

**Teaching briefs... Garage-Door Openers**

by Lillis Weber

Recently on several occasions my husband and I have come home to discover our large overhead garage door open. Since we always shut it using an electronic closer, we wondered if someone else on the street had the same frequency. When our clicker failed to open any of the surrounding doors, it seemed a mystery until I heard our door go up about noon one day. I ran outside to see if I could spot a car. There were none in sight but an airplane was directly overhead coming in for a landing at Jacksonville Naval Air Station. Sure enough, when I called the Air Station, they said this could be the problem and that I should reset the dip switches on the opener and the remote control units. This prompted me to explore the number of settings on a garage door opener.

- (1) How many combinations of settings are available on a garage door opener with 8 dip switches? Each switch is either on or off. They can all be on or all be off or any combination of on's and off's. *Answer:* Since each switch is either on or off and you have 8 switches, there are altogether  $2^8 = 256$  possibilities!
- (2) Suppose you have 9 dip switches, how many more frequencies do you get? (The newer garage door openers have 9 switches) *Answer:*  $2^9 = 512$ , double the number for 8 switches, which provides 256 extra combinations.
- (3) What is the probability that we have now reset ours to match a neighbor's if there are 20 houses nearby with garage door openers similar to ours? *Answer:*  $20/255 = 4/51$ . ■

**Spreading the Word...**

by Kathy Blackwood

In the fall of 1986 I attended a four-session workshop called "New Directions in Math" led by the +PLUS+ Project of Los Angeles Educational Partnership (LAEP). It was the first valuable in-service that I had ever attended, so I had taken some trig tests with me to correct, thinking that I'd have plenty of time to mark them. The presenter was Bill Lucas, a professor of mathematics at Claremont Graduate School in Southern California. I was completely captivated by the content of discrete mathematics, i.e., fair division, game theory, graph theory, voting, and apportionment; and those trig tests remained uncorrected until I returned home. The following year, I coordinated the sessions for the program, and have presented the workshop for the last two years to other math teachers. For the last three summers I have also been on the faculty at the NSF-funded Institute for Mathematics and Computer Science Education (IFMACSE) in Kent, Ohio.

For the last five years we have offered a course in Discrete Mathematics at Venice High School in Los Angeles for seniors who don't want to take the Advanced Placement Calculus course for one reason or another. Some have been "turned off" to traditional math courses and most are humanities students who don't see a need for calculus in their future. Student comments range from "This is the first time I've seen a practical use for math since I started algebra," to "This is almost fun". It is very exciting to see the light go on again for many students.

As a result of the +PLUS+ workshops and IFMACSE, several other schools that I know about have started separate courses in discrete math and

*(Continued on page 11)***Inservice workshops...**

Are you looking for a one-day workshop in your own school or district dealing with discrete mathematics and how it can be incorporated into your math classes and curricula?

Participants in the *Leadership Program in Discrete Mathematics* at Rutgers University (see pages 6-7) have developed and are available to conduct such workshops. Priced moderately, the workshops are appropriate for teachers and administrators at all levels. Materials are provided for classroom activities. For further information, use the address or phone number on page 6.

**In each issue...**

... you will find a variety of articles under the following headings:

**Teaching briefs...**

suggestions for classroom activities

**Spreading the word...**

communicating with teachers and administrators

**Have-you-seen...**

recent articles about discrete mathematics in the news

**Mini-bibliography...**

helping you find your way into a topic

**Topics...**

articles to introduce you to various topics

**Reports...**

on happenings and events

**Announcements...**

of opportunities and events

**Ask a discrete question...**

of the editors or other readers

**Reader responses...**

letters to the editor

... and you are invited to submit your own comments, letters, and articles under any of these (or other) headings. Please use the Newsletter address on page 6.