The present invention includes a set of stacking blocks designed to resemble the Arabic numerals 1-10. Each number block is height proportional to its value, and they can be stacked vertically. This feature allows students to see the relationship between numbers, and discover math concepts as they stack or play.
EDUCATIONAL TOY NUMBER STACKING BLOCKS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of the provisional patent application No. 61/801,767, filed Mar. 15, 2013.

FIELD OF THE INVENTION

The present invention relates to educational toys and particularly to a manipulative aid for teaching arithmetic concepts. More particularly, the present invention relates to teaching arithmetic through repetitive play using vertically stackable toy building blocks, in the shape of numbers that are scaled according to their height value.

BACKGROUND OF THE INVENTION

Many previous inventions, whether teaching numerical values through elongated blocks or scaling numbers in relation to their value, require users to do the work of associating measurements to their respective symbols (usually painted on the front), or they simply lack the interconnectivity to provide long lasting engagement.

U.S. Pat. No. 3,934,357 to Couvillon and titled: TEACHING METHOD AND APPARATUS, teaches arithmetic using numeric cutouts that scale in height according to their numeric value. While this design succeeds in making numeric values more clear through size representations, the cutouts do not stack one atop the other so that each number is discernable.

U.S. Pat. No. 4,382,794 to Preus and titled: INSTRUCTIONAL AID, is intended to teach basic arithmetic using blocks in the shape of numeric symbols, that have a width value proportional to each number represented; e.g., the “2” block is twice the width of the “1” block. While this design is capable of continuously stacking numeric figures on top of one another, because the value representative of the numeral is located on a separate visual plane than the symbol, it is difficult to make the intended key memory associations, or see and apprehend those associations when multiple numbers are stacked on top of one another, as the topmost numeric symbols obscure the other symbols. Both Couvillon and Preus offer limited configurations and limited aggregate morphology.

Other patents such as U.S. Pat. No. 4,430,825 and U.S. Pat. No. 3,918,178 describe inventions that contain the numeric symbols in toy form, but fail to show both critical relationships between numeric symbols and provide a toy that has lasting replay value.

It would be desirable to provide a heavily kinesthetic dependent means for learning number relationships in the form of a stacking numbers toy.

It would be especially desirable to provide educational number blocks whereby the various base-ten numerals may be vertically stacked while maintaining the visibility of the represented number so that comparisons of values may be made by a student while at play.

OBJECTS AND ADVANTAGES OF THE INVENTION

In learning skills that require a lengthy duration to master, kinesthetic learning is only as powerful as the frequency with which it is used. The present invention not only allows the number blocks to be stacked vertically so that students can work with larger math problems, but the blocks stack from many different angles to provide kids with an engaging toy that they will manipulate and enjoy for hours on end. By being visually engaging and functionally instructive, the present invention provides a means for learning numbers and basic concepts core to mathematics wherein blocks representing numbers and their relative values are used for stacking and building. Elements of the present invention encourage students to vertically stack and build a great variety of toy architectural structures. Through the repetition of stacking each number block, students learn to associate each represented number and its relative value in relation to the other number blocks. These associations intuitively reinforce understanding of the base-ten concept and other essential number combinations during play. Block height directly corresponds to respective number value, making critical number associations easily apparent when viewing the numbers. Not only do these aided associations help accelerate the learning of basic number sense, but the stackable design allows users to engage in learning math concepts that span into the more complex realm of fractions, division, percentages. In addition to accelerating the users learning of number sense and basic mathematics, the blocks serve as a powerful visual aid in all forms of arithmetic. Coupled with the design are a series of symbols, including addition, subtraction, multiplication, division, percentages, greater-than, less-than, not-equals, and decimal points all designed in a style unique to this invention. Through repetition and creative exploration the present invention engages students for a time duration necessary to learn basic number relationships, the base-ten concept, and is an engaging visual instruction tool for parent and teacher alike.

SUMMARY

The present invention utilizes the basic numbers zero through ten. A building block is created for each number. With the exception of a zero block having a purely aesthetic shape and size that is nonrepresentational of its value, the number blocks are constructed with specific heights that are relative to one another. The base unit length is derived from the number 1 block which is most often stacked on its side. Accordingly, the base unit length is taken from the width of the number 1 block rather than its height. Each building block has a height in the foregoing base units corresponding to the respective number it represents; e.g., (2–2 units high (height of two “1’s”), 3–3 units high). With the exception of the number 1 block, each block is designed to represent its respective number when stacked vertically allowing the person stacking the blocks to associate the respective numeric symbol with its height value. In this way, learning the base-ten concept, key number combinations, and even basic addition and subtraction become intuitive by merely building with the blocks. All blocks stack right-side-up and vertically with all other blocks. Due to the number 4 block’s lower right leg, all blocks are four units wide, allowing the number 4 block to be stacked on its side and still remain uniform in width with the other blocks. All blocks have a thickness of two units, allowing users to build within a unified set of measurements.

