# MATHEMATICAL GAMES

In this section, we offer you some games of a mathematical flavour for you to play and possibly analyze. If you like them, or if you know some games yourself, let us hear from you.

Hex

This is a game which was invented by Piet Hein (see the article on the superellipse), although it was rediscovered in 1948 by John Nash in America (who called it John — probably because of the room that many people used for playing it!). It was produced commercially in 1953 when it received its present name.

To play the game, draw a rhombus using hexagons as in the figures below. Any number of hexagons may be used, but the standard game is usually played with eleven hexagons along each edge. The game is played by two people, one using black discs and the other using white discs. The players take it in turns to put a disc on one of the hexagons, each trying to get an unbroken chain of discs from an edge labelled with his colour across to the opposite edge. A player may put his disc on any empty cell and the chains may twist and turn as much as you like.
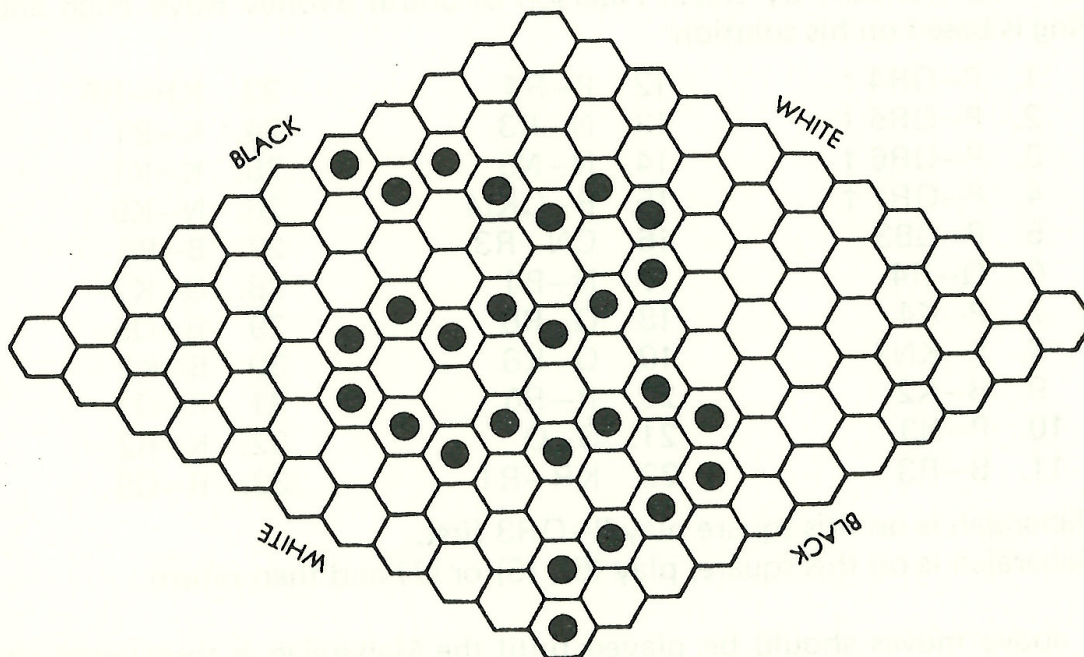
An example of a winning chain for Black.

Next time, we will give you a proof that one of the players must be able to force a win. See if you can work out which one. You might also like to try and devise some strategies for playing the game. To get you started, you may find it easier to analyze the game when there are only two, three, or four hexagons along each side:
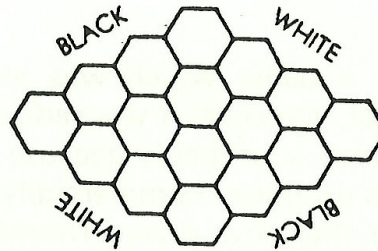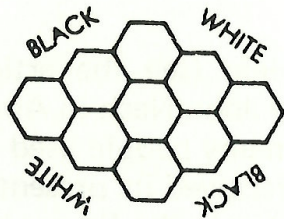
Maharajah

The only strategy for this game (which was described in Vol.8 No. 3) which we have received was sent by David Paterson of South Sydney Boys' High and the following is based on his solution:

1. P—QR4 *	12. P—R4	23. KR—R5
2. P—QR5 †	13. N—R3	24. K—B1
3. P—QR6 †	14. N—N5	25. K—K1
4. P—QR7 †	15. B—QKt4	26. N—K5
5. P—QB3	16. QN—R3	27. B—B4
6. Q—R4	17. N—B4	28. Q—K7
7. P—K4	18. Q—R6	29. R—Q5
8. P—KN3	19. Q—K6	30. B—K2
9. B—K2	20. R—R6	31. K—Q1
10. P—N3	21. O—O	32. K—B2
11. B—R3	22. KR—R1	33. R—Q8

* If Maharajah is on this square play P—QR3 first.
† If Maharajah is on this square, play (5), (6) or (7) and then return.

The above moves should be played until the Maharajah is threatened and so may be captured.

Note: The above notation is no longer used for chess and has been replaced by the algebraic notation, using the letters a to h for the files. The above is written:

1. a4	12. h4	23. R 1a5
2. a5	13. Nh3	24. Kf1
3. a6	14. Ng5	25. Ke1
4. a7	15. Bb4	26. Ne5
5. c3	16. Na3	27. Bc4
6. Qa4	17. Nc4	28. Qe7
7. e4	18. Qa6	29. Rd5
8. g3	19. Qe6	30. Be2
9. Be2	20. Ra6	31. Kd1
10. b3	21. O—O	32. Kc2
11. Ba3	22. Rfa1	33. Rd8.

Some of our readers might also like to consider the question of how many Maharajahs are needed to be able to defeat a person playing with the normal pieces.

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Puzzle: Think 'n Drink

An explorer and three of his bearers are to make a trip into the desert.

Each man can carry enough water to last ten days. Each man can walk 24 kilometres a day. Obviously if all four stay together they can manage a trip of only five days into the desert, leaving enough water to return.

If our explorer is a thinker, how far can he manage to get into the desert before he has to return, assuming that the desert is so uninhabited that it is safe to leave water behind for the return trip, but no bearer can return to civilization to replenish his supply and then return to the desert.