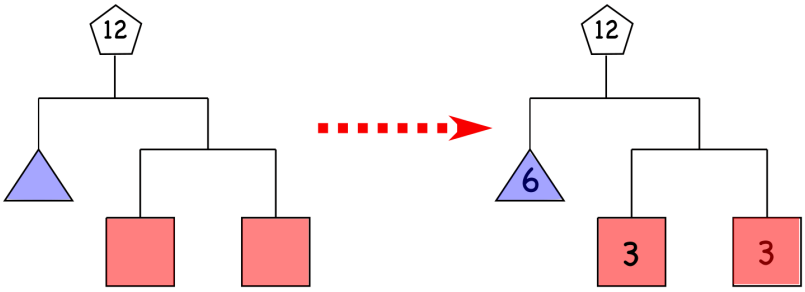
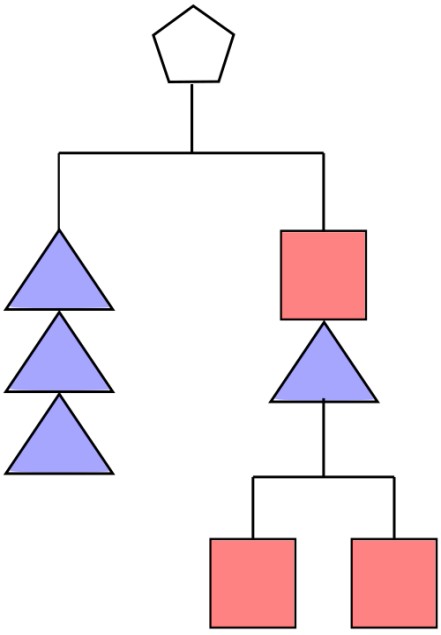
Puzzle of the Week
Balance Beam – 1

To balance, weights must be the same on opposite sides of a horizontal balance beam. The total weight is given above the balance beam.

For these puzzles, figures of the same shape must have the same weight. However, it is allowed for different shapes to have the same weight.



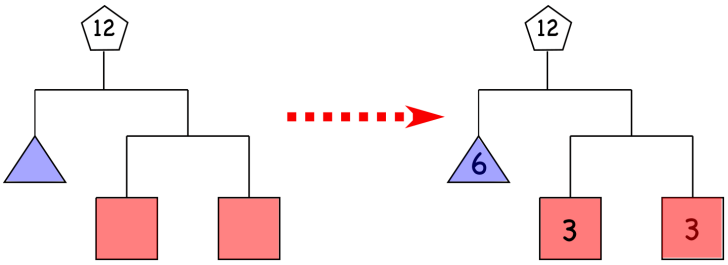
THE CHALLENGE: The squares each have weight 2. Find the weight of each of the triangles and the total weight of all the figures.



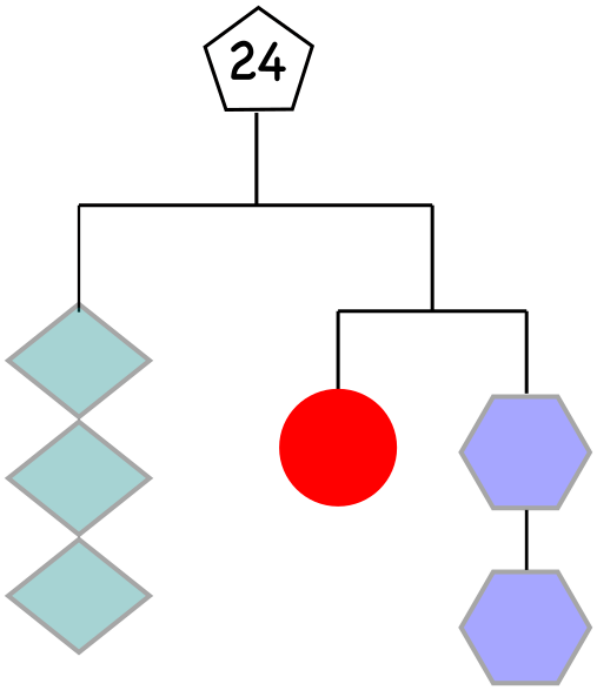
Puzzle of the Week
Balance Beam – 2

To balance, weights must be the same on opposite sides of a horizontal balance beam. The total weight is given above the balance beam.

For these puzzles, figures of the same shape must have the same weight. However, it is allowed for different shapes to have the same weight.



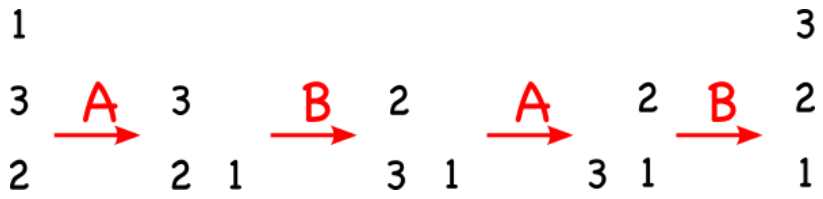
THE CHALLENGE: Find the weight of each of the diamonds, hexagons, and circle.



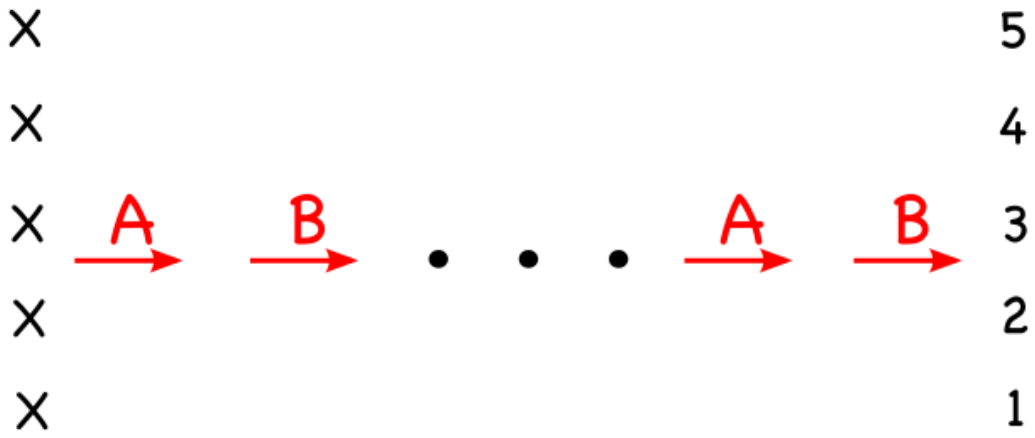
Puzzle of the Week
Card Deck Ordering

Two Steps: **Step A**: Remove the top card from a stack of cards and place it on the top of a discard pile. **Step B**: Move the new top card of the stack to the bottom of the stack.

If you start with a stack of cards ordered 1 - 3 - 2, repeatedly doing the Two Step process will result in a discard pile of cards in order from largest to smallest: 3 - 2 - 1.



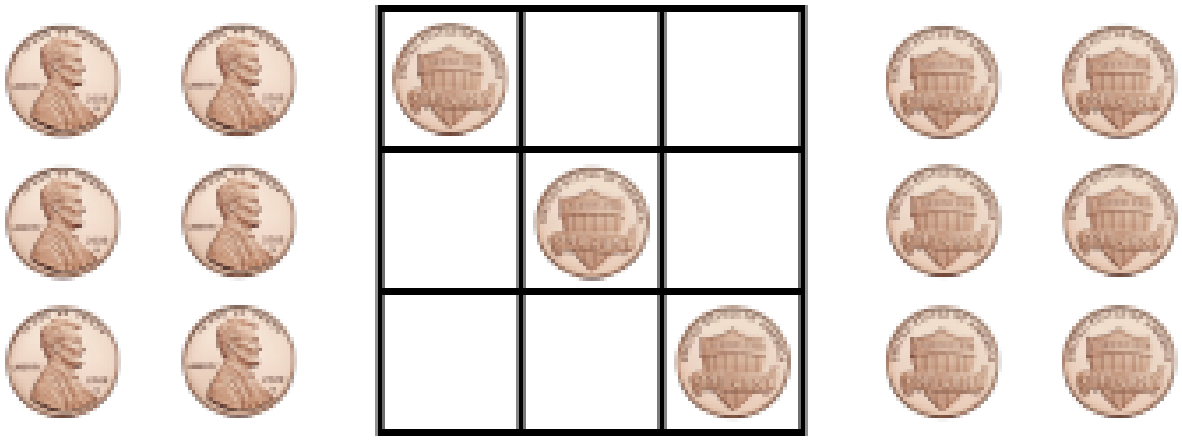
THE CHALLENGE Take cards numbered 1 to 5 and stack them so that if you repeat the Two Steps over and over with that stack, you will end up with a discard pile of cards in order from 5 down to 1.



