



Level 3

# Materials Included

- **One decagon base** (same base for all levels)
- One polybag of 11 laminated "identify cards" that fit into the base to initiate creating number links to numbers 0-9. •

**Image Cards** 

- **One bag of Level 1 puzzle pieces:** 19 pieces (colored numbers 0-9 and nine shapes)
- One bag of Level 2 stars puzzle pieces: 37 pieces (four per shape cutout with 2-9 points, three for teardrop cutout with one point and two for zero cutout with zero points)
- One bag of Level 3 puzzle pieces: 40 pieces (four per shape cutout)
- One bag of 70 Laminated Game Cards (cut to fit into the base):
  - · Animals (0-9): 0- glass lizard; 1 narwhal; 2 camel; 3 three-toed sloth; 4 kitten; 5 starfish; 6 bee; 7 ladybug; 8 - octopus; 9 - nine-spotted moth
  - Dominos (0-9 dots)
  - Irregular Shapes (0-9 points)
  - Stringed Musical Instruments (0-9 strings): 0 drum; 1 ektara; 2 ehru; 3 balalaika; 4 ukelele; 5 banjo; 6 guitar; 7 - guqin; 8 - mandolin; 9 - kelstone
  - American Sign Language (0-9)
  - 2 sets of blank cards (two sets of cards in the shapes for 0-9)

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# Ways to Play – Alone or with Friends

## 1. Leveled Learning Puzzle

There are many ways to play with the board, cards and leveled puzzle pieces. Begin discussing the puzzle base and the identify cards to initiate the idea of linking numbers to patterns. Then begin investigating the leveled puzzle pieces and series of the 70 game cards. As the Level 1 puzzle pieces become easy, challenge yourself with either variety of Level 2 puzzle pieces and then Level 3 puzzle pieces. Below are suggested ways to begin playing with the pieces and cards. You and learners will create additional ways to use the pieces and cards.

## Level 1 Puzzle Pieces and Base\*

- Count the number of points/sides on each shape to know which puzzle cutout space it fits into by comparing the count of the points of the piece to that of the base.
- Count the number of points/sides of the base and relate the resulting numbers ten to the number of shapes in the puzzle base.
- Consider why the center of the puzzle base is an oval hole. It is the center of Zero. It serves as a way to carry the base easily with reference a painter holding the palette.
- Look for the smiling number characters. Recite the name of each number. (The colorful smiling numbers match the color and faces of all NumbersAlive! plush and animated number characters that create Team Ten®, numbers 0-9.)
- Use a pencil and paper to trace the puzzle pieces to practice drawing the shapes and numbers 0-9 and then combine to create numbers 10 and above. Since the pieces are laser-cut they are already black on the sides.
- Feel the engraved stars of each large puzzle pieces and compare the number of stars and number of "arms" of each star with the number of points of the puzzle shape. (The "stars" for 0, 1 and 2 have the equivalent number of points as the number.) Once students have also begun using Level 2 puzzle pieces, return to the Level 1 pieces to compare the number of points and type of polygon of each star.
- Teachers, parents and mentors, use the arms of the stars to introduce arithmetic: addition, subtraction, multiplication and division. For example, add the number of arms of different stars on the same puzzle piece or across two or more puzzle pieces. Introduce the concept of subtraction by inquiring as to how many more arms the star of each hexagon to the triangle.
- The stars on an individual puzzle piece nicely introduces multiplication. For example, there are five 5-pointed stars on the regular pentagon piece with five sides and five points. Then cover one of the arms and discuss how to determine the total by estimation and subtraction.

### Level 2 Puzzle Pieces—Stars Edition

- Trace the number, star and shape pieces as relevant to the specific edition. Discuss how the two pieces for each polygon shape relate to each other.
- Count the number of points of each puzzle piece. (Discover the two points of each pieces creating a heart of the stars edition.)
- Sort the pieces into groups. Discuss the various sorting methods possible to determine how the pieces in each "group" are alike.
- Think about each piece to decide into which base cutout shape to put the piece. Discuss how to decide where to put each piece into the base cutout shape. (Often learners like to figure this out by first just putting the pieces into the base without thinking strategically and then experience the "wow" of discovering the patterns.)
- Either outside or inside the puzzle base investigate how the pieces are combined to form the base cutout shapes. Then put the pieces into the puzzle base if explored outside of the base.
- **Stars edition:** Put the pieces into the puzzle base so that the colored sides are on the top. Discuss the steps necessary for the pieces to fit.
- Stars edition: Discuss "center point" symmetry of the stars with three or more arms and the specific numbers and how that affects how to put the pieces into the base with the colors on the top.
- Begin putting the pieces into each puzzle base. If attempted without a strategy, players will have to be determined and eventually come up with a strategy to finish the entire puzzle.
- Discuss the various sorting methods possible to determine how the pieces in each "group" are alike.
- All faces and colors of the LEVEL 1 and LEVEL 2 number pieces are identical to the plush and animated numbers.

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- Think about each piece to decide into which base cutout shape to put the piece. Discuss how to decide where to put each piece into the base cutout shape. (Often learners like to figure this out by first just putting the pieces into the base without thinking strategically and then experience the "wow" of discovering the patterns.)
- Create 3-dimensional objects with the concentric pieces for the oval, teardrop and heart. (There is no piece for the carry hole of the center of zero.)
- Either outside or inside the puzzle base investigate how the pieces are combined to form the base cutout shapes. Then put the pieces into the puzzle base if explored outside of the base.

