

PROFITABLE PRIMES

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Prime numbers provide a rich resource of illustrations for the teacher to use to develop concepts of mathematics. Also, there are certain important ideas in mathematics which prime numbers can be used to illustrate that run like threads through many different courses commonly taught at the secondary level. One of these ideas is induction. As students are led to make conjectures about possible mathematical ideas, they may learn that doing mathematics can be a very creative activity.

Induction, the building of conjectures, can be very powerful when used to tie together various areas of study for students. Students should learn that posing questions is an important tool for them to use. Conjectures often are prompted from observing patterns and asking questions about those patterns. Insight into patterns will often occur when a collection of numbers is arranged in a new or perhaps a slightly different than usual form. The table listed below contains the natural numbers arranged in four columns. The examples that follow the table are offered as models the teacher might use to aid students to form conjectures about prime numbers.

The Natural Numbers

	: 1	2	3	4
.....				
1 :	1	2	3	4
2 :	5	6	7	8
3 :	9	10	11	12
4 :	13	14	15	16
5 :	17	18	19	20
6 :	21	22	23	24
7 :	25	26	27	28
.....				

Example one. Which columns contain prime numbers? If the columns are extended without limit, will primes occur eventually in each column? Why or why not? What patterns did you notice for

the numbers in column one? Represent those patterns algebraically.

Example two. Notice the pattern of numbers in column three; 3,7,11,15,19,23,27,...

3,7 and 11 appear consecutively in that column. They might be called "a triple of columnar consecutive primes." Will there be other sets of triples like 3,7 and 11? Find a "pair of columnar consecutive primes" in that column that appears after 11. Do you think there will be other such pairs? Why, or why not?

Example three. Sometimes a departure from a standard notation will enable the investigator to notice a pattern that otherwise is not obvious. In the table of natural numbers the columns are numbered in the typical fashion. Notice that a simple change of that pattern will provide a convenient way to identify each entry by its location within the table. In the table shown below, row numbers 1,2,3... are replaced with 0,1,2... .

The Natural Numbers
(rows renumbered)

:	1	2	3	4
.....				
0 :	1	2	3	4
1 :	5	6	7	8
2 :	9	10	11	12
... ..				

Now, any natural number can be represented by using the row and column numbers that locate its position in the table. For example, the number 11 is in row 2 and column 3, and $11=2(4)+3$. A second example would be: $13=3(4)+1$. Notice that 13 appears in row 3 and column 1. How would you use row and column designations to identify the number 25? or 99? What would be the generalized designation for any number of the set? What number is represented by row 5, column 3?

Since prime numbers and many of their properties can be examined with little more than elementary computation, more attention to them would seem to prove practical in the mathematics classroom. Primes offer students an easily accessible window

through which to profitably view some important ideas that appear repeated in various studies of mathematics. They ought to be exploited more frequently.

SPREADSHEETS IN BUSINESS MATHEMATICS

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With the level of sophistication and the low price of the available microcomputers, we find them to be a desirable tool in the instruction of mathematics. The professional software accessible to the business person and the quality of the business software also makes software a possibility for use in business mathematics education. In the case of business mathematics, we can choose to use the quality business software that is presently being used in the business world to help us teach our business math students.

The most popular business software is Lotus 1-2-3. Because of this popularity, there is a likelihood that your business math students will use this spreadsheet software. Since we teach the mathematics that our students will use, perhaps we should also teach the spreadsheet they will use. That is, teach Business Math using Lotus 1-2-3 as an aid. Thus, we have maintained our mathematical integrity and at the same time we have given our students a head start on using business software. We have captured the opportunity to demonstrate to our students that mathematics and business are in fact not mutually exclusive.

In the Columbus State Community College Math Department, we teach business math topics such as payroll, taxes, trade and cash discounts, markup, markdown, inventory, simple and compound interest, annuities, depreciation, descriptive statistics, and a few other comparable topics. After each of these topics is