Puzzle of the Week
Coin Flipping – 1

A coin may be placed heads up or down in any empty spot. When a coin is placed, all coins touching its sides must be flipped over.

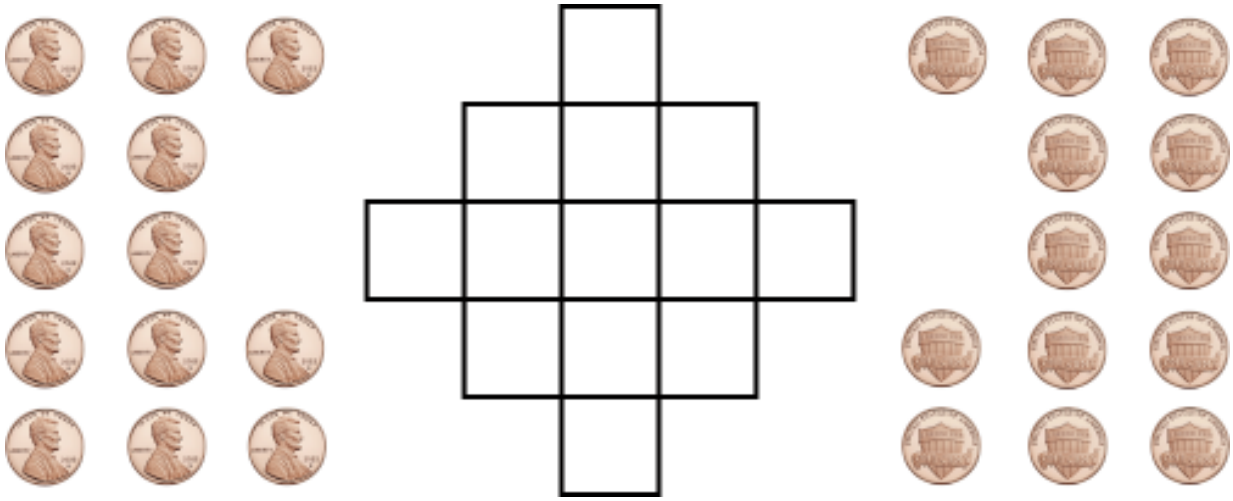
THE CHALLENGE: Fill this grid so all the coins end up heads up or heads down.



Puzzle of the Week
Coin Flipping – 2

A coin may be placed heads up or down in any empty spot. When a coin is placed, all coins touching its sides must be flipped over.

THE CHALLENGE: Fill this grid so all the coins end up heads up or heads down.



Puzzle of the Week

Combining Digits – 1, 2, 4, 8

Here are some ways to get 0 and 1 using 1, 2, 4, and 8.

$$0 = 8 - 1 * 2 * 4$$

$$0 = 8 * 1 - 2 * 4$$

$$1 = 8 - 2 * 4 + 1$$

$$1 = 8 - 4 - 2 - 1$$

THE CHALLENGE: How many numbers can you get using each of the numbers 1, 2, 4, and 8 in any order, using addition, subtraction, and multiplication?

EXPLORATION: What happens with other groups of four numbers? What happens if you use 1, 2, 4, 8, and 16?

Puzzle of the Week

Combining Digits – Easy as 1 2 3 4

Here are some ways to get 0 and 1 using 1, 2, 3, and 4.

$$0 = 1 + 4 - 2 - 3$$

$$0 = (3 - 1 - 2) * 4$$

$$1 = (2 - 1) * (4 - 3)$$

$$1 = 4 - 3 * (2 - 1)$$

THE CHALLENGE: How many numbers can you get using each of the numbers 1, 2, 3, and 4 in any order, using addition, subtraction, and multiplication?

Puzzle of the Week
Combining Digits – Four 4's

Here are some ways to get 0 and 1 using four 4's.

0 = 4 - 4 + 4 -4

0 = 44 - 44

1 = 4 / 4 * 4 / 4

1 = 4 / 4 + 4 - 4

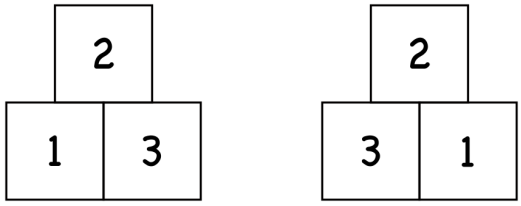
1 = 44 / 44

THE CHALLENGE: How many numbers can you get using four 4's using addition, subtraction, multiplication, division and creating double-digit numbers?

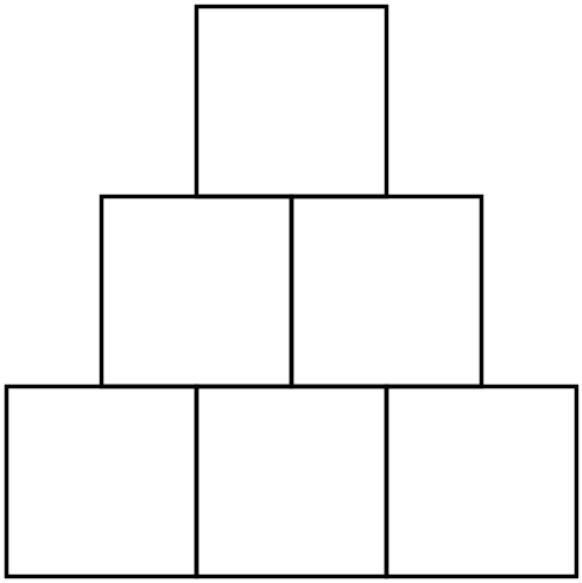
Puzzle of the Week

Difference Pyramids – 1

These pyramids are called *Difference Pyramids*. The number on top is the difference of the two numbers below.



THE CHALLENGE: Place the numbers from 1 to 6 to make a Difference Pyramid.

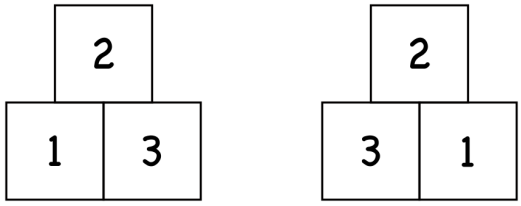


1 2 3 4 5 6

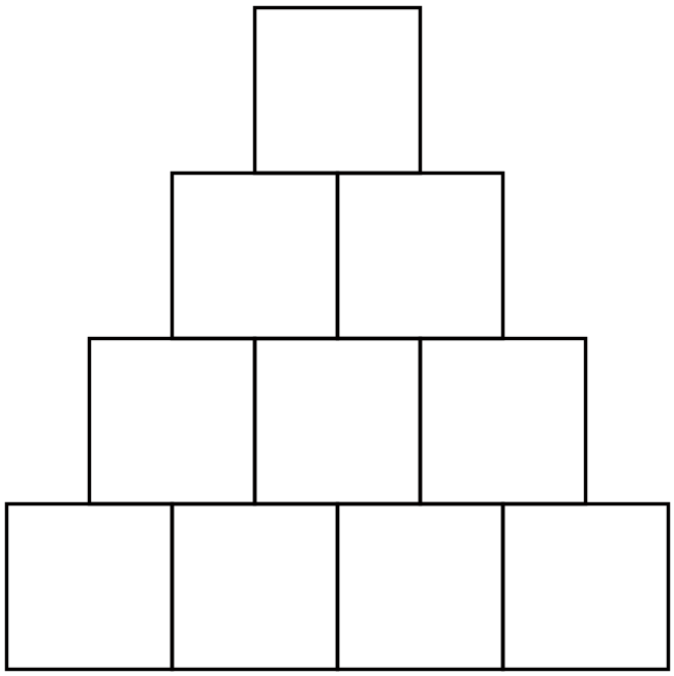
Puzzle of the Week

Difference Pyramids – 2

These pyramids are called *Difference Pyramids*. The number on top is the difference of the two numbers below.



