Chapter 3: Adding and Subtracting Decimals

Estimating Sums
You can often estimate sums of decimal numbers using whole numbers.

For example, 2.89 + 7.04 is close to 3 + 7, which is 10.

1. Estimate each sum.
   
a) 5.99 + 5.99 is about ______.    
d) 1.1 + 4.2 is about ______.

   b) 12.06 + 2.87 is about ______.    
e) 8 + 6.33 is about ______.

   c) 9.81 + 3.26 is about ______.    
f) 2.1 + 4 + 3.9 is about ______.

2. Circle the correct sum.
   
a) 14.8 + 6.1 = 0.209 or 2.09 or 20.9

   b) 2.69 + 8.92 = 1.161 or 11.61 or 116.1

   c) 25.07 + 0.88 = 2.595 or 25.95 or 259.5

   d) 0.2 + 0.7 = 0.9 or 9.0

3. Norman bought a tomato plant that was 9.3 cm tall. It grew 2.1 cm in the first week. How tall was his tomato plant after one week?

4. Grace had a ribbon that was 4.59 m long. She cut a piece that was 1.04 m to wrap a gift. How much ribbon did she have left?
5. Calculate each sum or difference.
   a) 8.22 + 4.93  
   d) 51.4 − 43.7  
   b) 4.9 − 1.2  
   e) 20.00 − 18.25  
   c) 3.99 + 8.99  
   f) 15.84 + 36.2  

6. Hillary bought a snack that cost $0.89.
   If she paid with a loonie, what was her change?

7. What is the change for a $12.65 purchase with a $20 bill?
3.3 Estimating Decimal Sums and Differences  Page 1
Student Book pages 88–91

Checking

1. This jar contains 1000 pennies. Each penny represents 0.001 of the pennies in the jar.

a) Estimate the sum of the 3 decimals given.
Using the “Exact Amount” thousandths grid, colour:
• the number of pennies on the chair (0.207) yellow
• the number of pennies in the car (0.096) green
• the number of pennies on the ground (0.188) purple

Using the “Estimation” thousandths grid, colour:
• your estimate of the number of pennies on the chair yellow
• your estimate of the number of pennies in the car green
• your estimate of the number of pennies on the ground purple

Write in your estimates and add them.
0.207 _______ thousandths
0.096 _______ thousandths
+0.188 + _______ thousandths
_______ thousandths

b) Use your answer for part a) to estimate the number of pennies found on the couch.
Look at your “Estimation” thousandths grid.
About how many more thousandths are left to fill the whole grid? _______
3.3 Estimating Decimal Sums and Differences

Practising

3. Write your estimate below the numbers and add/subtract.

(Circle) the exact total that is close to your estimate.

Hint: You can use a thousandths grid for the number after the decimal, but do not forget the whole number before the decimal in your final estimate.

a) \[2.77 + 6.29\]
Estimate: \[\_ + \_ = \_\]
9.06 10.06

b) \[0.699 + 0.319\]
Estimate: \[\_ + \_ = \_\]
1.018 1.218

c) \[2 - 0.499\]
Estimate: \[\_ - \_ = \_\]
0.501 1.501

d) \[23.698 - 9.777\]
Estimate: \[\_ - \_ = \_\]
12.921 13.921
3.3 Estimating Decimal Sums and Differences  Page 1

Student Book pages 88–91

GOAL

Estimate sums and differences with decimals.

You will need:

- hundredths grids
- pencil
- crayons

Norman found 100 pennies on the ground, in a car, on a couch, and on a chair. He collected the pennies in a jar.

![Image showing pennies in a jar with denominations]

How can you estimate the decimal for the portion of pennies found on the chair?

Each square on the hundredths grid represents 1 hundredth, or 0.01, of the pennies in the jar.

The sum of the 4 decimals for the 4 locations is 100 hundredths or 1.00.

<table>
<thead>
<tr>
<th>ground</th>
<th>car</th>
<th>couch</th>
<th>chair</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.46</td>
<td>0.14</td>
<td>0.22</td>
<td>?</td>
</tr>
</tbody>
</table>

Learning BLM 3.3: Estimating Decimal Sums and Differences
3.3 Estimating Decimal Sums and Differences

To estimate the sum of 3 known decimals, add close, but easier, numbers.

\[
\begin{align*}
0.46 & \quad 50 \text{ hundredths} \\
0.14 & \quad \_ \text{ hundredths} \\
+ 0.22 & \quad + \_ \text{ hundredths} \\
\_ \text{ hundredths}
\end{align*}
\]

The sum of the 3 known decimals is about \_

Subtract the sum of the 3 known decimals from 1.00.

\[
1.00 - \_ \_ = \_ \_ \_
\]

So, about \_ \_ \_ hundredths, or \_ \_ \_, of the pennies were found on the chair.

Reflecting

How did using an estimate of the 3 known amounts help you find the estimate of the pennies found on the chair?

How does using a hundredths grid help you to round decimals?
3.4 Adding Decimals Using Mental Math

Checking

1. Goldie's birth mass was 0.398 kg. She gained 0.079 kg.

   a) Is Goldie's new mass less than or greater than half a kilogram?
   
      Write half a kilogram in decimal form. ________
   
      Round Goldie's birth mass. ________
   
      Round the weight she gained. ________
   
      Do they add to greater than or less than half a kilogram? ________

   b) Calculate Goldie's new mass.

      Step 1: Colour 0.398 on the thousandths grid.

      Step 2: How many more thousandths are there to reach 0.400? ________

      Step 3: Subtract your answer in Step 2 from 0.400.

