THREE-DIMENSIONAL LOGIC PUZZLE

Inventor: John F. Lyons, JR., Wilmington, NC (US)

Correspondence Address:
TRIANGLE PATENTS, PLLC.
P.O. BOX 28539
RALEIGH, NC 27611-8539 (US)

Appl. No.: 11/973,158
Filed: Oct. 5, 2007

Publication Classification

Int. Cl. A63F 9/00 (2006.01)

U.S. Cl. ............................................ 273/153 R

ABSTRACT

A three-dimensional logic puzzle having a multiplicity of face sides wherein a final solution set is provided by forming a preliminary solution set on each of the face sides and across the face sides in a predetermined pattern.

Solution (2 concepts, 8 parts)
Each face (4 total) must have each number 1 thru 9
Each axis (4 total) must have each number 1 thru 9

Legend

- Face
- Axis 1
- Axis 2
- Axis 3
- Axis 4
FIG. 5

**All of the following conditions MUST be TRUE:**

- Each face \{A_{1-9}, B_{1-9}, C_{1-9}, D_{1-9}\} must contain 9 unique segments
- The set \{A_1, A_2, A_3, B_2, B_3, B_4, C_2, C_3, C_6\} must contain 9 unique segments
- The set \{A_{1'}, A_{2'}, A_{3'}, B_{2'}, B_{3'}, B_{4'}, C_{2'}, C_{3'}, C_{6'}\} must contain 9 unique segments
- The set \{B_{2'}, B_{3'}, B_{6'}, C_{2'}, C_{3'}, C_{6'}, D_{2'}, D_{3'}, D_{6'}\} must contain 9 unique segments
- The set \{A_{2'}, A_{3'}, A_{6'}, C_{3'}, C_{4'}, C_{6'}, D_{6'}, D_{7'}, D_{8'}\} must contain 9 unique segments
THREE-DIMENSIONAL LOGIC PUZZLE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention
[0002] The present invention relates generally to a three-dimensional logic puzzle, and more particularly, to a tetrahedral or pyramidal number puzzle.
[0003] 2. Description of the Prior Art
[0004] Generally, prior art in the field of three-dimensional (3D) logic puzzles is limited to twisting puzzles, such as RUBIK'S CUBE (trademark name), whose goal is to return a series of colored surfaces to their original position on each of the faces of a cube, wherein each face of the cube is formed of the same color block, i.e., nine equally sized and shaped small colored blocks form the face of each cube surface. Additionally, the prior art 3D logic puzzles include a pyramid-shaped color block matching, wherein the solution is realized when each face of the pyramid is returned to original position of matching colored surfaces formed of smaller, matching triangle colored blocks.
[0005] Relevant examples of prior art 3D logic puzzles include the following:
[0006] U.S. Pat. No. 4,593,907 for Polyhedral and spherical cubic puzzles;
[0007] U.S. Pat. No. 6,361,324 for Tetrahedral twist chemistry puzzle and teaching device;
[0008] U.S. Pat. No. 4,555,866 for Regular polyhedron-based logical puzzles;
[0009] U.S. Pat. No. 4,415,158 for Puzzle;
[0010] U.S. Pat. No. 4,600,199 for Three dimensional puzzle;
[0012] While these three-dimensional logic puzzles are known in the prior art, they are not based upon a triangular representation of a SUDOKU (trademark name) puzzle, which is not merely a color-block based matching solution.
[0013] Thus, there remains a need in the prior art for more intellectually challenging and stimulating 3D logic puzzles having solutions that extend beyond color block based matching solutions.

