

DONUT DINERO

Math Topic: Bartering & Monetary Systems

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ABOUT THE AUTHOR

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MATH TOPIC: Bartering & Money Systems

GRADE LEVEL: 3-5

TIME ALLOTMENT: 55-75 minutes

OVERVIEW: Have you ever wanted to trade something with someone, but you both couldn't agree on what made a fair trade? Instead of trading what you have for what you want, you can make it easier to buy and sell by creating a system of money where you exchange goods for tokens of different, agreed-upon fixed values. By relating to the CYBERCHASE kids' dilemma in the episode "Trading Places," students will learn how monetary systems are based on a standard unit of value that consequently can be broken down into fractions (to purchase an item of less value than the standard unit) or expanded into multiples (to purchase an item of greater value than the standard unit). These lessons can be related to real world issues children encounter everyday.

SUBJECT MATTER: Mathematics and Social Studies

LEARNING OBJECTIVES: Students will be able to:

- Describe the concept of bartering by giving specific examples (current and/or historical).
- Examine the use of a substance (a donut) as the standard value for developing a monetary system.
- Create a monetary system based on fractions and multiples of a standard unit.
- Compare this system to our U.S. monetary system.

STANDARDS: From the National Council of Teachers of Mathematics Standards, grades 3-5, available online at <http://standards.nctm.org>

NCTM Standards: Numbers & Operations, Measurement, Algebra, Representation

The primary NCTM Content Standard for this lesson is **Number & Operations**. In grades 3-5 all students should:

- Recognize and generate equivalent forms of commonly used fractions, decimals, and percents;
- Use visual models, benchmarks, and equivalent forms to add and subtract commonly used fractions and decimals.

MEDIA COMPONENTS:

Video

CYBERCHASE Episode #120: "Trading Places"

Web Sites

(For the Learning Activity)

History of Money

<http://www.pbs.org/newshour/on2/money/history.html>

A quick overview of the various forms of currency found throughout history, from 9000 B.C. to the present.

(For the Cross-Curricular Extensions)

Kid \$ense

<http://www.communitybankonline.com/kidsense/trivia.html>

These six trivia quizzes challenge children's knowledge of the history of money, the value and design of American money, and their aptitude at solving money word problems.

The United States Mint: h.i.p. pocket change

<http://www.usmint.gov/kids> (click on 'Time Machine')

The Time Machine section allows children to visit various historical periods of Early America and learn about how our monetary system has changed over the years.

Anatomy of a Bill

<http://www.pbs.org/wgbh/nova/moolah/anatomy.html>

Take a closer look at the design of the 1996 \$100 bill.

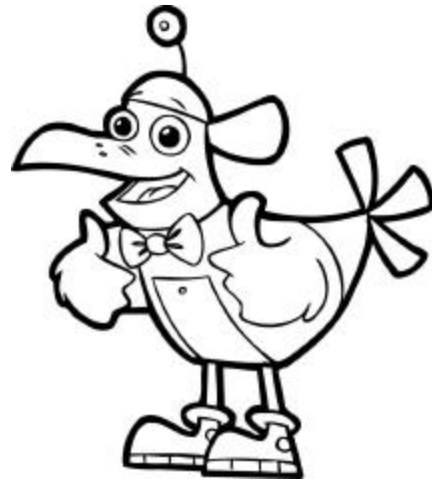
MATERIALS:

(For the class)

- Copy of the Shel Silverstein poem "Smart," from *Where the Sidewalk Ends*, available online at <http://www.fi.edu/pieces/knox/smart.htm>
- Chart paper and marker, or blackboard and chalk

(For each student)

- Paper donut cutouts (1 set per student): 2 chocolate donuts, 12 plain donuts (2 to be cut into fractions)
- Copies of the *Market Flier* and the *Donut Dinero* handouts (reproducibles provided)
- Magazines
- Plain paper
- Markers, crayons, or colored pencils
- Scissors (1 pair per student)
- Glue



PREP FOR TEACHERS:

Prior to teaching this lesson, you will need to:

- Load the Shockwave plug-in, available at www.macromedia.com, and Quicktime, available at <http://www.apple.com/quicktime/download>, onto each classroom computer.
- Create copies of student handouts.
- **CUE** the videotape to the appropriate starting point, which is when you see Jackie fall on her knees, and hear her say, "All I see is heat. I need something to drink!" Bookmark the Web sites noted for Cross-Curricular Extensions.
- When using media, provide students with a **FOCUS FOR MEDIA INTERACTION**, a specific task to complete and/or information to identify during or after viewing of video segments, Web sites, or other multimedia elements.