      0.400  \[ - \quad \]

      Step 4: Add this amount to 0.079.

      0.400  \[ - \quad \] (result from Step 2)

      +0.079

      ________  \[ - \quad ________ = \quad ________ \]

      What is Goldie's new mass? ________ kg
Practising

2. Calculate using mental math.
   a) $0.99 - 0.01$
   b) $1.998 - 0.002$
   $+ 0.77 + 0.77$
   $+ 0.378 + 0.378$

3. A diagram of a park is shown at the right.

   a) Calculate the distance around the park using mental math.

      Step 1: Calculate the total of $1.999 + 1.001$ using mental math.

      Step 2: Calculate the total of $2.499 + 2.002$ using mental math.

      Step 3: Calculate the sum of Step 1 and Step 2 using mental math.

      Step 4: What is the total distance around the park? ________

   b) How do you know that your answer is reasonable?

      ____________________________________________________________________
3.4 Adding Decimals Using Mental Math

Student Book pages 92–93

GOAL

Solve problems by using mental math to add decimals.

You will need:
- hundredths grids
- pencil
- crayons

Ami's dog, Bingo, had puppies.
Bingo's birth mass was 0.49 kg, and he gained 0.12 kg.

How can you calculate Bingo's new mass using mental math?

Step 1: Model 0.49 kg on a hundredths grid.
This step has been done for you.

Step 2: Look at the hundredths grid above.
How many squares need to be shaded to reach 0.50? _____
Hint: Remember each square represents 0.01.
How close is 0.49 to 0.50? _____
Colour in the number of squares needed to make 0.50.

Step 3: Add 0.12 kg, the mass that Bingo gained.

\[
0.50 - 0.01 \\
+ 0.22 \\
---- - 0.01 = \text{______}
\]

Bingo's new mass is ________ kg.
Reflecting

Ami knew that Bingo’s new mass was between half a kilogram (0.50 kg) and 1 kilogram (1.0 kg). How do you think she knew?

How is adding 0.49 and 0.22 like adding 49 and 22? How is it different?
3.5 Adding Decimals by Regrouping  Page 1

Student Book pages 94–97

Checking

1. Maya measured the masses of the flyers and newspapers her family received in 2 weeks.

<table>
<thead>
<tr>
<th></th>
<th>Week 1</th>
<th>Week 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newspapers (kg)</td>
<td>1.769</td>
<td>1.898</td>
</tr>
<tr>
<td>Flyers (kg)</td>
<td>2.210</td>
<td>1.478</td>
</tr>
</tbody>
</table>

Did Maya's family receive a greater mass of flyers or newspapers?

**Step 1:** Estimate. Round and then add the 2 weeks.

Newspapers _______ + _______ = _______

Flyers _______ + _______ = _______

Which number is greater: newspapers or flyers? _______

**Step 2:** Calculate.

**Newspapers**

<table>
<thead>
<tr>
<th>Ones</th>
<th>Tenths</th>
<th>Hundreds</th>
<th>Thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>+1</td>
<td>8</td>
<td>9</td>
<td>8</td>
</tr>
</tbody>
</table>

**Flyers**

<table>
<thead>
<tr>
<th>Ones</th>
<th>Tenths</th>
<th>Hundreds</th>
<th>Thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>+1</td>
<td>4</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

Which number is greater: newspapers or flyers? ________

**Hint:** First look at the ones place value. If they are the same, then look at the tenths place value and so on.

Was your answer reasonable? How do you know?

Think about your estimations in Step 1.
3.5 Adding Decimals by Regrouping  Page 2

Practising

2. Calculate. Use a place value chart.

a) \(4.55 + 0.77\)  

\(c) \ 0.965 + 0.378\)

b) \(1.5 + 4.67\)  

d) \(2.769 + 1.569\)

**Hint:** Remember \(1.5 = 1.50\).

3. This chart shows the team results for 4 events.

**Team Results of Athletic Events**

<table>
<thead>
<tr>
<th>Event</th>
<th>vault</th>
<th>uneven bars</th>
<th>balance beam</th>
<th>floor exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>38.461</td>
<td>37.986</td>
<td>37.236</td>
<td>36.877</td>
</tr>
</tbody>
</table>

a) Calculate the total team score. Show your work.

b) How do you know your answer is reasonable?

**Hint:** Use estimation.
3.5 Adding Decimals by Regrouping  Page 1
Student Book pages 94–97

GOAL
Solve problems by adding decimals.

For an Earth Day project, Jay measured the masses of newspapers and flyers his family received in 2 weeks.

Masses of Newspapers and Flyers

<table>
<thead>
<tr>
<th></th>
<th>Week 1</th>
<th>Week 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newspapers (kg)</td>
<td>1.46</td>
<td>1.09</td>
</tr>
<tr>
<td>Flyers (kg)</td>
<td>1.61</td>
<td>0.97</td>
</tr>
</tbody>
</table>

Did Jay’s family receive a greater mass of newspapers or flyers in 2 weeks?

Use blocks to represent each decimal amount.

Step 1: Model 1.46 kg and 1.09 kg.

Step 2: Add the hundredths and regroup.
Why is there a 1 and a 5 in Step 2?