THE CHALLENGE: Place the numbers from 1 to 10 to make a Difference Pyramid.



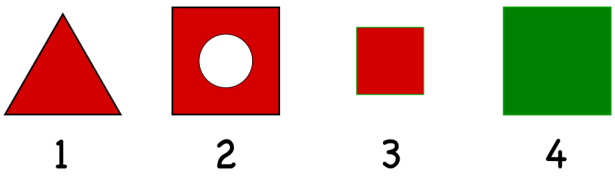
1 2 3 4 5 6 7 8 9 10

Puzzle of the Week

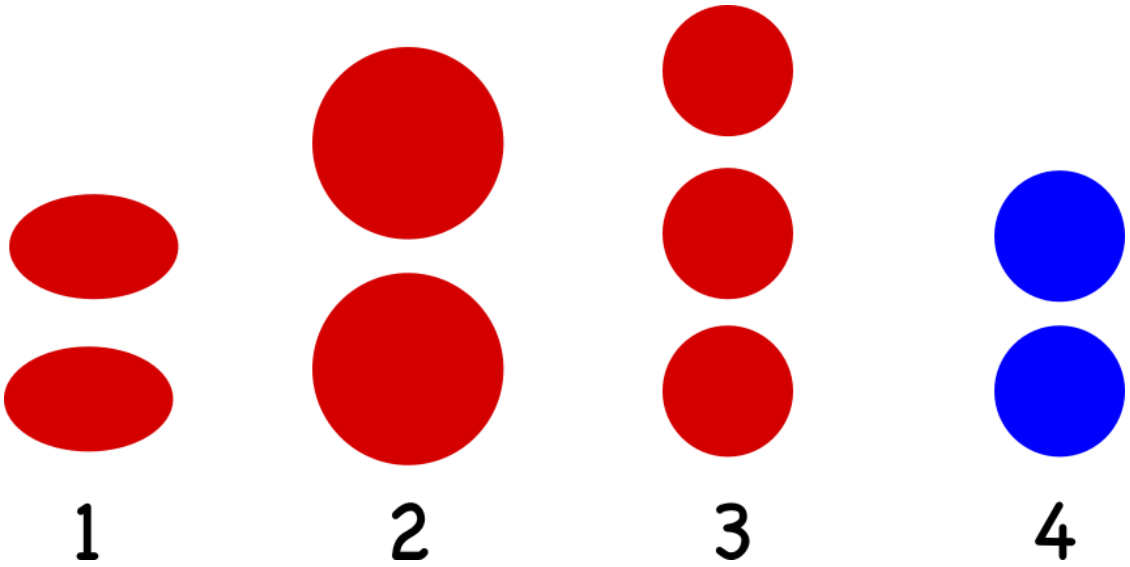
Each of These is Not Like the Others - 1

The objects in this group share some properties, but the objects also differ in some distinctive ways.

1. This is a triangle, the other three are squares.
2. This has a whole in it, the other three are solid.
3. This is a small shape, the other three are larger.
4. This is green, the other three are red.



THE CHALLENGE: For each of these next four groups of objects, describe a property that the remaining three groups have that it does not.



Puzzle of the Week
Fill in the Blanks – 1

Using the numbers from 1 to 5 at most once, this equation has three solutions.

$$\square - \square = \square - \square$$

1 2 3 4 5

The three solutions are:

$$3 - 1 = 4 - 2$$

$$4 - 2 = 5 - 3$$

$$4 - 1 = 5 - 2$$

THE CHALLENGE: Use the numbers from 1 to 8 at most once to fill in these blanks.

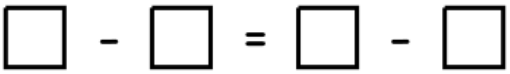
$$\square + \square = \square + \square = \square - \square$$

1 2 3 4 5 6 7 8

EXPLORATION: Explore other number ranges. What happens if you use 1 to 7, 1 to 9, or 1 to 10? How do things change if you use 0 to 7 or 0 to 8?

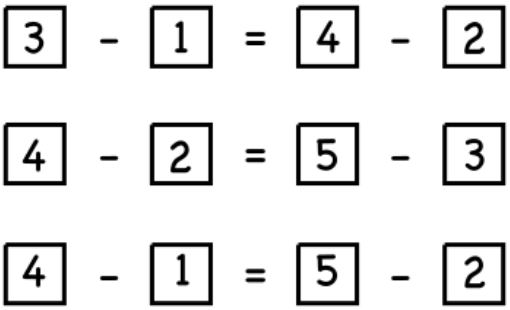
Puzzle of the Week
Fill in the Blanks – 2

Using the numbers from 1 to 5 at most once, this equation has three solutions.

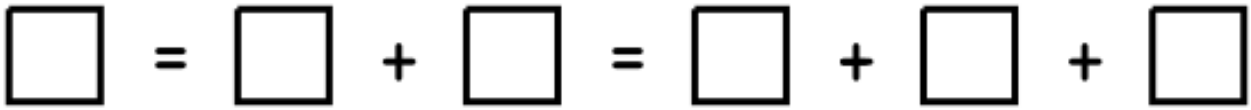


1 2 3 4 5

The three solutions are:



THE CHALLENGE: Use each of the numbers from 1 to 9 at most once to fill in these blanks.

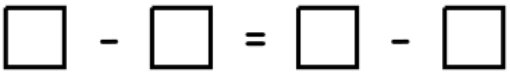


1 2 3 4 5 6 7 8 9

EXPLORATION: Explore other number ranges. What happens if you use 1 to 8 or 1 to 10?

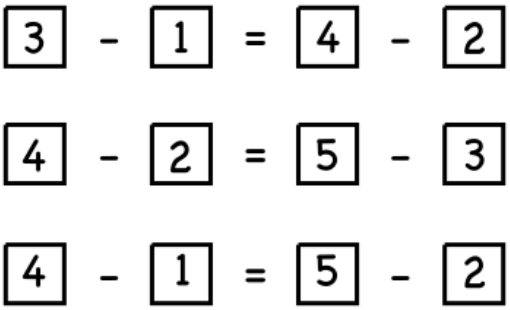
Puzzle of the Week
Fill in the Blanks – 3

Using the numbers from 1 to 5 at most once, this equation has three solutions.



1 2 3 4 5

The three solutions are:



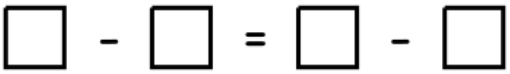
THE CHALLENGE: Use each of the numbers from 1 to 8 at most once to fill in these blanks.

1 2 3 4 5 6 7 8

EXPLORATION: Explore other number ranges. What happens if you use 1 to 9, 0 to 7, or 0 to 8?

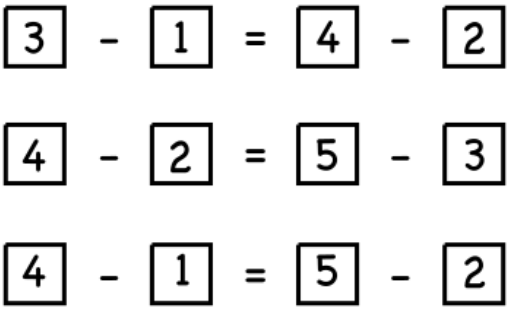
Puzzle of the Week
Fill in the Blanks – 4

Using the numbers from 1 to 5 at most once, this equation has three solutions.

