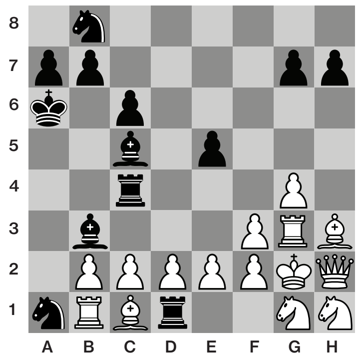
Jerold Grossman informs us that the National Council of Teachers of Mathematics website contains a contribution that is quite similar to our "yearly problem."

Problems

M/J 1. We begin with an unusual chess problem that Timothy Chow designed for MIT's 2013 Mystery Hunt, an annual IAP event. The question is whether the chess position shown in the following diagram can occur in a legal game. That is, can the position be reached from the initial state by a sequence of legal moves?



M/J 2. Robert High likes cryptarithmetic problems. In such puzzles, normally each letter represents a digit from 0 to 9, the same letter represents the same digit throughout, different letters represent different digits, and no number begins with 0. In honor of the famous Japanese puzzle inventor Nob Yashigahara, High gives us the following:

$$NOB^{X} + Y \times NOB = PUZZLES$$

This problem is unusual in using exponentiation and in permitting X and Y to take on any digit between 0 and 9, including values assumed by the other letters. The uniqueness of the solution, High believes, demonstrates that Nob has a unique relationship to puzzles. If you solve in addition

$$HIGH^{X} + Y \times HIGH = PUZZLES$$

you will see that the problem's author also has a unique relationship to puzzles.

M/J 3. Our last regular problem is Donald Aucamp's generalization of problem 3 from the March/April 2015 issue.

An airplane with N seats is fully booked, and every passenger has an assigned seat [*the good old days–Ed.*]. The first passenger ignores his or her assignment and chooses a seat at random. The remaining passengers take their assigned seats if available; otherwise they choose a seat at random. What is the probability the nth passenger gets his or her assigned seat?

Speed Department

A quickie that Geoffrey Coram adapted from an "Ask Marilyn" column. I have a briefcase with a four-digit combination. I remember one of the digits, but I don't know which position it occupies. How many combinations, at most, will I need to try?

Solutions

J/F 1. Larry Kells knows (because we ran the problem earlier) that even with 26 high-card points a defender cannot be assured of defeating 7 no-trump (i.e., there is a distribution where, with best play, declarer makes 7 no-trump). Larry wonders about the corresponding number of points for 6, 3, and 1 no-trump.

Jim Larsen took on the challenge and reports the following results. For 6 no-trump, 31 defensive points still does not guarantee defeat.

North:
♠
♥
♦ x x x x x x
♣ x x x x x x x

West:
♠ K
♥ K Q J x x x x x x x x
♦
♣

East:
♠ Q
♥
♦ A K Q J x x
♣ x x x

South:
♠ A J x x x x x x x x x
♥ A
♦ x
♣

South captures the initial lead, runs his spades and the heart ace, and finally loses the low diamond on the last trick.

For 3 no-trump, 34 defensive points can fail.

North:
♠
♥
♦ x x x x x x
♣ x x x x x x x

West:
♠ A K 5 4 3 2
♥ A K 6 5 4 3 2
♦
♣

East:
♠ Q
♥
♦ A K Q J x x x
♣ A K Q J x x

South:
♠ Q J 10 9 8 7 6
♥ Q J 10 9 8 7
♦
♣

Regardless of the order of play, West will capture his two AKs. South captures the rest with spade and heart leads.

For 1 no-trump, 36 defensive points can fail.

	♠ ♥ ♦ x x x x x x x ♣ x x x x x x	
♠ A K 4 3 2 ♥ A K 5 4 3 2 ♦ ♣		♠ J ♥ J ♦ A K Q J x x x ♣ A K Q J x x
	♠ Q J 10 8 7 6 5 ♥ Q J 10 9 8 7 6 ♦ ♣	

Regardless of the order of play, West will capture his four aces and two kings for six tricks. If he underleads them on an early trick, South's queens will capture East's jacks. South will capture the remaining tricks with spade and heart leads for seven tricks.

