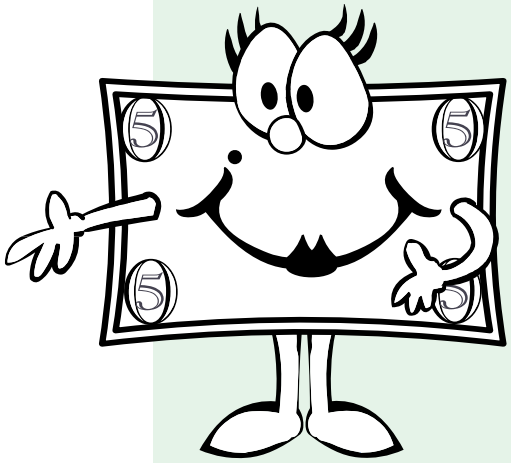
Grade Three

Mental Money



Overview

Students share the book *Betcha!,* by Stuart J. Murphy, to learn about using mental math while shopping, estimation techniques, and problem solving with money. They use rounding to complete a story and play a game of estimation with prices.

Prerequisite Skills

Students should understand rounding to the nearest ten and be able to read money amounts using dollar signs and decimal places.

Lesson Objectives

Students will be able to:

- Round money amounts to the nearest dollar
- Use mental computation to estimate the subtotal of three amounts
- Use estimation to solve "shopping" problems

Materials List

1. Book: *Betcha!,* by Stuart J. Murphy (Harper Collins MathStart, 1997)
2. Chalkboard or chart paper
3. Writing (or notebook) paper
4. Small tokens (chips, paper clips, buttons, etc.)–enough for each student in the small group to have five
5. Optional: crayons
6. Optional: a clear jar (such as a peanut butter or canning jar) filled with jelly-beans, marbles, or other small, uniformly-shaped items
7. Handouts:
   - **Betcha I Can Round 'Em!** cards (You might want to have these cards laminated for durability.)
   - **Guess a Story** worksheet

Content Standards

The activities in this lesson correlate to national standards in economics, math, and language arts. See the end of this lesson for content standards information.

Vocabulary

estimate

estimation

mental math

round down

round up

rounding

Large-Group Activity

Materials

- Book: *Betcha!*
- Chalkboard or chart paper
- Writing (or notebook) paper
- Optional: a small, clear glass jar (such as a peanut butter or canning jar) filled with jellybeans, marbles, or other small, uniformly-shaped items
- Optional: crayons

1. Gather students together to share the book *Betcha!*.

   ❍ If you brought in a jar of items, show it to the students as you introduce the story. Say:

   Have you ever entered a contest where you had to guess how many items are in a jar? How do you think you would do it–how can you guess an amount if you can't see all the items, or if you're in a hurry?

   Allow students to share their experiences and ideas. If time permits, you might allow two or three students to attempt to guess the number of items in the jar you brought in.

   I'm going to read a book about two boys who want to enter a contest to guess the number of jellybeans in a jar. On their way to the store they practice different ways to make guesses. The book is called *Betcha!,* and it was written by Stuart J. Murphy.

   This book is part of a series called MathStart books. All of the books in the series are written by Stuart J. Murphy, and they're all about kids using math in real life. This one was illustrated by S.D. Schindler, and talks about using brain power to make smart guesses.

   ❍ Read the book aloud to students. Pause at the end of each two-page spread and allow students to view the pictures.

2. Briefly discuss the book with the class.

   ❍ **What were some of the "bets" the two boys practiced on the way to the store?**

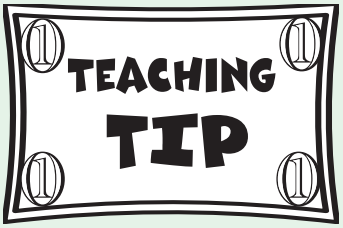
   They guessed how many people were on the bus; how many cars were stuck in a traffic jam; and how much money some toys in a store window would cost altogether.

   ❍ **Did both boys use guessing strategies?**

   No, the red-haired boy guessed, and his African-American friend checked his work.

   ❍ **Name some of the methods the African-American boy used to check his friend's answers.**

   He counted the people on the bus and the cars in the traffic jam. He used paper and pencil to add the costs of the toys in the window.



The story doesn't provide the boys' names, so descriptions are used here instead.

❍ **Which boy won the jellybean contest?**

The African-American boy won. He knew his friend was always close in his guesses, so he simply added a couple to his guess.

❍ **Who went to the All-Star Game?**

The two boys shared the prize.

3. Discuss this lesson's economic concepts: mental math and estimation, when to estimate, and using estimation with money.

❍ ***Mental Math and Estimation***

Who can tell me another word for "guessing" that describes what the red-haired boy did? The red-haired boy used estimation. Write the words "estimation" and "estimate" on the chalkboard or chart paper.

The word estimate means to guess, but it doesn't mean to make a wild guess. The red-haired boy didn't just grab a number out of thin air, did he? He used his brain and thought of a quick way to make a very close guess. When you use your brain to make close guesses without using paper and pencil or a calculator, you are using mental math. Point to your head as you repeat the word "mental," and write the words "mental math" on the board.

Your brain is a very powerful thing. It's constantly working problems, even when you don't realize it. Let's think of an example of how your brain uses mental math even when you aren't aware of it. Who can tell me what coins are needed to equal 57 cents? Write the amount "57¢" on the board, and select one student to answer. Write the student's suggested coins on the board under the amount.

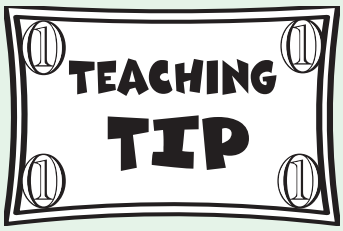
What's another way to make 57 cents? Continue asking this question until several different coin combinations are suggested. You might want to list them on the board as they're suggested. If students hesitate, prompt them by asking for ways to break down large coins ("How can I change just the dime in this combination to make a new one?").

- Two quarters, one nickel, two pennies
- Two quarters, seven pennies
- Five dimes, seven pennies
- . . . and so on

What if I laid a handful of coins on a table and asked you to pick out 57 cents–would you need paper and pencil or a calculator or a computer to find that amount of money? Allow one or two students to respond.

For a third grader, finding 57 cents in a pile of coins seems easy, doesn't it? But you may not realize that your brain does a lot of work for you to find that amount.

- **First, the brain recognizes the coins (pennies, nickels, dimes, etc.),**



Using clues like this ongoing list will help visual learners think of additional coin combinations.

- **then it labels each coin with the correct value (in other words, it sees a penny and thinks "one cent"; it sees a nickel and thinks "five cents"; and so on),**
- **and then finally, your brain computes, or counts, the coin values that equal 57 cents.**
- **It might even choose between several ways to make 57 cents!**

The most amazing part of this process is that your brain performs all these tasks so fast, you aren't even aware of all the mental math that's going on in there.

Let's think of the mental math and estimation strategies the red-haired boy used. How did he estimate the number of people on the bus? He noticed how many people could sit in a row of seats, and then multiplied that number times the number of rows. He added a couple more to his total because there were some people standing in the aisles.

So he counted one group, counted the number of groups, and multiplied–all in his head. What method did he use to estimate the number of cars in the traffic jam? The same method worked as before: he noticed how many lanes of traffic there were, and how many cars were backed up in one lane. He multiplied the two numbers.

The red-haired boy didn't use the same estimating method to guess the cost of the toys in the store window. Can you guess why? The first two problems involved equal groups (rows of people and lanes of cars), so he could use multiplication. The toys in the store window all had different prices, so he had to add several numbers.

We'll talk about the mental-math estimation method the red-haired boy used in the money bet in a minute, but first let's talk about why it's useful to use mental math and know how to estimate.

❍ *When to Estimate*

The red-haired boy was never exactly right when he worked his estimations. Do you think it's always necessary to know the exact right answer to a question? Why or why not?

Allow students to speculate, and encourage open discussion of this question. Students should be able to give examples of times when an exact answer isn't necessary. If you don't get any responses, move on to the next line to provide students with an example from the book.

Let's talk about the boys' bets in the story again. Did they really need to know *exactly* how many people were on the bus? How about the number of cars in the traffic jam? No, they didn't need to know the exact amounts. The answer didn't really matter because they were playing a game just for fun.

When *do* you need to know an exact answer to a counting or math problem? Allow students to speculate. They may suggest that exact answers are important in math homework, for example.

❍ *Using Estimation with Money*

Now let's think again about the money bet. Reread the money bet from pages 20 through 25.

Did the boys *really* need to know how much money all the toys in the store window would cost? No, not for a friendly bet.

Sometimes it comes in handy to be able to guess "about" how much several items will cost. Let's say you're in a candy store and you have five dollars to spend. Can you walk around the store and grab any and all the candy that catches your eye? No.

