<td>12.3</td>
</tr>
<tr>
<td>Soccer</td>
<td>8.2</td>
<td>4.9</td>
</tr>
<tr>
<td>Swimming</td>
<td>27.0</td>
<td>31.3</td>
</tr>
</tbody>
</table>

### Estimating Sums and Differences

**a.** To estimate the answer to the first real-world question above, round each decimal to the nearest whole number. Then add.

\[
\begin{align*}
8.2 & \rightarrow 8 \quad \text{Round 8.2 down to 8.} \\
+ 4.9 & \rightarrow +5 \quad \text{Round 4.9 up to 5.} \\
\hline
13 & \quad \text{ANSWER: About 13 million people played soccer.}
\end{align*}
\]

**b.** To estimate the answer to the second real-world question above, round each decimal to the nearest whole number. Then subtract.

\[
\begin{align*}
20.6 & \rightarrow 21 \quad \text{Round 20.6 up to 21.} \\
- 5.7 & \rightarrow -6 \quad \text{Round 5.7 up to 6.} \\
\hline
15 & \quad \text{ANSWER: About 15 million more females participated in bicycling than in golf.}
\end{align*}
\]

### Use the information provided at the top of the page.

1. **Estimate** the total number of people who participated in hiking.
2. **Estimate** how many more males participated in swimming than in golf.
**Discussion Guide**

**Level 4**

<table>
<thead>
<tr>
<th>Word Bank</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate (=)</td>
<td>Finally</td>
<td>Front-ent</td>
</tr>
<tr>
<td>Round</td>
<td>Predict</td>
<td>digit (#)</td>
</tr>
<tr>
<td>Total (=)</td>
<td>High (↑)</td>
<td>Whole Number</td>
</tr>
<tr>
<td>Up (↑)</td>
<td>Low (↓)</td>
<td>Tenths</td>
</tr>
<tr>
<td>Down (↓)</td>
<td>Added (+)</td>
<td>Hundredths</td>
</tr>
<tr>
<td>First (1st)</td>
<td>Subtracted (-)</td>
<td>Thousandths</td>
</tr>
<tr>
<td>Next</td>
<td>Sum (+)</td>
<td></td>
</tr>
<tr>
<td>Then</td>
<td>Difference (-)</td>
<td></td>
</tr>
</tbody>
</table>
In the Real World

Sports
The table shows the number of people, in millions, who participated in five sports.

One way to estimate a sum or a difference is to use rounding.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycling</td>
<td>22.9</td>
<td>20.6</td>
</tr>
<tr>
<td>Golf</td>
<td>21.8</td>
<td>5.7</td>
</tr>
<tr>
<td>Hiking</td>
<td>14.9</td>
<td>12.3</td>
</tr>
<tr>
<td>Soccer</td>
<td>8.2</td>
<td>4.9</td>
</tr>
<tr>
<td>Swimming</td>
<td>27.0</td>
<td>31.3</td>
</tr>
</tbody>
</table>

Example 1 – Estimating Sums and Differences

a. About how many people played soccer?

Round each decimal to the nearest whole number, then add.

\[ 8.2 \approx 8 \]

\[ + 4.9 \approx + 5 \]

\[ \text{ANSWER: About 13 million people played soccer.} \]

b. About how many more females bicycled than in golfed?

Round each decimal to the nearest whole number, then subtract.

\[ 20.6 \approx 21 \]

\[ - 5.7 \approx - 6 \]

\[ \text{ANSWER: About 15 million more females bicycled than golfed.} \]

Your Turn Now:

1. Estimate the total number of people who hiked.

2. Estimate how many more males swam than golfed.
Discussion Guide
Level 3

When stating the results to an addition or subtraction problem:

I estimate the ________________ of the problem to be
sum/difference

______________________
answer

When explaining your answer:

I got my estimate by rounding ________________ to ________________
1st number rounded #

and ________________ to ________________
2nd number rounded #

Then I ______________________ the two numbers.
added/subtracted
### Sport Participation (millions ≈ 1,000,000s)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycling</td>
<td>22.9</td>
<td>20.6</td>
</tr>
<tr>
<td>Golfing</td>
<td>21.8</td>
<td>5.7</td>
</tr>
<tr>
<td>Hiking</td>
<td>14.9</td>
<td>12.3</td>
</tr>
<tr>
<td>Soccer</td>
<td>8.2</td>
<td>4.9</td>
</tr>
<tr>
<td>Swimming</td>
<td>27.0</td>
<td>31.3</td>
</tr>
</tbody>
</table>

**SPORTS** The table shows the number (#) of people, in millions (1,000,000s), who participate in five (5) sports in a recent year.

**One way to estimate (≈) the sum (+) or difference (−) is to use ROUNDDING.**
Example 1 – Estimating (=) Sums (+) and Differences (−)

1a. About (=) how many people + played soccer ?

\[
8.2 \approx 8 \quad \text{Round 8.2 down (↓) to 8.}
\]
\[
+ 4.9 \approx + 5 \quad \text{Round 4.9 up (↑) to 5.}
\]
\[
13
\]

**Answers:** About 13 million (13,000,000) people play soccer.

1b. About (=) how many more (↑) females participated in bicycling than in golf ?

\[
20.6 \approx 21 \quad \text{Round 20.6 up (↑) to 21.}
\]
\[
- 5.7 \approx - 6 \quad \text{Round 5.7 up (↑) to 6.}
\]
\[
15
\]

**Answers:** About 15 million (15,000,000) more (∆) females participated in bicycling than in golf.
Your Turn Now:

1. Estimate (=) the total (=) number (#) of people who participated in hiking.

About ______________ people participated in ______________.

2. Estimate (=) how many more males participated in swimming than in golf.

About ______________ more males participated in ______________ than ______________.
**Discussion Guide**

**Level 2**

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Ones</th>
<th>And</th>
<th>Decimals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hundred Thousands</td>
<td>Ten Thousands</td>
<td>Thousands</td>
<td>Hundreds</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

When stating the results to an addition or subtraction problem:

I estimate the __________________ of the problem to be sum/difference

_________________________.

answer

When explaining your answer:

I got my estimate by rounding ___________ to ___________.

1\(^{st}\) number rounded #

and ___________ to ___________.

2\(^{nd}\) number rounded #

Then I __________________ the two numbers.

added/subtracted
## Discussion Guide

### Level 1

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Ones</th>
<th>And</th>
<th>Decimals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hundred Thousands</td>
<td>Ten Thousands</td>
<td>Thousands</td>
<td>Hundreds</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

When stating the results to an addition (+) or subtraction (−) problem:

I estimate (=) the ___________ of the problem to be

sum(+) / difference(−)

____________

answer (=)

When explaining your answer:

I got my estimate (=) by rounding _______________ to _______________

1st number rounded #

and _______________ to _______________.

2nd number rounded #

Then I _______________ the two (2) numbers.

added (+) / subtracted (−)
Predicting Results

Shopping: You buy a T-shirt that costs $9.21. You give the clerk $20.00. Estimate your change. Is this estimate high or low?

\[
\begin{align*}
$20.00 & \quad $20 \\
- \quad $9.21 & \quad - \quad $9 \\
\hline
\quad \quad & \quad $11
\end{align*}
\]

Round 9.21 down to 9.

Answer: Your change is about $11. This estimate is high because you subtracted too little by rounding $9.21 down to $9.

Using Front-End Estimation

Groceries: You have $10 to buy bread, milk, and cereal. If you have enough money, you would like to buy popcorn. The prices of these items are shown. Do you have enough money to buy popcorn?

<table>
<thead>
<tr>
<th>Grocery List</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>bread</td>
<td>$1.79</td>
</tr>
<tr>
<td>milk</td>
<td>$2.18</td>
</tr>
<tr>
<td>cereal</td>
<td>$3.34</td>
</tr>
<tr>
<td>Popcorn</td>
<td>$3.65</td>
</tr>
</tbody>
</table>

Solution

Find the sum of all the prices, including the price of the popcorn.

\[
\begin{align*}
\text{(1) Add the front-end digits:} & \quad $3.79 \\
\text{(2) Estimate the sum of the remaining digits:} & \quad $3.65 \\
\text{(3) Add your results:} & \quad $11
\end{align*}
\]

Answer: You do not have enough money to buy popcorn.

Use front-end estimation to estimate the sum.

3. \(6.42 + 7.64 + 3.94 + 2.21\)  
4. \(8.59 + 1.37 + 2 + 6.12\)
Example 2 ~ Predicting Results

Shopping:
You buy a shirt for $9.21. You give the clerk $20.00. About how much change will you get back? Is this a high or low estimate?

\[
\begin{array}{ccc}
$20.00 & \approx & $20 \\
- 9.21 & \approx & - 9 \\
\hline
$11 & & \\
\end{array}
\]

ANSWER: You should get about $11 back. This is a high estimate because you rounded down.

Example 3 ~ Using Front-end Estimation

Groceries: You have $10. You need bread, milk, and cereal. You also want popcorn. Do you have enough money to buy everything?

1. Add the front-end digits

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$1.79</td>
<td>$2.18</td>
<td>$3.34</td>
</tr>
<tr>
<td>$9</td>
<td>2.18</td>
<td>3.34</td>
</tr>
<tr>
<td>$9</td>
<td>+3.65</td>
<td>+3.65</td>
</tr>
</tbody>
</table>

2. Estimate the sum of the remaining digits

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$1.79</td>
<td>$3.34</td>
</tr>
<tr>
<td>$1</td>
<td>$1</td>
</tr>
<tr>
<td>$9</td>
<td>$2</td>
</tr>
</tbody>
</table>

3. Add your results

\[
\begin{array}{ccc}
\text{Bread} & \text{Milk} & \text{Cereal} \\
$1.79 & $2.18 & $3.34 \\
\hline
$1 & $1 & $2 \\
\hline
$9 & $2 & $11 \\
\end{array}
\]

ANSWER: You do not have enough money.

Your Turn Now: Use Front-end estimation to find the sum.

3. \[6.42 + 7.64 + 3.94 + 2.21\]

4. \[8.59 + 1.37 + 2 + 6.12\]
Example 2 ~ Predicting Results

Shopping

You buy a T-shirt that cost $9.21. You give the clerk $20.00. Estimate (=) your change. Is this estimate (=) high (↑) or low (↓)?

\[
\begin{array}{ccc}
$20.00 & \approx & $20 \\
- 9.21 & \approx & - 9 \\
\hspace{1cm} & \approx & 11
\end{array}
\]

Round 9.21 to 9.

**Answer:** Your change is about $11. This estimate (=) is high (↑) because you subtracted (-) too little by rounding $9.21 to $9.
Example 3 ~ Using Front-End Estimation

Groceries:

You have $10 to buy bread, milk, and cereal. If you have enough money ($), you would like to buy popcorn. The prices ($) of these items are shown. Do you have enough money ($) to buy popcorn?

<table>
<thead>
<tr>
<th>Grocery</th>
<th>List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread</td>
<td>$1.79</td>
</tr>
<tr>
<td>Milk</td>
<td>$2.18</td>
</tr>
<tr>
<td>Cereal</td>
<td>$3.34</td>
</tr>
<tr>
<td>Popcorn</td>
<td>$3.65</td>
</tr>
</tbody>
</table>
Use front-end estimation (=) to solve this problem.

Add (=) the front-end digits

Estimate (=) the sum (+) of the remaining digits.

Add (=) the 2 answers (=).

$1.79 + $2.18 + $3.34 + $3.65 = $11

$9 + $2

Your Turn Now:

Use front-end estimation (=) to estimate (=) the sum (+).

3. $6.42 + 7.64 + 3.94 + 2.21

4. $8.59 + 1.37 + 2 + 6.12
Lesson 3
### Lesson 3.6 - Adding and Subtracting Decimals

<table>
<thead>
<tr>
<th>Content/Knowledge Goal</th>
<th>Language Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Students will add and subtract decimals.</td>
<td>1a. Students will listen to classroom and small group discussion to formulate an understanding of the addition and subtraction when using decimals.</td>
</tr>
<tr>
<td>4. Students will use estimation to check the reasonableness of their sums/differences.</td>
<td>1b. In small groups, students will discuss and explain how to add/subtract decimals.</td>
</tr>
<tr>
<td></td>
<td>1b. Students will demonstrate an understanding of story problems by creating word problems that utilize decimals.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task</th>
<th>Level 5 Nearly Fluent</th>
<th>Level 4 Intermediate</th>
<th>Level 3 Speech Emergent</th>
<th>Level 2 Early Production</th>
<th>Level 1 Pre-production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Listening:</strong> Addition/Subtraction of decimals</td>
<td>Evaluate and use different representations for solving grade-level oral problems.</td>
<td>Analyze and apply use of graphic representations for oral explanations of problems or situations.</td>
<td>Draw or construct graphs and diagrams from oral descriptions using various tools.</td>
<td>Classify the different parts of a written story problem.</td>
<td>Identify the process required to various processes required to complete addition/subtraction problems.</td>
</tr>
<tr>
<td><strong>Speaking:</strong> Addition/Subtraction of decimals</td>
<td>Discuss and explain in small groups how to add/subtract decimals with and without a model.</td>
<td>Discuss and explain in small groups how to add and subtract decimals with and without a model and with the aid of a place value chart.</td>
<td>Discuss and explain in small groups how to add/subtract decimals with and without a model with the aid of a place value chart and sentence starters.</td>
<td>Discuss and explain in small groups how to add/subtract decimals with and without a model with the aid of a place value chart, sentence starters and word banks.</td>
<td>Discuss and explain in small groups how to add/subtract decimals with and without a model with the aid of a place value chart, sentence starters and iconic representations.</td>
</tr>
<tr>
<td><strong>Writing:</strong> Addition/Subtraction of decimals</td>
<td>Demonstrate an understanding of adding/subtracting decimals through the generation of story problems.</td>
<td>Demonstrate an understanding of adding/subtracting decimals through the generation of story problems with the aid of models.</td>
<td>Demonstrate an understanding of adding/subtracting decimals through the generation of story problems with the aid of word banks and models.</td>
<td>Demonstrate an understanding of adding/subtracting decimals through the generation of story problems with the aid of models, iconic representations, flow charts, and sentence strips.</td>
<td></td>
</tr>
</tbody>
</table>
### Lesson 3.6 ~ Adding and Subtracting Decimals

**Functional/Notational Chart**

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expression</th>
<th>Words/Phrases</th>
<th>Grammar</th>
</tr>
</thead>
</table>
| **Evaluate** | Algebraic Expressions  | When I substituted _______ for
|            |                         |                             | (1) Numbers 0-infinity                              | Nouns    |
|            |                         |                             | (2) any variable provided                          |          |
|            |                         |                             | (3) numbers 0-infinity                              |          |
|            |                         |                             | (4) added/subtracted                                |          |
|            |                         |                             | (5) number 0-infinity                               |          |
|            |                         |                             | (6) number 0-infinity                               |          |
|            |                         |                             | (7) sum/difference                                  |          |
|            |                         |                             | (8) number 0-infinity                               |          |
| **Explain** | Addition/Subtraction of decimals | I _______ to _______.  (4) added/subtracted
|            |                         |                             | (5) number 0-infinity                               | Verbs    |
|            |                         |                             | (6) number 0-infinity                               |          |
|            |                         |                             | (7) sum/difference                                  | Nouns    |
|            |                         |                             | (8) number 0-infinity                               |          |
Revised Lesson 3.6
Adding and Subtracting Decimals

Prior to teaching, the content and language objectives are written on the board.

Anticipatory Set (10 Minutes):
Instruct students to take a set of base-ten blocks and a copy of "Model Decimal Addition" activity sheet on page fifty-five from the front of the classroom. The teacher should remind students that they are using the base-ten blocks to model the use of decimals and not whole numbers. Although students have used these blocks to model decimals previously, they are still very much used to affiliating them with whole numbers. Students are to then work with their assigned partner to complete the "Activity" on page 136 in the textbook. While working together, the teacher should be moving around the room addressing needs and questions as they arise. If, through observation, it is determined that there is some confusion, the teacher should model the completion of Steps 1-3 on the overhead.

Teaching (30 minutes):
The lesson begins with a review of the content and language objectives for the day. Any questions about the objective are clarified, or addressed again at the end of the lesson.

The teacher then goes on to explain that although one can use a model when solving addition and subtraction problems, there is another method that is much quicker. This is what the class will be learning today. At this point, the teacher will pass out copies of the "Listen Guide - Lesson 3.6" found on pages fifty-six through sixty-five. Once again, these are to be distributed as to the appropriate proficiency levels. Students are instructed to keep their books open to page 136, while the teacher goes on to model the completion of Example 1. This is done on the overhead to ensure that all students can follow along. Once the problem has been modeled, the teacher asks for classroom participation to complete the flow chart that was created for these types of problems. To check for comprehension with all students, the teacher then goes on to complete a "Group Response with White Board" on page fifty-two of the lesson plan (99 Ideas and Activities for Teaching English Learners with the SIOP Model) exercise utilizing the following problems (display one at a time on overhead):

1. \[ 2.8 + 4.91 = \]
2. \[ 3.15 + 7.27 = \]
3. \[ 8.91 - 6.24 = \]
4. \[ 3.98 - 0.88 = \]
5. \[ 15.791 + 2.68 = \]
6. \[ 12.09 - 6.452 = \]

The teacher will then repeat the process with Example 2 on page 137 in the text and the listening guide handout. Again, to check comprehension, complete a "Group Response with White Board" activity utilizing the following problems on the overhead:
Evaluate the expressions when $x = 3.28$ and $y = 12.46$

1. $2.49 + x$
2. $y - 4.67$
3. $9.271 + y$
4. $12.37 - x$
5. $y - x$
6. $x + y$

***** Please note, the symbol was introduced at the beginning of the school year. There was a tie made to a physician....what do doctor's do when you are sick? They try to figure out how to make you better, how to solve the problem. So, evaluate means to solve the problem.*****

For Example 3 on page 137 in the textbook, it is important for the teacher to introduce the new vocabulary - Commutative and Associative Property. Once the definition has been reviewed, the teacher should check for understanding. This can be accomplished with “Secret Answer” page fifty-three of the lesson plan (99 Ideas and Activities for Teaching English Learners with The SIOP Model). Display the following problems on the overhead, one at a time. If the students think the answer is commutative property, they hold up one finger, if they believe it shows the associative property, they should hold up two fingers.

1. $(2.6 + 4.1) + 8.9 = 2.6 + (4.1 + 8.9)$
2. $(6.6 + 14) + 9.4 = (14 + 6.6) + 9.4$
3. $12.1 + (4.94 + 9.9) = 12.1 + (9.9 + 4.94)$
4. $9.044 + (3.6 + 2.356) = 9.044 + (2.356 + 3.6)$

Example 4 textbook will not be utilized as it is written. Rather than have students create a written model (which means using key terms and symbols to rewrite the problem), I want my students to create actual word problems. Therefore, students should close their textbook so as not to get confused and refer solely to the “Listening Guides.”

The teacher reads Example 4 aloud from the Listening Guide Handout. A discussion occurs about the meaning of “Story Problem” and how one goes about completing the task. This is modeled on the overhead projector. The class comes up with a story
together, then uses estimation to check the reasonableness of the problem. Together, a
flow chart is completed on the overhead to aid students in completion of their own
story problems.

Closure (10 minutes):

Once the students have completed the above activity, it is important to bring
them back together as a group. At this time, the teacher should ask the students what
they learned in class today. This provides a final means of checking for understanding.
It is also during this time that the content and language objectives are reviewed and
clarified.

Independent Practice:

For homework, the teacher will have students complete problems 9–31 odd in
the textbook on page 139. Students will also be required to create two word problems
one based on problem 9 and one based on problem 17 from the textbook. The next
class will begin with a “Find Your Match” exercise from the 99 Ideas and Activities for
Teaching English Learners with the SIOP Model found on page fifty-four in the lesson.
Descriptive Narrative

Once again, a number of strategies were utilized throughout the deliverance of this lesson in order to make the lesson comprehensible to all students within the classroom.

The class began with the use base-ten blocks, a manipulative that provided students with a foundation for the lesson. It provided them with the “why” of the lesson.

The class then proceeded to a whole class discussion, however, the teacher provides all students with listening guides so that they are able to follow and participate in the discussion. The listening guide provided students with graphic organizers, chances for vocabulary development, and iconic representations.

Additionally, during this time, the teacher allowed students to build background knowledge and negotiate meaning through the use of “Group Response with a White Board.”

Although the text is not relied upon heavily, it is referred to throughout the lesson. Specific modifications were not made to the book, however, the listening guides were designed to go along with the text. This provided additional support for those students in the Level One, Two, and Three of proficiency.

Finally, it is important to use frequent pausing and repetitions throughout the lesson to ensure that students have enough time to comprehend the material being covered. Additionally, one may wish to use “Framing Main Ideas” when introducing each Example to guarantee that all students have access to the important points of the lesson.
**Group Response with a White Board**

**COMPONENT:** Interaction

Grade Levels: All (for K, use pictures, illustrations, numbers, or words in a multiple choice format)
Subject Levels: All
Grouping Configurations: Individual, small groups, whole class
Materials: Individual white boards; white board marking pens; paper and pencils

**Description:**

Group Response with a White Board fosters interaction while promoting individual thought. Students are grouped heterogeneously and each group is given a number. Each student in the group has paper and pencil, and each team has a white board and marking pen. The teacher then asks a question about a topic the class has been studying.

After allowing sufficient wait-time, ask students to individually jot down their responses to a question, even if it’s a “best guess” answer. Cue team members to share their responses with each other, and students then determine the best response and a student recorder writes it on the white board. It is important that all team members help each other by making sure each student knows the answer. When all teams have written on their white boards, the teacher spins a spinner or rolls a die and according to the number, one group holds up their white board to share their answer with the rest of the class. Each team must support its answer. If the answer is wrong, emphasize that it was a team response that was incorrect. Spin or roll the die to select another team until the correct answer appears on a white board. The team (and class) then discuss the question and answer so that everyone is able to answer it correctly. Team points can be awarded. Group Response with a White Board is a wonderful way for students to assess their own understanding of key concepts in a low-risk environment.

**SIOP® Connection**

**Content Objectives:**

Students will be able to (SWBAT) . . .
- Demonstrate knowledge about (a topic).
- Work with teammates to devise the best possible answer to a question about (a topic).
- Evaluate team members’ individual responses for accuracy.

*(continued)*
Secret Answer

COMPONENT: Lesson Delivery (and Review/Assessment)

(Adapted from Angie Medina, Long Beach Unified School District)

Grade Levels: K–8
Subject Levels: All
Grouping Configurations: Individual
Approximate Time Involved: 2–15 minutes
Materials: None

Description:

During Secret Answer students respond with a hand signal close to their chest to show their answer to a particular question. The question is posed either orally (by the teacher) or from a reading (in a text) and students are given options labeled 1, 2, 3, or 4 for the answer. Students make a fist as they listen to the question and think about the answer. On the teacher’s cue (“Show me!”), students show the number of fingers that corresponds to the correct answer. With Secret Answer, you are emphasizing that the answer to the question is between each individual student and the teacher.

Holding the answer number up high in the air takes away individual accountability and minimizes think-time, while Secret Answer encourages students to answer independently and process at their own pace. The teacher can monitor comprehension by checking the Secret Answers, validating correct answers and encouraging rethinking for incorrect responses. This activity supports test practice since it allows students to have their answers to test questions validated immediately. Secret Answer also enables the teacher to monitor comprehension and keeps each student engaged with the task. Older students may prefer to use the Response Cards or Number Wheels to accomplish the same goal.

SIOP® Connection

This particular activity for Lesson Delivery does not lend itself to specific content or language objectives; it is information for the teacher to use when planning the delivery of a lesson.
Find Your Match

COMPONENT: Interaction

Grade Levels: All
Subject Levels: All
Grouping Configurations: Partners, small groups, whole class
Materials: An index card for each student

Description:

Find Your Match encourages interaction among class members as they read and produce oral language. Each student is given an index card with information on it that matches the information on another students' card (e.g., words and definitions; antonyms or synonyms; generals and battles; characters and story titles, math problems and solutions, etc).

In the first step, students mix with each other, reading aloud the information on their cards. After students have had several opportunities to share their information, the teacher calls time. At that point, students are to find their matches by describing (not reading) what is on their cards. If students are learning about geometric shapes, student #1 has the word parallelogram written on his card, and student #2 has the definition of parallelogram on hers. While searching for their matches, student #1 listens to student #2 use her own words to describe a parallelogram. When the two students with a match find each other, they move to the side of the room until everyone is finished. At that point, all partners read both of their cards to the rest of the class.

SIOP® Connection

Content Objective:
Students will be able to (SWBAT) . . .

- Match words and/or concepts about a topic, such as the geometric shapes.

Language Objectives:
Students will be able to (SWBAT) . . .