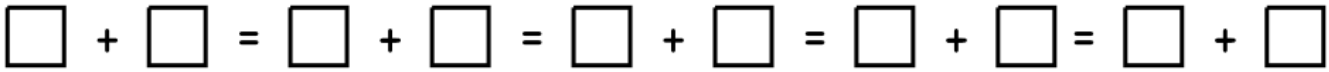


1 2 3 4 5

The three solutions are:



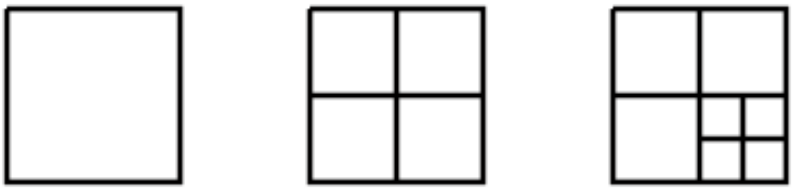
THE CHALLENGE: Use each of the numbers from 0 to 9 at exactly once to fill in these blanks.



0 1 2 3 4 5 6 7 8 9

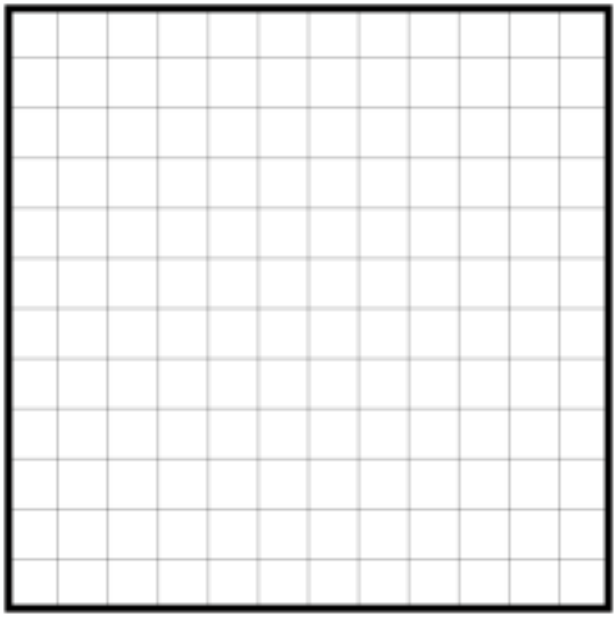
Puzzle of the Week
Filling Squares with Squares

Here is how to fill one large square with 1, 4, or 7 squares.



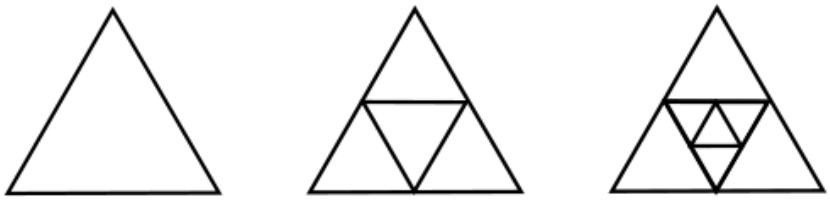
1 4 7

THE CHALLENGE: Find other square counts for filling a large square. Can you do it for 2, 3, 5, 6, 8, 9, or 10 squares?

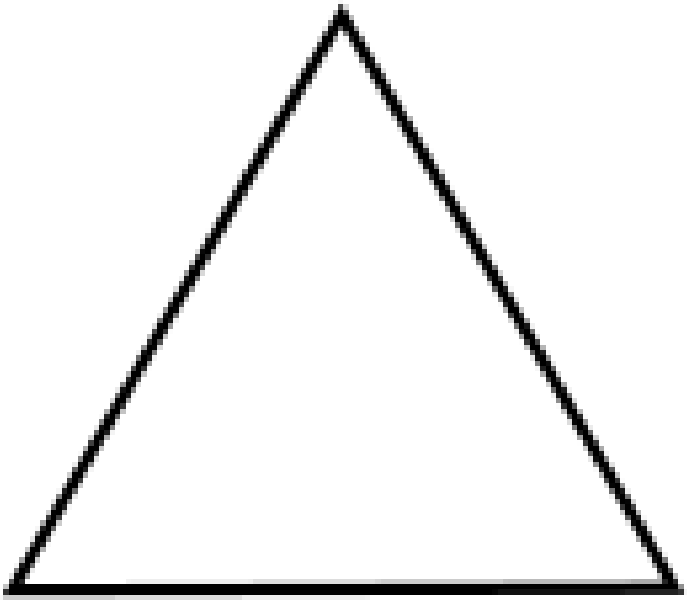


Puzzle of the Week
Filling Triangles with Triangles

Here's how to fill one large triangle with 1, 4, or 7 triangles..



THE CHALLENGE: Find other triangle counts for filling a large triangle. Can you do it for 2, 3, 5, 6, 8, 9, or 10 triangles?



Puzzle of the Week
Letter Substitutions – 1

Rules:

1. A letter represents a digit from 0 to 9, and has the same value throughout a single puzzle.
2. No number can start with the digit 0.
3. Within a puzzle, different letters must have different values.

$$\begin{array}{r} 8 \\ +\ A \\ \hline B\ 2 \end{array} \quad \Rightarrow \quad \begin{array}{r} 8 \\ +\ 4 \\ \hline 1\ 2 \end{array}$$

THE CHALLENGE: Find the value of C, D, E, F and G in these puzzles.

$$\begin{array}{r} C \\ +\ 8 \\ \hline D \end{array} \qquad \begin{array}{r} E \\ +\ E \\ \hline 8 \end{array} \qquad \begin{array}{r} F \\ +\ F \\ \hline G\ 4 \end{array}$$

Puzzle of the Week
Letter Substitutions – 2

Rules:

1. A letter represents a digit from 0 to 9, and has the same value throughout a single puzzle.
2. No number can start with the digit 0.
3. Within a puzzle, different letters must have different values.

$$\begin{array}{r} 8 \\ +\ A \\ \hline B\ 2 \end{array} \quad \Rightarrow \quad \begin{array}{r} 8 \\ +\ 4 \\ \hline 1\ 2 \end{array}$$

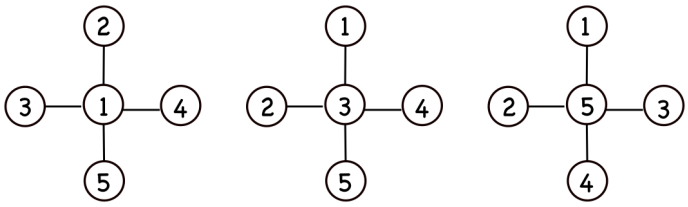
THE CHALLENGE: Find the value of C, D, E, F, G, and H in these puzzles.

$$\begin{array}{r} C \\ +\ 2 \\ \hline D\ E \end{array} \qquad \begin{array}{r} F \\ +\ G \\ \hline F\ H \end{array}$$

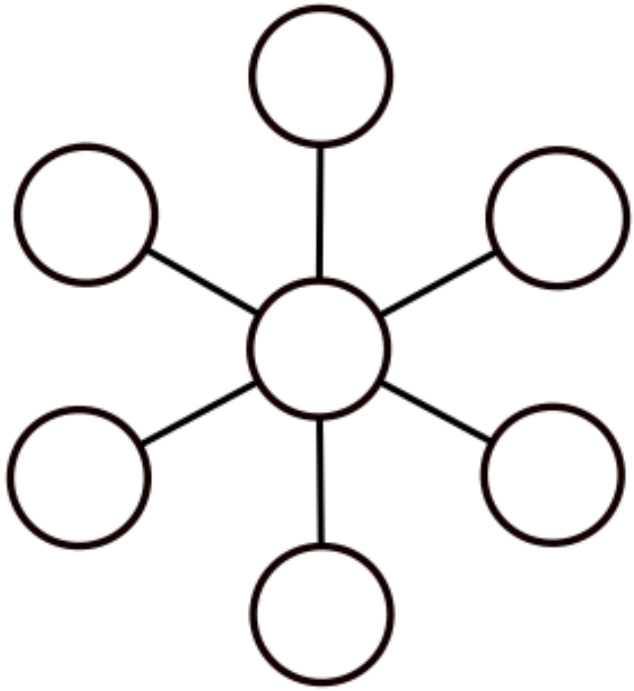
Puzzle of the Week

Magic Flowers - 1

The sums in a *Magic Flower* are the same for all straight lines. These Magic Flowers use numbers from 1 to 5.