No, you can't buy more than you have to spend. In that case, do you need a paper and pencil or a calculator to select your candy? Allow students to respond.

This is a good time to use that powerful brain of yours. You can use mental math by rounding the prices of the items and estimating the totals as you walk around the store. Write the word "rounding" on the board.

The red-haired boy used rounding when he estimated the total cost of the items in the toy store window. What words did he use when he rounded the amounts? He used the words "almost" and "about." Show the boy's mental processes as they are depicted at the top of page 23, and read them aloud one more time.

He didn't add the exact cost of the toys, because it's easier to add numbers that end in zeros. He looked at each amount, and thought of the closest number that ended in a zero–in other words, he rounded each amount to the nearest tens place. The nearest ten to 39 is 40, the nearest ten to 22 is 20, and so on. Write "39–40" and "22–20" on the board.

Then he could quickly add those round numbers together. It's a lot easier to add 40 plus 20 in your head than it is to add 39 plus 22.

When the red-haired boy rounded the dollar amounts in the story, sometimes he rounded up, and sometimes he rounded down. Write the phrase "round up" beside "39–40" and write "round down" beside "22–20" on the board. Point to each example as you ask the next question.

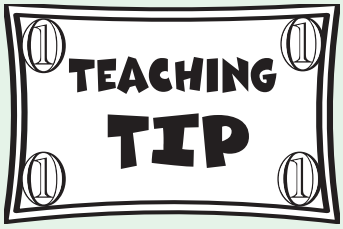
Why did he go up a tens place here, but then go down here? He chose the tens place that was closest to the original number.

Let's try rounding a few money amounts of our own. Let's say we have seven dollars and want to buy three things at a toy store. Write the following amounts on the board:

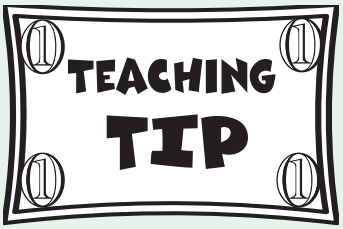
- Ball: $1.78
- Puzzle: $3.25
- Comic: $2.53

We can do the same kind of rounding when we're mentally adding money amounts with cents. In this case, we want to round to the nearest dollar. Point to the first amount in the list, $1.78.

Is $1.78 closer to one dollar or two dollars? Write "$2.00" beside "$1.78" after students respond.



By third grade, students should understand and have experience working with the process of rounding to the tens place.



Some children at this grade level have trouble conceptually with rounding numbers down. Don't force the issue at this time.

That's right, we have to round up, because there are so many cents. Seventy-eight cents is almost a dollar by itself, so a dollar 78 is closer to two dollars.

What about the next one–$3.25? Is it closer to three dollars or four dollars? Encourage students to discuss why this money amount should be rounded down instead of up. Write the amount "$3.00" on the board.

It may be easier for you to think of 50 cents as the cut-off point when you're rounding. The general rule for rounding money is to round up if the cents equal 50 or more, and round down if the cents are less than 50. What then would I round $2.53 to? Round $2.53 to three dollars. Write the amount "$3.00" on the board.

Now that we've rounded these amounts, let's use mental math to quickly estimate "about" how much these three items cost. What are two dollars plus three dollars plus three dollars? The answer is $8.00.

We would say that $1.78 plus $3.25 plus $2.53 is "about" $8.00. Remember that we walked into the store with $7.00 in our pocket–can we buy all three items? No.

Let's check to see how close we were with our estimate. Quickly demonstrate column addition to add the three actual amounts: $7.56.

It takes a lot longer to add up the items the regular way, doesn't it? Were we pretty close with our estimate? By using mental math, we could tell that we didn't have enough money to buy all three items, and that's all we needed to know. We didn't have to figure the exact cost–an estimate was all we needed.

Now we won't waste time or get embarrassed by taking these things to the cashier and finding out too late that we couldn't afford them. Mental math comes in handy at times like this!

Sometimes estimation isn't enough, though. Sometimes you have to know *exactly* how much a group of items cost. When would you need to know exactly how much several money amounts total? Encourage students to discuss this. They should mention that it's necessary to know exactly how much money amounts are when you're at the cash register and counting out the money to pay for them.

Sometimes we need to know exact amounts when we're dealing with money, and sometimes an estimate will do.