- Orally read the word(s) on their cards to other students.
- Describe a concept that is written on a card to another student.
Model Decimal Addition

Remember, Base-ten blocks can represent the following:

\[ = 1.00 = \text{one whole} \]

\[ = 0.1 = \text{one tenth} \quad \square = 0.01 = \text{one hundredth} \]

Now, with your partner, complete the Activity on page 136 in your textbook.
Listen Guide ~ Lesson 3.6
Level 3 and above

Example 1 ~ Adding and Subtracting Decimals

a. \( 9.8 + 2.12 \)  
b. \( 8 - 1.65 \)

Example 2 ~ Evaluating Algebraic Expressions

Evaluate \( 20 - x \) when \( x = 4.71 \).
Example 3 - Using Mental Math to Add Decimals

Commutative Property -

Associative Property -

Bakery
Find the total cost for a sweet roll that costs $1.30, two hard rolls that cost $1.20 each, and a coffee cake that costs $3.70.
Example 4 – Creating a Story Problem

Write a story problem that can be solved using the number sentence:

$7.96 - $0.49 = ____
Listen Guide ~ Lesson 3.6
Level 2

Example 1 ~ Adding and Subtracting Decimals

a. \(9.8 + 2.12\)  
b. \(8 - 1.65\)

<table>
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<tr>
<th>Line up the decimal points</th>
<th>or</th>
<th>from right to left.</th>
<th>your decimal point.</th>
</tr>
</thead>
</table>

**Word Bank**
- Vertically
- Add
- Bring Down
- Subtract
Example 2 - Evaluating Algebraic Expressions:

Evaluate \( 20 - x \) when \( x = 4.71 \).

**Word Bank**
- substitute
- subtract
- vertically
- decimal point
- add
- bring down your
Example 3 ~ Using Mental Math to Add Decimals

**Commutative Property** – You can add numbers in any order.

**Associative Property** – The sum does not depend on how the numbers are grouped.

**Bakery**

Find the total cost for a sweet roll that costs $1.30, two hard rolls that cost $1.20 each, and a coffee cake that costs $3.70.

List the prices vertically.

Rearrange and group pairs.

Add up the totals.
Example 4 - Creating a Story Problem

Write a story problem that can be solved using the number sentence:

\[ $7.96 - $0.49 = \underline{\hspace{2cm}} \]

Create a word sentence with the number sentence provided.

I have \underline{\hspace{2cm}} \text{$.1$}\text{st #}

bought a \underline{\hspace{2cm}} \text{for object}

\underline{\hspace{2cm}} \text{$.2$}\text{nd #}.

Create a distraction sentence.

I wanted to buy \underline{\hspace{2cm}} \text{for object}

\underline{\hspace{2cm}} \text{, but amount}

did not.

Ask a question.

How much money do I have left?

Use estimation to check the reasonableness of your answer.

\underline{\hspace{2cm}} \text{=} \underline{\hspace{2cm}}

\underline{\hspace{2cm}} \text{=} \underline{\hspace{2cm}}

\text{subtract}

\text{Make sense?}
Listen Guide ~ Lesson 3.6
Level 1

Example 1 ~ Adding and Subtracting Decimals

a. $9.8 + 2.12$

b. $8 - 1.65$

Example 2 ~ Evaluating Algebraic Expressions

Evaluate $20 - x$ when $x = 4.71$. 
Example 3 - Using Mental Math to Add Decimals

**Commutative Property** - You can add (+) numbers (#) in any order.

\[ 2 + 5 = 5 + 2 \quad a + b = b + a \]

**Associative Property** - The sum (=) does not ( ) depend on how the numbers (#) are grouped ( ).

\[ (2 + 5) + 4 = 2 + (5 + 4) \quad (a + b) + c = a + (b + c) \]

**Bakery**

Find the total (+) cost for a sweet roll that costs $1.30, two (2) hard rolls that cost $1.20 each, and a coffee cake that costs $3.70.

List the prices vertically ( ).

Rearrange and group pairs.

Add (+) up the totals (=).
Example 4 - Creating a Story

Write a story problem that can be solved using the number sentence:

$7.96 - $0.49 = ____

---

Create a word sentence with the number sentence provided.

I have ____ 1st #. I bought a _______ for object ________, but amount ________ did not.

Create a distraction sentence.

I wanted to buy ________, for object _________, but amount ________ did not.

Ask a question.

How much money do I have left?

Use estimation to check the reasonableness of your answer.

____ = ____

____ = ____

subtract

Make sense?
Checklists
# Grammar Checklist

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## Support Materials

### CHAPTER RESOURCE BOOK

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- Parents as Partners p. 3

**LESSON SUPPORT**
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- Technology Activities & Keystrokes p. 7
- Activity Masters p. 9
- Practice (3 levels) p. 12
- Study Guide p. 17
- Real-World Problem-Solving p. 20
- Challenge Practice p. 22

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### TRANSPARENCIES

- Warm-Up / Daily Homework Quiz
- Notetaking Guide
- Teacher Support
- English/Spanish Problem Solving
- Answer Transparencies

### TECHNOLOGY
- EasyPlanner CD-ROM
- Test and Practice Generator
- Electronic Lesson Presentations
- eTutorial CD-ROM
- Chapter Audio Summaries CDs
- Classzone.com
- eEdition Plus Online
- eWorkbook Plus Online
- eTutorial Plus Online
- EasyPlanner Plus Online

### ADDITIONAL RESOURCES
- Worked-Out Solution Key
- Notetaking Guide
- Practice Workbook
- Tutor Place
- Professional Development Book
- Special Activities Book
- Posters
- Spanish Study Guide
- Exercises in Spanish
- English/Spanish
- Multi-Language V
Lesson Plan
1-day lesson (See Pacing and Assignment Guide, TE page 104A)
For use with pages 124-128

GOAL
Round decimals.

State/Local Objectives

✓ Check the items you wish to use for this lesson.

STARTING OPTIONS
— Homework Check (3.3): TE page 120; Answer Transparencies
— Homework Quiz (3.3): TE page 121; Transparencies
✓ Warm-Up: Transparencies

TEACHING OPTIONS
— Notetaking Guide
— Activity Master: CRB page 35
✓ Examples: 1-4, SE pages 124-126
✓ Extra Examples: TE pages 125-126
✓ Your Turn Now Exercises: 1-12, SE pages 124-125
— Concept Check: TE page 126
— Getting Ready to Practice Exercises: 1-9, SE page 126

APPLY/HOMEWORK
Homework Assignment

Reteaching the Lesson
— Practice: CRB pages 36-38 (Level A, Level B, Level C); Practice Workbook
— Study Guide: CRB pages 39-40; Spanish Study Guide

Extending the Lesson
— Challenge: SE page 128; CRB page 41

ASSESSMENT OPTIONS
✓ Daily Homework Quiz (3.4): TE page 128 or Transparencies
— Test Taking Practice: SE page 128

Notes

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**PLAN**

**SKILL CHECK**
Round to the place value indicated:
1. 1843; hundreds 1800
2. 765; tens 770
3. 596; tens 600

**LESSON OBJECTIVE**
Round decimals.

**PACING**
Suggested Number of Days
Basic Course: 1 day
Average Course: 1 day
Advanced Course: 1 day
Block: 0.5 block with 3.3

**TEACHING RESOURCES**
For a complete list of Teaching Resources, see page 104A.

**TRANSPARENCY**
Warm-Up Exercises for this lesson are available on a transparency.

**TEACH**

**MOTIVATING THE LESSON**
Tell students they already know how to round whole numbers. It is the same as rounding whole numbers.

**TIPS FOR NEW TEACHERS**
Have students use different ways to identify the digit in the place to be rounded and the digit to its right. For example, have them underline the digit to be rounded and circle the digit to its right.
See Tips for New Teachers in the Chapter 3 Resource Book.

**Rounding Decimals**

**Number Line**
A number line can help you picture how to round a decimal.

**Example 1**
Using a Number Line to Round
Use a number line to round 3.87 to the nearest tenth.

**Answer**
The decimal 3.87 rounds up to 3.9.

**Your Turn Now**
Use a number line to round the decimal as specified.
1. 3.3 (nearest tenth) 3
2. 2.6 (nearest one) 3
3. 3.74 (nearest tenth) 3
4. 5.85 (nearest tenth) 6

**Using a Rule**
On a number line, you round a decimal by deciding which number it is closer to. The same idea applies when you use the rule below.

**Rounding Decimals**
To round a decimal to a given place value, look at the digit in the place to the right:
- If the digit is 4 or less, round down.
- If the digit is 5 or greater, round up.

**NCTM CURRICULUM STANDARDS**
Standard 1: Understand relationships among numbers
Standard 5D: Use representations to communicate mathematical ideas
Rounding Decimals

Number Lines A number line can help you picture how to round a decimal.

Example 1: Using a Number Line to Round
Use a number line to round 3.87 to the nearest tenth.

The decimal 3.87 is closer to 3.9 than to 3.8.

Answer: The decimal 3.87 rounds up to 3.9.

Example 2: Rounding Decimals
Round the decimal to the place value of the red digit.

a. 3.21 → 3.2 The digit to the right of 2 is 1, so round down.

b. 6.485 → 6.49 The digit to the right of 8 is 5, so round up.

c. 2.84619 → 2.846 The digit to the right of 6 is 1, so round down.

d. 5.961 → 6.0 The digit to the right of 9 is 6, so round up.

Example 3: Rounding Small Numbers
You can round a very small number to the place value of its leading digit to help make it easier to understand.

In a decimal, the leading digit is the first nonzero digit at the left.

Example 4: Rounding to the Leading Digit
Music A guitar was created that is 0.0009397 inch long. Round the length of the guitar to the place value of the leading digit.

Solution: The first nonzero digit at the left of 0.0009397 is 3, and it is in the ten-thousandths' place. You should round the length to the nearest ten-thousandth.

0.0009397 is in the ten-thousandths' place.

Because 9 is to the right of the ten-thousandths' place, round 3 up to 4.

Answer: The length of the guitar rounded to the place value of the leading digit is 0.0009 inch.

Example 5: Your turn now
Round the decimal to the leading digit.

9. 0.059 0.06
10. 0.0091 0.01
11. 0.0852 0.1
12. 0.006192 0.0
**Example 4** Round each quarterly sales figure to the nearest hundred thousand, then write each rounded amount as a decimal number of millions.

- **First** quarter: $2,457,390 = $2.5 million
- **Second** quarter: $3,127,640 = $3.1 million
- **Third** quarter: $9,128,452 = $9.1 million
- **Fourth** quarter: $10,429,448 = $10.4 million

**Differentiating Instruction**

**Less Proficient Students**

Suggest to students who are having difficulty identifying the correct place to round to that they write the decimal in a place-value chart as was done in Lesson 3.1, page 108. This will help them to identify not only the place they are rounding to, but also whether to round up or down.

**CONCEPT CHECK**

To round a number to the nearest hundredth, which place value do you inspect? What determines whether you will round up or round down?

To round a number to the nearest hundredth, look at the digit in the thousandths place. If that digit is 4 or less, round down. If that digit is 5 or more, round up.

**DAILY PUZZLER**

Find two decimals that have different digits in their thousandths place but that are equal if they are rounded to the tenths, hundredths, or thousandths place. Sample answer: 0.1235 and 0.1241.
**Example 4 Using Decimals for Large Numbers**

Sports The average annual salaries for some positions in major league baseball in a recent year are shown below. Round each salary to the nearest hundred thousand. Then write each rounded salary as a decimal number of millions. Display your results in a bar graph.

<table>
<thead>
<tr>
<th>Position</th>
<th>Average Salary</th>
<th>Round:</th>
<th>Write in million</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Base</td>
<td>$4,996,833</td>
<td>$5,000,000</td>
<td>$5.0 million</td>
</tr>
<tr>
<td>Outfield</td>
<td>$3,480,752</td>
<td>$3,500,000</td>
<td>$3.5 million</td>
</tr>
<tr>
<td>Pitcher</td>
<td>$3,664,021</td>
<td>$3,100,000</td>
<td>$3.1 million</td>
</tr>
<tr>
<td>Catcher</td>
<td>$2,747,726</td>
<td>$2,800,000</td>
<td>$2.8 million</td>
</tr>
</tbody>
</table>

Baseball Salaries

A sample answer: The graph should be 100 because a zero should be kept in the tenths place to indicate the place value to which the number was rounded.

**Practice and Problem Solving**

Use a number line to round the decimal as specified.

10. 5.3 (nearest one) 5
11. 9.5 (nearest one) 10
12. 3.76 (nearest tenth) 3.8
13. 1.41 (nearest tenth) 1.4

Round the decimal as specified.

14. 9.41 (nearest one) 9
15. 2.59 (nearest one) 2
16. 8.007 (nearest tenth) 8.01
17. 8.981 (nearest tenth) 8.98
18. 6.99 (nearest hundredth) 6.99
19. 3.902 (nearest hundredth) 3.90
20. 2.503 (nearest thousandth) 2.503
21. 7.296 (nearest thousandth) 7.296

22. Writing After sharing a pizza, you and two friends divide the cost by three. Each one pays $2.696666. Explain how to round this to the nearest dime. Sample answer: A dime is 0.10 of a dollar, so round to the nearest tenth, or 2.70.

