

Money Math (Crowdsource Content)

STEM.org¹

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Figure 1: Money Math Proficiency Badge

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Lesson 1: (A) Symmetry Grade Level: K-5 (Adaptable)

Suggested Time: 45-60 minutes

Overview

Students will learn about symmetry and other patterns found in the natural world, in objects, and in people. They will look at coins and bills of currency for examples of both symmetry and asymmetry, then practice making and designing (a) symmetrical objects on their own.

Vocabulary

- Symmetry
- Asymmetry
- Patterns
- Currency
- Money
- Chain Dolls

Objectives

- Students will observe patterns occurring in objects, nature, and in people.
- Students will observe currencies from around the world, handle real U.S. currency, and look for patterns in the design of these currencies.
- Students will practice making patterns of their own.

Next Generation Science Standards

- PS1-6. Asking Questions; Planning and Carrying Out Investigations; Obtaining, Evaluating, and Communicating Information

Common Core Mathematical Standards

- OA. Operations and Algebraic Thinking
- NBT. Number and Operations in Base Ten

Required Project Materials

- Real money (such as a dollar, \$5, and \$10) and coins
- Paper
- Scissors
- Markers, pens, and pencils
- Craft glue
- Paint
- Construction paper of various colors
- Other crafty materials, such as pipe cleaners, fuzzballs, googly eyes, sequins, etc.

Multimedia Resources

- What is Symmetry in Nature? Bobbie Kalman. <http://amzn.com/0778733475>
- What is Money? (Money Around the World.) Rebecca Rissman. <http://amzn.com/1432910779>
- “Paper Doll Chains”. Friday Fun Craft Projects. Aunt Annie’s Crafts. <http://www.auntannie.com/FridayFun/DollChains>

Optional Multimedia Resources

- There are many instructions for various chains of figures available online.

Before the Lesson/ Background Information

- Print chain doll instructions.

- Collect a few examples of U.S. money to be used in class (bills and coins).

Homework from Previous Session:

- None

The Lesson

Part 1: Reading Together (15 mins)

1. Read *What is Symmetry in Nature?* with the students.
2. Make it fun: read with energy and give the characters voices!
3. Review key terms from the book. Have the students think of examples of asymmetry.

Part 2: Scouting for Symmetry (20 mins)

1. Have students look at examples of currencies from around the world in *What is Money? (Money Around the World.)* Hint: there are usually examples of both symmetry and asymmetry in money!
2. Next, pass around examples of U.S. currency. What patterns can the students observe in the money? What about the coins?

Part 3: Chain Doll Competition (25 mins)

1. Separate the students into two teams: the symmetry and asymmetry team. You can either divide the class equally in half (as an example of symmetry, perhaps!) or allow students to pick which team they want to join (and see what kind of asymmetry shows up!).
2. Pass out instructions for making chain dolls and do a demonstration for the class. Have students make chain dolls from plain paper and assist the teams and individual students as needed.
3. Once the chain dolls are made, students should decorate them using the other craft materials, pens, paints, etc. The symmetry team members should make theirs as symmetrical as possible. The asymmetry team members should make theirs asymmetrical! There are many ways to do this: they can make their characters into cyclops, crazy fashionistas, etc. Encourage both teams to be as creative as possible.
4. Have the students put the designs up for display on one of the classroom walls.

Lesson 2: Where's George? Grade Level: K-6 (Adaptable)

Suggested Time: 45-60 minutes

Overview

This lesson concerns the way money gets around to many different people and places. Students will learn about how money travels, then explore the site “Where’s George?” which tracks the journeys of real dollar bills. Finally, in groups, students will compose stories or skits relating the travels of any currency of their choice (a dime, a nickel, a twenty dollar bill—whatever they like).

Vocabulary

- Currency
- Exchange
- Economy

Objectives

- Students will think about how money exchanges between various individuals and businesses.
- Students will learn how exchange functions within an economy.