## Level 3 Puzzle Pieces—Similar to Level 2 Plus the Following

- Begin putting the pieces into the puzzle base. If attempted without a strategy, players will eventually have to come up with a strategy to finish the entire puzzle.
- Discuss the various sorting methods possible to determine how the pieces in each "group" are alike.
- Think about each piece to decide into which base cutout shape to put the piece. Discuss how to decide where to put each piece into the base cutout shape.
- Create 3-dimensional objects with the concentric pieces for the oval, teardrop and heart. (There is no piece for the hole of the center of Zero to allow for carrying the completed puzzle.)
- Either outside or inside the puzzle base investigate how the pieces are combined to form the base cutout shapes. Then put the pieces into the puzzle base if explored outside of the base.

## 2. Games and Activities with the 70 Cards

There are many types of games and activities to create using the 70 shaped cards. Most children like to begin with the animal or domino cards and then progress to the American Sign Language cards. The nonstandard shapes and stringed instruments are the most difficult. The erasable blank cards allow players to create their own series that link the shape to a word, design, quantity, etc.

## **Memory Games**

- Take all the cards from a certain category (such as animals) and place them face-down on a table. Look at the shape of each card to determine its related number. Then turn the card over to discover the animal linkage. Think about why the animal was chosen: what links it to the number?
- After reviewing all 10 cards, turn the cards back over (face down). Without turning the cards over, look and feel the card's shape and remember which animal is related to the card's numeric count.
- For a more challenging memory game, place multiple series of cards facedown. Take turns turning over two cards to see if you can match a pair by number (for example: both cards are shapes with 4 sides/points) or category (for example: both cards are stringed instruments or a series you created).
- Another option is to use all of the cards and try to find all of the cards of one shape or series (such as stringed instruments).

#### Game of Series and Shape—2 to 4 players

Use all of the cards with series on them (include personal series if created). Deal 5 cards to each player and place the next card face up in the middle of the table. Place the remaining cards face down as a "draw" pile when unable to play with cards in the player's "hand." Each play involves matching the shape or series of the card face up in the center of the table. The first player to clear their hand is the winner. Players can create clever ways to use the blank cards, for example, selecting extra oval cards a "magic" cards allowing the player to state what the card represents in series or shape. Be creative!

#### **Create Your Own Cards**

Young players can practice drawing the numbers or shapes in conjunction with the Level 1 puzzle pieces. Older learners can create ancient numbering systems and other glyphs, such as Arabic, Roman, Quipu, and Egyptian numerals.

Think about each of the numbers 0-9. Look around your environment and try to identify a category or set of images that relate to each number. Consider sports, nature, art, vehicles, etc. The world is filled with number patterns! Draw your own set of linkages, and then challenge a friend to understand your number linx drawings.

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#### Create Visual Series—more advanced activity

The following picture shows the initial decimal digits of Pi using the cards. How does your eye "read" the sequence of pi using different series of cards?



#### Create a Visual Number System—more advanced activity

How could you express 10, 11, 20, etc. using the cards? Creating your own system will instill the concept of place value and assist visual learners. Once multiple-digit numbers are constructed with the cards, visually display the Fibonacci Sequence and then make up your own and ask friends what the next card-created number in the sequence.

Once attempted with the cards alone, use any of the Level 1, 2, or 3 puzzle pieces with the cards for more complex designs and storytelling.



#### 3. About the Game

The lynx is a type of wildcat that is important in the mythology of many cultures (in particular Greek, Norse and North American). The lynx is known as a "keeper of secrets" and symbolizes the unraveling of hidden truths. Let the lynx help you learn number secrets like why a starfish might like the number 5 or how many strings are on a mandolin.

Number Linx challenges children's (ages 3+) spatial and strategic skills while teaching them to recognize patterns and draw interdisciplinary links between numbers and the world around them. The goal is to fill the spaces in the decahedron base with numerically-linked puzzle pieces and image cards. Depending on the puzzle level\*\* played, puzzle pieces include: regular/irregular polygons and numbers. Image cards visually link animals, objects, concepts, or the child's own creation (blank cards provided) to a specific number based on the card's number of sides (e.g., bees have six legs and build honeycombs so they are associated with the hexagon). Beyond the basic puzzle, pieces can be used by children in a manipulative fashion to develop spatial and sensory skills by tracing shapes and numbers. The image cards can be used for memory games and as a vocabulary building tool.

Number Linx is protected by US patents 9403084 and D737905. It was named Education Invention of 2016 at the USA INPEX conference and one of the 16 best innovations in education at the 2016 Global Education Supplies and Services (Dubai). It was named the best invention of North America at the 2017 iCAN International Finals Competition in Toronto, Canada.

#### 4. Custom Orders/Variants

Level 2 Language Edition is available in the following standard language combinations: English, French, and Spanish; English, French, and Arabic; and English, French, and German subject to minimum order or licensing agreement.

- Language edition: Feel how the shapes are written in the various languages.
- Language edition: Count the number of points of each of the concentric pairs of the oval, teardrop or heart. Discuss what makes then "pairs" or "concentric" and where you see concentric shapes in your environment.
- Language edition: Create 3-dimensional shapes with the concentric pairs and discuss how 2-dimensional flat shapes are used to create 3-dimensional shapes. Discuss where you have ever created 3-dimensional objects from 2-dimensional pieces or materials.

\*\* Puzzle pieces from different levels (Level 1, 2 or 3) are not intended to be used together and may not fit into the base together. Since they create shapes of the same size, they can be stacked on top of each other to illustrate tessellations of the same shapes.

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