Round the decimal to the place value of the leading digit.

23. 0.0263 026
24. 0.0588 059
25. 0.0085 008
26. 0.006178 006
27. 0.00019 000
28. 0.00023 000
29. 0.0000889 000
30. 0.00000177 000

31. Skateboarding The table shows the scores of 4 skateboarders after three rounds of a skateboarding competition. Why is it not reasonable to round the scores to the nearest one? Explain. Sample answer: because many of the scores would round to 81.

Round the number to the nearest hundred thousand. Then write the rounded number as a decimal number of millions.

33. 15,925,000 16.0 million
34. 6,349,000 6.3 million
35. 9,587,280 10.0 million
36. 14,962,000

Technology A calculator sometimes gives long decimals. Round the number on the calculator display to the nearest hundredths.

37. 1.285714286 1.29
38. 1.078923077 1.08
39. 1.47587714 1.48

Lesson 3.4 Rounding Decimals

---

**EXTRA PRACTICE**

- Student Edition, p. 710
- Chapter 3 Resource Book, pp. 36-38
- Test and Practice Generator

**TRANSPARENCY**

Even-numbered answers are available on transparencies. A support transparency is available for Exercises 10-13.

**HOMEWORK CHECK**

When you review your students’ homework for this lesson, go over the following exercises to check understanding of key concepts.

Basic: 11, 17, 18, 24, 34
Average: 12, 18, 27, 32, 35
Advanced: 13, 20, 29, 32, 36

**COMMON ERROR**

In Exercise 32, stress that when rounding, the number of digits shown indicates which place the number has been rounded to. Thus, 10, 10.0, and 10.00 all represent different degrees of rounding.
**4 ASSESS**

**ASSESSMENT RESOURCES**
For more assessment resources, see:
- Assessment Book
- Test and Practice Generator

**MINI-QUIZ**
Round each number to the indicated place value.
1. Round 12.087 to the nearest hundredth. 12.09
2. Round 35.951 to the nearest tenth. 36.0
3. Round 2.0603 to its leading digit. 0.06
4. Round 20.501745 to the nearest hundredth. 20.50
5. Round 4.575,428 to the nearest hundred thousand. Then write the rounded number as a decimal number of millions. 4,000,000; 4.0 million

**5 FOLLOW-UP**

**RETEACHING/REMEDIATION**
- Study Guide in Chapter 3 Resource Book, pp. 39-40
- Tutorial Place, Whole Numbers and Decimals Card 16
- iTutor Plus Online
- Extra Practice, pp. 710
- Lesson Practice in Chapter 3 Resource Book, pp. 35-38

**CHALLENGE/ENRICHMENT**
- Challenge Practice in Chapter 3 Resource Book, p. 41
- Teacher’s Edition, p. 104F

**ENGLISH LEARNER SUPPORT**
- Spanish Study Guide
- Multi-Language Glossary
- Chapter Access Summaries CD

41-46. See Additional Answers beginning on page A11.

40. Hair. The width of a human hair is about 0.003887563 (in). Explain why it is not reasonable to round the width to the nearest hundredth. Find a reasonable estimate for the width. Sample answer: Because the width would be 0.003887563 in.

Tourism. The table shows the total number of people that visited the state parks of five states in one year. 41-42. See margin.

<table>
<thead>
<tr>
<th>State</th>
<th>Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>78,738,000</td>
</tr>
<tr>
<td>Illinois</td>
<td>81,990,000</td>
</tr>
<tr>
<td>New York</td>
<td>76,126,000</td>
</tr>
<tr>
<td>Ohio</td>
<td>66,206,000</td>
</tr>
<tr>
<td>Washington</td>
<td>48,138,000</td>
</tr>
</tbody>
</table>

42. Display your results in a bar graph.

Number Sense. Find three decimals that round to the number. 43-46. See margin.
43. 4
44. 15
45. 3.4
46. 67

47. Challenge. In Exercise 43, you are asked to find three decimals that round to 4. How many answers are possible? Explain.
Sample answer: There are infinitely many possible answers because there are infinitely many possible decimal places.

**Mixed Review**

Estimate the sum or difference. (Lesson 1.3) Estimates may vary.
48. 136 + 75 = 210
49. 141 + 537 = 678
50. 152 – 269 = -117
51. 343 – 27 = 316

Copy and complete the statement with <, >, or =. (Lesson 3.3)
52. 0.79 < 0.9 < 1
53. 0.05 < 0.05000 = 0.037 < 0.0373 < 0.0374

Basic Skills. Find the product or quotient.
54. 214 x 12
55. 125 x 10
56. 125 x 10
57. 345 - 315
58. 270 + 10

**Test-Taking Practice**

A. 10 pounds  B. 14 pounds  C. 14.5 pounds  D. 15 pounds

60. Short Response. The table shows the scores of 5 divers in a school diving competition. Round the scores to the nearest one and order them from greatest to least, to find each diver’s rank. Then rank the divers without rounding the scores. Which method is more reasonable to rank the divers? Explain.

<table>
<thead>
<tr>
<th>Diver</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diver</td>
<td>136.5</td>
</tr>
<tr>
<td>Diver</td>
<td>137.5</td>
</tr>
<tr>
<td>Diver</td>
<td>137.7</td>
</tr>
<tr>
<td>Diver</td>
<td>137.4</td>
</tr>
<tr>
<td>Diver</td>
<td>137.9</td>
</tr>
</tbody>
</table>
Round the number as specified.

1. 8579 (nearest hundred)
2. 46,321 (nearest thousand)

Copy and complete the statement with <, >, or =.

3. 3.89 ? 3.9
4. 0.004 ? 0.0041
5. 6.050 ? 6.05
6. 1.813 ? 1.318

---

Daily Homework Quiz

For use after Lesson 3.3, pages 118-121

1. Complete the statement with <, >, =.
   a. 8.7 ? 9
   b. 13.5 ? 13.500
   c. 27 ? 26.47
   d. 34.57 ? 34.5
   e. 7.3529 ? 7.3551

2. Order the numbers from least to greatest.
   22.56, 22.55, 22.5, 22.555, 22.48

ANSWERS

Warm-Ups: 1. 8600  2. 46,300  3. 3.89 < 3.9  4. 0.004 < 0.0041
5. 6.050 = 6.05  6. 1.813 > 1.318

Daily Homework Quiz: 1. a. < b. = c. > d. > e. <
2. 22.48, 22.5, 22.55, 22.555, 22.56
Rounding Decimals

You rounded whole numbers. You'll round decimals. So you can read large numbers, such as the salaries in Example 4.

Number Lines A number line can help you picture how to round a decimal.

The decimal 2.2 is closer to 2 than to 3, so 2.2 rounds down to 2.

---

EXAMPLE 1 Using a Number Line to Round

Use a number line to round 3.87 to the nearest tenth.

The decimal 3.87 is closer to 3.9 than to 3.8.

ANSWER The decimal 3.87 rounds up to 3.9.

Your turn now Use a number line to round the decimal as specified.

1. 1.3 (nearest one) 2. 2.8 (nearest one)
3. 3.74 (nearest tenth) 4. 3.86 (nearest tenth)

Using a Rule On a number line, you round a decimal by deciding which number it is closer to. The same idea applies when you use the rule below.

Rounding Decimals

To round a decimal to a given place value, look at the digit in the place to the right.

- If the digit is 4 or less, round down.
- If the digit is 5 or greater, round up.
**Example 2**  Rounding Decimals

Round the decimal to the place value of the red digit.

- **a.** \(3.23 \rightarrow 3.2\)  
The digit to the right of 2 is 3, so round down.
- **b.** \(6.485 \rightarrow 6.49\)  
The digit to the right of 8 is 5, so round up.
- **c.** \(2.83619 \rightarrow 2.836\)  
The digit to the right of 6 is 1, so round down.
- **d.** \(5.961 \rightarrow 6.0\)  
The digit to the right of 9 is 6, so round up.

**Your turn now**  Round the decimal as specified.

- **5.** 5.29 (nearest tenth)  
- **6.** 7.096 (nearest hundredth)
- **7.** 6.48 (nearest one)  
- **8.** 3.9876 (nearest thousandth)

**Rounding Small Numbers**  You can round a very small number to the place value of its leading digit to help make it easier to understand. In a decimal, the leading digit is the first nonzero digit at the left.

**Example 3**  Rounding to the Leading Digit

**Music**  A guitar was created that is 0.0003937 inch long. Round the length of the guitar to the place value of the leading digit.

**Solution**

The first nonzero digit at the left of 0.0003937 is 3, and it is in the ten-thousandths' place. You should round the length to the nearest ten-thousandth.

0.0003937  

3 is in the ten-thousandths' place.

Because 9 is to the right of the ten-thousandths' place, round 3 up to 4.

**Answer**  The length of the guitar rounded to the place value of the leading digit is 0.0004 inch.

**Your turn now**  Round the decimal to the leading digit.

- **9.** 0.058  
- **10.** 0.0091  
- **11.** 0.0952  
- **12.** 0.006192
**Example 4** Using Decimals for Large Numbers

**Sports** The average annual salaries for some positions in major league baseball in a recent year are shown below. Round each salary to the nearest hundred thousand. Then write each rounded salary as a decimal number of millions. Display your results in a bar graph.

<table>
<thead>
<tr>
<th>Position</th>
<th>Average Salary:</th>
<th>Round:</th>
<th>Write in millions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Base</td>
<td>$4,996,933</td>
<td>$5,000,000</td>
<td>$5.0 million</td>
</tr>
<tr>
<td>Outfield</td>
<td>$3,480,792</td>
<td>$3,500,000</td>
<td>$3.5 million</td>
</tr>
<tr>
<td>Pitcher</td>
<td>$3,064,021</td>
<td>$3,100,000</td>
<td>$3.1 million</td>
</tr>
<tr>
<td>Catcher</td>
<td>$2,767,726</td>
<td>$2,800,000</td>
<td>$2.8 million</td>
</tr>
</tbody>
</table>

![Baseball Salaries](image)

An appropriate scale for the data is 0 to 6 million.

3.4 Exercises
More Practice, p. 710

**Getting Ready to Practice**

**Vocabulary** Identify the leading digit of the decimal. Then round to the place value of the leading digit.

1. 0.024  
2. 0.0078  
3. 0.00149  
4. 0.000485

**Round the decimal as specified.**

5. 8.21 (nearest tenth)  
6. 1.159 (nearest hundredth)  
7. 10.6289 (nearest thousandth)  
8. 1.498 (nearest one)

9. Round the number 8,438,100 to the nearest hundred thousand. Then write the rounded number as a decimal number of millions.
Practice and Problem Solving

Use a number line to round the decimal as specified.

10. 5.3 (nearest one) 11. 9.5 (nearest one)
12. 3.76 (nearest tenth) 13. 1.41 (nearest tenth)

Round the decimal as specified.
14. 9.41 (nearest one) 15. 2.59 (nearest one)
16. 8.087 (nearest tenth) 17. 8.981 (nearest tenth)
18. 6.999 (nearest hundredth) 19. 3.902 (nearest hundredth)
20. 2.5634 (nearest thousandth) 21. 7.2961 (nearest thousandth)

22. Writing After sharing a pizza, you and two friends divide the cost by three. You each owe $2.666666. Explain how to round this to the nearest dime.

Round the decimal to the place value of the leading digit.

23. 0.0263 24. 0.0588 25. 0.0092 26. 0.006178
27. 0.00019 28. 0.000231 29. 0.00009888 30. 0.0000177

31. Skateboarding The table shows the scores of 4 skateboarders after three rounds of a skateboarding competition. Why is it not reasonable to round the scores to the nearest one? Explain.

<table>
<thead>
<tr>
<th></th>
<th>Round 1</th>
<th>Round 2</th>
<th>Round 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rob</td>
<td>80.7</td>
<td>84.4</td>
<td>80.8</td>
</tr>
<tr>
<td>Ruth</td>
<td>83.3</td>
<td>78.6</td>
<td>81.1</td>
</tr>
<tr>
<td>Kenny</td>
<td>81.2</td>
<td>83.6</td>
<td>80.6</td>
</tr>
<tr>
<td>Jessica</td>
<td>82.7</td>
<td>79.2</td>
<td>80.9</td>
</tr>
</tbody>
</table>

32. Find the Error Describe and correct the error in the form of the answer.

Round to the nearest tenth.

\[
9.95 \quad \rightarrow \quad 10
\]

Round the number to the nearest hundred thousand. Then write the rounded number as a decimal number of millions.

33. 15,925,000 34. 6,549,000 35. 9,987,260 36. 14,962,000

Technology A calculator will sometimes give long decimals. Round the number on the calculator display to the nearest hundredth.

