

STEM *Sims*™

Coin Challenge



Coin Challenge

**Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.**

Start learning right now about the using logic to solve problems. Take the following brief quiz to see how much you already know about logic and problem-solving. See the bottom of page 4 to check your answers.

1. What was the original meaning of the word “logic” based on the Ancient Greek language?
 - a. the word
 - b. reason
 - c. the thought
 - d. cutting
2. All of the following are commonly accepted forms of logic *except*:
 - a. informal
 - b. symbolic
 - c. mathematical
 - d. mnemonic
3. As of 2018, which of the following is the most valuable U.S. coin?
 - a. 1913 Liberty Head V Nickel
 - b. 1883 Liberty Head Double Eagle
 - c. 1885 O Morgan Silver Dollar
 - d. 1944 Steel Wheat Penny
4. Using only commonly circulated current U.S. coins, what is the largest amount of money you could have in coins and still *not* be able to make exact change for a dollar bill?
 - a. 99 cents
 - b. \$1.04
 - c. \$1.09
 - d. \$1.19
5. A folder on a teacher’s desk contained exactly 5 worksheets. Five students each took a worksheet, yet one worksheet remained in the folder. Is this scenario possible?
 - a. true
 - b. false



A Penny for Your Thoughts

In 1793 the first penny was minted in the United States. Since that time, a huge number of pennies have made their way into Americans' pockets. In this activity, you'll investigate if common pennies are similar or different in terms of their mass.



Materials Required

- About 10 pre-1982 minted pennies
- About 10 post-1982 minted pennies
- Digital or triple beam balance



Procedure

1. Find and record in table 1 the mass of each pre-1982 minted penny.
2. Find and record in table 1 the mass of each post-1982 minted penny.
3. Calculate and record in table 1 the average of the pre-1982 pennies.
4. Calculate and record in table 1 the average of the post-1982 pennies.

Table 1.

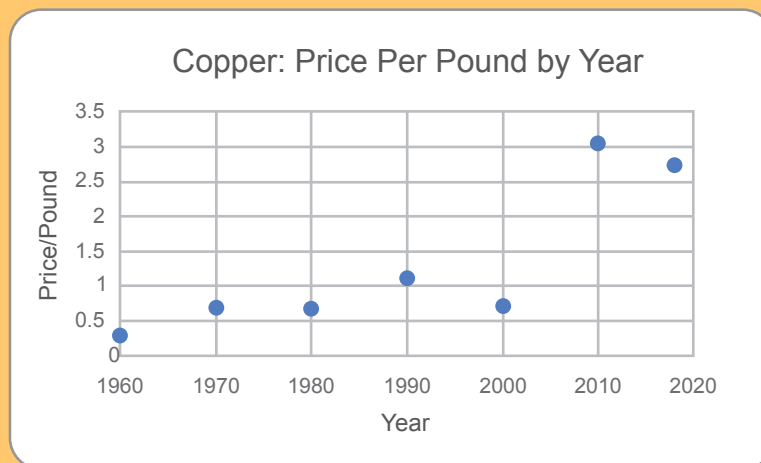
Mass Pre-1982 Pennies (grams)	Mass Post-1982 Pennies (grams)
Average=	Average=

1. Was there a difference in the average masses between the pre-1982 and post-1982 minted pennies? If so, what was the difference?
2. If a difference was found, provide a possible reason for their difference in mass.

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Challenging Coins

One of the most important metals in the modern world is copper. Copper has been used by humans for coins and jewelry since around 8,000 BC. Various alloys of copper are today used in electrical wiring, electric motors, guns, plumbing applications, radiators, brakes, and coins. The demand for copper has steadily risen, which has created a surge in copper's price. The graph below shows the price per pound of copper over the last few decades.



The current price for a pre-1982 Lincoln penny, which contains about 95% pure copper is about \$0.0173. That means that these pennies have a copper value more than 70% of their face value? So why doesn't everyone collect these pennies and melt them down for sale on the metals market? The main reason is that this action is strictly prohibited by the U.S. government. The government does not allow the destruction of any legal tender it offers. However, you can collect these pennies with the hopes of one day making a "mint" selling your almost pure copper pennies.

Please visit the following webpages for more helpful information:

STEMsims.com

Answers: Page 2 Answers: 1) a, 2) d, 3) a, 4) d (3 quarters, 4 dimes, and 4 pennies = \$1.19), 5) a. (Four students each took a worksheet from the folder, and then the last student took the folder and the worksheet.) Page 3 A Penny for Your Thoughts Answers: 1) The pre-1982 pennies had a larger average mass than the post-1982 minted pennies. 2) The pre-1982 pennies had a higher concentration of copper metal than the post-1982 pennies. Post-1982 pennies contain only 2.5% copper and the rest is made of zinc. The density of zinc (7.14g/mL) is less than the density of copper (8.96 g/mL), so the same sized penny will weigh less if the penny has a higher concentration of zinc than copper.

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