Next Generation Science Standards

- PS1-6. Asking Questions; Planning and Carrying Out Investigations; Obtaining, Evaluating, and Communicating Information

Common Core Mathematical Standards

- OA. Operations and Algebraic Thinking
- NBT. Number and Operations in Base Ten

Required Project Materials

- Notebooks
- Pens, markers, and pencils
- Computer lab or computer for demonstration with live internet

Multimedia Resources

- The Go-Around Dollar. Barbara Johnston Adams and Joyce Audy Zarins. [http:// amzn.com/0027000311](http://amzn.com/0027000311)
- “Where’s George?” <http://www.wheresgeorge.com>

Optional Multimedia Resources

- None

Before the Lesson/ Background Information

- Familiarize with the “Where’s George?” website if you have not seen it before.

Homework from Previous Session:

- None

The Lesson

Part 1: Money Travels (30 mins)

1. Read The Go-Around Dollar with the students. Have fun with it and give voices to the characters.
2. Have the students pass around a dollar among each other, exchanging it for marbles and other classroom items.
3. Show the website “Where’s George?” and click on various bills that have been tracked on the website. Have the class imagine stories for these bills. What happened to them?

Part 2: Money Stories (30 mins)

1. Separate the class into groups.
2. Have each student come up with a story about the journey of a unit of currency. It can be any unit: a \$50 bill, a quarter, a nickel or penny. They can either write the story and read it to the class, or do a skit for the class.

Lesson 3: Money Doesn’t Grow on Trees

Grade Level: K-5 (Adaptable)

Suggested Time: 45-60 minutes

Vocabulary

- Barter
- Trade

- Currency
- Money
- Savings
- Budget
- Earnings/Income
- Spending

Objectives

- Students will learn about various forms of currency not limited to money.
- Students will practice trading and bartering.
- Students will learn about the history of paper money.

Next Generation Science Standards

- PS1-6. Asking Questions; Planning and Carrying Out Investigations; Obtaining, Evaluating, and Communicating Information

Common Core Mathematical Standards

- OA. Operations and Algebraic Thinking
- NBT. Number and Operations in Base Ten

Required Project Materials

- Seashells(available at craft stores)
- Any money- related board games, such as several copies of The Allowance Game, or several games of various types

Multimedia Resources

- One Cent, Two Cents, Old Cent, New Cent: All About Money. Bonnie Worth and Aristides Ruiz.<http://amzn.com/0375828818>
- The Allowance Game. Lakeshore Learning Materials. <http://amzn.com/B004ZAKI1M>
- The Penny Pot. Stuart J. Murphy and Lynne Woodcock Cravath. <http://amzn.com/0064467171>
- Loose Change. Mindware. <http://amzn.com/B0028T139S> **Note: this is a board game**
- Pay Day. Winning Moves. <http://amzn.com/B00083HIJK> **Note: this is a board game**
- Sum Swamp. Learning Resources. <http://amzn.com/B00004TDLD> **Note: this is a board game**

Before the Lesson/Background Information

- None

Homework from Previous Session:

- None

The Lesson

Part 1: Reading Together (15 mins)

1. Read One Cent, Two Cents, Old Cent, New Cent: All About Money with the students.
2. Make it fun: read with energy and give the characters voices!

Part 2: Shelling out the Goods (15 mins)

1. Tell the class to imagine an economy without money. They have to trade and barter using seashells.
2. Have the sellers trade items with each other—their own, or items from the classroom. These can include books, desks, globes, maps, you name it! Everything is up for grabs! Allow the students to practice bartering with seashells.

Part 3: Money Games (30 mins)

1. In teams, students will play board games to exercise their skills in counting, simple arithmetic, and important concepts like earning, saving, and budgeting.
2. Save a few minutes at the end of class to review what each team learned.

Lesson 4: Classroom Sale

Grade Level: K-5 (Adaptable)

Suggested Time: 45-60 minutes

Overview

Students will practice having an old-fashioned garage sale—out of the classroom! Tasks include assessing the worth of items, deciding on a fair price, making change, and bargaining. Students will learn these skills, as well as why buying and selling used and repurposed items is important!