SUMMARY OF THE INVENTION

[0014] The present invention is directed to a 3D shaped logic puzzle in which a final solution set is realized by providing a preliminary solution set on each face side of the 3D shape and across sides in a predetermined pattern. In a preferred embodiment, the logic puzzle is tetrahedral in shape, having equilateral triangular face sides, each with corresponding subdivided segments of equal size that are interconnected within the 3D puzzle device. Each subdivided segment on the face side or outer surface of the overall tetrahedron further includes a graphic design that, together with other segments form the preliminary solution set. In one preferred embodiment, the graphic design is a single digit from 1 to 9, wherein the preliminary solution set is a single series 1 to 9. The objective of this 3D logic puzzle is to position a set of subdivided segments such that each of the four triangular faces of the overall structure include exactly one set of the digits 1 to 9 and to fill the middle band around each of the four vertices of the overall structure with the digits 1 to 9, thereby forming the final solution set. Thus, the 3D logic puzzle of the present invention is solved by realizing a final solution set achieved by altering the position of the subdivided segments by rotating layers or groups of them about each axis of the 3D overall shape to provide a preliminary solution set on each face side of the 3D overall shape and in a predetermined pattern across the face sides of the overall 3D shape.
[0015] These and other aspects of the present invention will become apparent to those skilled in the art after a reading of the following description of the preferred embodiment when considered with the drawings, as they support the claimed invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] FIG. 1 is a face side view of a 3D puzzle showing surfaces of the puzzle and dashed lines representing the middle band around each of the four vertices of the overall structure, in accordance with an embodiment of the present invention;
[0017] FIG. 2 is a perspective view of a 3D puzzle showing two solved surfaces of the puzzle, in accordance with an embodiment of the present invention;
[0018] FIG. 3 is a perspective view of a 3D puzzle showing ordered steps to create the puzzle, in accordance with an embodiment of the present invention;
[0019] FIG. 4 is another view of the puzzle shown in FIG. 3.
[0020] FIG. 5 is a representation of the logic formulae required to derive a solution set.
[0021] FIG. 6 is a colorized view of the 3D puzzle according to the present invention.

DETAILED DESCRIPTION

[0022] In the following description, like reference characters designate like or corresponding parts throughout the several views. Also in the following description, it is to be understood that such terms as “forward,” “rearward,” “front,” “back,” “right,” “left,” “upwardly,” “downwardly,” and the like are words of convenience and are not to be construed as limiting terms.
[0023] The present invention provides a three-dimensional (3D) logic puzzle having a multiplicity of face sides forming an overall 3D shape, wherein a final solution set is provided by forming a preliminary solution set on each of the face sides and across the face sides in a predetermined pattern. The preliminary solution set is selected from a series of patterns, such as graphic designs, colors, numbers, letters, symbols, lights, and combinations thereof. Preferably, the preliminary solution set is formed from a series of patterns that is exclusively represented one time within each face side, thereby forming a repeating pattern on each of the face sides. When the preliminary solution is also represented on each face side and in a predetermined pattern across the face side, then a final solution set is realized and the puzzle or game is solved.
[0024] In preferred embodiments of the present invention, each of the face sides includes subdivided segments of equal size and shape, wherein each segment has a portion of the preliminary solution set on its surface. In one embodiment of the present invention, these segments are operable to be rotationally manipulable such that rotating a group of connected segments moves them across surfaces. Preferably each of the subdivided segments is rotatable in more than one direction such that its interconnectivity to other segments changes based upon the rotation or manipulation of the device. In an alternative embodiment, the segments are static,
and the solution set is realized by manipulation of the lighting, colorization, graphic design, letter, number, indicia, and combinations thereof.

[0025] Referring now to the drawings in general, the illustrations are for the purpose of describing a preferred embodiment of the invention and are not intended to limit the invention thereto.

[0026] In a preferred embodiment, the logic puzzle is polyhedral in shape. By way of example, one having a triangular base and three equilateral triangles connected with the base making a total of four faces. For each face there are three layers of tetrahedral cells—a top layer with one tetrahedral cell, a middle layer of three tetrahedral cells, and a bottom layer of five tetrahedral cells. Each layer is parallel to at least a different one of the polyhedron faces. Each face of a tetrahedral cell visible on one of the four faces of the overall structure is labeled with a number 1 to 9. Each layer of cells can be rotated about its face axis. The overall structure can be oriented in any position or direction. An imaginary line exists between each vertex and its opposite face. The segments can be rotated to scramble and solve the puzzle.

[0027] The numbers may be randomly, but logically, scrambled from a solution set. The objective of this three-dimensional logic puzzle is to fill each of the four triangular faces of the overall structure with the digits 1 to 9, graphic designs, symbols, lights, and/or colors, and to fill the middle band around each of the four vertices of the overall structure with the digits 1 to 9, graphic designs, symbols, lights, and/or colors. The logic puzzle is solved by realizing a final solution set achieved by altering the position of the subdivided segments by rotating layers or groups of them about each axis of the 3D overall shape to provide a preliminary solution set on each face side of the 3D overall shape and in a predetermined pattern across the face sides of the overall 3D shape.