4. Introduce the large-group activity: Sometimes I Do–Sometimes I Don't.

   ❍ Write the title of the assignment, "Sometimes I Do–Sometimes I Don't," on the chalkboard or chart paper, and list the following subtitles below it:

   - **At a county fair**
   - **At a basketball game**
   - **At a grocery store**
   - **At a mall**

   ❍ Make sure all students have writing paper and pencils, then say:

Each one of these is a place where people spend money. At each place, sometimes you only need a close estimate of money, and sometimes you need to know an exact amount. At the top of your paper, write the title "Sometimes I Do–Sometimes I Don't," then choose one of the places and write it directly under the main title.

Write a story about a character who visits your chosen location. In the story, describe at least two different times when your character spends money. In one description, tell how the character used estimation to guess an amount. In another, describe why it was necessary for the character to know an exact amount. If you have time, draw and color a picture to go with your story.

Allow students to work on the **Sometimes I Do–Sometimes I Don't** stories while you work with individual groups in the following small-group activities. After small-group work, you might want to have students read their stories aloud.

Small-Group Activity One: Betcha I Can Round 'Em! Game

Concept Taught

Rounding Money to the Nearest Dollar and Estimating Amounts

Materials

- Chalkboard or chart paper
- Small tokens (chips, paper clips, buttons, etc.)–enough for each student in the small group to have five
- Handout: **Betcha I Can Round 'Em!** cards (You may want to have these cards laminated for durability.)

1. Before beginning Activity One, do an exercise in practicing rounding and mental addition of whole-dollar amounts.

   ❍ Say:

   I've got a fun game for us to play, but before we play let's have some more practice rounding money and mentally adding dollar amounts. Write the following amounts on the chalkboard or chart paper one at a time, and have one student in the group round the amounts. Don't write the rounded numbers down, though. Encourage students to remember them.

   - $3.45
   - $5.12
   - $2.81

   What is the estimated total of these three numbers? Students should be able to remember the rounded numbers and add them (3+5+3) mentally.

   If the students in this group have trouble rounding and adding mentally, provide several more examples before beginning the game, always using three money amounts at a time.

NOTE: Be sure to include examples that must be rounded down, as well as rounded up. However, if rounding down is obviously causing some members of the group too much difficulty, continue the practice using only those numbers that will be rounded up to the nearest dollar.

2. Begin the Betcha I Can Round 'Em! game.

NOTE: If any students in the group struggled with rounding down in the first part of the activity, remove the ten cards containing dots from the deck before playing.

❍ **Let's play a game like the two boys in the story played. This game is called "Betcha I Can Round 'Em!" First, each of you will receive five tokens.** Pass out five tokens (chips, paper clips, etc.) to each student in the group.

The object of the game is to try to keep all your tokens, and take away as many tokens as you can from the other players.

We start with one player, who gets three cards. The player turns the cards over one at a time, rounds the money amount written there to the nearest dollar, and mentally adds the three amounts.

Then the player will say, "These cards are about (or almost) $____," stating the estimated total. Deal out three cards to yourself and demonstrate how you would mentally estimate the total of three cards.

Here's where the game gets interesting: If anyone else in the group believes your estimate is wrong, that student will say, "Betcha I Can Round 'Em!" The challenger will then take the same three cards and use mental math to try to come up with a different answer.

But make sure you really believe the first player estimated incorrectly! I will check your answers each time. If I discover that the challenger is wrong, he or she must give the first player a token. But if the challenger is correct, he or she takes a token from the first player.

Deal three cards facedown to the first student, and begin the play. Play as many rounds of the game as time permits. Collect the cards after each player finishes an estimate, and reshuffle often–it won't matter if a card is used more than once. The student with the most tokens (if any) at the end of the game wins.

Small-Group Activity Two: Guess a Story

Concept Taught

Money Estimation in Problem Solving

Materials

- Chalkboard or chart paper
- Optional: crayons
- Handout: **Guess a Story** worksheet

1. Begin Activity Two: **Guess a Story** worksheet.

   ❍ Say:

   Now we're going to have you use what you've learned about rounding money to the nearest dollar to fill in the blanks in a story and solve a shopping problem. I'm going to pass out a worksheet that shows a store that sells snacks and toys. Each item has a price tag attached to it.

   First you will round the amounts of each item in the store to the nearest dollar. Then you will use this information, along with mental math, to fill in the blanks in the story.

   The last line of the story tells you to draw a picture on the back of the page. If you've filled in the story correctly, you should be able to create the correct picture.

