Dear Super Solvers:
Welcome to the second issue of the PRIME MATHgazine. Beginning with the April issue, we plan to feature problems and games from high school students who are members of the NSF Prime the Pipeline Project. You’ll also hear more about the project activities.

Send us your solutions to this month’s problems by February 28. Happy Presidents’ Month!

Carole Greenes
Associate Vice Provost for STEM Education

Your Turn
Readers of all ages are invited to solve the MATHgazine puzzles each month and submit answers to the PRIME Center. Points will be awarded for creative solution strategies as well as for correct answers. We will present the Great Stematician award in May 2010.

Submit your solutions by email to primecenter@asu.edu or by mail to Editor, PRIME MATHgazine, PO Box 875703, Tempe, AZ 85287-5703 or fax to 480-727-0910.

History and Math: February Birthdays
Abraham Lincoln, 16th President of the United States, and Charles Darwin, world famous scientist and naturalist, were born on February 12 of the same year in the 19th century. Use the clues to figure out the year.

Clues:
• The sum of the digits is divisible by 9.
• The sum of the thousands and hundreds digits is equal to the sum of the tens and ones digits.
• The product of the digits is 0.
• The year is an odd number.

Lincoln and Darwin were both born on February 12, ________.

Number Neighborhoods
A Long Story
You may have thought that only people have neighbors. Numbers have neighbors too!

Consider the counting numbers 1, 2, 3, 4, 5, 6, 7 . . . .

The first neighbors of 2 are 1 and 3 because 2 differs from both 1 and 3 by one. The first neighbors of 3 are 2 and 4 because 3 differs from both 2 and 4 by one. The second neighbors of 3 are 1 and 5 because 3 differs from both 1 and 5 by two.

What are the second neighbors of 4?
What are the third neighbors of 5?

Continued on page 2
Numbers in Your Neighborhood

City of Futurama Instructions
A new housing development in the city of Futurama is being planned. To allow for plenty of parks and other recreational sites, houses will be constructed on only one side of each street.

The streets will be called First Street, Second Street, Third Street and so on. Each street must have more than one house. If there are five houses on a street, then the numbers 1, 2, 3, 4 and 5 must be used as house numbers. If there are seven houses on a street, then the numbers 1, 2, 3, 4, 5, 6 and 7 must be used as house numbers.

The city planners of Futurama have predetermined the number of houses on each street and how each house is to be numbered.

First Street
On this street, no house may be numbered so that it is next door to its first number neighbor. Thus, the house numbered 2 cannot be next door to either the house numbered 1 or the house numbered 3.

What is the fewest number of houses that can be built on First Street if no house can be numbered such that it is next to its first number neighbor? (Remember there must be more than one house on the street.) What is the order of the house numbers?

Second Street
On this street, no house can be numbered so that it is next to either its first number neighbors or its second number neighbors. (Remember that the house numbered 3 cannot be next door to the houses numbered 1, 2 or 5.)

What is the order of the house numbers?

Third Street
On this street, no house can be numbered so that it is next to either its first, second or third number neighbors.

What is the fewest number of houses that can be built on Third Street? What is the order of the house numbers?

K Street
What is the fewest number of houses that can be built on K Street, where K is any number?

Show the city planners a scheme for ordering the house numbers on K Street.

Build Out
The city planners decide that they will stop development when there are 100 houses on a single street.

What will be the number name of this street?

How many streets will there be in this new housing development?

Submit your answers for a chance to win an award from the PRIME Center.
Instructions:
Cards A & B are numbered front and back. One side of each card is shown. Use the clues about sums of the two card numbers (front A + front B, front A + back B, back A + front B, back A + back b). Figure out the unseen numbers. All sums are A + B.

Example
Card A Card B
10 5
Back Back
10 + 5 = 15

Card Quest 1
Front Front
Card A Card B
4 7
Sums possible: 7, 11, 12, 16
Find solutions for the back of A and the back of B.

Card Quest 2
Front Back
Card A Card B
6 5
Sums possible: 11, 12, 17, 18
Find solutions for the back of A and the front of B.

Card Quest 3
Back Front
Card A Card B
14 10
Sums possible: 8, 12, 20, 24
Find solutions for the front of A and the back of B.
Balzano problems to solve

Balzano is a puzzle that will tap into your logical reasoning abilities. It uses ideas from two popular puzzlers, Pico Fermi Bagel and Mastermind®. Read the directions carefully, then try your hand at Balzano Colors and Balzano Shapes.

Directions:
Your job is to figure out the desired arrangement of three or more colors, numbers, shapes, or letters from clues that provide information about the elements and their locations. Each clue consists of two parts.

The Arrangement Column shows sets of elements in rows.

Correct Color or Shape in the Correct Place identifies the number of elements that are the right color or shape AND are in the right position.

Correct Color or Shape in the Wrong Place identifies the number of elements in the arrangement that are the right color or shape BUT are not in the right positions.

Incorrect Color or Shape identifies the number of elements that are not correct in the arrangement. Remember that the numbers in the three columns to the right of each arrangement describe the entire arrangement.

### Balzano Shapes
Use the clues to figure out the correct arrangement of shapes.

<table>
<thead>
<tr>
<th>Arrangement</th>
<th>Correct shape in correct place</th>
<th>Correct shape in wrong place</th>
<th>Incorrect shape</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1</td>
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<td>1</td>
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<td>3</td>
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<td>0</td>
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</tbody>
</table>

### Balzano Colors
Use the clues to figure out the correct arrangement of colors.

<table>
<thead>
<tr>
<th>Arrangement</th>
<th>Correct color in correct place</th>
<th>Correct color in wrong place</th>
<th>Incorrect color</th>
</tr>
</thead>
<tbody>
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