

A NEW PENTOMINO PUZZLE

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Polyominoes -- the many different shapes of dominoes having three or more faces -- were introduced to recreational mathematics by Solomon Golomb in 1954. Since then, they have been extensively investigated; many of their mathematical properties are discussed in Golomb's Polyominoes (Scribner's, 1965). Perhaps the most interesting polyominoes are the 12 distinct pentominoes -- all the possible shapes of dominoes having exactly five faces. There are many ways in which the pentominoes can be assembled to form rectangles of size 3×20 , 4×15 , 5×12 and 6×10 .

More recently, various word puzzles based on the pentominoes have been formulated. While enumerating all the possible ways the pentominoes can be arranged to form a 6×10 rectangle, Leigh Mercer discovered in 1968 a pair of rectangles with a most unusual property -- each pentomino can be transferred from one rectangle to the other without rotation. If five letters are written on the squares of a pentomino, the letters remain readable when it is located in either rectangle.

At first, this discovery seemed to have cryptographic significance. Why not write down a plaintext message of 60 letters in one rectangle, rearrange the pentominoes to form the other rectangle, and read off the encrypted message from this? However, Howard Bergerson soon discovered a more interesting logological puzzle. He suggested that one find a set of ten six-letter words such that when they are written in one of the rectangles, the pentominoes may then be rearranged into the other rectangle to produce a new set of ten six-letter words. I was successful in finding two solutions to the 6×10 puzzle (Word Ways, August 1969 and February 1970) and one solution to the 5×12 puzzle (Word Ways, August 1970).

Without rotating any of the pentominoes, it is also possible to arrange them successively in a 4×15 , a 5×12 and a 6×10 rectangle. This construction forms the basis for the patterns on the following page, where 60 letters have been inscribed on the twelve pentominoes in such a way that each rectangle contains a complete set of words.

P	I	L	L
C	A	N	T
T	R	I	P
C	R	A	N
P	O	T	S
T	I	E	S
L	I	O	N
T	E	N	T
L	I	E	S
L	O	P	S
I	L	L	S
O	A	R	S
I	O	N	S
L	O	S	S
M	E	S	S

S	P	I	L	L
S	C	A	N	T
S	T	R	I	P
S	C	R	A	N
S	P	O	T	S
A	R	I	E	S
O	N	I	O	N
O	L	E	N	T
T	I	L	E	S
L	O	O	P	S
T	I	L	L	S
L	I	M	E	S

P	I	L	L	A	R
C	A	N	T	O	N
T	R	I	P	O	S
C	R	A	N	E	S
P	O	T	I	O	N
S	I	L	E	N	T
S	T	I	L	E	S
S	L	O	O	P	S
S	T	I	L	L	S
S	L	I	M	E	S