Step 3: Complete the addition in the box in Step 2.

\[1.46 + 1.09 = \quad \]

How many kilograms of newspapers did Jay's family receive in 2 weeks? _______ kg

Step 4: Calculate the total amount of flyers. First model the 2 numbers and draw them in the place value chart. Then add the equation.

\[
\begin{array}{c|c|c}
\text{Ones} & \text{Tenths} & \text{Hundredths} \\
\hline
1 & .6 & 1 \\
+ & 0 & .9 \\
\hline
\end{array}
\]

How many kilograms of flyers did Jay's family receive in 2 weeks? _______ kg

Did Jay's family receive a greater mass of newspapers or flyers? ________________

Reflecting

Jay estimated that the total mass of the newspapers was close to 2.5 kg. How did he make this estimate?

How did you decide whether or not to regroup when you added the masses of flyers?
3.6 Exploring Problems that Involve Decimals

Owen measured the masses of bags of wild rice using balance scales. The grey bag is 2 kg more than the black bag.

**How many kilograms of rice might be in the grey bag and the black bag?**

**Step 1:** The white bag of rice is 3.998 kg.

\[ 3.998 + 0.002 = 4 \]

How can you share 0.002 equally between the grey and black bags? _________

**Step 2:** 10 = 4 + grey bag + black bag

What number must be the sum of the grey and black bags? _________

**Step 3:** Think of all possible numbers that can add to the sum in Step 2.

<table>
<thead>
<tr>
<th>Grey Bag</th>
<th>Black Bag</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Look at your chart. What set of numbers shows the grey bag as having 2 more than the black bag? _________

**Step 4:** Add the thousandths that you shared in Step 1 to the 2 bags. _________

What is the mass of the grey bag? _________ kg

What is the mass of the black bag? _________ kg

How can you check if your answers are correct?
3.6 Exploring Problems that Involve Decimals
Student Book page 100

GOAL
Use your own strategies to solve a problem that involves adding and subtracting decimals.

Owen measured the masses of bags of wild rice using balance scales.
The grey bag is 2 kg more than the black bag.

How many kilograms of rice might be in the grey bag and the black bag?

Step 1: The white bag of rice is 3.98 kg.
\[ 3.98 + 0.02 = 4 \]
You can share 0.02 evenly between the grey and black bags by giving each 0.01.
\[ 0.01 + 0.01 = 0.02 \]
grey black

Step 2: 10 = 4 + grey bag + black bag
What number must be the sum of the grey and black bags? ________

Step 3: Think of all possible numbers that can add to the sum in Step 2.
Look at your chart. What set of numbers shows the grey bag as having 2 more than the black bag? ________

Step 4: Add the 0.01 that you shared in Step 1 to the 2 bags.

What is the mass of the grey bag? ________
What is the mass of the black bag? ________
How can you check if your answers are correct?
3.7 Subtracting Decimals by Regrouping  Page 1

Student Book pages 102–105

Checking

1. Charlene recorded her brother's mass at birth and after 12 months.

<table>
<thead>
<tr>
<th>Baby's Mass by Age</th>
<th>Birth</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (months)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>3.567</td>
<td>12.035</td>
</tr>
</tbody>
</table>

a) How much mass did he gain?

Model 12.035 with base ten blocks and a decimal place value chart.

Subtract. Remember to begin in the thousandths column.

Can you subtract 7 thousandths from 5 thousandths? ______

What do you need to do?

__________________________________________

Continue to subtract and regroup if needed.

b) Use estimation to show that your calculation is reasonable.

Round 12.035 and 3.567. Subtract your 2 rounded numbers.

12.035 − 3.567 = _______ − _______ = _______

Is your estimation close to your answer in part a)? ______

c) Use addition to show that your calculation is correct.

Your answer in part a) ______

\[
\begin{align*}
& \quad +3.567 \\
& \begin{array}{r}
12.035
\end{array}
\end{align*}
\]

Is it correct? ______
Practising

2. Calculate. Use a place value chart and base ten blocks.

<table>
<thead>
<tr>
<th>Ones</th>
<th>Tenths</th>
<th>Hundredths</th>
<th>Thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>-1</td>
<td>2</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>

4. Benjamin is at post 1 on the park map. He wants to go fishing at post 4. Calculate the difference in distance between the grey and black routes.

**Step 1:** Add the distances in the grey routes.

1.789
0.439
+1.538

**Step 2:** Add the distances in the black routes.

0.394
1.988
+2.618

**Step 3:** Calculate the difference. Use a place value chart and base ten blocks.

**Hint:** Enter the larger number in the first row.

<table>
<thead>
<tr>
<th>Ones</th>
<th>Tenths</th>
<th>Hundredths</th>
<th>Thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.7 Subtracting Decimals by Regrouping  Page 1

Student Book pages 102–105

GOAL
Regroup to solve subtraction problems.

Brandon made a chart of his baby masses.

My Mass

<table>
<thead>
<tr>
<th>Age (months)</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>2.87</td>
</tr>
<tr>
<td>3</td>
<td>5.30</td>
</tr>
<tr>
<td>6</td>
<td>6.87</td>
</tr>
</tbody>
</table>

In which period did Brandon have the greatest change in mass?

To figure out the change in mass from birth to 3 months, calculate 5.30 – 2.87.

Step 1: Model 5.30 kg, Brandon’s mass at 3 months.

Step 2: Regroup 5.30 so that it looks like this. Then you can subtract.
3.7 Subtracting Decimals by Regrouping  Page 2

A. Complete the solution in the box in Step 2. _______
How much mass did Brandon gain in his first 3 months? _______ kg

B. Estimate to check if your answer is reasonable.
Round 5.30 _______
Round 2.87 – _______
Is the estimate close to your answer in part A? _______

C. Calculate the change in mass between 3 and 6 months.
Model 6.87 and draw it on the place value chart.
Subtract 5.30 from 6.87.
Remember to begin with the blocks in the hundredths column. As you subtract, fill in the equation box on the right.
The change in mass between 3 and 6 months is ________ kg.

