

Random Remainders

Math Concepts

- whole numbers
- division
- graphing

Materials

- TI-10, TI-15 Explorer™
- **Random Remainders** recording sheets
- pencils

Overview

Students will use the calculator to investigate the relationship between divisors and remainders in whole-number division.

Introduction

1. Present the following scene: You buy a bag of candy and want to eat it evenly throughout the week. What operation would you use to represent this on the calculator? (Division) Suppose there are 10 pieces of candy in your bag. How many pieces would you eat each day? How many would be left?
2. Have students enter $10 \div 7 =$ on the TI-15 Explorer™ or $10 \div 7 =$ on the TI-10 and compare the display to their mental computations. Discuss the meaning of each part of the display.

Note: The quotient **1** represents how many pieces of candy there are for each of the seven days, and the remainder **3** represents how many pieces are left over.

3. Have students pretend that they could start with any number of pieces of candy at the beginning of the week. Ask students: If you divide the candy evenly over the week, how many pieces might you have left at the end of the week ?
4. Working in small groups, students should use $\div 7 =$ on the TI-15 Explorer™ or $\div 7 =$ on the TI-10 with a variety of numbers to collect data about the kinds of remainders that occur.
5. Have students record their remainders and keep a tally of each occurrence of a remainder on the frequency table provided on the recording sheet. Then have them organize their data and make a bar graph of their group's results on the graph provided on the recording sheet.

Random Remainders *(continued)*

Collecting and Organizing Data


While students generate data about the remainders that occur when dividing by seven, ask questions such as:


- Do you think those are all of the possible remainders? Why or why not?
- What if you start with a really large number?
- How will you organize your data about the remainders you generated?
- How will you show your results on the graph?
- How do you think your results will compare with the results of other groups?


Analyzing Data and Drawing Conclusions

After students have made graphs of their data for their small groups, have them combine their data into a whole class graph and analyze the data. Ask questions such as:

- What remainders occurred when you divided by seven?
- How is your group's data like that of other groups? How is it different?
- Did the size of the number with which you started seem to matter? Why or why not?
- Do you think these are all the possible remainders? Why or why not?
- Did any remainders occur significantly more than others? Why or why not?
- What if you decided not to eat any candy on Sunday and spread it evenly over only six days? How do you think your results would change?
- How is the class graph like (different from) your group's graph?
- Did you notice any patterns with the numbers you used?

 What do the two numbers generated by using $\boxed{\text{Int}} \div$ on the TI-15 Explorer™ or $\boxed{\div}$ on the TI-10 represent?

 How could you use $\boxed{\text{Obl}}$ to help collect the data?

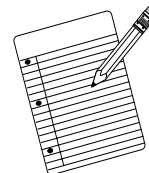
 On the TI-15 Explorer™, how is the display generated by using $\boxed{\text{Int}} \div$ different from the display generated by using the regular $\boxed{\div}$ key? How are they alike?

Random Remainders *(continued)*

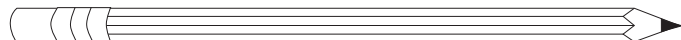
Continuing the Investigation

Have students:

- Investigate the remainders generated by three other divisors. Make a general statement about the relationship between divisors and possible remainders.
- Make a table of dividends and divisors that generate remainders of 0. Make a generalization about the conditions that generate a remainder of 0.



Name: _____



Random Remainders

Recording Sheet

Collecting and Organizing Data

Frequency Table for Dividing by _____

Remainders											
Frequency											

Graph: How Often Each Remainder Occurred When We Divided by _____

Conclusions we made about remainders from the data in our graph: