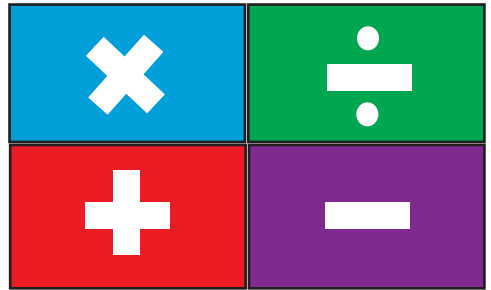


Math TODAY™ Challenge Teacher Edition



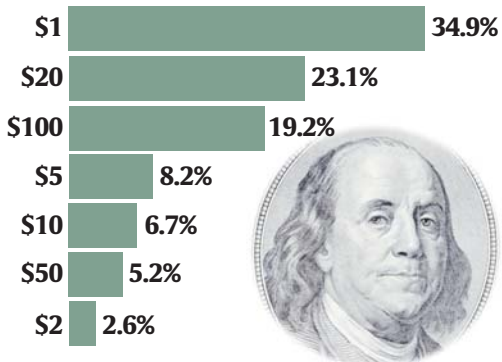
The New Color of Money

By: Bob Tower

USA TODAY Snapshots®

USA money in circulation

About 22 billion bills were circulating as of Dec. 31, 2001. Percentage of bills:



Source: Federal Reserve

By Sarah Renner and Quin Tian, USA TODAY

Activity Overview:

Using the graphing handheld, students will create a graph of all possible combinations of \$1 bills and \$20 bills that could be used to make a total of \$130 million. The activity provides students the opportunity to create a scatter plot of various combinations of U.S. currency and then generate an equation to represent the data. Given the large amounts of money and bills used to create the scatter plot, students will have opportunities to work with scientific notation. This activity also provides an excellent example of discrete, real-world data.

Concepts:

- Represent discrete real-world data with linear functions
- Create a scatter plot using real-world data
- Use scientific notation
- Determine percent of a number

Objectives:

- Investigate linear functions
- Explore constant rates of change in discrete data
- Use scientific notation
- Determine the percent of a number

Activity at a Glance:

- Grade level: 7-9
- Subject: Algebra, Pre-Algebra
- Estimated time required: 45-55 minutes

Materials:

- TI-83 Plus or TI-83 Plus Silver Edition
- Overhead view screen handheld for instruction/demonstration
- Student handout
- Transparency

Prerequisites:

Students should know how to:

- enter data into lists.
- build regression models.
- create a scatter plot.
- use scientific notation.
- find the percent of a number.

©COPYRIGHT 2003 USA TODAY, a division of Gannett Co., Inc.

This activity was created for use with Texas Instruments handheld technology.

Copyright © 2000 by the National Council of Teachers of Mathematics, Inc. www.nctm.org. All rights reserved.

The New Color of Money

Background:

The United States government has issued newly redesigned currency. The \$20 note is first to be released, and will include both new and enhanced designs and added security features in an effort to reduce the amount of counterfeit currency production. Students will read about the changes in the "new money" and then create a graph to represent various combinations of currency produced.

Preparation:

- Provide one graphing handheld for each student.
- Each student should have a copy of the corresponding student activity sheet.

Classroom Management Tips:

- The TI-73 Explorer can also be used for this activity.
- Students will have a better understanding of how to read the graphic and retrieve data if you use the transparency for a class discussion before the students start working.
- Remind students to carefully read all parts of the graphic before they start collecting data.
- Students can work individually or in groups to assist each other as they learn the various features of the handheld.
- Technology appeals to almost all students. Encourage all students to handle and use the graphing handhelds. The TI graphing handhelds are designed to be durable for daily classroom use and backpack portability.
- If possible, use an overhead view screen graphing handheld for instruction. It will make it much easier for you to provide instructions and directions if the students can see the display on your graphing handheld.
- The activity provides an opportunity to discuss the differences between discrete and continuous data and is essentially open ended. Although all students will get the same plot and same regression equation, it is very unlikely that students will use the same combinations of data.
- The Bureau of Engraving and Printing Web site, www.moneyfactory.com/newmoney, provides a tremendous amount of information and data. Students should be encouraged to visit this Web site.

Data Source:

Federal Reserve

National Council of Teachers of Mathematics (NCTM) Standards*:

Grades 6-8:

Number and Operations Standard

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

Algebra Standard

- Use mathematical models to represent and understand quantitative relationships
- Understand patterns, relations, and functions.

Problem-Solving Standard

- Solve problems that arise in mathematics and in other contexts.

Connections Standard

- Recognize and apply mathematics in contexts outside of mathematics.

Grades 9-12:

Number and Operations Standard

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

Algebra Standard

- Understand patterns, relations, and functions.

Problem Solving Standard

- Solve problems that arise in mathematics and in other contexts.

Connections Standard

- Recognize and apply mathematics in contexts outside of mathematics.

*Standards are listed with the permission of the National Council of Teachers of Mathematics (NCTM), www.nctm.org. NCTM does not endorse the content or validity of these alignments.

The New Color of Money

Activity Extension:

- Look through the Money section of USA TODAY and circle the articles that have currency issues that are greater than \$130 million.
- **The New Color of Money Program**
The USA TODAY Charitable Foundation, in collaboration with the Bureau of Engraving and Printing and the Federal Reserve System, has developed a range of interactive educational activities to raise awareness of the newly redesigned \$20 note. Find additional educational resources at: www.moneyfactory.com/newmoney and www.usatodayfoundation.org.

Curriculum Connections:

- Economics
- Marketing/Business
- Government

Additional Resources:

Student Handout

Transparency

TI Technology Guide, for information on the following:

- TI-83 Plus
- TI-83 Plus Silver Edition
- TI-73 Explorer
- List Editor
- Regression Equations

The New Color of Money

Assessment and Evaluation:

Q. According to USA TODAY Snapshot "USA money in circulation" about how many \$20 bills were in circulation? About how many \$1 bills were in circulation?

A. About 7,678,000,000 or 7.678×10^9 \$1 bills and about 5,082,000,000 or 5.82×10^9 \$20 bills.

Q. Using the USA TODAY Snapshot "USA money in circulation" determine the total percentage of bills in circulation that are \$20 and under.

A. 75.5% of the bills are \$1, \$2, \$5, \$10, and \$20

Bills (denomination)	Percentage for each denomination
\$1	34.9
\$2	23.1
\$5	8.2
\$10	6.7
\$20	2.6

Q. According to the USA TODAY article "It's too easy being green" \$130 million in counterfeit US currency is estimated to be circulating around the globe. If the most common notes are the \$1 bill and \$20 bill, create a graph showing all of the possible combinations of \$1 and \$20 bills that could be circulating.

A. The entries in the table are possible answers. The students may choose their own values so each student may have different values in their tables but the graphs will be the same.

Number of \$1 bills	Number of \$20 bills	Express the number of \$20 bills in scientific notation
20	6499999	6.499999×10^6
100	6499995	6.499995×10^6
300	6499985	6.499985×10^6
1500	6499925	6.499925×10^6
500000	6475000	6.475×10^6

Q. What is the equation of the graph described above?

