



# MATH TOWER 3D



TEACHING AID



#1187

236 PCS



5+



LEARN THROUGH PLAY **24** CHALLENGES





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## Product Description



### Theme

This game is inspired by a postman who lives in Mafate (Reunion Island) that is full of mountains and rugged landscapes. The postman needs your help to build the only possible path between two fixed TOWERS, so he can climb up and down to deliver mails. You can only use the other TOWERS and STAIRCASES, all in different heights, to connect the two fixed TOWERS.

### Introduction

This is a logical game that breaks down numbers. The use of the TOWER-and-STAIRCASE construction system provides a learning platform for mathematical formulas, allowing children to actually see the process of numerical changes while cultivating children's awareness to numbers.

This is a self-validating game featuring a broad range of increasing levels of difficulty. It can help children to develop logical reasoning through the use of a decision tree (algorithmic approach) which meets required skills from nursery school to secondary school.

This manual has 12 educational discovery activities, with suggestions and teaching aids for children to create their own Challenges. Included inside are 24 Challenge Cards of 6 different difficulty levels.



# Parts List



## Parts List

No.	Description	Item No.	Qty.	No.	Description	Item No.	Qty.
1	C-X SHAPE BASE	1187-W10-A1S	10	14	C-STAIRCASE 3	1187-W10-D3S	1
2	C-TOWER BASE	1187-W10-B1W	1	15	C-STAIRCASE 4	1187-W10-D4S	1
3	C-TOWER BASE	1187-W10-B1R	2	16	C-STAIRCASE 5	1187-W10-D5S	1
4	C-TOWER BASE	1187-W10-B1G1	3	17	C-STAIRCASE 6	1187-W10-D6S	1
5	C-TOWER BASE	1187-W10-B1K	4	18	C-STAIRCASE 7	1187-W10-D7S	1
6	C-TOWER BASE	1187-W10-B1Y	5	19	C-STAIRCASE 8	1187-W10-D8S	1
7	C-TOWER BASE	1187-W10-B1G2	6	20	C-STAIRCASE 9	1187-W10-D9S	1
8	C-TOWER BASE	1187-W10-B1D	7	21	B-PEG REMOVER	7061-W10-B1Y	1
9	C-TOWER BASE	1187-W10-B1T	8	22	C-STATIC AXLE CONNECTOR	1187-W10-E1K	100
10	C-TOWER BASE	1187-W10-B1B	9	23	B-DUAL PEG	1187-W10-C1S	55
11	C-TOWER BASE	1187-W10-B1O	10	24	B-3HOLE CUBE	7128-W10-A1O	4
12	C-STAIRCASE 1	1187-W10-D1S	1	25	P-CHALLENGE CARDS	K16#1187	1
13	C-STAIRCASE 2	1187-W10-D2S	1	26	P-LABEL	R20#1187	1

## Tips and Tricks:

Use the PEG REMOVER to remove the DUAL PEG out, as shown in Figure A.

Use the PEG REMOVER to remove the STATIC AXEL CONNECTOR out, as shown in Figure B.



A. DUAL PEG



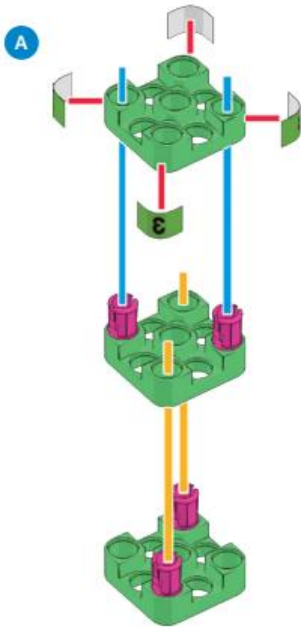
B. STATIC AXLE CONNECTOR

For more assembly tips, please refer to





# Preparation of Materials:



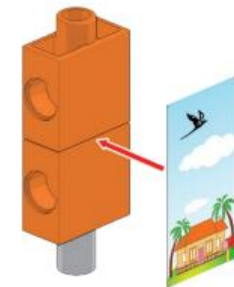
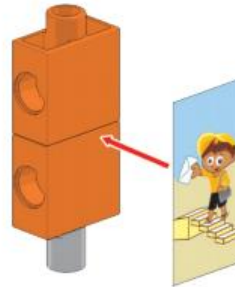
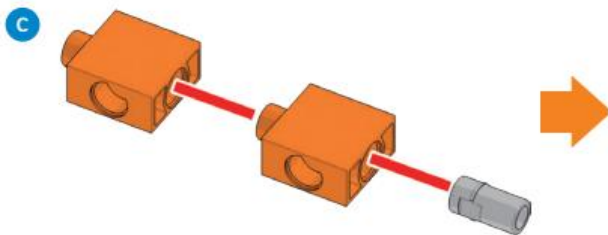
- A** Connect the same-colored TOWER parts by inserting 2 STATIC AXLE CONNECTORS diagonally between 2 levels. Stick the "number" LABELS on the TOWERS at four corners of the top floor.

**B**

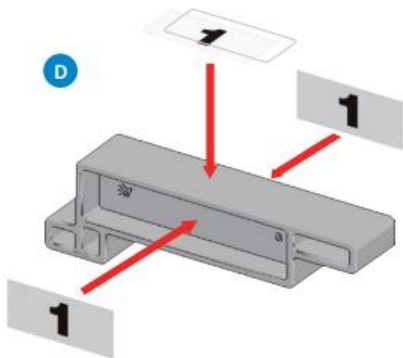


Tower 1

- B** Take the DUAL PEG into the bottom of the TOWER by using the short side. Note: TOWER 1 uses 2 DUAL PEGS and the other TOWERS use 4 DUAL PEGS.

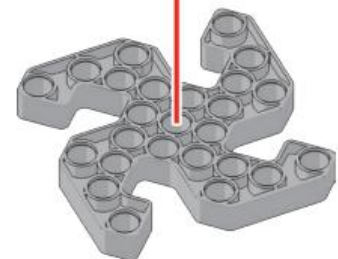


- C** Combine two 3HOLE CUBE. Place one DUAL PEG into the bottom of the FLAT CUBE, and attach a sticker of the postman or the house on the FLAT CUBE.

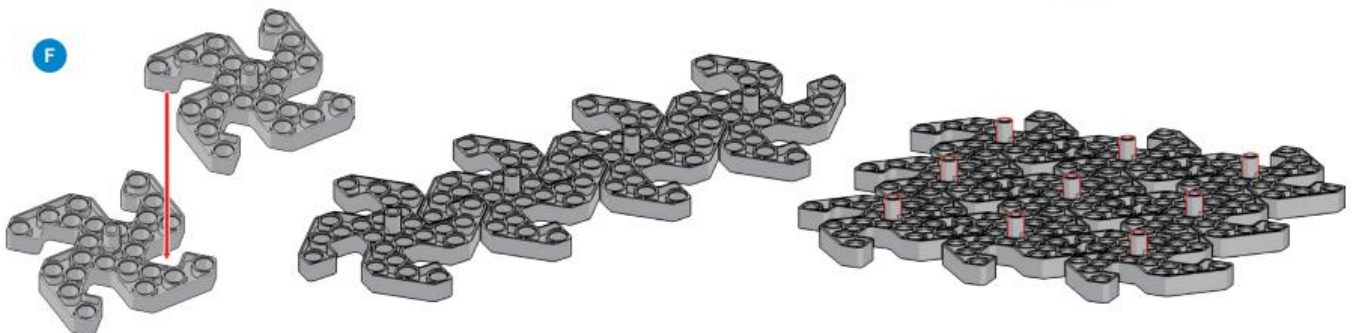


- D** Stick the "number" LABELS on the STAIRCASES (at the top and on both sides side at the bottom).

- E** shorter part



- E** Insert a DUAL PEG (shorter part) in the central hole of each X SHAPE BASE.



- F** Note that X SHAPE BASE can interlock with each other to make a row, crisscross pathway or a larger game board.





# A Postman Who Lives in Mafate



## Game Purpose

Review the height difference between the TOWERS. Think about how to use the appropriate STAIRCASE to connect the TOWERS to establish a path. It is helpful for the players to start on the left and finish on the right.

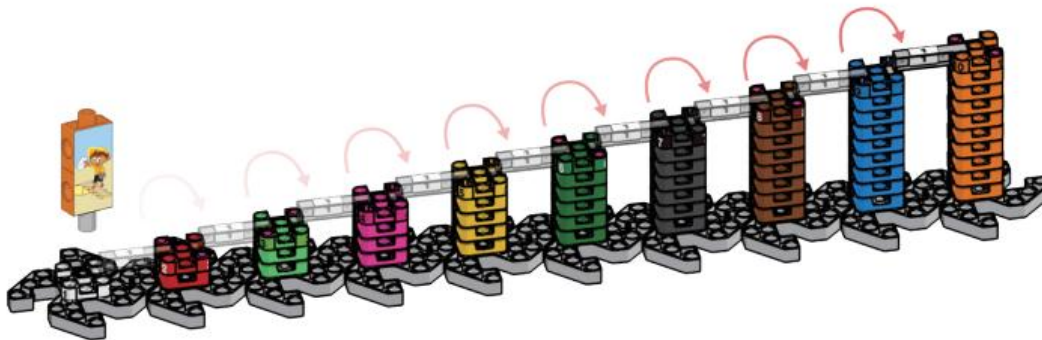
## Challenge 1A: Counting up

### Game Instructions:

- Assemble 10 X SHAPE BASES in a straight line. Place the 1-floor TOWER at the start of the row on the left.
- Ask the children (up to 4 children) to take turns placing the appropriate TOWER and then the correct STAIRCASE to move the Postman upwards.

### Learning Objectives:

Use STAIRCASE 1 repeatedly. The children use the STAIRCASE 1 to choose the next TOWER. Once the pathway has been built, the children will be able to observe that the order of the TOWERS (from 1 to 10) matching the increasing numerical chain (counting upwards).



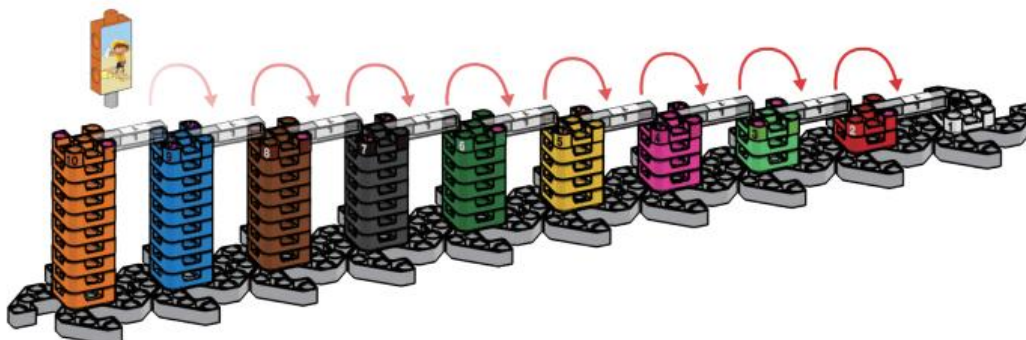
## Challenge 1B: Counting Down

### Game Instructions:

- As with Challenge 1A, but in this game, children will start the highest TOWER and go to the lowest TOWER.