D. In which 3-month period did Brandon have the greatest change in mass?
Look back at your answers and record them below.

<table>
<thead>
<tr>
<th>Months</th>
<th>Mass change (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth – 3 months</td>
<td></td>
</tr>
<tr>
<td>3 months – 6 months</td>
<td></td>
</tr>
</tbody>
</table>

The greatest mass change was _______. It took place between _________________.

Reflecting

How can you use addition to check your answer in part C?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

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Checking

1. In 1960, Harry Jerome set a world record of 10 seconds for the 100 m sprint. In 2007, the world record was 9.77 seconds. How many seconds less than Harry Jerome's time is this new time? You need to calculate $10 - 9.77$.

**Step 1:** Write 10 seconds as 10.00 to hold the place value of the tenths and hundredths.

**Step 2:** Rename 10.00 as 9.99 + 0.01 so it is easier to subtract.

**Step 3:** Subtract.

\[
9.99 (+ 0.01) \\
- 9.77 \\
____ ( + 0.01) =_______
\]

Remember to add the 0.01 back.

The 2007 world record is _______ seconds less than Harry Jerome's time.

Practising

3. Star often subtracts 2 whole numbers by adding the same amount to both numbers.

\[
1000 - 198 = 1002 - 200 \\
1000 - 198 = 802
\]

a) Show how this method works by using number lines.

\[
\begin{array}{cccccccc}
800 & 825 & 850 & 875 & 900 & 925 & 950 & 975 & 1000 \\
\end{array}
\]

\[
\begin{array}{cccccccc}
800 & 825 & 850 & 875 & 900 & 925 & 950 & 975 & 1000 \\
\end{array}
\]

Explain why your number lines show how Star's method works.
b) Calculate $10 - 1.998$ using Star's method.

Write $10$ as a decimal to hold the place values. ________

What do you need to add to $1.998$ to get to the next whole number? ________

Add this number to both numbers in the equation.

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

\[ \quad - 1.998 = \quad - \quad \]

\[ 10 - 1.998 = \quad \]

4. Emily is riding her mountain bike along a trail.

a) She stops to have a drink at rest stop A.

How much farther does Emily have to ride to complete the trail?

The end of the trail is ________ km.

Put that number in decimal form. ________

Rest stop A is ________ km.

What is your equation? ________ $-$ ________ $=$ ________

Rename the first number and subtract.

b) How do you know your answer is reasonable?

**Hint:** Use estimation or addition to check your answer.


c) How far is rest stop B from the end of the trail?

Look at what you did in part a) to help you.


3.8 Subtracting Decimals by Renaming  Page 1

Student Book pages 106–108

GOAL

Rename decimals to make subtraction easier.

In 1996, Curt Harnett became the first person to cycle 200 m in less than 10 seconds. He set a world record of 9.86 seconds.

How much less than 10 seconds is Curt Harnett's world record time?

Curt's time is about 0.1 seconds less than 10 seconds.

Step 1: Calculate 10 – 9.86.

First write 10 as 10.00 to hold the place value of the tenths and hundredths.

10.00
- 9.86

Step 2: Rename 10.00 as 9.99 + 0.01 so that it is easier to subtract.

9.99 + 0.01
10.00
- 9.86

Step 3: Subtract.

9.99 + 0.01
10.00
- 9.86
____

Step 4: Add back the 0.01.

9.99 + 0.01
10.00
- 9.86
____ + 0.01 = _______

Curt Harnett's time is _______ seconds less than 10 seconds.
Reflecting

Why did you add 0.01 in Step 4?

Use regrouping to subtract 9.86 from 10. Is the strategy of renaming 10 more efficient? Explain.
Chapter 3
Lesson 1

Estimating Whole-Number Sums and Differences

GOAL

Estimate sums and differences to solve problems.

1. Estimate each sum. Show the numbers you used.
   a) \( 41 008 + 29 100 \) is about
   
   b) \( 8 726 + 1 974 \) is about

   c) \( 301 040 + 512 113 \) is about

2. Estimate each difference.
   a) \( 18 015 - 2 632 \) is about

   b) \( 9 499 - 3 999 \) is about

   c) \( 700 988 - 501 012 \) is about

3. A weather balloon was sent up into the atmosphere. First, it rose to 48 700 m. Then it dropped down to 18 980 m. About how many metres did it drop?

4. 297 021 adults and 321 514 children live in Lakeview. About how many people live in Lakeview?
Communicating about Estimating and Calculating

1. Tyler estimated the total number of students.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kindergarten and Grade 1</td>
<td>792</td>
</tr>
<tr>
<td>Grades 2 and 3</td>
<td>1046</td>
</tr>
<tr>
<td>Grades 4 and 5</td>
<td>3217</td>
</tr>
</tbody>
</table>

Tyler's solution and explanation:

I can solve the problem by figuring out how many students there are. The first two numbers are both about 1000. All the numbers together are about 5000.

a) How can Tyler improve his explanation?

b) Write a new solution and explanation. Use the Communication Checklist.

2. About how many trees are in Lakeview Forest?

<table>
<thead>
<tr>
<th>Kind of tree</th>
<th>Number of trees</th>
</tr>
</thead>
<tbody>
<tr>
<td>pine</td>
<td>286 215</td>
</tr>
<tr>
<td>oak</td>
<td>109 283</td>
</tr>
<tr>
<td>maple</td>
<td>327 003</td>
</tr>
</tbody>
</table>
Chapter 3
Lesson 3

Estimating Decimal Sums and Differences

GOAL

Estimate sums and differences with decimals.