37. 1.285714286 38. 1.076923077 39. 1.714285714
40. **Hair** The width of a human hair is about 0.00389763 inch. Explain why it is not reasonable to round the width to the nearest hundredth. Find a reasonable estimate for the width.

**Tourism** The table shows the total number of people that visited the state parks of five states in one year.

<table>
<thead>
<tr>
<th>State</th>
<th>Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>76,736,000</td>
</tr>
<tr>
<td>Illinois</td>
<td>41,891,000</td>
</tr>
<tr>
<td>New York</td>
<td>61,960,000</td>
</tr>
<tr>
<td>Ohio</td>
<td>60,220,000</td>
</tr>
<tr>
<td>Washington</td>
<td>48,138,000</td>
</tr>
</tbody>
</table>

41. Round each number to the nearest hundred thousand. Then write the rounded number as a decimal number of millions.

42. Display your results in a bar graph.

**Number Sense** Find three decimals that round to the number.

43. 4  
44. 15  
45. 3.4  
46. 8.7

47. **Challenge** In Exercise 43, you are asked to find three decimals that round to 4. How many answers are possible? Explain.

---

**Mixed Review**

**Estimate the sum or difference.** (Lesson 1.2)

48. $136 + 75$  
49. $418 + 397$  
50. $572 - 269$  
51. $343 - 27$

**Copy and complete the statement with $<$, $>$, or $=$.** (Lesson 3.3)

52. $0.79 \_\_ 0.9$  
53. $0.05 \_\_ 0.05000$  
54. $3.037 \_\_ 3.073$

**Basic Skills** Find the product or quotient.

55. $214 \times 9$  
56. $125 \times 10$  
57. $345 \div 3$  
58. $270 \div 10$

---

**Test-Taking Practice**

59. **Multiple Choice** You record the weight of a package weighing 14.57 pounds to the nearest pound. What weight do you record?

A. 10 pounds  
B. 14 pounds  
C. 14.5 pounds  
D. 15 pounds

60. **Short Response** The table shows the scores of 5 divers in a school diving competition. Round the scores to the nearest one and order them from greatest to least, to find each diver's rank. Then rank the divers without rounding the scores. Which method is more reasonable to rank the divers? Explain.

<table>
<thead>
<tr>
<th>Diver</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dionne</td>
<td>136.35</td>
</tr>
<tr>
<td>Ashley</td>
<td>137.5</td>
</tr>
<tr>
<td>Ellie</td>
<td>136.7</td>
</tr>
<tr>
<td>Alina</td>
<td>137.45</td>
</tr>
<tr>
<td>Julie</td>
<td>137.35</td>
</tr>
</tbody>
</table>
Lesson Plan

1-day lesson (See Pacing and Assignment Guide, TE page 104A)
For use with pages 129-133

**GOAL** Estimate sums and differences of decimals.

State/Local Objectives

✓ Check the items you wish to use for this lesson.

**STARTING OPTIONS**

- Homework Check (3.4): TE page 127; Answer Transparencies
- Homework Quiz (3.4): TE page 128; Transparencies
- Warm-Up: Transparencies

**TEACHING OPTIONS**

- Notetaking Guide
- Hands-on Activity: SE page 129
- Technology Activity with Keystrokes: CRB pages 44-45
- Examples: 1-3, SE pages 130-131
- Extra Examples: TE page 131
- Your Turn Now Exercises: 1-5, SE pages 130-131
- Concept Check: TE page 131
- Getting Ready to Practice Exercises: 1-5, SE page 132

**APPLY/HOMEWORK**

**Homework Assignment**

- Average: Day 1: pp. 132-133 Exs. 10-29, 31-40

Reteaching the Lesson

- Practice: CRB pages 46-48 (Level A, Level B, Level C); Practice Workbook
- Study Guide: CRB pages 49-50; Spanish Study Guide

Extending the Lesson

- Challenge: SE page 133; CRB page 51

**ASSESSMENT OPTIONS**

- Daily Homework Quiz (3.5): TE page 133 or Transparencies
- Test Taking Practice: SE page 133

Notes

42 Middle School Math, Course 1
Chapter 3 Resource Book
**Plan**

**Skill Check**
- Estimate to the nearest 10:
  1. $317 + 42 = 360$
  2. $241 + 88 = 330$
  3. $462 - 77 = 380$
  4. $350 - 119 = 240$

**Lesson Objective**
Estimate sums and differences of decimals.

**Pacing**
Suggested Number of Days
- Basic Course: 1 day
- Average Course: 1 day
- Advanced Course: 1 day
Block: 0.5 block w/ 3.6

**Teaching Resources**
For a complete list of Teaching Resources, see page 1048.

**Transparency**
Warm-Up Exercises for this lesson are available on a transparency.

**Teach**

**Motivating the Lesson**
Example 3 provides a good motivator for this lesson. Present the situation to students before they open their books and ask them to offer solutions.

**Tips for New Teachers**
Be sure students understand that different methods of estimating may give different values. See Tips for New Teachers in the Chapter 3 Resource Book.

---

**Decimal Estimation**

**In the Real World**
Sports: The table shows the number of people, in millions, who participated in five sports in a recent year. About how many people played soccer? About how many more females participated in bicycling than in golf?

One way to estimate a sum or difference is to use rounding.

**Example 1**

**Estimating Sums and Differences**

a. To estimate the answer to the first real-world question above, round each decimal to the nearest whole number. Then add.

- $8.2 \rightarrow 8$
- $+0.6 \rightarrow 0$
- $\rightarrow 8$
- $= 8$

**Round 8.2 down to 8.**

**Round 0.6 up to 8.**

**Answer:** About 13 million people played soccer.

b. To estimate the answer to the second real-world question above, round each decimal to the nearest whole number. Then subtract.

- $20.6 \rightarrow 21$
- $-0.5 \rightarrow 6$
- $\rightarrow 6$
- $15$

**Round 20.6 up to 21.**

**Round 0.5 up to 6.**

**Answer:** About 15 million more females participated in bicycling than in golf.

---

**Your Turn Now**
Use the information provided at the top of the page.

1. Estimate the total number of people who participated in bicycling: 27 million
2. Estimate how many more females participated in bicycling than in golf: 5 million

**NCTM Curriculum Standards**

- **Standard 1:** Understand relationships among numbers. Make reasonable estimates.
- **Standard 2:** Solve problems in math and other contexts.
Decimal Estimation

**EXAMPLE 1** Estimating Sums and Differences

a. To estimate the answer to the first real-world question above, round each decimal to the nearest whole number. Then add.

8.2 → 8
4.9 → 5
Round 8.2 down to 8.
Round 4.9 up to 5.

**ANSWER** About 13 million people played soccer.

b. To estimate the answer to the second real-world question above, round each decimal to the nearest whole number. Then subtract.

20.6 → 21
5.7 → 6
Round 20.6 up to 21.
Round 5.7 up to 6.

**ANSWER** About 15 million more females participated in bicycling than in golf.

**EXAMPLE 2** Predicting Results

Shopping: You buy a T-shirt that costs $9.21. You give the clerk $20.00.

**Estimate** Your change is high or low?

\[ \text{Round } 9.21 \text{ down to } 9, \] \[ \text{Round } 9.21 \text{ down to } 9. \]

\[ \$20.00 - \$9.21 = \$10.79 \]

**ANSWER** Your change is about $10. This estimate is high because you subtracted too little by rounding $9.21 down to $9.

**EXAMPLE 3** Using Front-End Estimation

Groceries: You have $10 to buy bread, milk, and cereal. If you have enough money, you would like to buy popcorn. The prices of these items are shown.

- $1.79 for bread
- $2.16 for milk
- $3.34 for cereal
- $3.69 for popcorn

**Solution**

Find the sum of all the prices, including the price of the popcorn.

1. Add the front-end digits: the dollars.
2. Add the remaining digits: the cents.
3. Add your results.

\[ $1.79 + $2.16 = $3.95 \]
\[ $3.34 + $3.69 = $7.03 \]
\[ $7.03 + $3.95 = $11.00 \]

**ANSWER** You do not have enough money to buy popcorn.

**YOUR TURN NOW** Use front-end estimation to estimate the sum.

3. 6.42 + 7.64 + 3.84 + 2.21 = 20
4. 8.59 + 1.37 + 2 + 6.12 = 18
5. How can you estimate the difference in Example 2 so that your answer is a low estimate? Sample answer: Subtract $10 from $11.

**EXTRA EXAMPLES**

**Example 1** Estimating by rounding each decimal to the nearest whole number.

- a. 27.2 → 27.2
- b. 11.25 + 3.80 = 12

**Example 2** Estimating by rounding each decimal to the nearest whole number.

- a. 27.2 → 27.2
- b. 11.25 + 3.80 = 12

**Example 3** Using front-end estimation.

- a. 27.2 → 27.2
- b. 11.25 + 3.80 = 12

**CONCEPT CHECK**

When shopping for a list of items, how can you get a good estimate of what the total will be? Add the front-end digits (the dollars) to get a low estimate. Round the remaining digits (the cents) to adjust the sum and get a closer estimate.

**DAILY PUZZLER**

Each of two items cost between $2 and $5. The estimated difference in the costs is $9.99 more than the exact difference. What are the cost of the items? $2.50 and $2.69
ASSIGNMENT GUIDE
Basic Course
Average Course
Day 1: pp. 132-133 Exs. 10-29, 31-40
Advanced Course
Day 1: pp. 132-133 Exs. 12-19, 23-38, 40
Block
pp. 132-133 Exs. 10-29, 31-40
(extra 3.6)

EXTRA PRACTICE
• Student Edition, p. 710
• Chapter 3 Resource Book, pp. 46-48
• Test and Practice Generator

TRANSPARENCY
Even-numbered answers are available on transparencies.

HOMEWORK CHECK
When you review students' homework for this lesson, go over the following exercises to check understanding of key concepts.
Basic: 6, 10, 13, 19, 21
Average: 11, 14, 19, 22, 23
Advanced: 12, 15, 19, 24, 25

28. 4 mi; high; the estimate of the dividend is an overestimate.

Getting Ready to Practice
1. Vocabulary Identify the front-end digits of $11.2$ and $5.86$. 1 and 5
Use rounding to estimate the sum or difference.
2. $2.6 + 6.9$ 12
3. $12.43 + 5.8$ 18
4. $15.5 - 14.7$ 1
5. Guided Problem Solving A table is 73.66 centimeters tall. An igniter cage on the table is 75.2 centimeters tall. Estimate to decide whether they will fit beneath a shelf that is 157.16 centimeters off the floor.
(a) Draw a diagram of the situation. Check drawings.
(b) Estimate the height of the table and the cage combined. 190 cm
(c) Compare the combined heights to the height of the shelf. 190 centimeters is less than 157.16 centimeters, so they will fit beneath the shelf.

Practice and Problem Solving
Use rounding to estimate the sum or difference.

A
6. $9.7 + 8.4$ 18
7. $9.3 + 3.8$ 12
8. $9.3 - 6.9$ 2
9. $7.2 - 4.6$ 2
10. $10.64 + 7.94$ 18
11. $2.25 + 0.93$ 1
12. $12.81 - 1.92$ 11
13. $10.72 - 2.85$ 1
14. $15.99 + 3.06$ 10
15. $12.38 + 12.53$ 25
16. $20.2 - 10.31$ 16
17. $9.1 - 8.8$ 0

Critical Thinking Estimate the change you will receive and tell what the estimate is high or low. Explain.
18. You buy several postcards totaling $3.82. You give the clerk $10.00. $6.00, rem. $3.82 was rounded up.
19. You buy a bag of pretzels for $1.15. You give the cashier $5.00. $4.00, high; $1.15 was rounded down.

Use front-end estimation to estimate the sum.

20. $4.79 + 5.16 + 8.08$ 21
21. $6.23 + 4.75 + 3.91$ 22
22. $4.5 + 8.92 + 9.21$ 18
23. $0.46 + 3.22 + 2.58$ 24
24. $5.55 + 7.19 + 4.49$ 25
26. $6.31 + 2.5 + 1.93$ 12
26. Find the Error Describe and correct the error in the estimate.

Sample answer:
The sum of the front-end digits is $55, not $66$. The correct estimate is $55 = 56$.
Getting Ready to Practice

1. Vocabulary: Identify the front-end digits of $12.34$ and $5.678$. 1 and 5

Use rounding to estimate the sum or difference.

2. $2.6 + 3.12 = 5.72$
3. $3.12 + 5.8 = 8.92$
4. $4.15 - 1.7 = 2.45$

5. Guided Problem Solving: A table is 73.66 centimeters tall. An igna
cage on the table is 76.2 centimeters tall. Estimate to decide whether
they will fit beneath a shelf that is 157.16 centimeters off the floor.