   Watch to make certain students write in the correct rounded amounts in the price tags, and then let them work independently or in pairs to fill in the story. NOTE: The pizza slice on the worksheet requires students to round down.

   You might want to provide crayons and let students color their worksheets if they finish early.

Additional Small-Group Activities for *Betcha!*

Pages 32 and 33 in *Betcha!*, by Stuart J. Murphy, provide additional activities that can be used in the classroom as well as ideas to share with parents. The activity titled "Buying Food" works especially well with this lesson, and will encourage students to get their families involved in using estimation for personal finances.

Assessment

Check students' understanding by listening carefully to the responses they give during group discussions and while playing the **Betcha I Can Round 'Em!** game. Go over the answers to the **Guess a Story** worksheet from small-group activity two, and allow students to discuss how they deduced the correct toy purchased by Mike and Kali. The ability to describe their own thinking processes will help cement the learning of this skill.

Suggested Online Activity

NOTE: Teachers should preview all sites to ensure they are age-appropriate for their students. At the time of publication, all URLs listed here were valid. In addition, some Web sites provide lessons via pop-up screens, so you may have to disable your computer's pop-up blocker software to access them.

Glowla's Estimation Contraption

PBS KIDS GO! is a new place on pbskids.org for big kids–kids who like to play games, solve puzzles, share their own stories, and much more. In this offering from the *Cyberchase* collection, students will practice ballpark estimation in an interactive game where they have 60 seconds to estimate the sum of a group of numbers. To do this, they must round the numbers first and then estimate the sum. Found at: pbskids.org/cyberchase/games/ballparkestimation/index.html.

National Standards Correlations

Economics

The activities in this lesson correlate to the following Voluntary National Content Standards in Economics, as determined by the National Council on Economic Education, found at: www.ncee.net/ea/standards.

Standard 7: Markets–Price and Quantity Determination

Students will understand that: Markets exist when buyers and sellers interact. This interaction determines market prices and thereby allocates scarce goods and services.

K–4 Grade Benchmarks:

- A price is what people pay when they buy a good or service, and what they receive when they sell a good or service.

Standard 11: Role of Money

Money makes it easier to trade, borrow, save, invest, and compare the value of goods and services.

K–4 Grade Benchmarks:

- Money is anything widely accepted as final payment for goods and services.

Mathematics

In addition to economics, the activities in this lesson also correlate to the following *Principles and Standards for School Mathematics,* from the National Council of Teachers of Mathematics, found at: standards.nctm.org/document/index.htm.

Numbers and Operations Standards

Understand numbers, ways of representing numbers, relationships among numbers, and number systems

3–5 Grade Benchmarks:

- develop fluency in adding, subtracting, multiplying, and dividing whole numbers

Compute fluently and make reasonable estimates

3–5 Grade Benchmarks:

- develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results
- develop and use strategies to estimate computations involving fractions and decimals in situations relevant to students' experience

Language Arts

This lesson, based on the children's book *Betcha!,* by Stuart J. Murphy, also correlates to the following *Standards for the English Language Arts,* from the National Council of Teachers of English, found at: www.ncte.org/print.asp?id=110846&node=204.

1. Students read a wide range of print and non-print texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of

society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works.

3. Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics).

5. Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

Betcha I Can Round 'Em!

$0.82	$0.76
$1.19	$1.37
$1.68	$1.99
$1.80	$1.74

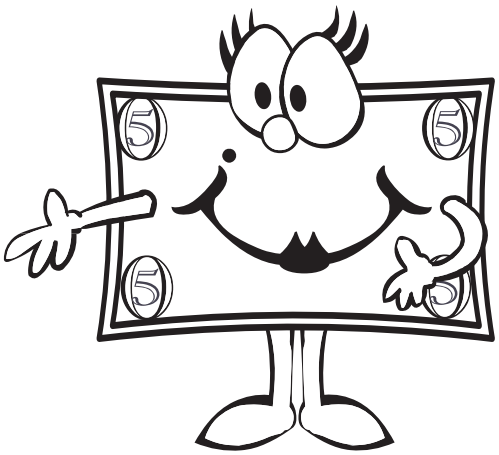
Betcha I Can Round 'Em!

$2.07	$2.17
$2.35	$2.20
$2.79	$2.59
$2.98	$2.64

Betcha I Can Round 'Em!