### Learning Objectives:

- Contrary to Challenge 1A, after the path is constructed, the children will see that the height of the TOWER will match the decreasing numerical chain (counting downwards).
- Please note that the same STAIRCASE can be used to go up or down.



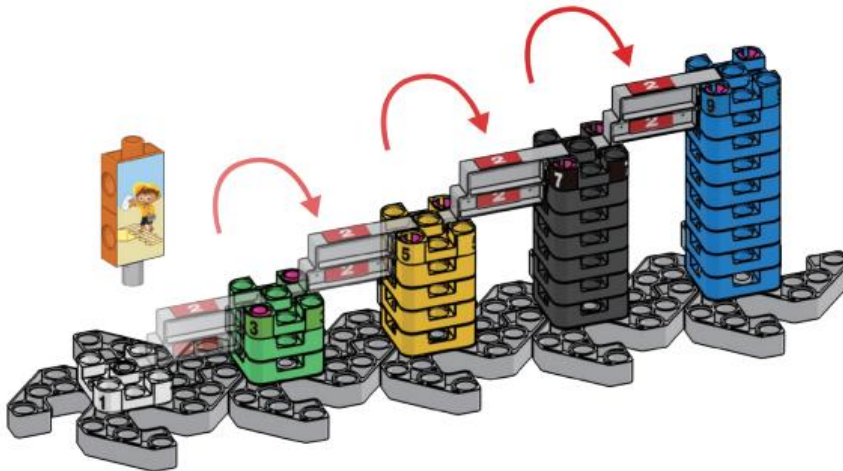
## Challenge 2~9: Counting Exercise

### Game Instructions:

- Review Challenges 1A and 1B games. Repeat with STAIRCASES 2 ~ 9 to start a new challenge.

### Learning Objectives:

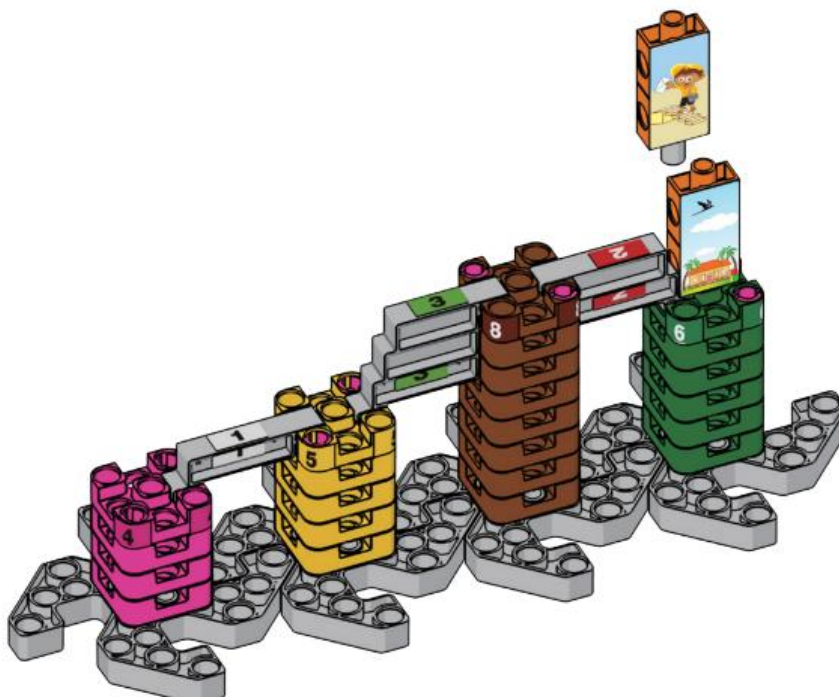
- Understand adding and subtracting functions by the changes in the TOWER heights.



## Challenge 10: Step by Step

The instructor will give a child a complete path, either orally or in writing. The child finds the TOWER or STAIRCASE needed for the next step and completes the same path as the instructor.

For example, the instructor needs to tell the child to use the STAIRCASE 1 after the TOWER 4, and the child finds the TOWER 5 by himself or herself. The child continues until the path is completed.





## Challenge 11: Long-Distance Expedition

### Game Instructions:

- The challenge here is to build the longest path with all the parts.

### Learning Objectives:

- Working with the limitations and using reasoning techniques, children can come up with the best arrangement.



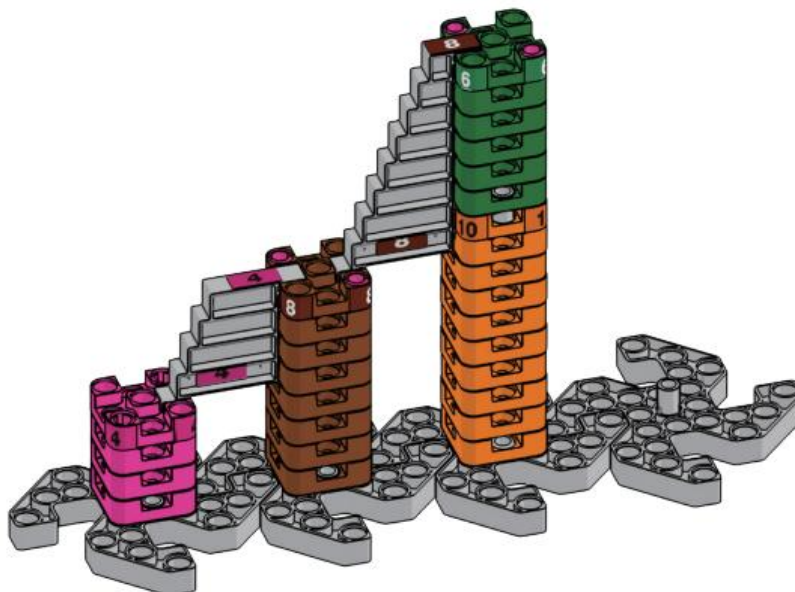
## Challenge 12: Learning Multiplication (Doubles. Level: first-grade)

### Game Instructions:

- Build pathways using only double increases. Each TOWER is always followed by a STAIRCASE with the same number of floors. Find the longest possible pathway.
- Help other children by giving them the first TOWER on which to place the Postman, for example a 1 or 3 floor TOWER.
- Remember: You can combine 2 TOWERS to get a higher platform.
- Try to find as many different pathways as possible. Also try to find the longest distance of the pathway (example:  $4+4 \rightarrow 8+8 \rightarrow 16$ ).

### Learning Objectives:

- Use various blocks to see the changes in numbers and learn multiplication.



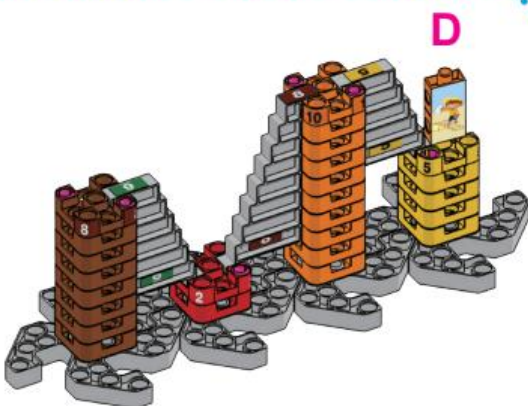
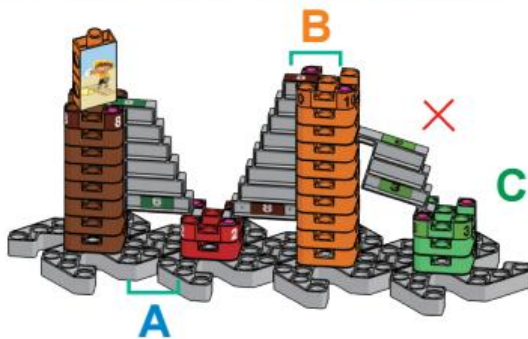
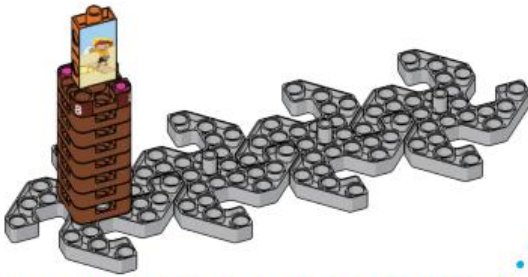
## Game Theme

Use the TOWER and STAIRCASE construction path to reach the end point (the last X SHAPE BASE).

## Role Assignments

- One player is chosen to be the TOWERS and STAIRCASES Seller. The Seller's role is to give the other players the TOWERS and STAIRCASES that they request.
- Builders: All the other players are Builders. Their roles are to set up the path of the TOWERS and STAIRCASES.

## Game Instructions



- The X SHAPE BASE is assembled in a straight line as a game base. The number of bases used will determine the difficulty level of the game.
- The Seller places a first TOWER at the start of a row, and places the Postman game piece on top of it.

- The Builders must say their requests to the Seller successively. They must reach an agreement to request one STAIRCASE and one TOWER that can be placed in front of the Postman.

For example:

**A:** The first time, the players received the STAIRCASE 6 and the TOWER 2.

**B:** The second time, the players received the STAIRCASE 8 and the TOWER 10.

- But if the requested components cannot make the Postman move forward, these parts are removed, which means they are set aside and may not be used again.

**C:** The third time, the players received the STAIRCASE 3 and the TOWER 3. Unfortunately, this is a failure. In this case, the STAIRCASE 3 and the TOWER 3 cannot be used.

- Every player advises his or her opinion on a request before voting and deciding which request is the best.
- Players can only obtain the parts when the request has been made to the Seller.

**D:** The 4th time, the players received the staircase 5 and the TOWER 5 to complete the game.

## Learning Objectives:

- Learn to express clearly the needs through communicating the exact number of TOWERS and STAIRCASES.
- Learn to plan ahead by using logical thinking.
- Show addition and subtraction by using their fingers or drawings.





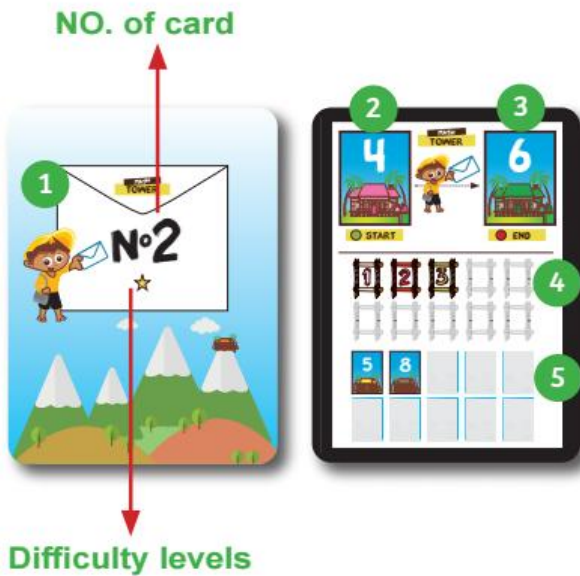
# Sending a Big Challenge



## Game Instructions

The Challenge Card adds limits and changes to this numerical game. As the child goes through “trial–error–success” process, the challenge becomes more and more difficult as the problem changes. There are 24 challenge cards, which are divided into 6 difficulty levels (each difficulty level has 4 cards).

