

Comparing Costs

Grades 3 - 5

Overview

Students will solve a problem using division with an integer quotient and remainder, division with the quotient in fraction form, and division with the quotient in decimal form and compare the results.

Math Concepts

- division
- multiplication
- fractions
- decimals

Materials

- TI-15
- pencil
- student activity (page 14)

Introduction

1. Introduce the following problem:

The maintenance department has determined that it will cost \$.40 per square yard to maintain the district's soccer field each year. The soccer field is 80 yards wide and 110 yards long. The six schools that play on the field have decided to split the cost evenly. How much should each school contribute to the soccer field maintenance fund this year?

2. Have students use the calculator to solve this problem in three ways:
 - Finding an integer quotient and remainder.
 - Finding the quotient in fraction form.
 - Finding the quotient in decimal form.




Collecting and Organizing Data

Students should record their procedures and results on the Student Activity page. To help them focus on their thinking, ask questions such as:

- *What did you enter into the calculator to solve the problem?*

Example:

A student may have entered $80 \times 110 \text{ [Enter]}$ to determine the area of the soccer field, then entered $\times 0.40 \text{ [Enter]}$ to find the total maintenance cost, then $\div 6 \text{ [Enter]}$ to find the cost for each school in fraction or decimal form.

-  To display an integer quotient with a remainder, use the $\text{[Int}\div\text{]}$ key.
-  To display a quotient in fraction form, press [Mode] \rightarrow [Enter] to select **n/d**, then use the $\text{[}\div\text{]}$ key.
-  To display a quotient in decimal form, press [Mode] \leftarrow [Enter] to select **.**, then use the $\text{[}\div\text{]}$ key.

Comparing Costs (Continued)

- *Could you have solved the problem more efficiently? How?*

Example:

A student may see that 80×110 could be done mentally, and the key presses could be simplified to **8800** \times **.4** \div **6** Enter .

- *How are your procedures alike for each type of solution?*

Examples:

They all involve finding how many square yards in the soccer field; they all involve multiplication and division.

- *How are they different?*

You use different keys to tell the calculator in what form you want the answer displayed.

Analyzing Data and Drawing Conclusions

To guide students in the analysis of their data, ask questions such as:

- *How are your solutions in the three forms alike?*


They all have a whole number component of 586.


- *How are your three solutions different?*

The remainder form just tells how many dollars are left over. The fraction and decimal forms tell how much more than \$586 each school has to pay.

Comparing Costs (Continued)

- *What happens if you multiply each solution by 6 to check it?*


For the remainder form, you have to multiply 586×6 and then add 4 to get the total cost of \$3520. You can multiply $586\frac{2}{3} \times 6$ in fraction form to get \$3520. If you enter **586.666667 x 6** and press , you get **3520**, but that doesn't make sense because 6×7 doesn't end in a 0!

If you enter **586.66667**, then fix the decimal quotient to hundredths since it is money, and then find 586.67×6 , you *still* get 3520.00, which still doesn't make sense because $6 \times 7 = 42$. If you clear the calculator and enter **586.67 x 6**, and press , then the display reads **3520.02**, which does make sense.

- *As a school, which form of the quotient would you want to use?*

Responses may vary. Some students may want to use the decimal form, since it is the closest to the representation of money. Some students may want to use the integer quotient and remainder form and suggest that the Central Office pay the \$4.00 remainder.

Although the fraction form of the quotient describes the exact quantity that each school should pay, most students will recognize, by comparing it to the decimal form, that the fraction form is not easily translated into money.

 When you fix 586.666667 to 2 decimal places, and then multiply by 6, the calculator “remembers” the original number and uses it as the factor. The product rounded to the nearest hundredth, using the original factor, is 3520.00. When you enter 586.67, the calculator uses this number for the factor, showing the actual product of 3520.02.

Comparing Costs

Name _____

Date _____



Collecting and Organizing Data

The Maintenance department has determined that it will cost \$4.00 per square yard to maintain the district's soccer field each year. The soccer field is 80 yards wide and 110 yards long. The 6 schools that play on the field have decided to split the cost evenly. How much should each school contribute to the soccer field maintenance fund this year?

1. Use division with an integer quotient and remainder:

2. Use division with a quotient in fraction form:

3. Use division with a quotient in decimal form:

Analyzing Data and Drawing Conclusions

Write a short paragraph comparing the three solutions.