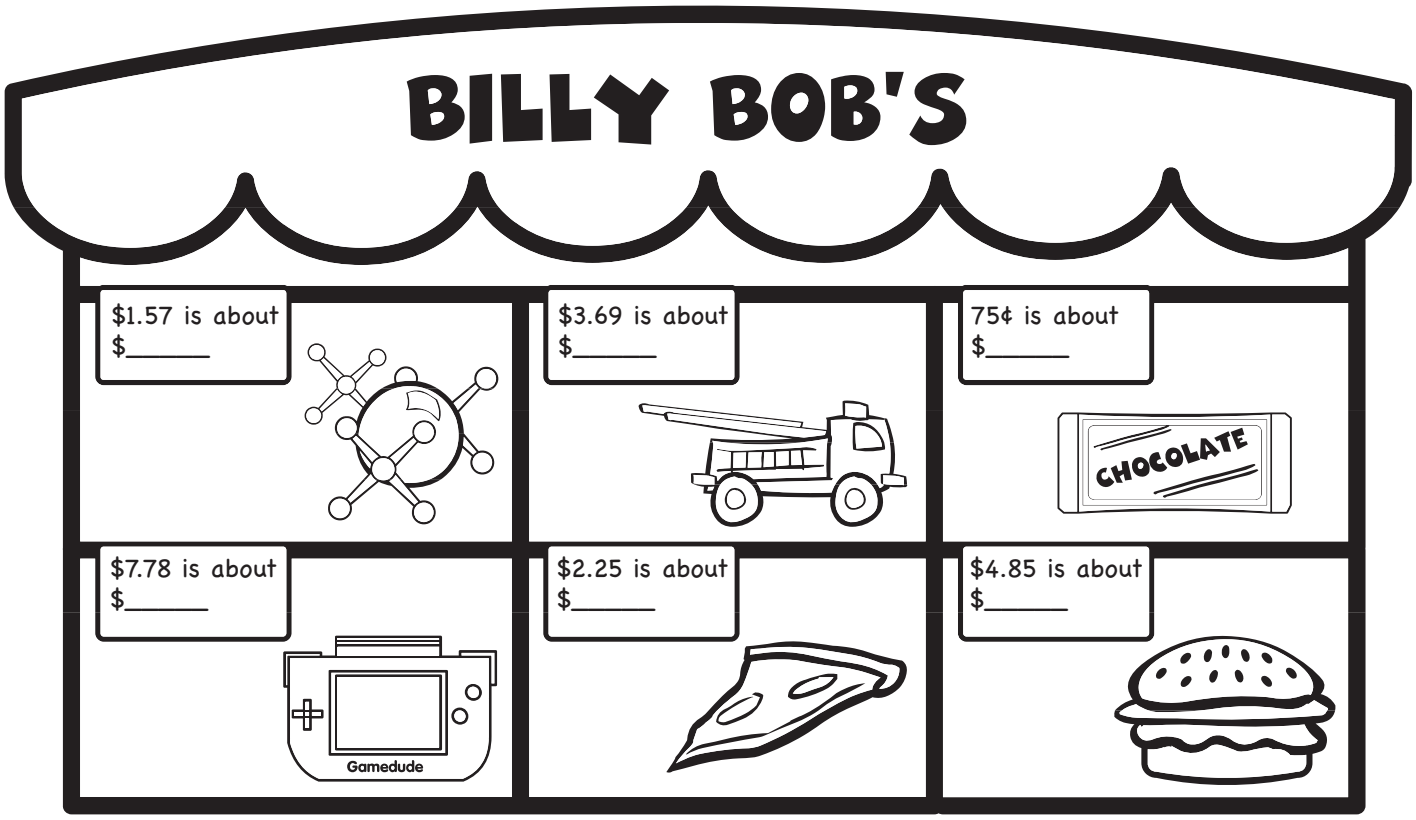
$3.12	$3.34
$3.68	$3.81
$4.02	$4.25
$4.75	$4.90

Guess a Story



Name _____

Round each item in the store to the nearest dollar. Then use the estimated prices to fill in the story.



Mike, Kali, and Ro went shopping. They were hungry, so they each bought something to eat.

Mike had $10.00. After he bought a _____, he had about $5.00 left.

Kali had $4.00. After she bought a _____, she had about $3.00 left.

Ro had $6.00. After she bought a _____, she had about $4.00 left.

After their snack, the friends went shopping for new toys. Ro had enough money left to buy a _____ or a _____. Color the toy you think she should buy.

Mike and Kali put their money together because they wanted a toy that neither of them could afford alone. Draw a picture of the toy Mike and Kali bought together on the back of this paper.