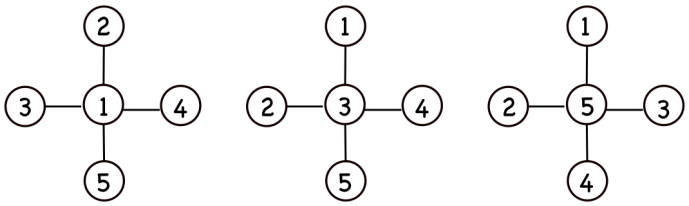
THE CHALLENGE: Use the numbers from 1 to 7 to make Magic Flowers.



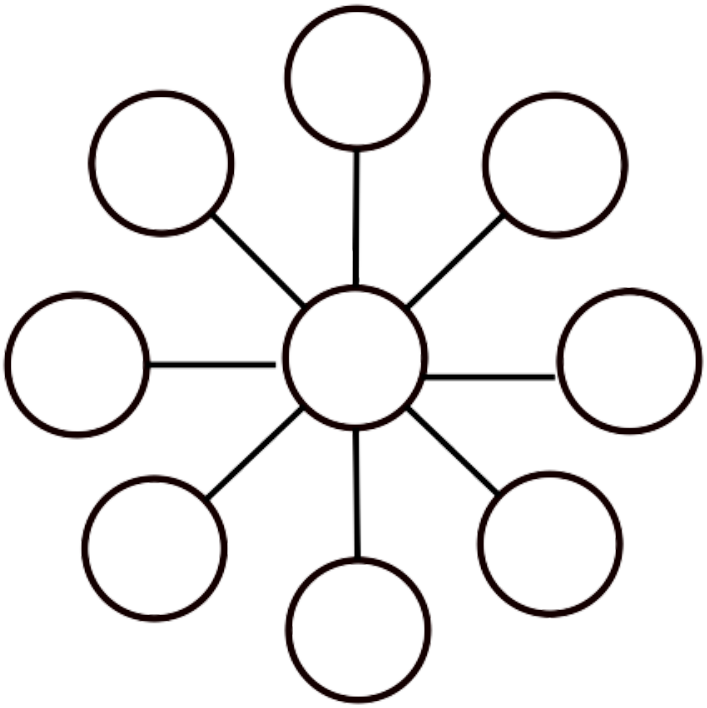
1 2 3 4 5 6 7

Puzzle of the Week
Magic Flowers - 2

The sums in a *Magic Flower* are the same for all straight lines. These Magic Flowers use numbers from 1 to 5.



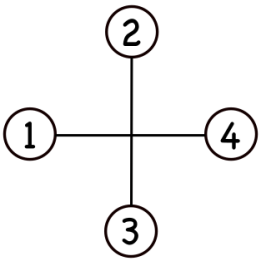
THE CHALLENGE: Use the numbers from 1 to 9 to make Magic Flowers.



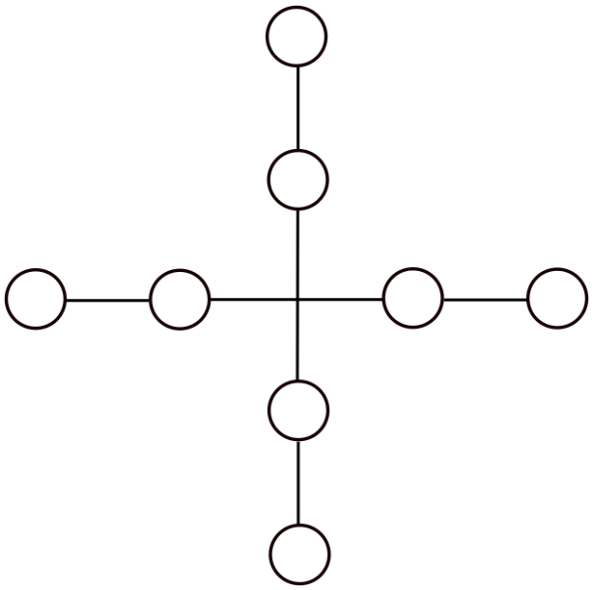
1 2 3 4 5 6 7 8 9

Puzzle of the Week
Magic Pluses

A *Magic Plus* is a plus sign with all the sums the same. This one uses the numbers from 1 to 4.



THE CHALLENGE: Make a Magic Plus with the numbers from 1 to 8.

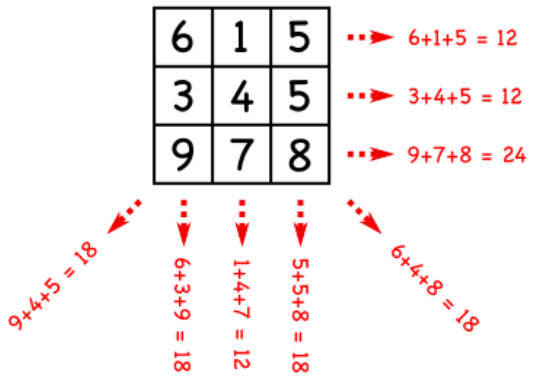


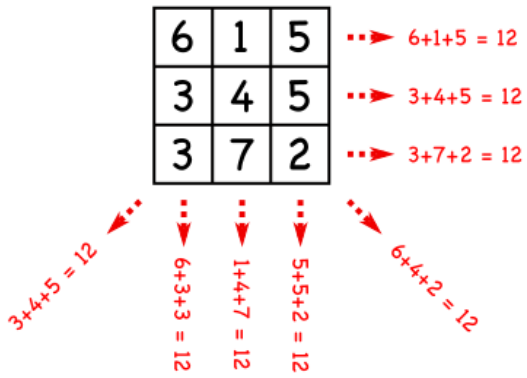
1 2 3 4 5 6 7 8

Puzzle of the Week

Magic Squares – 1

In a *Magic Square*, all the rows, columns and diagonals add up to the same number. This first square is not a Magic Square. The second one is a Magic Square with a constant sum of 12.





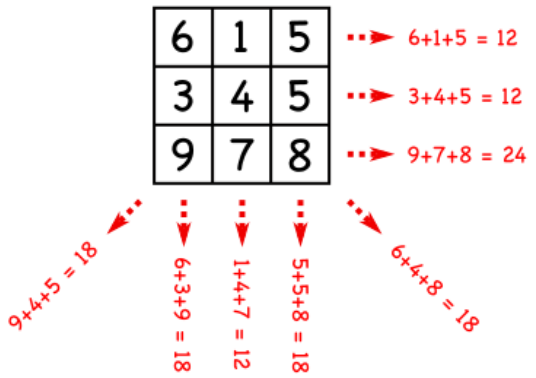
THE CHALLENGE: Use each of the numbers 3, 5, 6, and 9 once to complete this Magic Square.

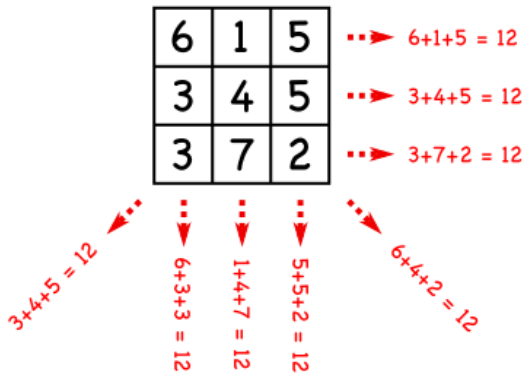
8	1	
		7
4		2

3 5 6 9

Puzzle of the Week
Magic Squares – 2

In a *Magic Square*, all the rows, columns and diagonals add up to the same number. This first square is <u>not</u> a Magic Square. The second one is a Magic Square with a constant sum of 12.