Vocabulary

- Garage Sale
- Fair Price
- Re-purposed Items
- Reuse and Recycle
- Bargain
- Price Gouging
- Heckling

Objectives

- Students will think about how to make prices fair for both buyers and sellers.
- Students will learn how to make change.
- Students will learn that used items are cheaper than new ones, but often still good or even like new!
- Students will learn how buying and selling used items prevent waste.

Next Generation Science Standards

- PS1-6. Asking Questions; Planning and Carrying Out Investigations; Obtaining, Evaluating, and Communicating Information

Common Core Mathematical Standards

- OA. Operations and Algebraic Thinking
- NBT. Number and Operations in Base Ten

Required Project Materials

- Toy money
- Price tags or labels
- Tagging gun such as Max Sale brand <http://amzn.com/B00DJ2VR9E>
- Markers, pens, and notepads

Multimedia Resources

- A Bargain for Frances. Lillian Hoban. <http://amzn.com/006444001X>

Optional Multimedia Resources

- The Penny Pot. Stuart J. Murphy and Lynne Woodcock Cravath. <http://amzn.com/0064467171>

Before the Lesson/Background Information

- None

Homework from Previous Session:

- None

The Lesson

Part 1: Reading Together (20 mins)

1. Read A Bargain for Frances with the students.
2. Make it fun: read with energy and give the characters voices!
3. Discuss lessons learned from the book. Why is it important to set a fair price, for both buyers and sellers?
4. What is price gouging? What is heckling? What is a fair bargain?

Part 2: Classroom Sale (30 mins)

1. Separate the class into two teams: buyers and sellers.
2. Have the sellers set the prices of items in the classroom. These can include books, desks, globes, maps, you name it! Everything is up for grabs! Allow the sellers to discuss and argue prices among themselves.
3. Armed with toy money, it is now time for buyers to buy things! They may bargain to try to get prices they think are fair.
4. When someone buys something, the seller will need to make change.

Part 3: Discussion (10 mins)

1. Bring the class back together and discuss what they learned. How easy or hard was it to find fair prices for everyone?
2. Review the process of making change.
3. Identify the reasons that people have garage sales. Why is it beneficial to buy and sell used items? Discuss how many usable objects end up in landfills. Buying and selling used items is a form of recycling: it's called re-purposing items!

Lesson 5: Cartoon Money Math

Grade Level: K-6 (Adaptable)

Suggested Time: 45-60 minutes*

***This lesson is ideal for extending to two or more class periods.**

Vocabulary

- Arithmetic
- Addition
- Subtraction
- Division
- Multiplication
- Fractions

- Decimals

Objectives

- Students will learn math concepts in a fun way, then apply them to practice problems.
- Students will come up with their own problems, figure out how to explain and demonstrate them, and build their own story lines.

Next Generation Science Standards

- PS1-6. Asking Questions; Planning and Carrying Out Investigations; Obtaining, Evaluating, and Communicating Information

Common Core Mathematical Standards

- OA. Operations and Algebraic Thinking
- NBT. Number and Operations in Base Ten

Required Project Materials

- Sketch paper
- Pens, markers, and pencils
- Grid paper(optional)

Multimedia Resources

- Comic-Strip Math: Problem Solving. Dan Greenberg .<http://amzn.com/0545195713>

Optional Multimedia Resources

- Lunch Money and Other Poems About School. Carol Diggory Shields. <http://amzn.com/014055890X> **Note: this book (or other money books) can be used to inspire students to come up with story lines.**

Before the Lesson/Background Information

- None

Homework from Previous Session:

- None

The Lesson

Part 2: Comical Competition (30 mins)

1. Separate the class into two teams.
2. Have teams come up with their own practice problems. The catch: these problems must have something to do with money!
3. Now they will need to draw cartoons to illustrate the problems in a similar way.
4. Each student can draw as many cartoons as they like!
5. Once the teams are finished, have them compile their cartoons together.
6. Have each team work on the other team's problems and read the cartoons. Were the problems done correctly?What did they learn from the cartoons about money?