In one aspect, the present invention includes number blocks that are shaped and sized to stack as building blocks, in multiple configurations.

In another aspect, the width and depth of all number blocks are part of a unified measurement system. For
example, the number 4 block can be stacked on its side or right-side up to achieve a represented value and stacks in an interconnecting fashion with the number 6 block to reinforce base-ten combinations. In another example, the number 1 block stacks perfectly with number 4 block to allow it to stand on its lower right leg, aiding the vertical stacking theme. In yet another example, the number 9 block stacks atop the number 1 block to complete a base-ten combination.

[0013] The foregoing and other objects, features, and advantages of the present disclosure will become more apparent from the following detailed description, which proceeds with reference to the accompanying figures wherein the scale depicted is approximate.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0014] FIG. 1 is a series of plan views showing the number 1 block laid on its side, and number blocks 3 and 5 of a preferred embodiment according to the present invention;

[0015] FIG. 2 is a side view of a number one block (FIG. 1) taken from the direction of arrow (a) showing thickness of the blocks;

[0016] FIG. 3 are plan views showing number blocks 2, 4 and 6 of a preferred embodiment according to the present invention;

[0017] FIG. 4 are plan views showing number blocks 7, 8 and 9 of a preferred embodiment according to the present invention;

[0018] FIG. 5 are plan views showing a stacking arrangement of number blocks 2, 3 and 5 next to a number 10 block;

[0019] FIG. 6 is a perspective view showing a stacking arrangement of number blocks 2, 3 and 5;

[0020] FIGS. 7-16 are orthographic views of a preferred embodiment according to the present invention wherein each figure corresponds to a number block one through nine;

[0021] FIGS. 17 through 23 are orthographic views of objects corresponding to mathematical symbols used in basic arithmetic as well as number blocks corresponding to the numbers zero and ten.

[0022] FIGS. 24 through 26 are orthographic views of various number blocks of a preferred embodiment shown in relation to one another;

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

[0023] In the following description the term “number” refers to an “integer” i.e., the seven integer is the number seven “7.” The term “unit” and “base unit” are used interchangeably. For purposes of clarity, blocks representative of a number are referred to using the Arabic number symbol, e.g., “the number 7 block”, while quantitative references of length or width are referred to using the spelled number quantity, e.g., “equivalent to two base units.” The term “symbol” refers either to a numeric symbol or calculative symbol. Unless otherwise explained, any technical terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this disclosure belongs. The number blocks have sides and two faces which can be thought of as the readable sides. The singular terms “a”, “an”, and “the” include plural references unless the context clearly indicates otherwise. Similarly, the word “or” is intended to include “and” unless the context clearly indicates otherwise. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of this disclosure, suitable methods and materials are described below. The term “comprises” means “includes.” All publications, patent applications, patents, and other references mentioned herein are incorporated by reference in their entirety for all purposes. In case of conflict, the present specification, including explanations of terms, will control. In addition, the materials, methods, and examples are illustrative only and not intended to be limiting.

[0024] Referring generally to FIGS. 1-26, a preferred embodiment of the present invention includes a series of stackable blocks that are proportional to one another; the base unit of length derived from the number one block. As shown in FIG. 7, a block representative of the Arabic numeral 1 has a thickness 10 of two base units that it shares in common with the elements shown in FIGS. 7-26, comprising double the height 12 of FIG. 7.

[0025] With the exception of FIG. 22, width 11 of FIG. 7 is shared with FIGS. 7-26. FIG. 8, which corresponds to the number 2 block possesses a height 13 of two base units which is double the height value of 12 in FIG. 7, a thickness 10 of two base units and a width 11 of four base units.

[0026] FIG. 9, which corresponds to the number 3 block possesses a height 14 of three base units which is triple the height value of 12 of FIG. 7, a thickness 10 of two base units and a width 11 of four base units.

[0027] FIG. 10 which corresponds to the number 4 block has two heights, 15 and 16, belonging to the left and right side of FIG. 10 respectively. The left height measurement 15 of four base units coincides with the exact width 11 of all numbers FIGS. 7-15, and is a height value four times that of 12. Right height measurement 16 is five base units. FIG. 10 also has thickness 10 equivalent to two base units, a general width 11 of four base units wherein the width 18 of the protruding leg of the number 7 block is the equivalent of 1 base unit. Height 17, is also one base unit.

[0028] FIG. 11, which corresponds to the number 5 block has a height 19 of five base units, a thickness 10 of two base units, and a width 11 of four base units.