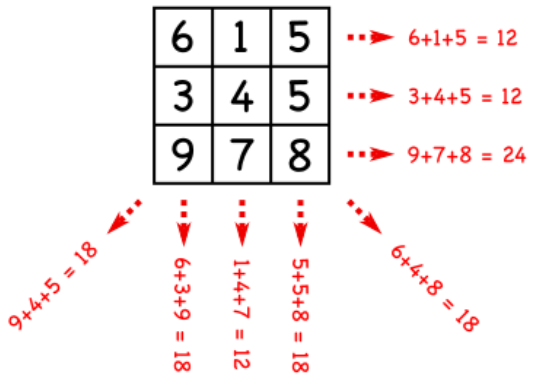
THE CHALLENGE: Use each of the numbers 1, 2, 4, 7, and 8 once to complete this Magic Square.

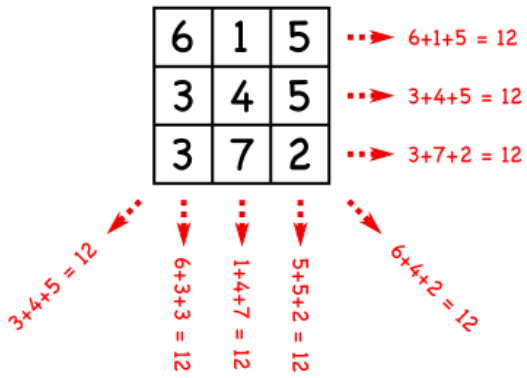
		6
3	5	
	9	

1 2 4 7 8

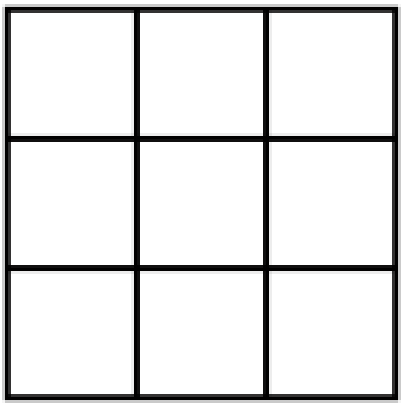
Puzzle of the Week
Magic Squares – 3

In a *Magic Square*, all the rows, columns and diagonals add up to the same number. This first square is <u>not</u> a Magic Square. The second one is a Magic Square with a constant sum of 12.





THE CHALLENGE: Use each of the numbers from 0 to 8 once to complete this Magic Square.

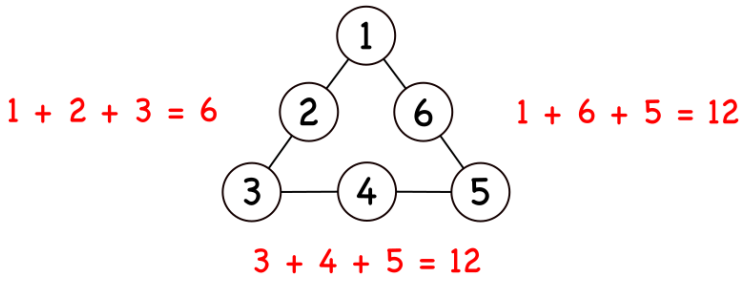


0 1 2 3 4 5 6 7 8

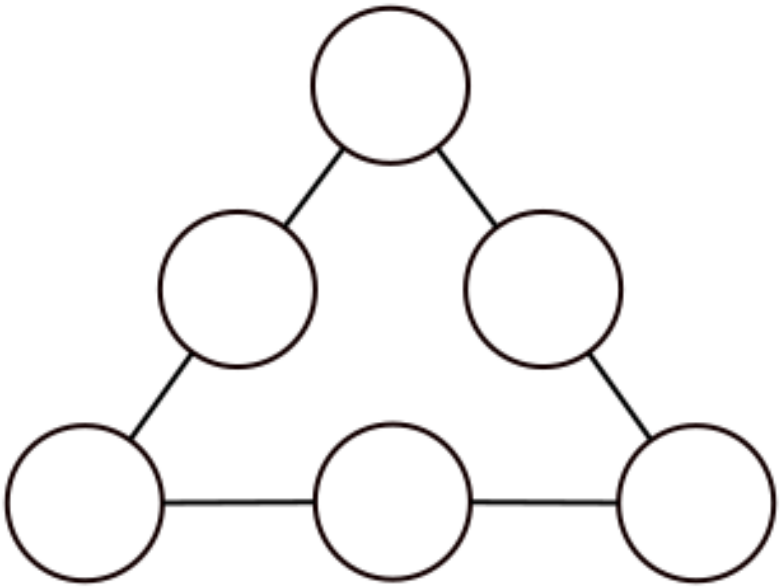
EXPLORATION: Can you find more than one way to do it? What do the different ways have in common?

Puzzle of the Week
Magic Triangles - 1

The sums of the sides of a *Magic Triangle* are all the same. This example is **NOT** a Magic Triangle.



THE CHALLENGE: Use the numbers from 1 to 6 to make a Magic Triangle below.

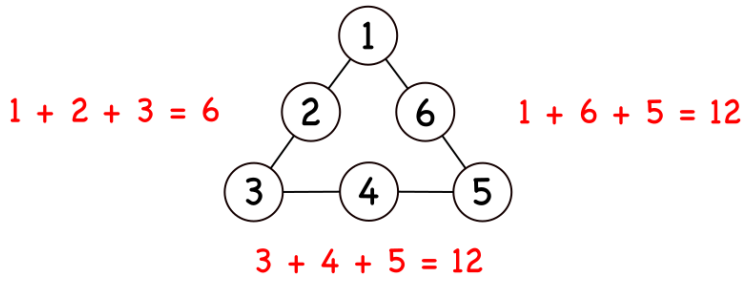


1 2 3 4 5 6

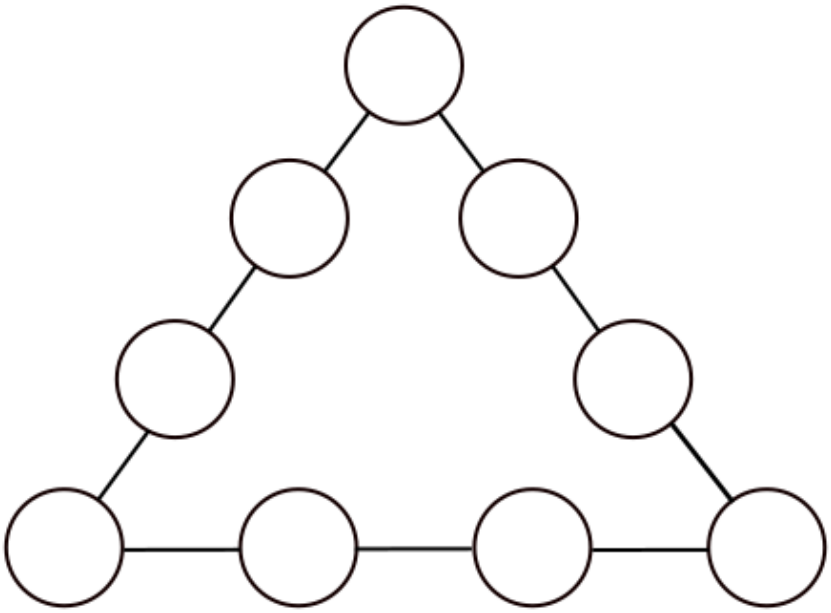
EXPLORATION: What are the different sums that are possible for Magic Triangles that use 1 to 6?

Puzzle of the Week
Magic Triangles - 2

The sums of the sides of a *Magic Triangle* are all the same. This example is **NOT** a Magic Triangle.



THE CHALLENGE: Use the numbers from 1 to 9 to make Magic Triangles.