Lesson 6: Dewey Decimal Detectives

Grade Level: K-5 (Adaptable)

Suggested Time: 45-60 minutes

Vocabulary

- Dewey Decimal System
- Public Service
- Public Library
- Borrowing
- Loan
- Lending
- Late Fees
- Interest

Objectives

- Students will learn about loaning and borrowing.
- Students will practice using the Dewey Decimal System.
- Students will learn about the social and educational function of libraries.

Next Generation Science Standards

- PS1-6. Asking Questions; Planning and Carrying Out Investigations; Obtaining, Evaluating, and Communicating Information

Common Core Mathematical Standards

- OA. Operations and Algebraic Thinking
- NBT. Number and Operations in Base Ten

Required Project Materials

- Dewey Decimal Detective Badges (toy badges can be found at craft and toy stores)

Multimedia Resources

- Do You Know Dewey?: Exploring the Dewey Decimal System. Brian P. Cleary and Joanne Lew Vriethoff. <http://amzn.com/0761366768>

Optional Multimedia Resources

- None

Before the Lesson/Background Information

- If possible, find a librarian at a local public library to assist with the lesson.
- Arrange a field trip to a local public library and obtain permission to host the lesson there.

Homework from Previous Session:

- None

The Lesson

Part 1: What is the Dewey Decimal System? (20 mins)

1. Once at the library, begin to read Do You Know Dewey?: Exploring the Dewey Decimal System with the students.
2. Demonstrate how the system works by showing them the markers on the back of a few books.
3. Have the students practice putting the piles of books in order.

Part 2: Dewey Detectives! (20 mins)

1. Following the exercises in the book, have groups of students seek out particular topics of interest, or specific books.
2. Make it fun: they are playing as Dewey Decimal Detectives!

Part 3: Dewey Discussion (20 mins)

1. If possible, have a librarian lead or assist with this part of the lesson.
2. Bring the class together again for discussion. Review the history of libraries and why they are important.
3. Go over the process of borrowing and lending. Discuss the importance of taking care of library books. What happens when the books are late? Introduce the concept of interest and compare this to library late fees and fines.
4. Pass out Dewey Decimal Detective badges!

Lesson 7: Market Mayhem

Grade Level: K-5(Adaptable)

Suggested Time:45-60 minutes

Overview

Students will start out with a set amount of imaginary money. They will make a list of things they think they can buy with that amount of money, then go on a fieldtrip to a nearby grocery store to test their shopping list. Groups will compete with each other for the best budget!

Vocabulary

- Groceries
- Budget
- Estimation
- Price
- Inventory
- Substitution

Objectives

- Students will practice estimating costs of items and putting together a budget.
- Students will explore the actual prices of food items.
- Students will learn about inventory by considering how to substitute items that are unavailable.

Next Generation Science Standards

- PS1-6. Asking Questions; Planning and Carrying Out Investigations; Obtaining, Evaluating, and Communicating Information

Common Core Mathematical Standards

- OA. Operations and Algebraic Thinking
- NBT. Number and Operations in Base Ten

Required Project Materials

- Receipt paper
- Pencils and erasers
- Calculator
- Packaged snacks as prizes

Multimedia Resources

- None

Optional Multimedia Resources

- Pigs Will Be Pigs: Fun with Math and Money. Amy Axelrod and Sharon McGinley-Nally. <http://amzn.com/0689812191>

Before the Lesson/Background Information

- Locate a nearby grocery or corner store for the field trip and let the proprietor know you will be coming. It would be a good idea to purchase your prizes from this person, too!

Homework from Previous Session:

- None

The Lesson

Part 1: Budget Bending (15 mins)

1. If you have time, read Pigs Will Be Pigs: Fun with Math and Money together.
2. Separate students into groups and give each group the same imaginary amount of money. For example, you might tell the groups that they each have \$20 to spend.
3. Each group will need to come up with a list of grocery items (food only) to last a whole week. Guessing at the cost of each item, they will have to stay within the budget. Individuals within the group should consult with each other to arrive at their best guess for the cost of each item.