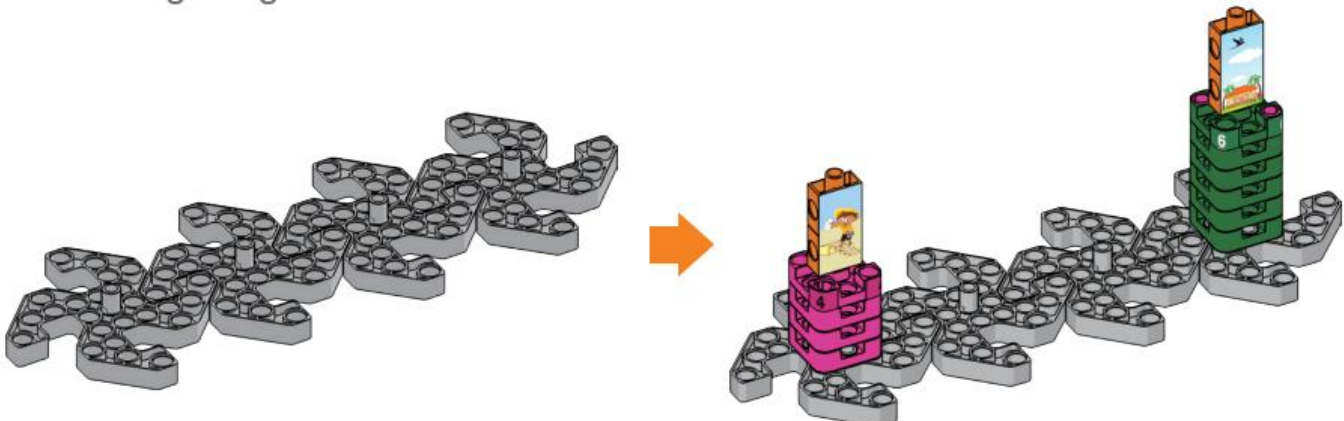
## Challenge Card Example



- 1 Challenge Card difficulty: level 1; second card
- 2 Starting Point: TOWER 4 (Pink)
- 3 Finishing Point: TOWER 6 (Green)
- 4 STAIRCASE(S) to use: STAIRCASES 1, 2, 3
- 5 TOWER(S) to use: TOWERS 5, 8

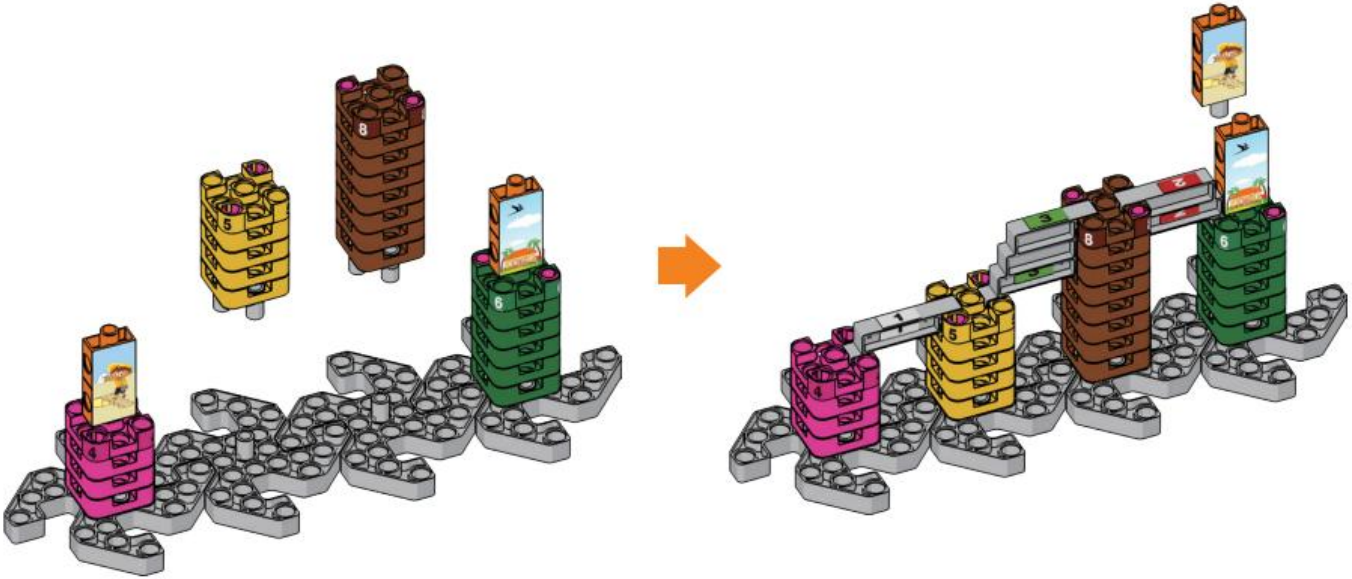
## Example Card and Game Description:

- Since a total of 4 TOWERS (TOWERS 4, 5, 6, 8) will be used, the four X SHAPE BASE will be assembled directly as the game base. (Please see figure below.)
- Set the starting TOWER (TOWER 4) and the postman at the far left; set the terminal TOWER and house at the far right. The position of the starting point and the ending TOWER cannot be moved during the game.





- Use the TOWERS and STAIRCASES defined in the Challenge Card to create a viable path. (See figures below.)