(i) Draw a diagram of the situation. Check drawings.
(ii) Estimate the height of the table and the cage combined. 180 cm
(iii) Compare the combined heights to the height of the shelf. 110 centimeters is less than 157.16 centimeters, so they will fit beneath the shelf.

Practice and Problem Solving

6. $9.7 + 8.4 = 18.1$
7. $9.5 + 3.8 = 1.2$
8. $9.5 - 6.9 = 2.6$
9. $7.2 - 6.2 = 1.0$
10. $10.06 - 3.74 = 11.25$
11. $2.25 + 0.93 = 4.18$
12. $12.81 - 1.92 = 11.89$
13. $10.92 - 2.85 = 8.07$
14. $15.99 + 3.46 = 19.45$
15. $12.38 + 12.86 = 25.24$
16. $20.02 - 10.31 = 9.71$
17. $9.1 - 8.88 = 0.22$

Critical Thinking: Estimate the change you will receive and tell whether the estimate is high or low. Explain.

18. You buy cereal for $3.82. You give the clerk $10.00. Your change is $6.18. Your estimate was rounded up. Your total was $3.82, and you give the cashier $10.00. Your change is $6.18. Your estimate was rounded up. Your change is $6.18.

Use front-end estimation to estimate the sum.

19. $4.79 + 5.16 + 8.01 = 18.06$
20. $6.23 + 4.75 + 3.91 = 14.99$
21. $4.5 + 8.92 + 9.21 = 22.63$
22. $5.46 + 3.22 + 2.58 = 11.26$
23. $5.55 + 7.19 + 4.49 = 17.23$
24. $6.31 + 2.5 + 1.93 = 10.74$

Basic Skills: Find the sum or difference.

25. $10.75 + 1.25 = 12.00$
26. $10.75 + 1.25 = 12.00$
27. $36.90 + 4.20 = 41.10$
28. $29.8 + 1.35 = 31.15$

Test-Taking Practice

40. Extended Response: You have $25 to buy prizes for a game. The table shows the prices and their prices. Use rounding to estimate the total cost and decide if this estimate is high or low. Then use front-end estimation to find the total cost. Which method is better when you have a fixed amount of money to spend? Explain. See margin.
Warm-Up Exercises

For use before Lesson 3.5, pages 129–133

Estimate the sum or difference.

1. $532 + 789$
2. $1287 - 433$
3. $7408 - 3276$
4. $6992 + 2131$

5. The school sold $394$ worth of adult tickets and $128$ worth of student tickets for the school talent show. About how much money did the school make selling tickets?

Daily Homework Quiz

For use after Lesson 3.4, pages 124–128

Round each number to the indicated place value.

1. Round $12.087$ to the nearest hundredth.
2. Round $35.951$ to the nearest tenth.
3. Round $0.0509$ to its leading digit.
4. Round $20.501745$ to the nearest ten-thousandths.
5. Round $4,575,428$ to the nearest hundred thousand. Then write the rounded number as a decimal number of millions.

ANSWERS

Warm-Ups: 1. 1300 2. 900 3. 4000 4. 9000 5. About $500$

Daily Homework Quiz: 1. 12.09 2. 36.0 3. 0.05 4. 20.5017
5. 4,600,000; 4.6 million
Decimal Estimation

You estimated sums and differences of whole numbers.  
You’ll estimate sums and differences of decimals.  
So you can estimate change you’ll receive, as in Exs. 18 and 19.

In the Real World

Sports  The table shows the number of people, in millions, who participated in five sports in a recent year. About how many people played soccer? About how many more females participated in bicycling than in golf?

One way to estimate a sum or a difference is to use rounding.

<table>
<thead>
<tr>
<th>Sports Participation (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>Bicycling</td>
</tr>
<tr>
<td>Golf</td>
</tr>
<tr>
<td>Hiking</td>
</tr>
<tr>
<td>Soccer</td>
</tr>
<tr>
<td>Swimming</td>
</tr>
</tbody>
</table>

Example 1

Estimating Sums and Differences

a. To estimate the answer to the first real-world question above, round each decimal to the nearest whole number. Then add.

\[
\begin{align*}
8.2 & \rightarrow 8 \quad \text{Round 8.2 down to 8.} \\
+ 4.9 & \rightarrow +5 \quad \text{Round 4.9 up to 5.} \\
\hline
13 & \quad \text{ANSWER About 13 million people played soccer.}
\end{align*}
\]

b. To estimate the answer to the second real-world question above, round each decimal to the nearest whole number. Then subtract.

\[
\begin{align*}
20.6 & \rightarrow 21 \quad \text{Round 20.6 up to 21.} \\
- 5.7 & \rightarrow -6 \quad \text{Round 5.7 up to 6.} \\
\hline
15 & \quad \text{ANSWER About 15 million more females participated in bicycling than in golf.}
\end{align*}
\]

Your Turn Now

Use the information provided at the top of the page.

1. Estimate the total number of people who participated in hiking.
2. Estimate how many more males participated in swimming than in golf.
**Example 2**  Predicting Results

**Shopping** You buy a T-shirt that costs $9.21. You give the clerk $20.00. Estimate your change. Is this estimate high or low?

\[
\begin{align*}
\text{$20.00$} & \rightarrow \text{Round $9.21$ down to $9$.} \\
- \text{$9.21$} & \rightarrow \text{Round $9.21$ down to $9$.}
\end{align*}
\]

**Answer** Your change is about $11. This estimate is high because you subtracted too little by rounding $9.21$ down to $9$.

**Front-End Estimation** You can also estimate sums using front-end estimation. You add the front-end digits to get a low estimate. Then you use the remaining digits to adjust the sum and get a closer estimate.

**Example 3**  Using Front-End Estimation

**Groceries** You have $10 to buy bread, milk, and cereal. If you have enough money, you would like to buy popcorn. The prices of these items are shown. Do you have enough money to buy popcorn?

**Solution**

Find the sum of all the prices, including the price of the popcorn.

\[
\begin{align*}
\text{(1) Add the front-end digits: the dollars.} \\
\text{(2) Estimate the sum of the remaining digits: the cents.} \\
\text{(3) Add your results.}
\end{align*}
\]

\[
\begin{align*}
\text{Grocery List} & \quad \text{bread} & \quad \$1.79 \\
& \quad \text{milk} & \quad \$2.18 \\
& \quad \text{cereal} & \quad \$3.34 \\
& \quad \text{popcorn} & \quad \$3.65
\end{align*}
\]

\[
\begin{align*}
\text{\$1.79} & \rightarrow \text{\$1.79} \\
\text{\$2.18} & \rightarrow \text{\$2.18} \\
\text{\$3.34} & \rightarrow \text{\$3.34} \\
\text{\$3.65} & \rightarrow \text{\$3.65} \\
\text{\$9} & \rightarrow \text{\$9} \\
\text{\$2} & \rightarrow \text{\$2} \\
\text{\$11} & \rightarrow \text{\$11}
\end{align*}
\]

**Answer** You do not have enough money to buy popcorn.

**Your turn now**  Use front-end estimation to estimate the sum.

3. \[6.42 + 7.64 + 3.94 + 2.21\]  
4. \[8.59 + 1.37 + 2 + 6.12\]

5. How can you estimate the difference in Example 2 so that your answer is a low estimate?
Getting Ready to Practice

1. Vocabulary  Identify the front-end digits of $1.12$ and $5.86$.

Use rounding to estimate the sum or difference.

2. $2.6 + 8.9$  
3. $12.43 + 5.8$  
4. $15.5 - 14.7$

5. Guided Problem Solving  A table is $73.66$ centimeters tall. An iguana cage on the table is $76.2$ centimeters tall. Estimate to decide whether they will fit beneath a shelf that is $157.16$ centimeters off the floor.

(1) Draw a diagram of the situation.
(2) Estimate the height of the table and the cage combined.
(3) Compare the combined heights to the height of the shelf.

Practice and Problem Solving

Use rounding to estimate the sum or difference.

6. $9.7 + 8.4$  
7. $8.3 + 3.8$  
8. $9.3 - 6.9$

9. $7.2 - 4.6$  
10. $10.64 + 7.49$  
11. $2.25 + 0.93$

12. $12.81 - 1.92$  
13. $10.72 - 2.85$  
14. $15.99 + 3.4$

15. $12.38 + 12.8$  
16. $20.2 - 10.31$  
17. $9.1 - 8.98$

Critical Thinking  Estimate the change you will receive and tell whether the estimate is high or low. Explain.

18. You buy several postcards totaling $3.82$. You give the clerk $10.00$.
19. You buy a bag of pretzels for $1.15$. You give the cashier $5.00$.

Use front-end estimation to estimate the sum.

20. $4.79 + 5.16 + 8.08$  
21. $6.23 + 4.75 + 3.91$  
22. $4.5 + 8.92 + 9.21$

23. $6.46 + 3.22 + 2.58$  
24. $5.55 + 7.19 + 4.49$  
25. $6.31 + 2.5 + 1.93$

26. Find the Error  Describe and correct the error in the estimate.

\[
\begin{array}{c}
\text{\$4.79} \xrightarrow{\text{\$1}} \text{\$6} \\
+ \text{\$1.22} \xrightarrow{\text{\$1}} \text{\$7}
\end{array}
\]
Extended Problem Solving  The Seven Summits are the highest mountain peaks on each of the seven continents. The heights of the summits are shown in the table. Use the table in Exercises 27–29.

27. Order the heights of the mountains from least to greatest. Then find the median of the heights.

28. Estimate the mean of the heights. Is your estimate high or low? Explain.

29. Critical Thinking Which of your answers in Exercises 27 and 28 is more representative of the heights? Explain.

30. Challenge How can you use rounding to overestimate the sum of two numbers? the difference of two numbers? How can you use rounding to underestimate the sum of two numbers? the difference of two numbers? Explain and show examples.

<table>
<thead>
<tr>
<th>Mountain</th>
<th>Height (miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mount Elbrus (Europe)</td>
<td>3.5</td>
</tr>
<tr>
<td>Mount Kosciusko (Australia)</td>
<td>1.38</td>
</tr>
<tr>
<td>Mount Aconcagua (South America)</td>
<td>4.33</td>
</tr>
<tr>
<td>Mount Everest (Asia)</td>
<td>5.50</td>
</tr>
<tr>
<td>Mount Kilimanjaro (Africa)</td>
<td>3.7</td>
</tr>
<tr>
<td>Mount McKinley (North America)</td>
<td>3.85</td>
</tr>
<tr>
<td>Vinson Massif (Antarctica)</td>
<td>3.04</td>
</tr>
</tbody>
</table>

Mixed Review

Evaluate the expression when \( x = 2 \) and \( y = 3 \). (Lesson 1.5)

31. \( x + 14 \)  
32. \( 9y \)  
33. \( x + y \)  
34. \( y + x \cdot y \)

Round the decimal as specified. (Lesson 3.4)

35. 17.8023 (nearest thousandth)  
36. 4.79663 (nearest hundredth)

Basic Skills  Find the sum or difference.

37. \$10.75 + \$1.25 \  
38. \$9.80 + \$4.20 \  
39. \$2.85 - \$1.35 \  

Test-Taking Practice

40. Extended Response  You have \$25 to buy prizes for a game. The table shows the prizes and their prices. Use rounding to estimate the total cost and decide if this estimate is high or low. Then use front-end estimation to find the total cost. Which method is better when you have a fixed amount of money to spend? Explain.

<table>
<thead>
<tr>
<th>Prize</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>yo-yo</td>
<td>$1.48</td>
</tr>
<tr>
<td>bear</td>
<td>$9.46</td>
</tr>
<tr>
<td>sunglasses</td>
<td>$1.07</td>
</tr>
<tr>
<td>magic tricks</td>
<td>$5.91</td>
</tr>
<tr>
<td>set of books</td>
<td>$8.00</td>
</tr>
</tbody>
</table>
Lesson Plan

1-day lesson (See Pacing and Assignment Guide, TE page 104A)
For use with pages 134–141

GOAL
Add and subtract decimals.

State/Local Objectives

✓ Check the items you wish to use for this lesson.