[0028] The overall equilateral triangular structure that forms the basis for this puzzle can be best seen in FIG. 1, which illustrates each of the single face sides of the multi-sided, coordinately interactive 3D logic puzzle of the present invention. In FIG. 1, a single face of each of the sides of a pyramid-shaped 3D puzzle is shown. In one embodiment of the present invention as illustrated with FIG. 1, heavy black lines 111 dividing the overall triangle 10 into four different triangles represent the edges of the three-dimensional logic puzzle. The dashed lines 12, which are unmarked on the tetrahedron face side, pass through the segments that will make the middle band around each vertex 13. Thus, a 3D logic puzzle of the present invention includes a multiplicity of face sides juxtapositioned each other to form a predetermined 3D form that is interactively rotatable across each of the face sides based upon subdivided segments of each face. Preferably, the subdivided segments on each face side are equally sized and shaped. Also, preferably, the subdivided segments on each face side are small matching shapes of the shape of the side or a sub-component thereof. By way of example and not limitation, a 3D logic puzzle having a tetrahedral shape includes four equally sized face sides that are triangles, which further include subdivided segments that are triangles having the same shape as the face side, but down-sized, such that they collectively completely cover and form the face side surface geography. Also preferably, the subdivided segments of each face side are equally spaced apart by divider lines, which are illustrated in the figures.

[0029] A view of two of the puzzle face sides is shown in FIG. 2. In this illustration, each face side is subdivided into 9 equal segments of equilateral triangular shape. Each of the segments subdividing each of the multiplicity of face sides further include a number 1 to 9 as shown in FIG. 3. The upper layer 21, at the top of the face side illustrated 20, and correspondingly on each of the other three face sides for this tetrahedral example, includes one subdivided segment, in this example it is one tetrahedral cell; the middle layer 22, includes three tetrahedral cells; and, the bottom layer 23 includes five tetrahedral cells. For this configuration, each of the face sides includes the appropriate number of subdivided segments to fully collectively form the face side surface.

[0030] The 3D logic puzzle of the present invention includes numbered subdivided segments of each face side that must be returned to an original position, or to a solution set. In the case of the illustration, the objective of the 3D logic puzzle is to realize a preliminary solution set wherein each face side surface includes only one of each of a series of numbers from 1 to 9. In other words, to arrange or to solve all the triangles on the surface of the tetrahedron so that each of the four triangular faces of the overall pyramid structure contain the digits 1 to 9.

[0031] Importantly, and differentiated from the prior art 3D logic puzzles, the final solution set is not completed merely by providing the solution set on each face side, but also by realizing the solution set on multi-side solution map areas. By way of example, in the tetrahedral 3D logic puzzle set forth hereinabove as an example, this multi-side solution map area is realized by providing a middle band 24 around each of the four vertices 25 of the overall structure with the digits 1 to 9 while still retaining each face side surface with the solution set of a single set of digits 1 to 9. FIG. 3 illustrates a preliminary solution set on at least one side of the device. FIG. 4 is another view of the puzzle shown in FIG. 3, illustrating the preliminary solution set.

[0032] FIG. 5 illustrates a representation of logic formulae provided to derive a solution set. FIG. 6 is a colorized view of the 3D puzzle according to the present invention.

[0033] The realization of the solution set for a given 3D logic puzzle is provided through a process of moving the subdivided segments from one position to another until the final solution set is realized. The development of the game is that by means of rotation, any of the layers or groups of subdivided segments is operable to be moved in three dimensions relative to other layers or groups of subdivided segments, whereby the surfaces of face sides are scrambled across the overall surface of the tetrahedron. When the game is originally provided with the final solution set presented, then it is started or restated such that a scrambled pattern is formed by the rotation of the subdivided segments to eliminate the presented solution set. Then, the user or player moves or manipulates the pieces or subdivided segments about the surface of the tetrahedron in order to bring the surfaces to match the objective of the puzzle or final solution set as set forth hereinabove in the representative example illustrating the present invention.