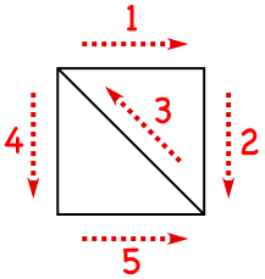


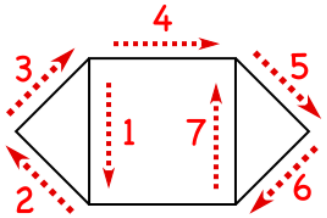
1 2 3 4 5 6 7 8 9 10

EXPLORATION: What are the different sums that are possible for Magic Triangles that use 1 to 10?

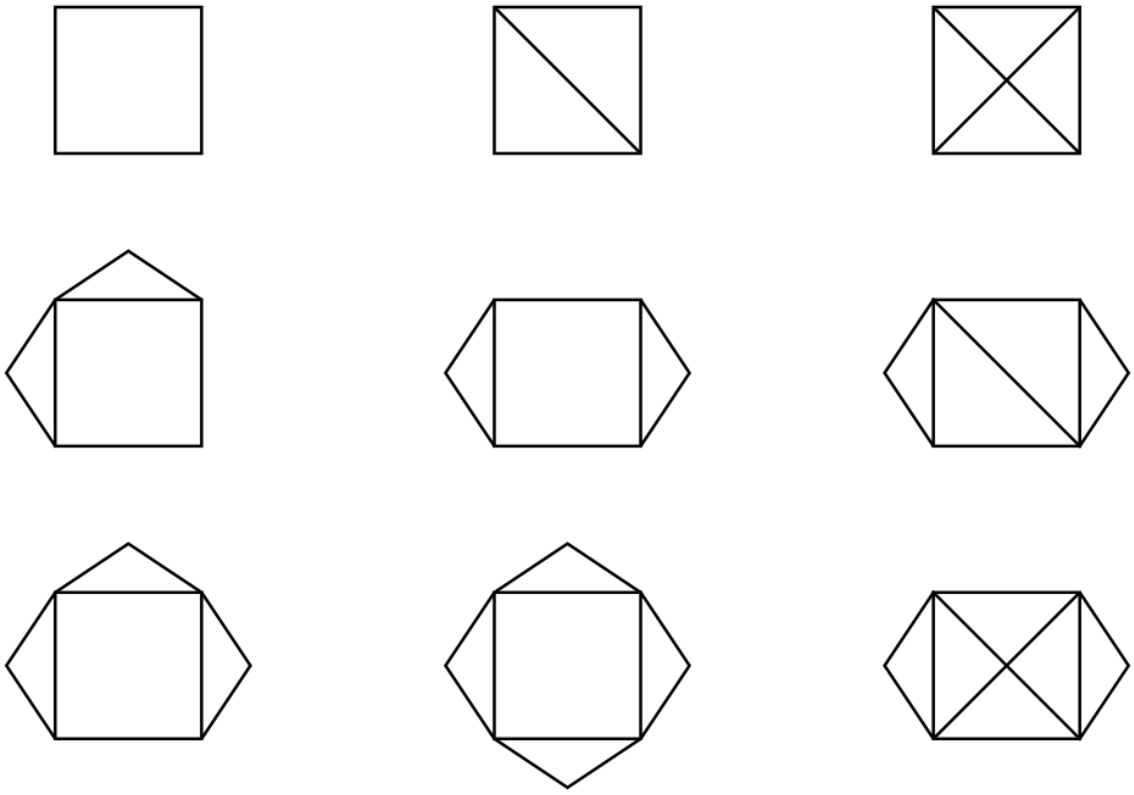
Puzzle of the Week
Parades

Parades wish to visit each street on their route exactly once. In these two examples, the first one is a successful parade route and the second one is not (one street is left out).





THE CHALLENGE: For each street layout, either find a parade route that visits each street exactly once or decide that it is impossible. For street layouts that have a parade, which ones allow parades to start and end at the same place? Can you find a pattern in your results?



Puzzle of the Week
Self-Describing Numbers – 1

The number 1210 is a *Self-Describing Number* because each digit in order describes how many digits of that type there are - there is 1 0, 2 1's, 1 2, and 0 3's. SImilarly, 2020 is a Self-Describing Number because it has 2 0's, 0 1's, 2 2's, and 0 3's.

1	2	1	0
# of 0's	# of 1's	# of 2's	# of 3's

2	0	2	0
# of 0's	# of 1's	# of 2's	# of 3's

THE CHALLENGE: Find a Self-Describing Numbers that has five digits. Find a second one that has seven digits.

Puzzle of the Week
Self-Describing Numbers – 2

The number 1210 is a *Self-Describing Number* because each digit in order describes how many digits of that type there are - there is 1 0, 2 1's, 1 2, and 0 3's. SImilarly, 2020 is a Self-Describing Number because it has 2 0's, 0 1's, 2 2's, and 0 3's.

1	2	1	0
# of 0's	# of 1's	# of 2's	# of 3's

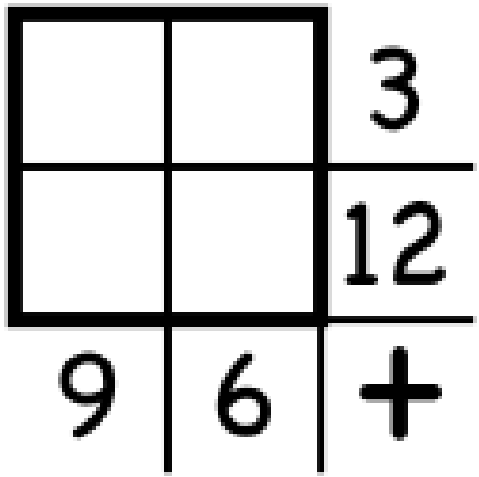
2	0	2	0
# of 0's	# of 1's	# of 2's	# of 3's

THE CHALLENGE: Find a Self-Describing Number that has eight digits. Find a second one that has ten digits.

Puzzle of the Week
Square Sums – 1

The rows and columns add up to the numbers on the outside of this 2 by 2 square.

THE CHALLENGE: Using the numbers from 1 to 7, solve for the missing numbers in this square.



1 2 3 4 5 6 7

EXPLORATION: Make a Square Sum challenge for someone else.

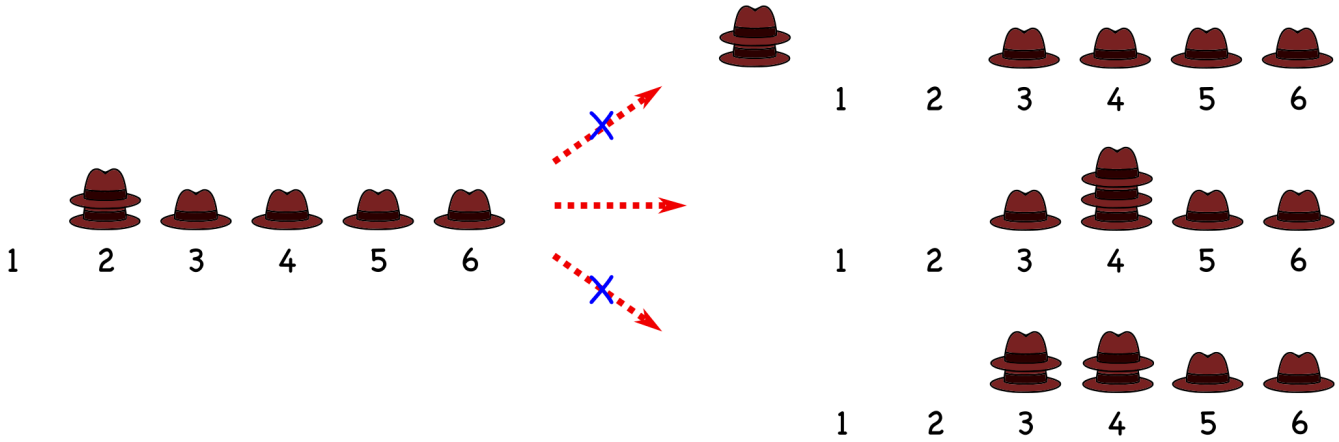
Puzzle of the Week
Stacking Hats – 1

Rules for stacking:

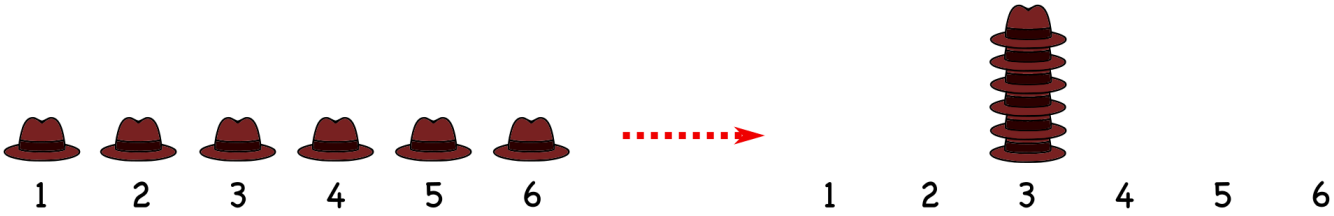
1) When you move a stack, you must move the whole stack.