## Learning Objectives:

- Develop basic concepts of numbers and math formulas.(5<sup>+</sup>)
- Learn addition and subtraction of numbers by recognizing the changes of numbers through the STAIRCASES and TOWERS (5<sup>+</sup>).
- The process of calculating numbers in the brain is mentally reinforced.(5<sup>+</sup>)
- Develop logical and structural reasoning.(5<sup>+</sup>)
- Learn to solve various problems.(9<sup>+</sup>)
- Understand the decision tree and apply logical thinking to solve the TOWER challenges. (12<sup>+</sup>)  
"Building a Double Table" and "Developing a Decision Tree" can help to develop a child's ability to solve math problems.

## Extracurricular Activities

### Create Challenges

In addition to the 24 Challenge Cards, children can create their own cards. The goal is still for a postman to deliver the letter. Children can design their pathway first, and then fill in the game settings on the blank challenge card. Invite other children to find the solution according to the newly designed challenge card, and help the postman to deliver the letter.

### Online Resources

- Advanced Challenge (13<sup>+</sup>) - The test will prove that the Math Tower Challenge Card has only a single solution.The content can be downloaded free of charge by scanning the QR code on page 14.





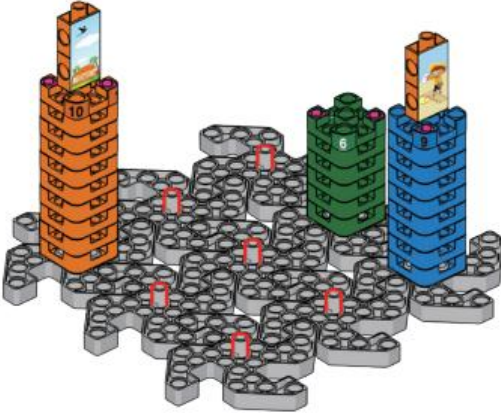
# Sending a Letter of Attack and Defense



## Game Theme

This is a strategy game in which 2 players (or 2 teams) play against one another. The players have to break down numbers (up to 15) in complex ways.

## Game Settings



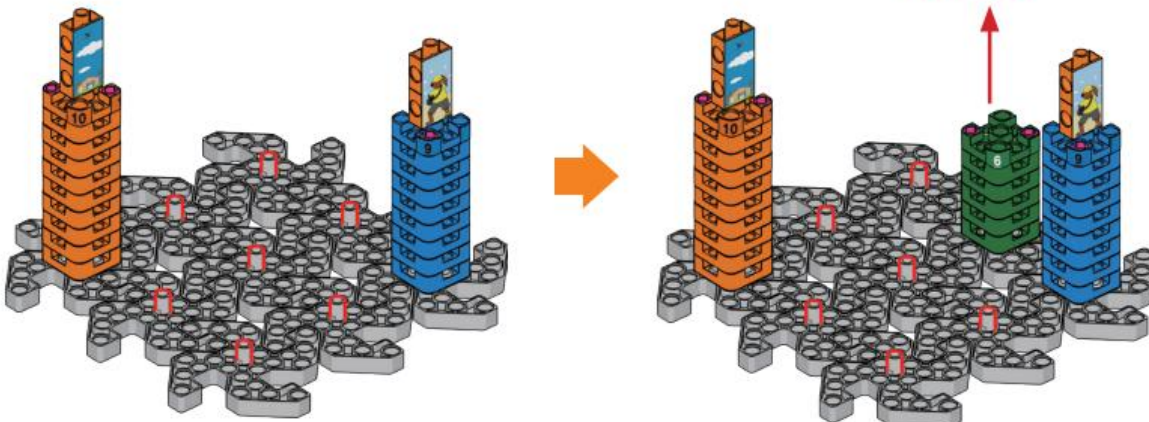
- Build a square board with 9 X SHAPE BASES (3 x 3).
- Place the 9-floor “Start” TOWER with the Postman on it in one corner of the game board. Place the 10-floor “Finish” TOWER in the opposite corner of the game board. These 2 TOWERS cannot be moved.
- All the remaining game components are available to the 2 players/teams.
- One of the players/teams is the postman to deliver the letters. The other player/team is the enemy, and their purpose is to prevent the postman from delivering the letters.

## How the Game is Played:

- The postman makes a move first. Then, each player/team takes their turn.
- TOWERS can be stacked on top of each other to create a taller TOWER, and this taller TOWER can be used directly on any open spaces.
- The same STAIRCASE can be moved and used repeatedly. Please note: After a STAIRCASE is moved, it will continue to connect one of the TOWERS to another TOWER before the postman can be moved. That is, as long as the height difference (number) between the TOWERS is the same, the STAIRCASE can create a path by one of the TOWERS originally connected. (See Action 4.)
- For example: A player chooses to take the following actions:

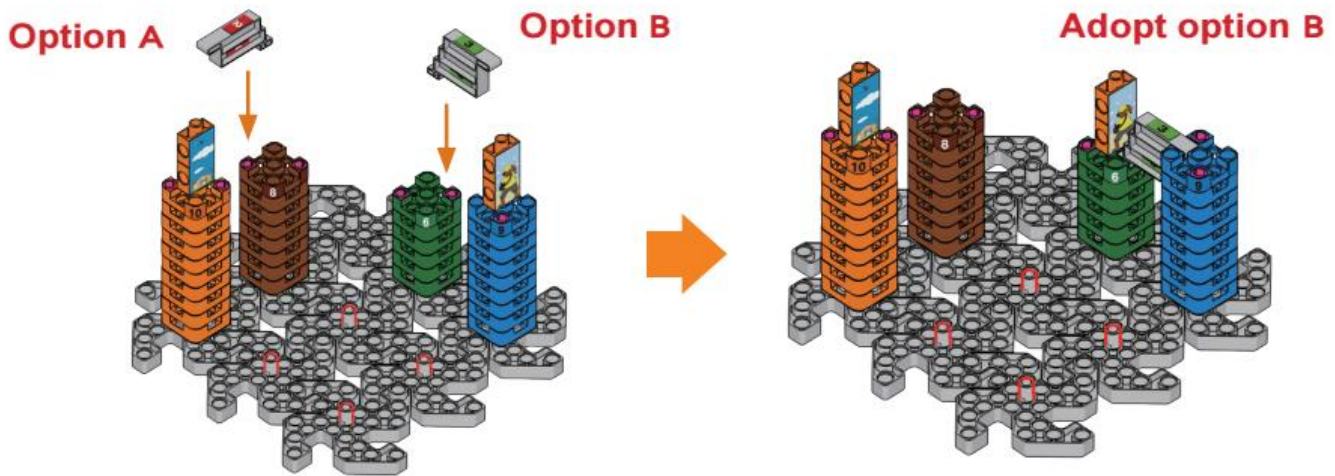
**Action 1** Place a new TOWER on an empty base or onto another TOWER.

