

Math TODAY™ Challenge Teacher Edition



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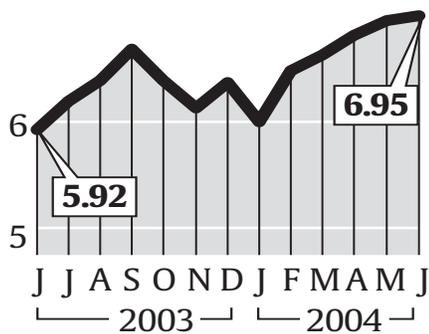
Home sales records

By: Bob Tower

Home sales records

Home sales and prices reached new levels in June. Existing home sales, seasonally adjusted at an annual rate.

(in millions):



Source: National Association of Realtors

By Karl Gelles, USA TODAY

Activity Overview:

Many young people may choose to buy their own homes, rather than rent them. Most will have to take out a home mortgage in order to fulfill this dream. If buying a home is in their future, they will need to think about: How much does it cost per month to pay back a home loan? How does the length of time of the loan and the rate of interest affect your payments? How much do you actually pay for the house over the length of time for the loan?

Concepts:

- Ratios
- Interest rates, loan amounts, total amount of a loan
- Spreadsheet
- Percents, decimals

Activity at a Glance:

- Grade level: 9-12
- Subject: Algebra
- Estimated time required: 50 minutes

Materials:

- TI 83 Plus family or TI-84 Plus family
- Overhead view screen calculator for instruction/demonstration
- Student handout
- Transparency
- TI keyboard
- USA TODAY newspapers

Prerequisites:

Students should know how to:

- use the CellSheet™ Application.
- enter a formula in a spreadsheet.
- convert a percent to a decimal.
- apply the concept of ratio.



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

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Home sales records

Objectives:

Students will:

- use USA TODAY to find interest rates for 30-year and 15-year loans.
- express percentages in decimal notation.
- use a spreadsheet to compute the monthly payment, total amount paid and ratio of total amount paid to loan amount for a home mortgage.

Background:

Many students will need to make a decision about taking out a loan for large purchases during their lifetime. This activity will give them a start in making knowledgeable decisions about those types of purchases. Students will use a formula to calculate the monthly payment on a home mortgage. Then, they will compare different lengths of time and interest rates for the national median price of a home. This activity will give students experience with determining monthly payments and total amount paid over the term of a loan.

Preparation:

- Provide one graphing handheld for each student.
- Each student should have a copy of the corresponding student activity sheet.
- Provide copies of USA TODAY for the class to use.

Classroom Management Tips:

- 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.
- Take time at the beginning of the class period to talk with the class about how they should choose the eight additional loan amounts used in the Cellsheet Application.
- You can have the students work together on the material they need from USA TODAY. This is a good way to introduce the students to the different sections of USA TODAY.
- The interest rates used to determine the answers below were taken from the September 2, 2004 edition of USA TODAY's Money Section. The answers may vary when using a different edition of USA TODAY.

Data Source:

National Association of Realtors

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

Number and Operations Standard

- Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
- Understand meanings of operations and how they relate to one another.

Algebra Standard

- Understand patterns, relations, and functions.
- Represent and analyze mathematical situations and structures using algebraic symbols.

Problem Solving Standard

- Apply and adapt a variety of appropriate strategies to solve problems.

Connections Standard

- Recognize and apply mathematics in contexts outside of mathematics.

Representation Standard

- Create and use representations to organize, record, and communicate mathematical ideas.

*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.

Home sales records

Activity Extension:

- Contact local financial institutions and real estate agents about the local interest rates, price of homes and mortgages.
- Have students research the beginning salary for a job that students would like to pursue after high school, technical school or college. Some lenders say that you can spend about 25% of your gross income on a house payment. Have them estimate the amount of money they would be able to pay per month for a house payment.
- Have students use the formula for determining the monthly payment that they used for the spreadsheet to determine how much money they could borrow at the current 15-year and 30-year rates.
- Have students discuss the pros and cons of owning their own home.

Curriculum Connections:

- Business/Finance

Additional Resources:

- Student handout
- Transparency
- TI Technology Guide, for information on the following: TI-73 family, TI-83 Plus family, TI-84 Plus family, List Editor, ScienceTools, Finance, and Cabri® Jr.
- TI-Navigator™ Basic Skills Guide for information on using the TI-Navigator Classroom Learning System

Teacher Notes:

Home sales records

Assessment and Evaluation:

Note: The interest rates used to determine the answers below were taken from the September 2, 2004, edition of USA TODAY's Money Section. The answers may vary when using a different edition of USA TODAY.

Activity #1:

Q. How much does it cost per month to pay back a home mortgage?

- A. The monthly payment for the May 2004 median priced home of \$182,400 is \$1,073 for 30 years and \$1,462 for 15 years. The monthly payment for the June 2004 median priced home of \$191,800 is \$1,128 for 30 years and \$1,538 for 15 years. The amounts used for the monthly payments were rounded to the nearest dollar.

Activity #2:

Q. How much do you actually pay for a house when you take out a loan?

- A. The home owner would pay a total of \$406,021 for a loan amount of \$191,800 over 30 years and \$276,805 for the same loan amount over 15 years. The home owner would pay a total of \$386,122 for a loan of \$182,400 over 30 years and a total of \$263,239 over 15 years.

Activity #3:

Q. What is the value for the ratio of a 30-year total amount paid to the loan amount? What is the value of the ratio of the 15-year total amount paid to the loan amount? What do these ratios tell you about total amount paid over the time period of a loan?

- A. The ratio of the 30-year total amount paid to the loan amount is 2.12 in every case which means that over the 30 years you are paying more than double the original loan. The ratio of the 15-year total amount paid to the loan amount is 1.44 for every case and this means that you are paying 1.44 times the original loan. These results are based on the interest rates found in the Money Section of USA TODAY on September 2, 2004.

Activity #4:

Q. Suppose the monthly payments for a 30-year and a 15-year loan are determined using the same interest rate and loan amount. How will the monthly payments for the 30-year loan compare to the 15-year loan? How will the total amount paid for a 30-year loan compare to the total amount paid for the 15-year loan?

- A. The monthly payment for the 15-year loan is higher than the 30-year loan. The total amount paid for the 30-year loan is higher than the total amount paid for the 15-year loan.

As an example, a \$225,000 loan amount at an interest rate of 5.82% would require a monthly payment for the 15-year loan that is \$554 (rounded to the nearest dollar) greater than the 30-year loan. This same loan and interest rate would generate a total amount paid over the 30 years that would be \$138,466 (rounded to the nearest dollar) more than the total amount paid for the 15-year loan.



If you are using the TI-Navigator Classroom Learning System, send the provided LearningCheck assessment to your class to gauge student understanding of the concepts presented in the activity. See the TI-Navigator Basic Skills Guide for additional information on how this classroom learning system may be integrated into the activity.