- To read about what kids know and don't know about this lesson's math topic, please turn to the last page of this lesson.

INTRODUCTORY ACTIVITY:

1. Ask students how they are able to get something, some item, that they want? (*Go to a store and buy it!*) Ask students with what do they buy the goods? (*Money!*) Read the poem "Smart" by Shel Silverstein. Ask students if the narrator in the poem made a smart decision or if he made a big mistake? How? (*Big mistake — he thought the value or worth of the coins was dependent on the size of the coins.*)
2. Ask students what they do if they want something, but don't have any money in their pockets — no change at all! (*Trade something!*) What sort of things can you trade with one another? (*Trading cards, sports figures, action heroes, lunch items, toys, buttons, etc.*) Ask students if one can trade goods for services? (*Sure — prizes for good behavior, privileges for chores, etc.*) Can you think of a time when you traded something for a service or vice versa? (*Personal example: I used to work in my father's office, and he "paid" me for my service in batteries for all of my electronic toys. Batteries were of value to me, so I was willing to work at the office in exchange for batteries. It took me a while to wise up and realize that I could only use so many batteries for my toys!*)
3. Throughout the years, people have traded goods with one another. What sorts of things have been traded in historical times? [*Crops (tobacco), animals (cattle) animal products (eggs, leather), services/talents (sewing, carpentry)*] This system of trading is called bartering. Bartering is when people directly swap goods for other goods they need. Money was not involved because money had yet to be invented!
4. Give a historical example by dividing the room in half and posing this scenario: Suppose that one half of the room grew corn, and had a lot of corn but not much meat. Now the other side of the room had lots of meat, but no corn. If you could agree on a fair swap, you would have a simple trade. However, what if the corn farmers wanted even more meat, but those that had meat didn't want anymore corn? (*There would be no trade.*) What could the corn farmers do? (*They could see if they could trade something else for the meat, like eggs, for example.*) Even now, we barter for things we want if we do not have the money to make the purchase.

LEARNING ACTIVITY:

1. Explain to your students that they will be learning by watching video clips from the PBS series CYBERCHASE to explore the basic concepts behind our monetary system: the principle of bartering, standard substances, the need for standard substances, as well as fractions and multiples of the standard. **INSERT** the CYBERCHASE episode, "Trading Places," into your VCR. Explain to your students that the CYBERCHASE kids have crashed into the cybersite called Nowhere. They are hungry and they need parts in order to fix their now broken ship. However, even in Nowhere, nothing is free! Yet they quickly learn that their money is no good in Nowhere. **CUE** the tape to where Jackie falls on her knees and says, "All I see is heat. I need something to drink!" Provide your students with a **FOCUS FOR MEDIA INTERACTION** by asking them to determine how Jackie will convince the woman to give her lemonade. **PLAY** the video until the food woman in the booth says, "You got anything to trade?" **PAUSE** the video. Ask: **What is**

the only way that Jackie will be able to get a drink? (*She will have to trade something, or barter, for the lemonade.*)