Example: Put on the TOWER 6

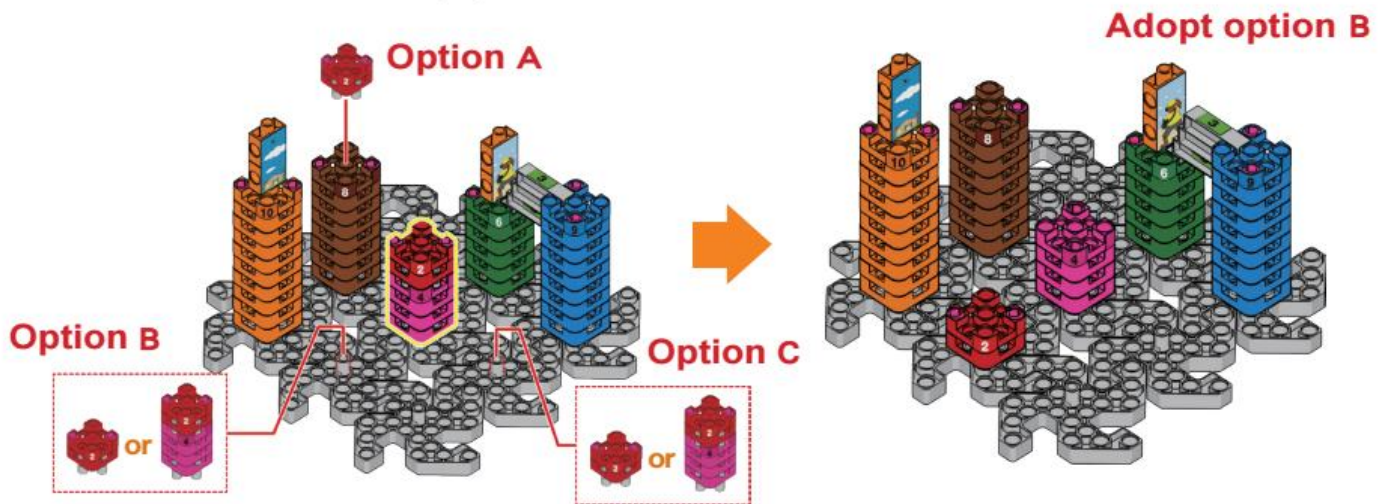




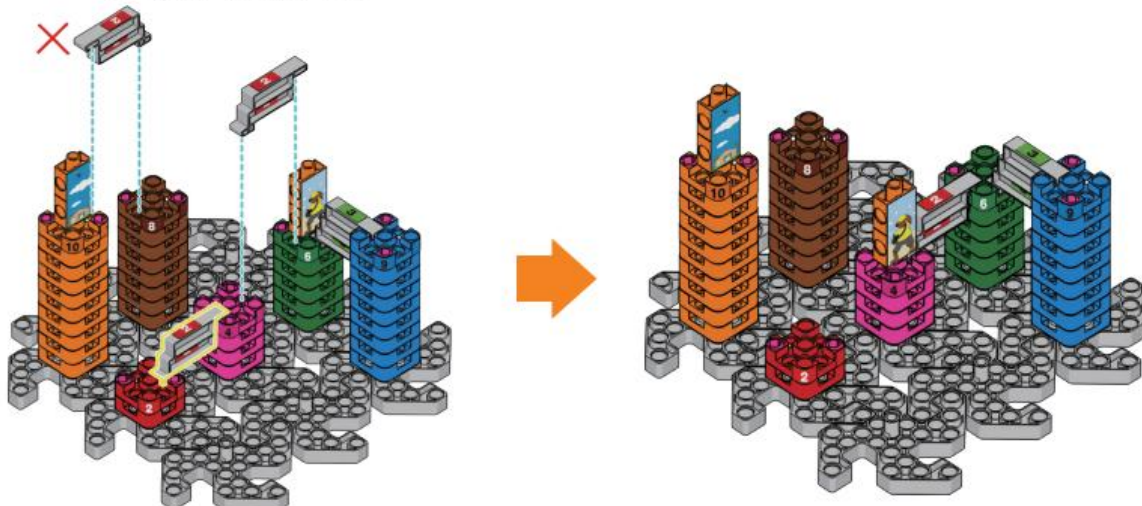
**Action 2** The player places a new STAIRCASE between TOWERS.



**Action 3** A player moves a TOWER from a base (diagonally not allowed) to an empty base or another TOWER.



**Action 4** A player moves a STAIRCASE, but makes sure to keep a connection between 1 of the originally connected TOWERS and a new TOWER.



**Action 5** The opposing player (enemy) can choose either to make a move or skip a turn (“Pass”).

**Other:** To move the postman piece, the player can use the constructed path to move the postman in each turn or after completing the whole pathway to final TOWER. This is not considered a turn.