1. Estimate each sum.
   a) 0.32 + 0.28 is about ________________
   b) 0.099 + 0.410 is about ________________
   c) 1.03 + 2.61 is about ________________

2. Estimate each difference.
   a) 1.99 − 1 is about ________________
   b) 0.821 − 0.490 is about ________________
   c) 3.97 − 0.77 is about ________________

3. Estimate to match the sums and differences with the correct answers.

<table>
<thead>
<tr>
<th>Sum/Difference</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.713 − 0.522</td>
<td>2.02</td>
</tr>
<tr>
<td>4.80 − 0.32</td>
<td>0.631</td>
</tr>
<tr>
<td>0.229 + 0.402</td>
<td>0.066</td>
</tr>
<tr>
<td>0.047 + 0.019</td>
<td>0.801</td>
</tr>
<tr>
<td>2.99 − 0.97</td>
<td>4.48</td>
</tr>
<tr>
<td>0.062 + 0.739</td>
<td>0.191</td>
</tr>
</tbody>
</table>

4. Rebecca’s bedroom walls have an area of 17.29 square metres.
   She has enough yellow paint to cover 11.88 square metres.
   She has enough white paint to cover 5.11 square metres.
   Does Rebecca have enough paint to colour her bedroom yellow and white?
Chapter 3
Lesson 4

Adding Decimals Using Mental Math

GOAL
Solve problems by using mental math to add decimals.

1. Add using mental math.
   a) 0.49 + 1.51
   b) 0.99 + 0.11
   c) 0.001 + 0.099
   d) 1.010 + 1.090

2. Add using mental math.
   a) 2.999 + 0.054
   b) 0.847 + 5.999
   c) 4.001 + 0.973
   d) 3.498 + 2.002

3. Ami went for a walk around the park.
   a) How far did Ami walk? Show your work.

   b) Use estimating to check your answer. Show your work.
1. Calculate.
   a) \[ 0.039 + 0.153 = 0.192 \]
   b) \[ 0.875 + 0.125 = 1.000 \]
   c) \[ 1.522 + 0.180 = 1.702 \]
   d) \[ 5.423 + 2.627 = 8.050 \]

2. Tyler added \( 1.228 + 0.457 \) like this:
   \[ 1.228 + 0.400 = 1.628 \]
   \[ 1.628 + 0.050 = 1.678 \]
   \[ 1.678 + 0.007 = 1.685 \]
   a) Use Tyler’s method to add \( 0.944 + 0.045 \). Show your work.
   b) Use Tyler’s method to add \( 4.283 + 0.164 \). Show your work.

   a) \[ 0.412 + 1.388 = 1.800 \]
   b) \[ 2.871 + 3.006 = 5.877 \]
   c) \[ 1.862 + 3.501 = 5.363 \]
Exploring Problems that Involve Decimals

**GOAL**

Use your own strategies to solve a problem that involves adding and subtracting decimals.

Ami has $20.00. She bought a pencil case for $6.29. She wants to buy three more things. Which things can she buy? Give Ami two choices. Show your work.
Subtracting Decimals by Regrouping

GOAL
Regroup to solve subtraction problems.

1. Maya used regrouping to subtract.
   a) How did Maya regroup 1.724 to get 1 one, 6 tenths, 12 hundredths, and 4 thousandths?

   b) Complete Maya's subtraction.

2. Calculate.
   a) 0.82
      \[ \begin{align*}
      \text{c) } & 2.405 \\
      & - 0.26 \\
      & \hline
      \end{align*} \]
   b) 2.07
      \[ \begin{align*}
      \text{d) } & 5.000 \\
      & - 1.95 \\
      & \hline
      \end{align*} \]

3. Rebecca hiked 2.062 km of a 4.500 km hike.
   How much of the hike is left?
Subtracting Decimals by Renaming

GOAL

Rename decimals to make subtraction easier.

1. Jay wants to calculate $9 - 0.46$. How can he rename the 9 to help him subtract?

2. Calculate by renaming. Show your work.
   a) $5.0 - 0.2$
   b) $9 - 0.08$
   c) $3 - 0.472$
   d) $1 - 0.721$
   e) $6.000 - 3.625$

At-Home Help

You can rename decimals to help you subtract. For example, $5 - 0.743$.

First, rename $5$ as $4.999 + 0.001$.

\[
\begin{align*}
4.999 + 0.001 & \quad (5.000) \\
- 0.743 & \quad \underline{+ 0.001} \\
4.256 + 0.001 & = 4.257
\end{align*}
\]

3. Owen, Sydney, and Jolie are collecting 4.00 kg of garbage each for Earth Day. So far, they have collected these amounts of garbage: Owen 0.72 kg, Sydney 3.02 kg, Jolie 2.145 kg. How much more does each student need to collect?

Owen: Sydney: Jolie:
Test Yourself

Circle the correct answer.

