RESEARCH CORNER

In the last issue of Parabola, you were introduced to palindromic numbers: positive integers which read the same backwards as forwards (such as 11, 131 and 4334). Some students at Blakehurst High worked on these numbers a few years ago, and here are a few of their results, together with some questions that these results suggest:

(1) Every palindromic number with an even number of digits is divisible by 11. However, 121 is palindromic and has an odd number of digits.

Can you find a result which states that another set of numbers is palindromic? Can you find *all* palindromic numbers which are divisible by 11?

(2) If we reverse the order of the digits in the numbers 134 and 23417 and add the result to the original number we get a palindromic number (e.g. 134 + 431 = 565). This does not work for 517 as 517 + 715 = 1232, but if we repeat this process, we get 1232 + 2321 = 3553 (a palindromic number).

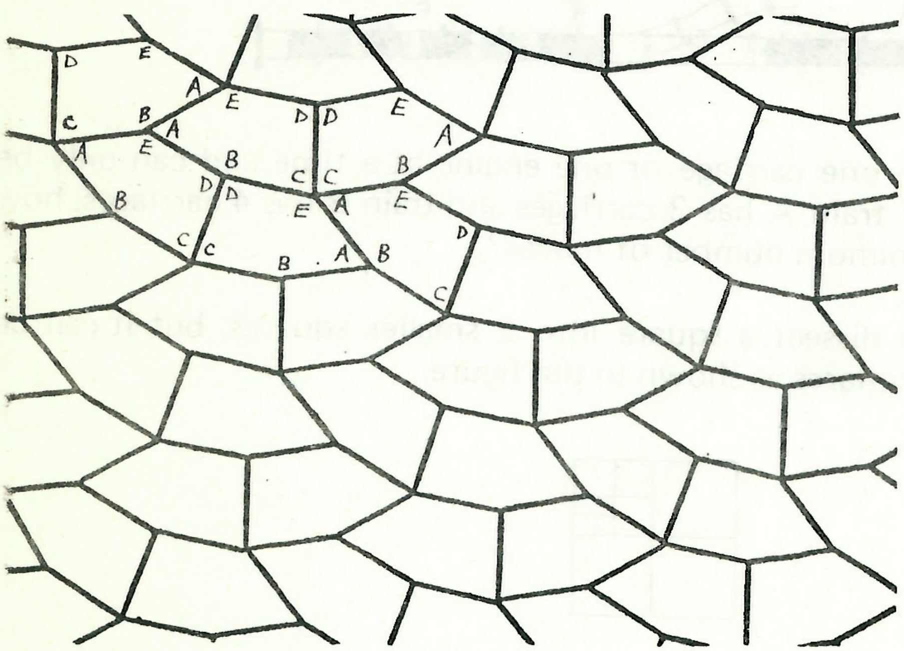
If we continue repeating this process for any number will we always get a palindromic number? When? Which numbers yield a palindromic number after only doing this once?

(3) Some products are palindromic, e.g.

$$23 \times 64 = 46 \times 32$$
$$93 \times 26 = 62 \times 39$$

Why does this work? Are there any other examples? Is the number of examples finite?

Those readers who have pocket calculators might like to search for more examples using their calculators. Send in your results so that we can publish them in the next issue of Parabola.



$A + 2C + E = 360^\circ$
$A + B + E = 360^\circ$
$B + 2D = 360^\circ$
$A = 60^\circ$
$B = 160^\circ$
$C = 80^\circ$
$D = 100^\circ$
$E = 140^\circ$

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