STARTING OPTIONS

Homework Check (3.5): TE page 132; Answer Transparencies
Homework Quiz (3.5): TE page 133; Transparencies
Warm-Up: Transparencies

TEACHING OPTIONS

Notetaking Guide
Problem Solving Strategies: SE pages 134–135
Activity Support Master: CRB pages 7–8
Examples: 1–4, SE pages 136–138
Extra Examples: TE pages 137–138
Your Turn Now Exercises: 1–5, SE page 137
Concept Check: TE page 138
Getting Ready to Practice Exercises: 1–8, SE page 138
Technology Activity: SE page 141

APPLY/HOMEWORK

Homework Assignment


Reteaching the Lesson

Practice: CRB pages 54–56 (Level A, Level B, Level C); Practice Workbook
Study Guide: CRB pages 57–58; Spanish Study Guide

Extending the Lesson

Real-World Problem Solving: CRB page 59
Challenge: SE page 140; CRB page 60

ASSESSMENT OPTIONS

Daily Quiz (3.6): TE page 140 or Transparencies
Test Taking Practice: SE page 140
Quiz (3.4–3.6): SE page 143; Assessment Book page 30

Notes

52 Middle School Math, Course 1
Chapter 3 Resource Book
Adding and Subtracting Decimals

**Lesson Objective**
Add and subtract decimals.

**Pacing**
Suggested Number of Days
Basic Course: 1 day
Average Course: 1 day
Advanced Course: 1 day
Block: 0.5 block with 3.5

**Teaching Resources**
For a complete list of Teaching Resources, see page 1048.

**Transparency**
Warm-Up Exercises for this lesson are available on a transparency. A support transparency is available for the Activity.

**Teach**

**Motivating the Lesson**
Expand upon the activity by having students use base-ten pieces to model decimal subtraction.

**Activity**
Goal: Add decimals.
Key Discovery: Base-ten pieces can help you with regrouping when you add decimals.

**Example**

### Adding and Subtracting Decimals

You can use base-ten pieces to model decimal addition.

1. 1.15 and 0.95, combine the pieces.
2. Combine the pieces.
3. Use base-ten pieces to find the sum.

**Example 1**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 9.8 + 2.12</td>
<td>b. 8 - 1.65</td>
</tr>
<tr>
<td>9.8</td>
<td>8</td>
</tr>
<tr>
<td>+2.12</td>
<td>-1.65</td>
</tr>
<tr>
<td>11.92</td>
<td>6.35</td>
</tr>
</tbody>
</table>

**NCTM Curriculum Standards**

- Standard 6: Solve problems in math and other contexts
- Standard 10: Create representations to communicate mathematical ideas
Adding and Subtracting Decimals

**Example 1** Adding and Subtracting Decimals

You can add or subtract decimals by aligning the decimal points. Then add or subtract as with whole numbers and bring down the decimal point.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>9.8 + 2.12</td>
</tr>
<tr>
<td></td>
<td>9.80</td>
</tr>
<tr>
<td></td>
<td>+ 2.12</td>
</tr>
<tr>
<td></td>
<td>11.92</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>8 − 1.65</td>
</tr>
<tr>
<td></td>
<td>8.00</td>
</tr>
<tr>
<td></td>
<td>− 1.65</td>
</tr>
<tr>
<td></td>
<td>6.35</td>
</tr>
</tbody>
</table>

**Example 2** Evaluating Algebraic Expressions

Evaluate $20 - x$ when $x = 4.71$

$20 - x = 20 - 4.71$

Substitute 4.71 for $x$.

$= 15.29$

**Your turn now** Evaluate the expression when $x = 5.82$ and $y = 9.1$.

1. $4.7 + x$ $10.2$
2. $12.56 - y$ $3.46$
3. $y - x$ $3.21$

**Example 3** Using Mental Math to Add Decimals

Bakery: Find the total cost for a sweet roll that costs $1.30, two hard rolls that cost $1.20 each, and a coffee cake that costs $3.70.

List the prices: $1.30$需转为头和尾, $1.20$ 需转为头和尾, $3.70$

Rearrange the prices and group them:

- $1.30$
- $1.20$ pairs of rolls, $3.70$

Add $1.30 + 2.40 = 3.70$

**Answer**: The bakery goods will cost $7.40.

**Mental Math**: In Example 3, you rearranged numbers and grouped them. The properties that allow you to do this are shown below.

**Properties of Addition**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commutative Property</td>
<td>You can add numbers in any order.</td>
</tr>
<tr>
<td>Associative Property</td>
<td>The value of a sum does not depend on how the numbers are grouped.</td>
</tr>
</tbody>
</table>

**Example 4** Commutative Property: $a + b = b + a$

- Numbers: $2 + 5 = 5 + 2$
- Algebra: $a + b = b + a$

**Example 5** Associative Property: The value of a sum does not depend on how the numbers are grouped.

- Numbers: $(2 + 5) + 4 = 2 + (5 + 4)$
- Algebra: $(a + b) + c = a + (b + c)$

**Your turn now** Tell which property is illustrated. Then find the sum.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>9.3 + 2.0 = 9.3</td>
</tr>
<tr>
<td>b</td>
<td>(6.4 + 4.8) + 5.2 = 6.4 + (4.8 + 5.2)</td>
</tr>
</tbody>
</table>

- Commutative property: 12.2
- Associative property: 18.4

**Tips for New Teachers**

Students can use ruled paper to help them with vertical alignment of decimal points and digits that have the same place value. See Tips for New Teachers in the Chapter 3 Resource Book.

**Extra Examples**

- Example 1 Find the sum and the difference.
  - a. $3.286 + 4.51 = 7.796$
  - b. $15.2 - 2.08 = 12.92$

- Example 2 Evaluate $15.5 - y$ when $y = 12.719$.

- Example 3 Use mental math to find the total cost of two notebooks at $1.45 each, two pads at $5.55 each, and one box of pencils at $2.75. The total cost is $9.75.

**Multiple Representations**

Base-ten pieces can help students understand the regrouping that occurs when they add decimals.

**Math Reasoning**

Just as students use specific numbers to calculate $2 + 5$ and $5 + 2$ and explore the pattern of the Commutative Property of Addition, they can look at specific examples such as $5 - 2$ and $2 - 5$ to see that there cannot be a commutative property for subtraction.
**Example 4**
A jar of change holds $5.78 in quarters, dimes, nickels, and pennies. One morning you took out coins whose value was $2.30, and in the evening you put in coins whose value was $1.57. What is the new value of the change in the jar? $5.05

**Concept Check**
You are going to add the decimals 12.357, 0.782, and 5.069. Which digits would align under the digit "5" in 12.357? Add the decimals. 0 and 6, 235.626

**Daily Puzzler**
Two sides of a triangle are the same length and one side is a different length. If the lengths are 12.65 centimeters and 8.19 centimeters, how many values are possible for the perimeter of the triangle? List all the possible values. 2 values, 33.49 cm or 29.03 cm

**Example 4**
**Writing a Model**
Banking: You have a balance of $141.82 in an account. You withdraw $37 and then deposit a check for $41.93. What is the new balance?

**Solution**
Write a verbal model to help you find the new balance.
New balance = Beginning balance - Withdrawal + Deposit
= 141.82 - 37 + 41.93
= 137.75

**Check**
Use estimation to check that your answer is reasonable. Round $141.82 to $142 and $41.93 to $42. Because $142 - 30 + 42 = 154$, the answer is reasonable.

**Getting Ready to Practice**
1. Vocabulary. According to the I. property, you can add numbers in any order. commutative

Find the sum or difference.
2. 3.6 + 1.98 = 5.58
3. 6.54 + 12.1 = 18.64
4. 9.8 - 7.96 = 1.84
5. 4 - 0.25 = 3.75

Tell which property is illustrated.
6. 3.8 + 4.1 = 4.1 + 3.8
7. (3.1 + 2.1) + 9 = 3.1 + (2.1 + 9)

Guided Problem Solving
The Metro heavy rail system in Washington, D.C., has 198.7 miles of track. Cleveland's RTA has 96.7 miles of track. Boston's MBTA has 107.7 miles of track. How many more miles of track does the Metro have than the RTA and the MBTA combined?

(1) Write a verbal model of the problem.
Number of miles = Metro miles - (RTA miles + MBTA miles)

(2) Use the model to solve the problem.

(3) Check your answer using estimation.
200 - (60 + 50) = 200 - 100 = 100, so the answer is reasonable.
**Example 4 Writing a Model**

**Banking** You have a balance of $141.82 in an account. You withdraw $30 and then deposit a check for $41.93. What is the new balance?

**Solution**

Find the new balance.

\[ \text{Balance} = \text{Beginning Balance} - \text{Withdrawal} + \text{Deposit} \]

\[ = 141.82 - 30 + 41.93 \]

\[ = 112.75 \]

**Answer** The new balance is $112.75.

**Check** Use estimation to check that your answer is reasonable.

Round $141.82 to $142 and $41.93 to $42. Because $142 - 30 + 42 = 154$, the answer is reasonable.

---

**Practice and Problem Solving**

Find the sum or difference.

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>5.56 + 3.7</td>
<td>67.10</td>
<td>2.88 + 6.7</td>
<td>95.13</td>
<td>16.2</td>
<td>8.34</td>
</tr>
<tr>
<td>12</td>
<td>16.4</td>
<td>61.8</td>
<td>8.95</td>
<td>14.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>4.09 + 5.87</td>
<td>14.8</td>
<td>7.38</td>
<td>4.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>16.18</td>
<td>17.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>76.12</td>
<td>3.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>19.34</td>
<td>6.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>14.12</td>
<td>2.78</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>20.12</td>
<td>6.3</td>
<td>8.68</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Algebra** Evaluate the expression when \( x = 2.4 \) and \( y = 8.75 \).

\[ 21.5 \times 2.4 + 8.72 \]

\[ 22 \times 7.5 + 10.25 \]

\[ 23 \times 3.01 + 5.74 \]

**Mental Math** Tell which property is being illustrated. Then use mental math to evaluate the expression in red.

27. \( (9.5 + 4.9) + 5.1 = 9.5 + (4.9 + 5.1) \) (associative property)

28. \( 4.2 + (2.8 + 11.95) = (4.2 + 2.8) + 11.95 \) (associative property)

29. \( 1.5 + (1.7 + 3.5) = 1.5 + (3.5 + 1.74) \) (commutative property)

30. \( 3.7 + 8.9 = 8.9 + 3.7 \) (commutative property)

**Estimation** Solve the problem. Use estimation to check that your answer is reasonable.

31. **Dining Out** Your meal at a restaurant costs $52.29. Your guest’s meal costs $49.95. You give the cashier $150. How much change should you get?

32. **Banking** You have $554 in your savings account. You withdraw $22.75 and deposit $550. What is the new balance? $1552.25

**Orienteering**

In the sport of orienteering, people use maps and compasses to find their way from point to point along an unfamiliar outdoor course. The table shows the average of the best scores of the top five women orienters in the world at one time.

<table>
<thead>
<tr>
<th>Orienter</th>
<th>Average of Best Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simone Luder</td>
<td>1422.75</td>
</tr>
<tr>
<td>Hanne Staff</td>
<td>1394.6</td>
</tr>
<tr>
<td>Reeta Rokkel</td>
<td>1389.75</td>
</tr>
<tr>
<td>Yumi Reiwa-Saito</td>
<td>1375.25</td>
</tr>
<tr>
<td>Heather Mono</td>
<td>1362.5</td>
</tr>
</tbody>
</table>

**Lesson 3.6 Adding and Subtracting Decimals**
**ASSESS**

**ASSESSMENT RESOURCES**
For more assessment resources, see:
- Assessment Book
- Test and Practice Generator

**MINI-QUIZ**
1. Find each sum or difference.
   a. $22 - 13.57 = 8.43$
   b. $31.05 - 18.68 = 12.37$
   c. $8.07 + 19.1 = 27.17$
   d. $53.176 + 23.05 = 76.226$

2. What is the value of $17 - x$ when $x = 15.017$? When $x = 3.788$?
   a. $1.95$
   b. $13.212$

3. Your sister owes you $7.50. She pays you $5.75 and then borrows $2.30. What does she owe you now? $4.65$

**FOLLOW-UP**

**RETEACHING/REMEDIATION**
- Study Guide in Chapter 3 Resource Book, pp. 57-58
- Tutor Place, Whole Numbers and Decimals Cards 6, 19
- Tutor Plus Online
- Extra Practice, p. 710
- Lesson Practice in Chapter 3 Resource Book, pp. 54-56

**CHALLENGE/ENRICHMENT**
- Challenge Practice in Chapter 3 Resource Book, p. 60
- Teacher's Edition, p. 104F

**ENGLISH LEARNER SUPPORT**
- Spanish Study Guide
- Multi-Language Glossary
- Chapter Audio Summaries CDs

41. See Additional Answers beginning on page AA1.

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**GEOMETRY**
Find the perimeter of the triangle.

35. $3.5 \text{ cm}$
36. $21.65 \text{ mm}$
37. $1.24 \text{ m}$
38. $5.17 \text{ cm}$
39. $6.5 \text{ mm}$
40. $5.17 \text{ mm}$

---

**CRITICAL THINKING**
Follow the order of operations to evaluate the expressions $(9.5 - 3.5) - 3.2$ and $9.5 - (3.5 - 3.2)$. Based on your results, decide whether subtraction is associative.