1. Estimate to choose the correct answer for 10362 + 28364.
   A. 29 676  B. 38 726  C. 45 696  D. 59 019

2. Which number is a good estimate for the sum 498 + 1066 + 3512?
   A. 2000  B. 3000  C. 4000  D. 5000

3. Estimate to choose the correct answer for 1.08 + 0.66.
   A. 1.74  B. 0.74  C. 2.74  D. 7.4

4. Estimate to choose the correct answer for 0.975 – 0.222.
   A. 75.3  B. 7.53  C. 0.753  D. 0.0753

5. Calculate 0.34 + 0.11.
   A. 0.23  B. 0.45  C. 0.83  D. 0.51

6. Calculate 2.82 + 5.17.

7. Calculate 0.283 + 1.347.
   A. 1.63  B. 1.072  C. 3  D. 1.520

8. Calculate 0.882 + 0.442.
   A. 2.413  B. 4.231  C. 3.124  D. 1.324

9. Estimate to choose the correct answer for 4.82 – 1.77.
   A. 0.305  B. 3.05  C. 30.5  D. 305

10. Calculate 0.812 – 0.471.
    A. 0.341  B. 0.421  C. 0.881  D. 0.651

11. Calculate 7 – 0.436.
    A. 6.722  B. 5.832  C. 6.564  D. 7.129
Subtracting Decimal Numbers

Find the difference between 76.91 and 39.45.

Line up the decimal points. Subtract the hundredths. Trade? yes Subtract the tenths. Trade? no Subtract the ones. Trade? yes

\[
\begin{array}{cccc}
76.91 & 8.11 & 8.91 & 6.16 \\
\end{array}
\]

The difference is 37.46

Subtract.

1. 8.62
   - 2.7
   \[\underline{5.4}\]

2. 97.7
   - 8.3
   \[\underline{89.4}\]

3. 52.2
   - 13.8
   \[\underline{38.4}\]

4. 9.15
   - 6.46
   \[\underline{2.69}\]

5. 240.2
   - 97.5
   \[\underline{142.7}\]

6. 198.61
   - 53.45
   \[\underline{145.16}\]

7. 213.27
   - 105.15
   \[\underline{108.12}\]

8. 104.81
   - 69.76
   \[\underline{35.05}\]

9. 222.09
   - 209.93
   \[\underline{12.16}\]

10. 564.75
    - 386.58
    \[\underline{178.17}\]

Line up the decimal points. Subtract.

11. 15.8 - 6.4
    \[\underline{9.4}\]

12. 37.54 - 28.15
    \[\underline{9.39}\]

13. 298.17 - 176.55
    \[\underline{121.62}\]

14. 403.3 - 183.8
    \[\underline{219.5}\]

MathQuest 5 TRB

For use with MathQuest 5, page 265

Reteaching 75
Estimating Decimal Sums

Estimate the sum of 82.41 and 136.75 by rounding to the nearest whole number.

Look at the tenths digit. Round to a whole number. Add.

Think: the tenths digit is less than 5, so round down.

\[ 82.41 \]
\[ + 136.75 \]

Think: the tenths digit is greater than 5, so round up.

\[ 82 \]
\[ + 137 \]

\[ 219 \]

The estimated sum is \( 219 \).

Estimate the sum by rounding to the nearest whole number.

1. \( 72.22 \rightarrow + 109.02 \)
2. \( 55.61 \rightarrow + 41.17 \)
3. \( 38.56 \rightarrow + 224.88 \)

Estimate the sum by rounding to the nearest 10.

4. \( 28.36 \rightarrow + 13.59 \)
5. \( 44.93 \rightarrow + 57.31 \)
6. \( 129.39 \rightarrow + 54.40 \)

Estimate the sum by rounding to the nearest 100.

7. \( 679.15 \rightarrow + 238.54 \)
8. \( 346.88 \rightarrow + 550.24 \)
9. \( 783.43 \rightarrow + 173.56 \)
Adding Decimal Numbers

Add these decimal numbers: 8.46 and 7.95.

Line up the decimal points. Add the hundredths. Trade? yes Add the tenths. Trade? yes Add the ones.

\[
\begin{align*}
&\downarrow & \downarrow & \downarrow & \downarrow \\
&8.46 & 8.46 & 8.46 & 8.46 \\
+7.95 & +7.95 & +7.95 & +7.95 \\
\hline \\
&16.41 & & & \\
\end{align*}
\]

The sum is 16.41

Add.

\[
\begin{align*}
1. & \quad 2.4 & \quad 6.3 & \quad 7.8 & \quad 4.1 & \quad 5.91 \\
+5.6 & +3.5 & +9.6 & +8.7 & +4.73 \\
\hline \\
& & & & \\
\end{align*}
\]

\[
\begin{align*}
5. & \quad 2.59 & \quad 19.70 & \quad 60.39 & \quad 153.49 & \quad 338.68 \\
+8.21 & +56.81 & +74.94 & +29.08 & +167.17 \\
\hline \\
& \quad & & & \\
\end{align*}
\]

Line up the decimal points. Add.

\[
\begin{align*}
11. & \quad 7.3 + 5.4 \\
\hline \\
12. & \quad 9.5 + 3.6 \\
\hline \\
13. & \quad 67.11 + 85.49 \\
\hline \\
14. & \quad 321.06 + 182.58 \\
\hline \\
\end{align*}
\]
Adding Several Decimal Numbers

Add these decimal numbers:

Line up the decimal points.  Add the hundredths. Trade? yes  Add the tenths. Trade? yes  Add the tens and ones.

\[
\begin{array}{cccc}
7.62 & + & 24.85 & + 35.61 & + 9.34 \\
21.12 & + & 24.85 & + 35.61 & + 9.34 \\
& & & 77.42 \\
\end{array}
\]

The sum is \(77.42\)

Add.

\[
\begin{array}{cccc}
1. & 4.0 & + & 2. & 47.1 & + 3. & 18.3 & + 4. & 52.5 \\
& 9.2 & + & 8.4 & + & 12.6 & + & 68.4 \\
& + & 3.8 & + & 29.3 & + & 33.9 & + & 87.7 \\
& 17.0 & + & . & + & . & + & . \\
\end{array}
\]

\[
\begin{array}{cccc}
5. & 45.82 & + & 6. & 561.10 & + 7. & 616.29 & + 8. & 242.75 \\
& 107.05 & + & 73.91 & + & 310.26 & + & 59.78 \\
& 224.30 & + & 115.30 & + & 94.19 & + & 450.47 \\
& + & 81.41 & + & 7.53 & + & 273.62 & + & 74.64 \\
& 458.58 & + & . & + & . & + & . \\
\end{array}
\]

Line up the decimal points. Add.