[0029] FIG. 12, which corresponds to the number 6 block, has a height 21 of six base units, a thickness 10 of two base units, and a general width 11 of four base units. The upper right corner of the number element shown in FIG. 12, has a subtracted area 20 of one base unit that allows it to interconnect with the number 4 block (FIG. 10) and maintain a uniform width between the two figures.

[0030] FIG. 13, which corresponds to the number 7 block, it has a height 22 of 7 base units, a thickness 10 of 2 base units, and a general width 11 of 4 base units.

[0031] FIG. 14, corresponding to the number 8 block, it has a height 23 of 8 base units, a thickness 10 of 2 units, and a width 11 of four units.

[0032] FIG. 15, corresponding to the number 9 block, it has a height 24 of nine units, a thickness 10 of two units, and a width 11 of four units.

[0033] FIG. 16 corresponds to the number ten, has a height 35 of ten base units, a thickness 10 of two base units and a width 11 of four base units.

[0034] The bottom left corner of the element depicted in FIG. 15 has a subtracted area 20 of one unit that allows it to interconnect with the number 4 block and maintain a uniform width between the two figures.

[0035] FIGS. 17 and 18 correspond to the vertical slash in a not-equils symbol, and possess a diagonal length 25 of four and four fifths units, a thickness 10 of two units, and a width
FIG. 19 corresponds to the symbols greater-than or less-than, and possesses a height of 27 of four units, a thickness of 10 of two units and a horizontal width of four units. FIG. 20 (orthographic-back view) and FIG. 21 (orthographic-front view), correspond to the mathematical symbols, add, multiply, divide and percent, and possess a height and width of four base units when measured along the cross sections. Width 29 and 31 of each cross section measures one base unit. The thickness of the vertical cross section is split midway through the element depicted in FIGS. 20 and 21 where circular attachments one unit thick connect and produce the division symbol. These circular attachments depicted in FIG. 22, have a diameter of four fifths of a base unit and a thickness of one base unit.

FIG. 24 depicts a grouping of the number 4 and number 6 blocks, and illustrates how the number 4 block can be placed horizontally and stacked with the number 6 block to achieve the same height as when the number 4 block is stacked vertically and interconnected, on top of the number 6 block as shown in FIG. 25. Both FIG. 24 and FIG. 25 show how the objects represented can be combined in their respective numeral pairs to match the height of the object representing the integer ten as shown in FIG. 26.

It should be understood that the drawings and detailed description herein are to be regarded in an illustrative rather than a restrictive manner, and are not intended to be limiting to the particular forms and examples disclosed. Accordingly, it is intended that this disclosure encompass any further modifications, changes, rearrangements, substitutions, alternatives, design choices, and embodiments as would be appreciated by those of ordinary skill in the art having benefit of this disclosure, and falling within the spirit and scope of the following claims.

What is claimed is:

1. An educational system for conveying via play activity, the numerical relationships of the base ten numerical system comprising:
   1) a series of stacking blocks, each with length, width, depth, faces and sides wherein blocks representing a number symbol are proportionally sized and shaped based on the relative numerical value of each number block in the series, and,
   2) wherein the blocks are vertically stackable along the sides to produce in aggregate a plurality of structures that provides ready visibility of the represented values of the separate blocks and encourage reasoned or intuitive comparisons of the relative values.

2. The system according to claim 1, wherein the number symbols are European-style Arabic numbers.

3. The system according to claim 1, wherein a base unit of proportioning is derived from a block representing the number one.

4. The system according to claim 1, wherein the blocks stack right-side-up and vertically with all other blocks.

5. The system according to claim 1, wherein all blocks are four units wide, allowing the "4 block" to be stacked on its side and still remain uniform in width with the other blocks.

6. The system according to claim 1, wherein all blocks have a thickness of two units, allowing users to build within a unified set of measurements.

7. In a play setting, a process to convey concepts related to the base ten system comprising the steps:
   1) providing a set of vertically stackable blocks with each block having length, width and depth including blocks representing whole numbers and wherein number blocks 1-10 are shaped and sized in proportion to their relative value, and
   2) stacking the blocks to produce in aggregate a plurality of three-dimensional structures that permits visibility of the represented values of the separate blocks and encourages reasoned or intuitive comparisons of the relative values.

8. The process according to claim 7, wherein the number symbols are European-style Arabic numbers.

9. The process according to claim 7 wherein a base unit of proportioning is derived from a block representing the number 1.

10. The process according to claim 7 wherein the blocks stack right-side-up and vertically with all other blocks.

11. The process according to claim 7, wherein all blocks are four units wide, allowing the "4 block" to be stacked on its side and still remain uniform in width with the other blocks.

12. The process according to claim 7, wherein all blocks have a thickness of two units, allowing users to build within a unified set of measurements.