2. Explain that in order to barter successfully, we have to assign value to our goods. Value is what we think something is worth. Ask students to think of something they own that is valuable to them. What are some things that they could trade with one another? Compile a list of students' examples. Now pose this scenario to the students: They are very hungry and are hankering for a hot dog. Ask: **Is there anything off the list that you would trade for one satisfying hot dog?** (*There may be nothing off of the initial list.*) Ask the students to add to the list, and add some other things that they would be willing to trade for a delicious hot dog. (*Student answers will vary.*) Note that there will be a variety in this list, and discuss with students what they would or would not be willing to trade for this hot dog.
3. Provide your students with a **FOCUS FOR MEDIA INTERACTION** by asking them to determine how Jackie successfully trades for the lemonade. **PLAY** the video until Matt says, "Okay, deal," and all three kids drink their lemonade. **STOP** the video. Ask: **How did Jackie end up getting her lemonade?** (*She traded a baseball card for three lemonades.*) **Which item was more valuable?** (*The Mark McGwire baseball card*) **How do you know?** (*For only one card, Matt received three glasses of lemonade.*)

4. Explain to your students that Jackie also wants three PB&J sandwiches. Ask them to predict what Jackie may do. (*Barter*) Provide your students with a **FOCUS FOR MEDIA INTERACTION** by asking them to check if their prediction is correct. **PLAY** the video until the food woman in the booth throws her hand in the air and says, "Sorry, you got nothing I want, so no trade!" **STOP** the video. Ask: **What is the dilemma?** (*The kids don't have anything that the woman wants or values — so they can't do any bartering.*) The food woman calls the problem, "the perils of bartering." Ask: **What does she mean by that?** (*You can't barter successfully if both parties don't have something the other wants or values.*) Ask the students if they have ever tried to trade with someone unsuccessfully? (*Student answers will vary.*) Describe how the CYBERCHASE kids also have to get parts for their spaceship so that Digit can continue fixing it. They encounter a similar problem when trying to barter with the Parts Man when he doesn't want anything that Matt has! However, as luck has it, he hears the kids talking about donuts.



5. Provide your students with a **FOCUS FOR MEDIA INTERACTION** by asking them how the stale donuts help the kids' dilemma. Continue to **PLAY** the video. **PAUSE** the video when Jackie says, "Don't go away! We'll be back with more donuts than you can imagine!" Ask: **How have the donuts become valuable?** (*The Parts Man is willing to trade donuts for goods, i.e., the parts.*) **Who else values donuts?** (*The Food Lady said she'd even trade for donuts; she valued them, too!*) Reiterate that instead of random goods, both the Parts Man and the Food Lady are willing to trade donuts for parts and sandwiches. The donuts become the standard for exchange because everyone values the donuts and agrees that they

are willing to trade donuts versus actual goods. The donuts have become the standard substance in Nowhere.

6. Historically, people have agreed upon a standard substance for trading or bartering. For instance, the Ancient Romans and Chinese traded things for salt, since salt was highly valued (and easily weighed). In Early America, some Indians used strings of seashells, called wampum, as currency ('the standard substance'). According to legend, Dutch settlers even traded wampum for the island of Manhattan (the strings equaled about \$16). Log onto the PBS Web site <http://www.pbs.org/newshour/on2/money/history.html> to read about an example of wampum use. Again, ask students what the standard substance is in Nowhere? (*Donuts!*) What are some of the added advantages to having donuts as the standard substance? (*Like wampum, donuts are lightweight and easy to carry and handle.*) Who knew donuts were so valuable?
7. Give each student 10 plain donut cutouts. Hold up three objects of varying value (i.e., a coat, a notebook, a pencil). Tell the students that the notebook is worth exactly one donut. Ask: **Are the two other items worth more or less than the notebook?** (*The pencil is worth less, only a part of a donut.*) **How about the coat?** (*No, the coat is worth more than the notebook.*) **How did you come up with your answers?** (*All three objects are not of equal value; they are worth different amounts.*) Ask the students what they can do with the donuts to buy objects worth more or less than one donut. (*Use only part of the whole donut.*)
8. **CUE** video to when the kids return to the Parts Man and Inez says, "Here you go! One donut, just like you wanted." Provide your students with a **FOCUS FOR MEDIA INTERACTION** by asking them to find out how Matt and the gang use donuts to trade for items of different values. **PLAY** the video until Matt says, "One quarter of a donut for one bolt," as the donut is cut into fourths. Ask: **How much is one valve worth? One bolt?** (*1 valve = 1 donut; 1 bolt = $\frac{1}{4}$ donut*) **Why was the valve worth more than the bolt?** (*The valve is more precious, much more rare — 'hard to come by.'*) **How did the kids pay $\frac{1}{4}$ of a donut?** (*They used a donut cutter to divide the donut into four small, equal parts.*)