---

**Astronauts**
On a space shuttle mission, astronauts are allowed 1.5 pounds of personal items. The table shows the weights of some possible items.

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 rolls of pennies</td>
<td>1.17</td>
</tr>
<tr>
<td>1 golf ball</td>
<td>0.98</td>
</tr>
<tr>
<td>1 watch</td>
<td>0.99</td>
</tr>
<tr>
<td>1 college sweater</td>
<td>0.75</td>
</tr>
<tr>
<td>1 whale</td>
<td>1.21</td>
</tr>
<tr>
<td>1 camera</td>
<td>0.82</td>
</tr>
</tbody>
</table>

---

**Challenge**
What is the maximum number of different items an astronaut could bring from the list? What are they? What is their total weight? 4 rolls of pennies, 1 golf ball, 1 watch, and a 1.316 pounds college sweater. Total weight: 1.98 pounds.

---

**Mixed Review**

41. Make a frequency table of the data. (Lesson 2.4) See margin.

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2, 1.4, 1.6</td>
<td>1</td>
</tr>
<tr>
<td>3, 3.5, 4.1</td>
<td>2</td>
</tr>
<tr>
<td>4.2, 4.5, 5.1</td>
<td>3</td>
</tr>
</tbody>
</table>

42. Camping
According to the graph, which camping activity was favored by the least number of people surveyed? (Lesson 2.7) Hiking

**Basic Skills**
Find the product.
43. $12 \times 16 = 192$
44. $30 \times 15 = 450$
45. $54 \times 16 = 864$
46. $23 \times 74 = 1712$

**Test-Taking Practice**

47. Multiple Choice: Evaluate the expression $12.4 - 2.95 + 24.6$.
   A. 42.45
   B. 39.95
   C. 34.65
   D. 34.75

48. Short Response: You buy one video tape for $19.95 and rent one for $4.29. The sales tax is $1.45. How much change should you receive if you give the cashier $30? Explain how you solved the problem. $4.21. Add $19.95, $4.29, and $1.45; then subtract this sum from 30.00.
Warm-Up Exercises
For use before Lesson 3.6, pages 134-141

Evaluate the expression when $x = 8$ and $y = 3$.

1. $12 + x$  
2. $y - 1$  
3. $x + y$  
4. $21 - x$

5. Find the perimeter of a triangle with side lengths of 4 inches, 3 inches, and 5 inches.

Daily Homework Quiz
For use after Lesson 3.5, pages 129-133

Round each value to the nearest whole number to estimate each sum or difference.

1. $5.73 + 12.84 + 3.15$  
2. $25.33 - 9.82$  
3. $14 - 7.61$

4. In Exercise 3, is the estimate high or low? Explain.

5. For $2.25 + 6.87 + 3.72 + 4.09$, what sum do you get from adding just the front-end digits? What adjustment do you get from adding just the remaining digits?

ANSWERS

Warm-Ups: 1. 20  
2. 2  
3. 11  
4. 13  
5. 12 inches

Daily Homework Quiz: 1. 22  
2. 15  
3. 6  
4. The estimate is low. The number 7.61 was rounded up to 8, so the estimate subtracted a larger number than the exact value.  
5. 15; 2
Adding and Subtracting Decimals

Before
You added and subtracted whole numbers.

Now
You'll add and subtract decimals.

Why?
So you can find account balances, as in Example 4.

Activity
You can use base-ten pieces to model decimal addition.

To find the sum of 1.15 and 0.95, combine the pieces.

1. Model the numbers using base-ten pieces.

2. Combine the pieces.

3. Trade 10 tenths for 1 one and 10 hundredths for 1 tenth.

\[ 1.15 + 0.95 = 2.1 \]

Use base-ten pieces to find the sum.

1. 2.1 + 0.9
2. 1.5 + 0.8
3. 2.23 + 1.89

To add and subtract decimals, line up the decimal points. Then add or subtract as with whole numbers and bring down the decimal point.

Help with Solving
You can add zeros following the last digit to the right of the decimal point to help you line up the decimal points.

Example 1
Adding and Subtracting Decimals

a. \[ 9.8 + 2.12 \]
   \[
   \begin{array}{c}
   9.80 \\
   \hline
   + 2.12 \\
   \hline
   11.92
   \end{array}
   \]

b. \[ 8 - 1.65 \]
   \[
   \begin{array}{c}
   8.00 \\
   \hline
   - 1.65 \\
   \hline
   6.35
   \end{array}
   \]
**Example 2** Evaluating Algebraic Expressions

Evaluate \(20 - x\) when \(x = 4.71\).

\[
20 - x = 20 - 4.71 \quad \text{Substitute 4.71 for } x.
\]

\[
= 15.29
\]

**Your turn now** Evaluate the expression when \(x = 5.82\) and \(y = 9.1\).

1. \(4.7 + x\)
2. \(12.56 - y\)
3. \(y - x\)

**Example 3** Using Mental Math to Add Decimals

**Bakery** Find the total cost for a sweet roll that costs $1.30, two hard rolls that cost $1.20 each, and a coffee cake that costs $3.70.

<table>
<thead>
<tr>
<th>List the prices:</th>
<th>$1.30</th>
<th>$1.20</th>
<th>$1.20</th>
<th>$3.70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rearrange the prices and group pairs of prices.</td>
<td>$1.30</td>
<td>$3.70</td>
<td>$1.20</td>
<td>$2.40</td>
</tr>
</tbody>
</table>

**Answer** The bakery goods will cost $7.40.

**Mental Math** In Example 3, you rearranged numbers and grouped them. The properties that allow you to do this are shown below.

**Properties of Addition**

**Commutative Property** You can add numbers in any order.

- **Numbers** \(2 + 5 = 5 + 2\)
- **Algebra** \(a + b = b + a\)

**Associative Property** The value of a sum does not depend on how the numbers are grouped.

- **Numbers** \((2 + 5) + 4 = 2 + (5 + 4)\)
- **Algebra** \((a + b) + c = a + (b + c)\)

**Your turn now** Tell which property is illustrated. Then find the sum.

4. \(9.3 + 2.9 = 2.9 + 9.3\)
5. \((6.4 + 4.8) + 5.2 = 6.4 + (4.8 + 5.2)\)
**Example 4** Writing a Model

**Banking** You have a balance of $141.82 in an account. You withdraw $30 and then deposit a check for $41.93. What is the new balance?

**Solution**

Write a verbal model to help you find the new balance.

\[
\text{New balance} = \text{Beginning balance} - \text{Withdrawal} + \text{Deposit}
\]

\[
= 141.82 - 30 + 41.93 \\
= 111.82 + 41.93 \\
= 153.75
\]

**ANSWER** The new balance is $153.75.

**Check** Use estimation to check that your answer is reasonable.
Round $141.82 to $142 and $41.93 to $42. Because

\[142 - 30 + 42 = 154\]

the answer is reasonable.

---

### 3.6 Exercises

More Practice, p. 710

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**Getting Ready to Practice**

1. **Vocabulary** According to the ? property, you can add numbers in any order.

**Find the sum or difference.**

2. \(3.6 + 1.89\)  
3. \(6.54 + 12.1\)  
4. \(9.8 - 7.96\)  
5. \(4 - 0.25\)

**Tell which property is illustrated.**

6. \(3.8 + 4.1 = 4.1 + 3.8\)  
7. \((3.1 + 2.1) + 9 = 3.1 + (2.1 + 9)\)

8. **Guided Problem Solving** The Metro heavy rail system in Washington, D.C., has 198.7 miles of track. Cleveland's RTA has 46.7 miles of track. Boston's MBTA has 107.7 miles of track. How many more miles of track does the Metro have than the RTA and the MBTA combined?

   1. Write a verbal model of the problem.
   2. Use the model to solve the problem.
   3. Check your answer using estimation.
## Practice and Problem Solving

### Find the sum or difference.

9. \(5.56 + 3.7\)  
10. \(2.88 + 6.7\)  
11. \(16.2 + 8.34\)  
12. \(18.4 + 1.6\)  
13. \(4.091 + 5.87\)  
14. \(3.781 + 4.19\)  
15. \(5.56 - 2.3\)  
16. \(7.42 - 3.2\)  
17. \(6.18 - 1.71\)  
18. \(9.14 - 6.64\)  
19. \(4 - 1.24\)  
20. \(8 - 6.68\)

### Algebra
Evaluate the expression when \(x = 2.4\) and \(y = 8.75\).

21. \(4.52 + x\)  
22. \(y + 7.5\)  
23. \(y - 3.01\)  
24. \(6.48 - x\)  
25. \(x + y\)  
26. \(y - x\)

### Mental Math
Tell which property is being illustrated. Then use mental math to evaluate the expression in red.

27. \((9.5 + 4.9) + 5.1 = 9.5 + (4.9 + 5.1)\)
28. \(4.2 + (2.8 + 11.95) = (4.2 + 2.8) + 11.95\)
29. \(1.5 + (1.74 + 3.5) = 1.5 + (3.5 + 1.74)\)
30. \((3.7 + 8.9) + 6.3 = (8.9 + 3.7) + 6.3\)

### Estimation
Solve the problem. Use estimation to check that your answer is reasonable.

31. **Dining Out** Your meal at a restaurant costs \$5.29. Your guest’s meal costs \$4.95. You give the cashier \$15 for the two meals. How much change should you get?

32. **Banking** You have \$98 in your savings account. You withdraw \$5.50 and deposit \$22.75. What is the new balance?

### Orienteering

#### Orienteering

On a map an orienteer is using, the scale is 1 cm : 100 m. If the map of the course is 20 cm tall and 30 cm wide, what is the actual area of the course?

#### Orienteering In Exercises 33 and 34, use the table at the right.

In the sport of orienteering, people use maps and compasses to find their way from point to point along an unfamiliar outdoor course. The table shows the average of the best scores of the top five women orienteers in the world at one time.

33. How much greater was Simone Luder’s score than the next best score?

34. Find the range of the scores.

<table>
<thead>
<tr>
<th>Orienteer</th>
<th>Average of Best Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simone Luder</td>
<td>1422.75</td>
</tr>
<tr>
<td>Hanne Staff</td>
<td>1394.5</td>
</tr>
<tr>
<td>Reeta Kolkkala</td>
<td>1373.75</td>
</tr>
<tr>
<td>Vroni Koenig-Salmi</td>
<td>1371.25</td>
</tr>
<tr>
<td>Heather Monro</td>
<td>1362.5</td>
</tr>
</tbody>
</table>
Geometry  Find the perimeter of the triangle.

35.  \[ \text{Perimeter} = 6 + 7.5 + 7.5 = 21 \text{ cm} \]

36.  \[ \text{Perimeter} = 6.5 + 9.1 + 5.85 = 21.45 \text{ mm} \]

37.  \[ \text{Perimeter} = 3.075 + 4.1 + 5.125 = 12.3 \text{ m} \]

38.  Critical Thinking  Follow the order of operations to evaluate the expressions \((9.5 - 3.5) - 3.2\) and \(9.5 - (3.5 - 3.2)\). Based on your results, decide whether subtraction is associative.

39.  Astronauts  On a space shuttle mission, astronauts are allowed 1.5 pounds of personal items. The table shows the weights of some possible items.

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 rolls of pennies</td>
<td>1.12</td>
</tr>
<tr>
<td>5 golf balls</td>
<td>0.506</td>
</tr>
<tr>
<td>watch</td>
<td>0.09</td>
</tr>
<tr>
<td>college sweatshirt</td>
<td>0.75</td>
</tr>
<tr>
<td>whistle</td>
<td>0.125</td>
</tr>
<tr>
<td>camera</td>
<td>0.625</td>
</tr>
</tbody>
</table>

If an astronaut decides to bring 2 rolls of pennies and a watch on the mission, what other item from the list could the astronaut bring?

40.  Challenge  What is the maximum number of different items an astronaut could bring from the list? What are they? What is their total weight?

Mixed Review

41.  Make a frequency table of the data.  \((Lesson 2.4)\)

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

42.  Camping  According to the graph, which camping activity was favored by the least number of people surveyed?  \((Lesson 2.7)\)

Basic Skills  Find the product.

43.  \(12 \cdot 14\)

44.  \(30 \cdot 15\)

45.  \(54 \cdot 16\)

46.  \(23 \cdot 74\)

Test-Taking Practice

47.  Multiple Choice  Evaluate the expression \(12.4 - 2.35 + 24.6\).

A.  44.65  B.  39.35  C.  34.65  D.  34.75

48.  Short Response  You buy one video tape for $19.95 and rent one for $4.29. The sales tax is $1.45. How much change should you receive if you give the cashier $30? Explain how you solved the problem.