### Game Limit

- TOWERS cannot be stacked on other TOWERS that have STAIRCASES, or where the postmen and the house piece are located.
- Only a single TOWER can be stacked.
- TOWERS can only receive one additional TOWER.
- A player may not do the exact opposite of what his or her opponent has just done (i.e. canceling the previous action). However, a player can use the same components but in a different direction.

### How to Win the Game

- The Postman: Gets home using the TOWERS and the STAIRCASES.
- The Enemy :
  - Prevents the Postman from getting home
  - The Postman player/team is unable to build or change anything.
  - The enemy can lead the Postman’s action into an unending loop of repetitive movements, such as a circle. (However, this is rare.)

### Learning Objectives

- Develop cognitive strategies about spatial reasoning (thinking in 3 dimensions), mathematical formula, and possible solutions.
- Break down and add numbers up to 15 by using a variety of numbers.
- Watch carefully the opponents’ actions and communicate to others (in the case of a team with several players) in order to develop and implement an appropriate response strategy.





# All Roads Lead to Rome



## Lead Player's Mission

### Learning Objectives

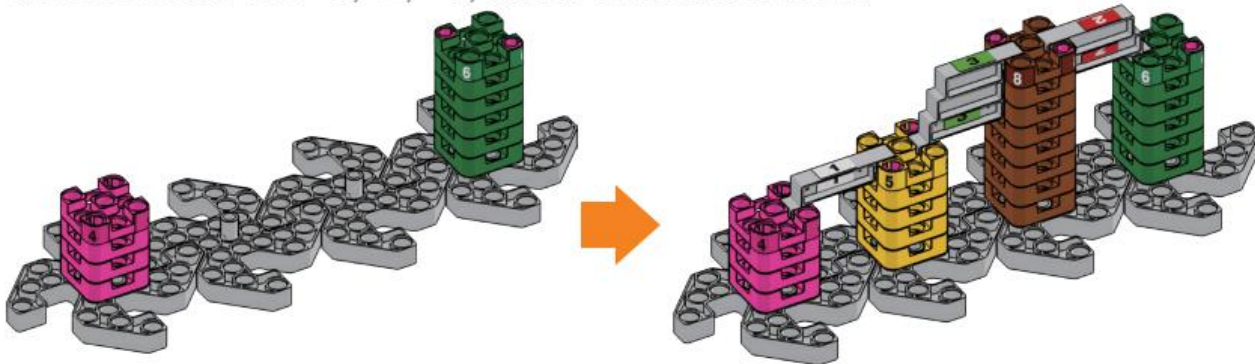
Using “+” and “-” symbols, with the STAIRCASE(S) and TOWER(S) to solve multiple addition and subtraction problems to help learn math.

### Game Instructions

Provide the children partial clues and the either “+” or “-” value of the individual steps which will allow the child to set up the path.

### For Example

The starting TOWER is the TOWER 4, the terminal TOWER is the TOWER 6, and the stairs are +3, -2, +1, which must all be used.



## Total Path Problem

### Learning Objectives

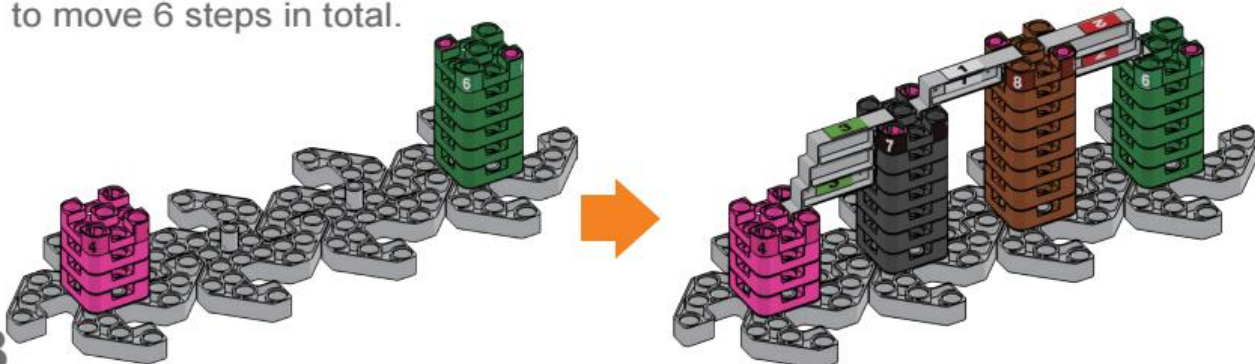
Challenge the child by showing the numerical value of the addition and subtraction, while addressing the concept of breaking down or building up numbers.

### Game Instructions

Provide the child a combination of partial clues and steps, allowing the child to set up the path.

### Example:

The starting TOWER is the TOWER 4, the terminal TOWER is the TOWER 6, and the stairs rise by a total of +4, down -2. Or, the starting point TOWER is the TOWER 4, the terminal TOWER is the TOWER 6, and the postman needs to move 6 steps in total.







# 24 Challenge Card Solutions

5 6 7 9  
2 2 5 7  
3 8 2 2  
1 3 6 8

N1 N2 N3 N4

3 8 5 10  
1 1 5 8  
4 7 10 2  
2 3 1 7

N1 N2 N3 N4

4 8 9 10  
2 6 7 1  
3 2 5 3  
7 6 1 8

N1 N2 N3 N4

6 5 8 6  
3 5 5 8  
9 10 4 8  
5 1 10 9

N1 N2 N3 N4

9 2 8 8  
7 10 9 8  
1 6 3 6  
7 2 5 3

N1 N2 N3 N4

9 2 7 6  
10 8 1 4  
3 5 8 3  
7 1 2 5

N1 N2 N3 N4



Online Resources





MADE IN TAIWAN

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