9. Refer back to the coat, notebook and pencil example. Tell the students that since they all agreed that the pencil was worth less than one donut, you are going to give it a value of $\frac{1}{4}$ donut. Ask: **How can you pay for the pencil?** (*Cut one of the plain donuts into quarters.*) Instruct students to cut two of the plain donuts into fourths. Tell students that the valuable coat is worth 13 donuts. (*No one has enough donuts to trade for the coat.*) Explain to the kids that luckily you have found some chocolate donuts. And in this land, the chocolate donuts are so wonderful, that people are willing to trade 10 plain donuts for one chocolate donut. The chocolate donuts are

hard to come by and therefore much more precious. Distribute two chocolate donuts to each student. Ask: **Can you now buy the coat? How?** (*Sure, with one chocolate donut and three plain donuts.*)

10. Ask students to compare the 'donut' monetary system to our monetary system of bills and coins. Explain that a donut is the standard in that system as a dollar is the standard in our system. Invite the students to cut one of the donuts in half. Ask: **What compares to $\frac{1}{2}$ and $\frac{1}{4}$ donut in our monetary system?** ($\frac{1}{2}$ donut = A half dollar or 50 cents; $\frac{1}{4}$ donut = a quarter dollar or 25 cents.) **Why might one need to break a single unit into smaller parts?** (Because some items are not as valuable as others, they are worth less; therefore you want to 'pay' a lesser amount so you divide the unit into smaller parts that are equal.)

CULMINATING ACTIVITY:

1. Divide the class into small groups (4-5 students in each group.) Hand out the *Market Flier*. Ask students to use the 'donut' monetary system to buy objects from the flier. Ask: **Do you have enough donuts to purchase any of the listed items?** (Yes, the combinations of goods may vary, though.) Reiterate if necessary, that the donuts can be cut into fractions for lesser amounts, and can be used in multiples for greater amounts.
2. While in their small groups, have students cut pictures out from magazines and include the approximate worth according to the 'donut' monetary system. Ask students if they are able to buy items off of each other's lists. (Most likely, some items will be way too expensive.)
3. Distribute the "Donut Dinero" worksheet to each student in your class. Ask students to fill out the "Donut Dinero" worksheet with illustrations and notations. Encourage students to extend the monetary system to include other donuts (filled donuts, frosted donuts, square donuts) that are worth greater amounts (20 donuts, 50 donuts, etc.) The class now has created a sophisticated 'donut' monetary system.

CROSS-CURRICULAR EXTENSIONS:

- **Language Arts.** Several poems and picture books relate to money (and money woes!). They are perfect for read-alouds and class discussions:

The Hundred Penny Box by Sharon Bell Mathis (Puffin, 1996)

The 100-year-old protagonist has collected a penny for every year of her life. She recounts the stories of her life by reflecting on her collection. Ask students to use a penny with a particular date in order to write about a specific memory. This is a wonderful activity for a memoir unit.

Alexander, Who Use to be Rich, Last Sunday by Judith Viorst (Simon & Schuster, 1980)

Alexander's grandparents give him a dollar, and he fantasizes about all he could buy with it. However, he learns just how quickly money disappears! To relate this issue to the real world, ask student what they would spend a dollar on first.

- **Math.** Quiz students' money know-how with the questions in the trivia section of the Kid \$ense Web site at <http://www.communitybankonline.com/kidsense/trivia>. These six trivia quizzes challenge children's knowledge of the history of money, the value and design of American money, and their aptitude at solving money word problems.
- **Social Studies.** The U.S. Mint's Web site for kids, "h.i.p. pocket change," at <http://www.usmint.gov/kids> has valuable information about the United States'

minting process. Go to the Time Machine section to visit various historical periods of Early America and learn how our monetary system has changed over the years.