J/F 2. Michael Auerbach has an "ominoes" question. Clearly with one 1x1 square tile only one unique shape can be formed. The same is true with two such tiles (only one domino). There are only two triominoes, a 3x1 and an L-shape (we consider two shapes the same if one can be turned into the other by rotation, translation, or flipping it over). Michael knows there are five tetrominoes, and 12 pentominoes. He asks for the number of hexominoes.

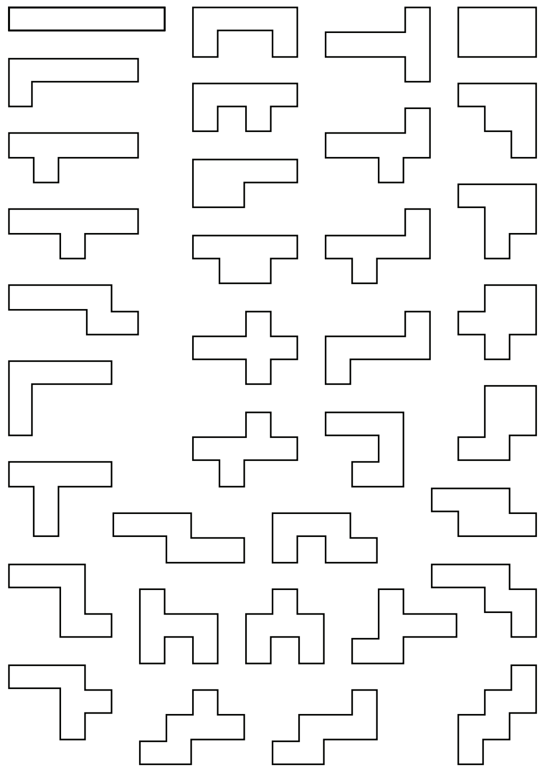
Avi Ornstein writes that at first he constructed 29 hexominmoes, which seemed too good to be true.

Consider: If you double the two possible triominoes and add the single domino you get five, the number of tetrominoes. Doubling the five tetrominoes and then adding the two triominoes gives 12, the number of pentominoes. Doubling 12 and adding five gives 29, which was the number of hexominoes he had initially found.

However, after cutting out six paper squares and working carefully, he found that there were actually 35, the same number as found by Phillip Davis, Jim Larsen, Zachary Levine, Naomi Markovitz, and Eric Nelson-Melby.

At first I was puzzled, because I was sent a solution with 36 hexominoes. I was planning to print the 36-hexomino solution with the caveat that geometric visualization is not my strength. Fortunately, as I was submitting this solution to my editor, Alice Dragoon, she found the duplicate, so now we are fairly confident that 35 is right.

Ornstein's solution follows.



Better Late Than Never

S/O 1. Timothy Maloney noticed that we need another heart in the East hand.

Y2017. Something went very wrong with the solution and we found the error only after the column went to the printer. The version on the Puzzle Corner and *MIT Technology Review* websites are better but still have errors, which are corrected here.

$1 = 2 - 17^0$

$20 = 21 - 7^0$

$21 = 20 + 1^7$

$35 = (10/2) \times 7$

$50 = 10 \times (7 - 2)$

Other Responders

Responses have also been received from F. DeSimone, R. Leuba, J. Mayne, R. Morgen, J. Prussing, E. Signorelli, and A. Stark.

Proposer's Solution to Speed Problem

1,000 + 900 + 810 + 729 = 3,439.

Send problems, solutions, and comments to Allan Gottlieb, New York University, 715 Broadway, Room 712, New York, NY 10003, or to gottlieb@nyu.edu. For other solutions and back issues, visit the Puzzle Corner website at cs.nyu.edu/~gottlieb/tr.