9. \(13.5 + 95.7 + 148.9\)  
10. \(29.14 + 108.36 + 275.54\)
Estimating Decimal Differences

Estimate the difference between 34.33 and 58.86 to the nearest whole number.

Look at the tenths digit.

<table>
<thead>
<tr>
<th>58.86</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>-34.33</td>
<td>3</td>
</tr>
</tbody>
</table>

Round to a whole number.

Subtract.

Think: the tenths digit is greater than 5, so round up.

59

Think: the tenths digit is less than 5, so round down.

34

\[\begin{array}{ccc}
59 & - & 34 \\
\text{Subtract} & & \\
& & 25
\end{array}\]

The estimated difference is 25.

Estimate the difference by rounding to the nearest whole number.

1. \[\begin{align*}
62.2 & \rightarrow \\
-17.7 & \rightarrow \\
\end{align*}\]

2. \[\begin{align*}
81.0 & \rightarrow \\
-21.3 & \rightarrow \\
\end{align*}\]

3. \[\begin{align*}
49.53 & \rightarrow \\
-24.85 & \rightarrow \\
\end{align*}\]

4. \[\begin{align*}
125.54 & - \\
-87.98 & - \\
\end{align*}\]

5. \[\begin{align*}
290.72 & - \\
-114.27 & - \\
\end{align*}\]

6. \[\begin{align*}
754.45 & - \\
-503.02 & - \\
\end{align*}\]

Estimate the difference by rounding to the nearest 10.

To round to the nearest 10, look at the ones digit.

7. \[\begin{align*}
93.13 & \rightarrow \\
-57.62 & \rightarrow \\
\end{align*}\]

8. \[\begin{align*}
854.45 & \\
-293.13 & \\
\end{align*}\]

9. \[\begin{align*}
826.26 & \\
-618.57 & \\
\end{align*}\]
Going to the Movies

Suppose you win these movie gift cards in a contest.

? Who can go with you to a movie?

A. Choose three or more people to take to a movie with you. Estimate the total cost of the movie tickets.

<table>
<thead>
<tr>
<th>Person</th>
<th>Cost (adult, child, senior)</th>
<th>Estimated cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>You</td>
<td>$8.95</td>
<td>$9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Explain how you estimated.

B. Calculate the total cost of the movie tickets. Explain your method of calculating.
Scaffolding for Getting Started  Page 2
STUDENT BOOK PAGES 80-81

Going to the Movies

C. Compare your sum for Part B with your estimate for Part A.
   Is your sum for part B reasonable?
   How do you know?


D. Which gift cards would you use to pay for the tickets?
   Explain your choice.
   Note: There are many possible answers. Make sure that the gift
   cards total more than the actual cost in Part B.


E. How much will you have left when you pay
with the gift cards in Part D?

   Gift Cards Used (Part D) − Total Cost (Part B) = Amount left

   ______________________ − ______________________ = ______________________

F. Repeat Parts A to E for a different group of people.
Scaffolding for Lesson 1, Question 3
STUDENT BOOK PAGES 84

3. a) How do you know that the sum of 3867 and 2819 is between 5000 and 7000? Here are two ways you might estimate this sum.

- **Front-end estimation:** Use the digits in the greatest place value.

  \[
  3867 + 2819 = 3000 + \_
  
  = \_
  \]

  (This is an underestimate.)

- **Rounding:** Use the value of the hundreds place to determine whether to round up or down to the nearest thousands place.

  \[
  3867 + 2819 = 4000 + \_
  
  = \_
  \]

  (This is an overestimate.)

How do you know that the sum of 3867 and 2819 is between 5000 and 7000?

b) How do you know that the difference between 15 987 and 11 015 is greater than 4000? Use estimation and the number line to explain.

![Number Line](image-url)
Scaffolding for Lesson 7, Question 3

4. Benjamin is at Post 1 on the park map. He wants to go fishing at Post 4. Calculate the difference in distance between the white route and the black route.

Determine the black route distance by adding the distances between the posts:

Post 1 to Post 2
Post 2 to Post 3
Post 3 to Post 4
Route total

Determine the white route distance by adding the distances between the posts:

Post 1 to Post 6
Post 6 to Post 5
Post 5 to Post 4
Route total

Determine the difference between the routes by subtracting.

Regroup the place values in the white route as needed.

White Route
Black Route
Difference

Use base ten blocks and a place value chart if needed for regrouping.
2. Barrett bought 2.635 kg from a 5 kg block of cheese.

a) How many kilograms of cheese are left?

To solve this problem, calculate $5 - \underline{\hspace{2cm}}$.

Rewrite 5 as a decimal number with place-holding zeros: $\underline{\hspace{2cm}}$

Next, use renaming.