[0034] In a method of playing a 3D logic puzzle, the following steps are included: providing a 3D shaped game device having an overall shape and matching face side shapes being formed from a multiplicity of subdivided segments juxtapositioned and equally spaced apart to form the face side shape, wherein a potential to include a preliminary solution set is provided for each side and for being formed across sides; moving the subdivided segments on each face side
across face sides to provide a preliminary solution set on each side and in a predetermined pattern across the sides; and realizing a final solution set.

[0035] In one embodiment of the invention, the solutions are realized by the user selectively and rotationally manipulating the subdivided segments across the face sides, where a rotationally operable device is provided. Alternatively or additionally, the solutions are realized by the user selectively activating an illumination member associated with each of the subdivided segments across the face sides; and selectively manipulating the illumination member to create the solution sets. In this embodiment, the puzzle device is operable so that the user cycles through options by selectively applying pressure on the face side surface associated with a segment. By way of example and not limitation, the puzzle is operable when a user activates or applies a pressure once to obtain a first color, a second time to obtain a second color, etc. Alternatively, the activation or selective manipulation of the segments is operable to cycle through a predetermined set of graphics, such as numbers, letters, and combinations thereof, with or without associated colorization.

[0036] Certain modifications and improvements will occur to those skilled in the art upon a reading of the foregoing description. The above mentioned examples are provided to serve the purpose of clarifying the aspects of the invention and it will be apparent to one skilled in the art that they do not serve to limit the scope of the invention. All modifications and improvements have been deleted herein for the sake of conciseness and readability but are properly within the scope of the following claims.

What is claimed is:

1. A three-dimensional (3D) logic puzzle comprising a multi-sided 3D overall shaped game device wherein each of the sides further includes a face side formed of a multiplicity of subdivided segments and wherein a final solution set is embodied when each of the face sides includes a preliminary solution set and wherein the preliminary solution set is also formed across multiple face sides, thereby providing a 3D logic puzzle game having a complex inter-sided solution.

2. The puzzle of claim 1, wherein the preliminary solution set is formed from a single set of graphics.

3. The puzzle of claim 1, wherein the preliminary solution set includes a series of numbers.

4. The puzzle of claim 1, wherein the preliminary solution set includes a series of letters.

5. The puzzle of claim 1, wherein the preliminary solution set includes a combination of colors and graphic designs.

6. The puzzle of claim 1, wherein the preliminary solution set includes lighted elements.

7. The puzzle of claim 1, wherein the device is shaped as a tetrahedron.

8. The puzzle of claim 7, wherein each face side is a matching triangle.

9. The puzzle of claim 7, wherein each face side is an equilateral triangle.

10. The puzzle of claim 7, wherein the preliminary solution set includes a single digit number on each subdivided segment from 1 to 9.

11. The puzzle of claim 1, wherein the preliminary solution set includes a number on each subdivided segment.

12. The puzzle of claim 1, wherein the preliminary solution set is selected from the group consisting of a number, graphic design, symbol, color, light, and combinations thereof on each subdivided segment.

13. The puzzle of claim 1, wherein the final solution set exclusively contains the preliminary solution on each of the face sides and in a predetermined pattern formed across multiple face sides.

14. The puzzle of claim 1, wherein the subdivided segments are rotationally manipulateable to move from one position to another position on the various face sides.

15. The puzzle of claim 1, wherein the subdivided segments are static.

16. A method of playing a 3D logic puzzle comprising the steps of:

   Providing a 3D shaped game device having an overall shape and matching face side shapes being formed from a multiplicity of subdivided segments juxtaposed within and equally spaced apart to form the face side shape, wherein a potential to include a preliminary solution set is provided for each side and for being formed across sides;

   Moving the subdivided segments on each face side across face sides to provide a preliminary solution set on each side and in a predetermined pattern across the sides; and realizing a final solution set.

17. The method of claim 16, further comprising the steps of:

   Rotationally manipulating the subdivided segments across the face sides.

18. The method of claim 16, further comprising the steps of:

   Activating an illumination member associated with each of the subdivided segments across the face sides; and selectively manipulating the illumination member to create the solution sets.

19. The method of claim 18, further comprising the steps of:

   Activating an illumination member associated with each of the subdivided segments across the face sides; and selectively manipulating the illumination member to create the solution sets, cycle through options by selectively applying pressure on the face side surface associated with a segment.

* * * * *