For a more recent update on our monetary system, check out Nova Online's "Anatomy of a Bill" at <http://www.pbs.org/wgbh/nova/moolah/anatomy.html> to take a closer look at the design of the 1996 \$100 bill (part of the new series of bills — the new \$20 bill was just introduced in 2003).

COMMUNITY CONNECTIONS:

- Within your school or after-school group, create a unique monetary system based on a standard substance other than US money. For instance, in exchange for a needed pencil or notebook, students could 'pay' for these goods with varying amounts of the following items: cans of food, food coupons, aluminum cans. These items (or the profits generated from them) could be donated to charity. Students could also acquire tickets or marbles through a behavioral reward system.
- Organize a "Penny Harvest" at your school. Encourage all of the grades to accumulate as many pennies as possible for a chosen charitable organization. Encourage your class to collect the pennies and track the individual class's contributions as well as the school's overall donation (great for bar and line graph practice!). Ask students to organize the funds into money rolls, to then exchange for larger multiples:

It all starts with a penny —10 pennies = a dime; 100 pennies = a \$1 bill; 10 single dollars = a \$10 bill; 10 \$10 bills = a \$100 bill.



MARKET FLIER

Organic Apple: $1\frac{1}{2}$ donuts

New lipstick in the latest color: $5\frac{3}{4}$ donuts

The latest pair of sneakers: $19\frac{1}{2}$ donuts

A gumball: $\frac{1}{4}$ of a donut


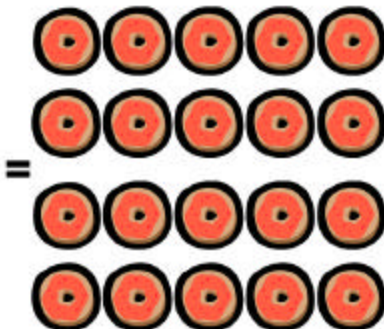
A pack of gum: $1\frac{1}{2}$ donuts

A pizza meal including a soda
and cookies: $8\frac{3}{4}$ donuts



DONUT DINERO

NAME _____

Draw a whole donut.	
Draw a piece of a donut worth $\frac{1}{4}$ a whole plain donut.	
Draw a piece of a donut worth $\frac{1}{2}$ a whole plain donut.	
Draw a chocolate donut that is equal to 10 plain donuts.	= 
Draw 2 chocolate donuts that would be worth 20 plain donuts.	= 
In the box to the right, draw donuts worth 50 and $\frac{1}{2}$ donuts.	
Draw and describe a new donut which would be worth exactly 50 plain donuts.	

Math Topic: Bartering & Monetary Systems

(To go with “Donut Dinero”)

What we can assume 8- and 9-year-olds already know about BARTERING & MONETARY SYSTEMS:

Kids are experienced with some kinds of bartering, such as when they swap sandwiches or other goodies from lunchboxes or trade Pokémon cards or baseball cards. They know how to assign a value to the different items and trade them for things of comparable worth.

From history lessons or even coin collecting, some kids will be familiar with coins from previous eras, including pirate coins and ‘pieces of eight.’

Kids use tokens at video game arcades and in mass transit turnstiles, but they do not recognize these as part of a monetary system. They realize that the tokens have value, but not in the same sense as real money.

Kids may readily do chores around the house in exchange for a special privilege, or even do a chore for a neighbor to make up for breaking a window during a baseball game. And when it comes to situations like these, as any parent will attest, they are very good negotiators at the bargaining table!

What confuses kids about BARTERING & MONETARY SYSTEMS:

Kids generally don’t understand the underlying assumptions of monetary systems—that there has to be something precious of commonly accepted value in order for a monetary system to work. They often believe that the money itself is the valuable thing and don’t recognize that dollar bills are just paper and coins are just pieces of metal.

They accept the names of the coins without realizing there is an implied meaning in the word itself. For example, they are not aware that nickels are so-called because they used to be constructed from a precious metal called nickel, and quarters because they represent one-fourth of a dollar.

At an early age kids assume that the largest coin is worth the most. They later learn that a smaller coin can be more valuable.