\textbf{Step 1: Rename 5 as 4.999 + \underline{\hspace{2cm}}.}

\textbf{Step 2: Subtract.}

\[
\begin{array}{c}
4.999 + 0.001 \\
-2.635 \\
\hline
\underline{\hspace{1cm}} + 0.001 = \underline{\hspace{2cm}}
\end{array}
\]

\textbf{Step 3: Add back the 0.001.} $\underline{\hspace{2cm}}$

b) How do you know your answer is reasonable?

Use estimation.

2.635 is close to 2.5.

So, $5 - 2.635$ is about $5 - \underline{\hspace{2cm}}$, which equals $\underline{\hspace{2cm}}$.

Is this estimated difference close to the answer you got in part a)? $\underline{\hspace{2cm}}$

Explain in words how you know your answer is reasonable. $\underline{\hspace{2cm}}$
Chapter 3 Test  Page 1

1. Colton hopes to get 10,000 signatures by March 31 on a petition that opposes a new shopping centre in town.

About how many more signatures are needed? ________

Explain how you estimated.

<table>
<thead>
<tr>
<th>Month</th>
<th>Number of signatures</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>2896</td>
</tr>
<tr>
<td>February</td>
<td>4032</td>
</tr>
<tr>
<td>March</td>
<td></td>
</tr>
</tbody>
</table>

2. A truck can carry 4000 kg safely. Can the truck carry these three crates safely?

3. Estimate the decimal for the portion of the rug that is blue.

4. Solve each problem using mental math.
   a) A sandwich costs $6.95 and juice costs $1.95, including taxes. What is the total cost?

   b) The drive from home to school is 1.534 km.
   The drive from school to tumbling class is 4.999 km.
   What is the total driving distance from home to tumbling class?
**Chapter 3 Test**  Page 2

5. Calculate. Choose two of your answers and explain how you know they are reasonable.

   a) $3.824 + 1.219$  
   b) $0.683 + 0.149$  
   c) $5.117 + 5.8$  
   d) $0.594 + 8.21$

6. Estimate to place the decimal point in each sum. Show your work for one of the answers.

   a) $2.59 + 1.33 = 392$  
   b) $32.69 + 15.18 = 47.87$  
   c) $0.972 + 0.216 + 0.304 = 1.492$  
   d) $0.5 + 7.49 + 6.998 = 14.988$

7. During a science experiment, Gabrielle measured the masses of different substances and their containers. What is the mass of each substance without its container? Explain how you know that your answers are reasonable.

**Mass of Substance and Its Container**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Mass of substance with container (kg)</th>
<th>Mass of container (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>0.832</td>
<td>0.261</td>
</tr>
<tr>
<td>salt</td>
<td>0.137</td>
<td>0.07</td>
</tr>
<tr>
<td>sugar</td>
<td>0.089</td>
<td>0.063</td>
</tr>
</tbody>
</table>


Chapter 3 Test  Page 3

8. Calculate. Choose one of your answers and explain how you know it is reasonable.

   a) 12 - 7.499
   b) 9.451 - 0.489
   c) 8.492 - 2.8
   d) 7.4 - 3.126

9. The perimeter of the forest is 15.000 km.
   a) What is the missing length?
   b) How do you know that your answer is reasonable?

10. Estimate to place the decimal point in each difference.
    Show your work for one answer.

   a) 18 - 5.932 = 12068
   b) 35 - 6.9 = 281
   c) 7 - 2.198 = 4802
   d) 2 - 0.117 = 1883
Chapter 3 Task  

Gold Coins

The chart below shows the weights, masses, and values of the five types of Canadian Maple Leaf gold coins.

<table>
<thead>
<tr>
<th>Weight (troy ounces)</th>
<th>1.000</th>
<th>0.500</th>
<th>0.250</th>
<th>0.100</th>
<th>0.050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass (kg)</td>
<td>0.031</td>
<td>0.016</td>
<td>0.008</td>
<td>0.003</td>
<td>0.002</td>
</tr>
<tr>
<td>Value ($)</td>
<td>50</td>
<td>20</td>
<td>10</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

Ami has a collection of Canadian Maple Leaf gold coins. She put them in a coin collection book.

What are the values and masses of Ami’s gold coins?

Read the Task Checklist before you begin.

A. Three gold coins have a total weight of 1.750 troy ounces. What is their value?

Find three gold coins that have a total weight of 1.750 troy ounces and fill in the blanks below. Then, calculate the total value of these coins.

<table>
<thead>
<tr>
<th>Coin</th>
<th>Troy ounces</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coin 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coin 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coin 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
+--------+-------------+-------+
Total: 1.750 troy ounces

Task Checklist

☐ Did you show all of your steps?
☐ Did you check that your calculations are reasonable?
☐ Did you explain your thinking?
Chapter 3 Task  Page 2

B. What is the total mass of the three coins in kilograms?
   Determine the mass of each of the three coins from Part A.
   Then, calculate the sum.

   _____ kg + _____ kg + _____ kg = _____ kg

C. Four other gold coins have a total weight of 0.500 troy ounces.
   What is their total value and mass?

   Coin 1  _____  troy ounces  value $ _____  mass _____ kg
   Coin 2  _____  troy ounces  value $ _____  mass _____ kg
   Coin 3  _____  troy ounces  value $ _____  mass _____ kg
   Coin 4  _____  troy ounces  value $ _____  mass _____ kg
   + _____   + _____   + _____
   Totals  0.500  troy ounces  value $ _____  mass _____ kg

D. Some other coins have a total value of $27. How many troy ounces
   and kilograms of gold coins could there be?

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

E. Create and solve your own problem about a gold coin collection.

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________