

Math 5 - Act. 27: Alphabet Study

Summary

This activity has students investigating the order of usage of alphabet letters.

Materials

- Chart paper
- Markers
- Adding machine tape
- *Martha Blah Blah*
by Susan Meddaugh

Additional Resources

A Collection of Math Lessons, From Grades 3-6 by Marilyn Burns

Background for Teachers

The order of usage of alphabet letters is useful, even essential, information for people. Manufacturers of bulletin board letters, marquee letters, and artists' press-type letters certainly need to know. It is also valuable to people who break codes, important at times of national security, and recreational at times for those who solve puzzles. In this lesson, students are engaged in a statistical study in which they investigate the order of usage of alphabet letters. Students will collect and organize data. They will compare their individual data with data collected in their groups, and then with the data collected in the entire class. This will give them experience as they compare results from different sample sizes.

Intended Learning Outcomes

3. Reason mathematically.
4. Communicate mathematically.
5. Make mathematical connections.

Instructional Procedures

Invitation to Learn

Read *Martha Blah Blah* by Susan Meddaugh. This is the story of a talking dog who loses her ability to talk when the owner of the alphabet soup company decides to cut back and leave some letters out of the alphabet soup she eats.

Announce to your class that for the next few days they will be studying the alphabet. Tell them they will be involved in a math exploration with the alphabet in a way that helps them investigate ideas about probability and statistics. Without discussing their thoughts with others, tell students to predict what they think are the five most commonly used letters in the English language (the letters that occur most often when people write books, newspaper articles, magazine articles, etc.). Have students list their choice of five letters and put a star next to the one letter they think is used the most.

Instructional Procedures

After students have made their individual predictions explain what they will do in their groups. Students share their predictions in their groups and come to a group decision about what they think are the five most commonly used letters and which one occurs most. Write each group's prediction on the board. Ask students to explain why they predicted what they did.

Real world connections: Next ask students who in the world they think would care about the order of usage of alphabet letters. Ask if they can think of anyone who needs to know or who would benefit from knowing. If students cannot come up with any, some include: Wheel of

Fortune participants, Scrabble players (some letters are worth more than others), and letter manufacturers. Show a sheet of press-type letters purchased from an art store, the kind of type that you transfer onto paper by rubbing. Explain that they are commonly used by artists and designers when they need lettering.

Explain to students that you already know which letter is used the most often and that you have prepared a list of all twenty-six letters of the alphabet in order of their usage in the English language. Write the letters on an addition machine tape, roll the tape up and paper clip it.

Tack the adding machine tape to the wall or board in the rolled up position. Explain to the class that before unrolling it that you are planning to have them conduct a mathematical investigation. Then you will check the class' prediction with what is on the rolled-up tape.

Explain that it would be very difficult to take all the writings ever done in the English language and count up how many A's were used and how many B's, C's and so on, but it would be possible to look at smaller samples. Explain to students you would like each of them to do the following:

Pick a sentence with at least five words in it from any book.

Copy the sentence onto a piece of paper.

Find out and record how many times each letter of the alphabet appears in your sentence.

Give time for several students to explain how they went about counting which letters were used more often than others.

Have students then compile their records to find group (4-5 students) totals for how often each letter appeared. Explain that once their group had arrived at their totals, you will have a large class chart on the board in which one student from each group should record their group totals. The chart should resemble this:

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	
Group 1																											
Group 2																											
Group 3																											
Group 4																											
Group 5																											
TOTALS																											

When all group data is entered on the chart, assign each group to find the total for 4 or 5 letters. Students should be allowed to use calculators for a task such as this. Suggest that several students find the total for the same letter so that the accuracy of the totals is valid. Record totals on the chart.

When all totals are entered on the chart, have the class gather around the chart. Have students tell you which letter is used most often while you write this on the board next to the rolled up tape. Students can help you determine the order of usage of letters for the class investigation while you record them.

Before unrolling the tape, ask students what their thoughts were about their totals and the totals on the tape. Would more than half or less than half of the letters match? How much of the order would have to match for them to be satisfied with their statistical sample? What would disappoint them?

Extensions

Possible Extensions/Adaptations

Explain to students the following history of the typewriter keyboard. When Christopher Sholes invented the typewriter in 1867, he purposely scrambled the letters so that typists couldn't type too quickly and jam the letters. That was before the invention of electric typewriters, which eliminated the problem of jamming when someone typed too quickly. On a typewriter keyboard, more than half of the strokes are done with the left hand, the weaker hand for most people. The two most agile fingers on the right hand rest on J and K, which are two of the least used letters. The left pinky, the weakest finger for most, rests on the A. In 1930, August Dvorak designed a keyboard on which it is possible to type more quickly. Although used on some Apple computers, it has not received widespread use. Students can choose one from the following extension assignments:

Design a typewriter keyboard that makes use of the results of our mathematical investigation. When they finish, they will be able to compare it with the Dvorak keyboard.

Investigate the game Scrabble. List the letters in the game in two ways--in order of their values and in order of how many there are of each. See how it relates to the findings of the class.

Describe your thoughts as to why you do or do not think the Scrabble scoring or the numbers of each letter ought to be changed.

Do a statistical sample for another language and compare the results with our findings for English. If others in the class choose this assignment, combine your findings for a larger sample. Cryptograms are communications written in code, in which each letter stands for another letter in the alphabet. Whichever letter is used as a substitute for A, for example, is used for A throughout the puzzle. Figure out this message:

AB CD EDDF AG FXD HIJY

A CAKK LMN NZM IG AWD WJDIE WZGD.

Here's a clue: The most frequently used words in the English language are the, an, a, and and.

The order of the usage is as follows:

1.E 2.T 3.A 4.O 5.NI 6.S 7.R 8.H 9.L

10.D 11.C 12.U 13.P 14.F 15. M 16.W 17.Y 18.BG

19.V 20.K 21.QX 22.JZ

Homework & Family Connections

Ask students to have family members help them find games in newspapers, magazines, or books at home that use letters to solve the puzzle. An example would be the Cryptoquotes or Word Jumble printed in most daily newspapers. Crossword puzzles are also an excellent extension to this lesson. Students can cut these from the newspapers and bring them to class to share. Discuss how letter usage can help solve some puzzles.

Assessment Plan

Possible questions to stimulate discussion:

What would happen if we had done a larger sample?

How might the results differ if we had used first grade readers instead of the assortment of books we did use?

What if we used sentences from a book written in Spanish or French or some other language?

If we were to try the sampling experiment again, would we be likely to produce results that would match exactly the order on the adding machine tape?

Why do you think mathematicians say that larger samples will more closely resemble what really happens?

Do you think a larger sampling of letters would produce results closer to the actual order?

Authors

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