Part 2: Market Mayhem (20 mins)

1. Once the groups have their lists, take the class to a nearby store. Have the group record the actual price of each item on the list. If the store doesn't have a particular item or if the item is just too expensive, the group is allowed to make a substitution on that item as long as it is in the same food group and used for a similar purpose (for example, tortillas instead of bread, or strawberries instead of blueberries).
2. However, the group is not allowed to take any items off the list! If they can't stay within budget, that's part of the game.
3. Approve of any substitutions before you leave the store.

Part 3: Market Masters and Budget Blasters (25 mins)

1. Return to class and evaluate each group's results. Was anyone able to stay under budget? Who paid the lowest amount for the food they wanted? Who stayed closest to the exact budget amount?
2. Announce winners and handout prizes. **Who are the "Market Masters" and who are the "Budget Blasters"?**

Lesson 8: Time is Money

Grade Level: K-6 (Adaptable)

Suggested Time: 45-60 minutes

Overview

"Time is money" is a popular saying. But is it true that time is money? Students will play games that teach them how to tell time and how to count money. Then they will connect concepts between the two by using math understanding, for example, how fractions can either help one to tell time or to count money.

Vocabulary

- Digital
- Analog
- Hours
- Minutes
- Seconds
- Half Past
- Half Dollar
- Quarter Till
- Quarter

Objectives

- Students will use games to learn the units of time and of money.
- Students will learn important mathematical concepts that are used to count time and money.

Next Generation Science Standards

- PS1-6. Asking Questions; Planning and Carrying Out Investigations; Obtaining, Evaluating, and Communicating Information

Common Core Mathematical Standards

- OA. Operations and Algebraic Thinking
- NBT. Number and Operations in Base Ten

Required Project Materials

- Real money (such as a dollar, \$5, and \$10) and coins
- Digital and analog watches

Multimedia Resources

- Time and Money Flash Cards. Brighter Child. <http://amzn.com/0769664806>

Optional Multimedia Resources

- A Clock Struck One: A Time-Telling Tale. Trudy Harris and Carrie Hartman. <http://amzn.com/0822590670>
- Telling Time with Big Mama Cat. Dan Harper, Barry Moser, and Cara Moser. <http://amzn.com/0152017380>
- Time Money & Fractions. Lorie DeYoung. <http://amzn.com/0938256440> **Note: this book is appropriate for K-2 students.**

Before the Lesson/Background Information

- Review the game options provided with the flashcards, and select games appropriate for class.

Homework from Previous Session:

- None

The Lesson

Part 1: Time Isn't Quite Money but You Count Both (40 mins)

1. Review the rules of the chosen games.
2. Have the students play the games with the flashcards to learn the basic units of time and of money.
3. Explain and demonstrate counting strategies used for both money and time.

Part 2: A Quarter is Half of Half is Half of One (20 mins)

1. Have students perform exercises using the real money and clocks as examples. They should be able to describe and use terms such as half past, quarter till, half dollar, and quarter dollar.
2. Use **optional multimedia resources** to help explain concepts.

Lesson 9: Bread and Cheese!

Grade Level: K-5 (Adaptable)

Suggested Time: 45-60 minutes

Overview

Students will figure out how to share a loaf of bread and block of cheese so that everyone gets a piece. This introduction to fractions also includes lessons about sharing, budgeting, and nutrition!

Vocabulary

- Fractions
- Sharing
- Budget
- Nutrition

Objectives

- Students will practice splitting a loaf of bread and a chunk of cheese into ever smaller fractions in order to ensure that everyone gets a piece.
- Students will think about circumstances where people have to share food.
- Students will consider the nutritional value of various kinds of food.

Next Generation Science Standards

- PS1-6. Asking Questions; Planning and Carrying Out Investigations; Obtaining, Evaluating, and Communicating Information

Common Core Mathematical Standards

- OA. Operations and Algebraic Thinking
- NBT. Number and Operations in Base Ten

Required Project Materials

- Loaf of bread
- Block of cheese
- Kitchen gloves
- Knife (not to be handled by students)
- Pencils and notebooks

Multimedia Resources

- Bread and Cheese .Billie Huban. <http://amzn.com/8966294049>

Optional Multimedia Resources

- None

Before the Lesson/Background Information

- None

Homework from Previous Session:

- None

The Lesson

Part 1: Fraction Demonstration (20 mins)

1. Announce to the students that today, they will be sharing an entire loaf of bread and chunk of cheese! Note that the instructor should, of course, do all of the slicing. Also have baby carrots or a similar option for students who don't like, or can't eat, bread and/or cheese.
2. Slice the bread and the cheese in half. Ask the students if it's possible to split the halves between the students so that everyone gets a piece. Teach them the fraction $1/2$ or 50%.
3. Repeat this process, slicing each chunk in half as you go along. Work with the class to identify each fraction until there is enough for the class.
4. On the board, show the students the math for ensuring there is enough food for everyone.
5. Allow each student to come up and get their snack.

Part 2: Reading Together! (20 mins)

1. Read Bread and Cheese. Work with the students to increase their range of food vocabulary. Why is it important to eat more than just bread and cheese?
2. Discuss situations where people might need to share a limited amount of food. Such situations might include camping out in the wilderness, getting lost somewhere, throwing a party for a group of people, or needing to stay on a budget.
3. Ask students to give examples of food sharing, from home or otherwise.

Part 3: Party Workshop (20 mins)

1. Tell the students that they are throwing a party for a hundred people. They will be serving grilled cheese sandwiches, a vegetable platter, and lemonade at the party. Ask the students to put together a list of ingredients and calculate how much of each ingredient they will need for the party.
2. Compare and discuss their answers.

Lesson 10: Tax Pies

Grade Level: K-6(Adaptable)

Suggested Time: 45-60 minutes

Overview

Students will learn about the purposes of taxes. First, they will learn from professional adults whose services are paid for by taxpayers. Then, students will share pies that are divided to show how taxes are apportioned to different societal needs.

Vocabulary

- Taxes
- Social Security
- Defense
- Unemployment and Public Assistance
- Medicare and Medicaid

Objectives

- Students will learn about the purpose of taxes.
- Students will learn about the current highest levels of tax-supported spending.

Next Generation Science Standards

- PS1-6. Asking Questions; Planning and Carrying Out Investigations; Obtaining, Evaluating, and Communicating Information

Common Core Mathematical Standards

- OA. Operations and Algebraic Thinking
- NBT. Number and Operations in Base Ten

Required Project Materials

- One large pie (or two pies, depending on number of students)
- Knife (not to be handled by the students)

Multimedia Resources

- None

Optional Multimedia Resources

- “FY 2010 Spending by Category” piechart. Obtained from www.wikipedia.org.

Before the Lesson/Background Information

- Set up a field trip to a firestation. Have the firefighters talk to the students about the costs of items—such as firetrucks, the hoses they have to buy, and fuel for the trucks.
- Alternatively, locate a fireman or other public servant (or several public servants) to come talk to the class about publicly funded professions.

Homework from Previous Session:

- None

The Lesson

Part 1: Presentation (40 mins)

1. Take the class on a field trip to a nearby firestation. Alternatively, if you have guest speakers, introduce the public service professional(s).
2. Explain to the class that such jobs are funded by taxpayer money.
3. With the public service professionals, discuss the prices of items that are necessary for this job. For example, a good fire department must have several highly technical vehicles, plus a myriad of expensive and sturdy equipment, and enough highly qualified staff to service a city. Discuss how much these materials cost to buy and maintain. What would happen if individuals had to put out their own fires?
4. Remind the students that the library they visited earlier in the course is also paid for by taxpayer money.

Part 2: The Tax Pie (20 mins)

1. Cut a pie (or pies) into slices to show how taxes are (or might be) divided among various programs.
2. If you like, you can slice the pie based on the main categories of U.S. tax spending, which are:
3. Social security
4. The Department of Defense
5. Unemployment and other public assistance programs
6. Medicare and Medicaid
7. Other

8. For older students, demonstrate what the pie would look like if you sliced the “Other” category the same way as represented on the “FY 2010 Spending by Category” pie chart. If you have a second pie, go ahead and make the second pie the “Other” pie.
9. Interact with the groups to define what each category of spending represents and what specific costs are covered by public funds.
10. Allow students to eat the pie(s).