2) A stack moves over the number of places for how many hats there are.

3) You can only use the original six spots.



THE CHALLENGE: Use these rules to move the six hats into one stack. Can the final stack of six hats end up in any of the six positions, or do only some of the positions work?



EXPLORATION: What happens if you start with seven hats in seven places? What about other numbers?

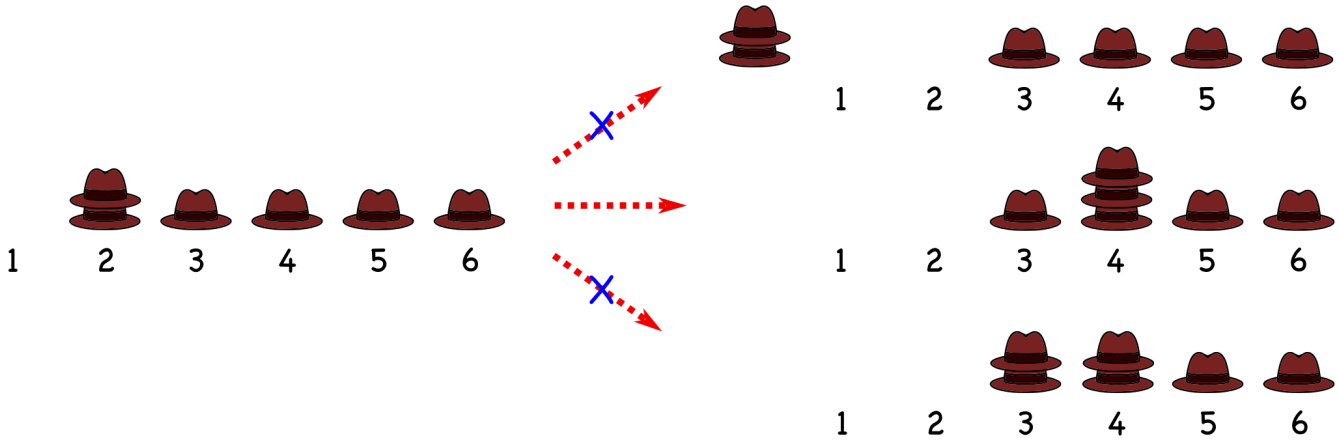
Puzzle of the Week
Stacking Hats – 2

Rules for stacking:

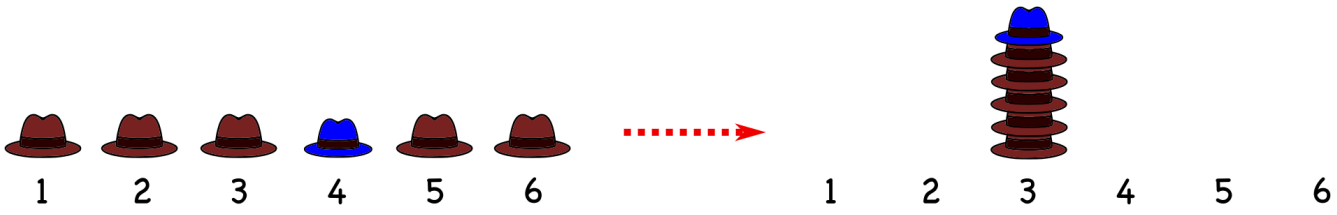
1) When you move a stack, you must move the whole stack.

2) A stack moves over the number of places for how many hats there are.

3) You can only use the original six spots.



THE CHALLENGE: Use these rules to move the six hats into one stack. The small blue hat needs to end up on top of the stack. Can the final stack of six hats end up in any of the six positions, or do only some of the positions work? Can the blue hat start in any position, or do only some of the starting positions work?

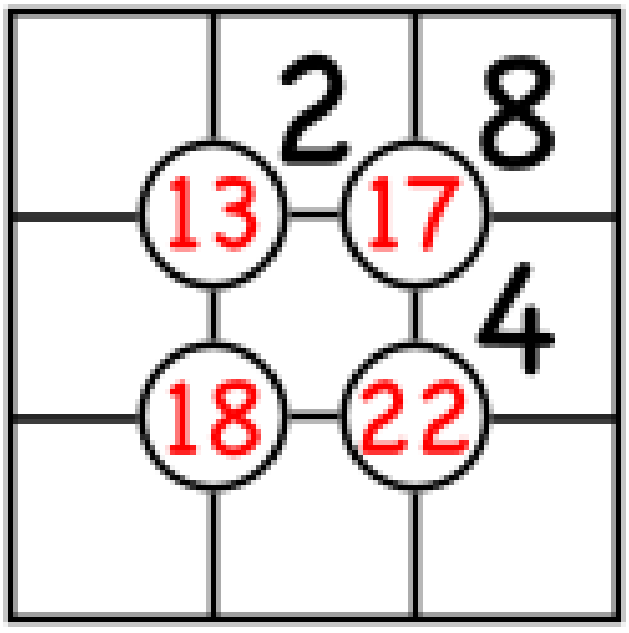


EXPLORATION: What happens if you start with seven hats in seven places? What about other numbers?

Puzzle of the Week
Sujiko Puzzle – 1

In a Sujiko puzzle, use each of the numbers from 1 to 9 once in the nine squares. The number in each circle must be the sum of the four squares that surround it.

THE CHALLENGE: Fill in this Sujiko puzzle.

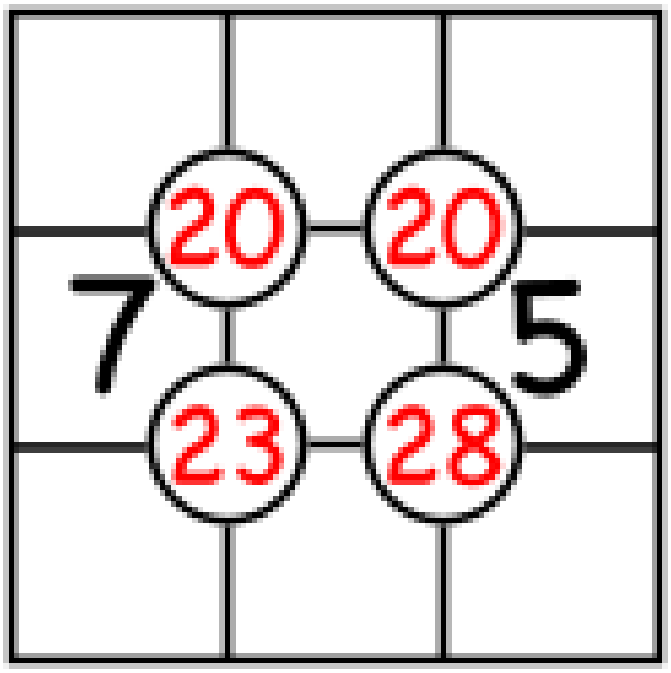


1 3 5 6 7 9

Puzzle of the Week
Sujiko Puzzle – 2

In a Sujiko puzzle, use each of the numbers from 1 to 9 once in the nine squares. The number in each circle must be the sum of the four squares that surround it.

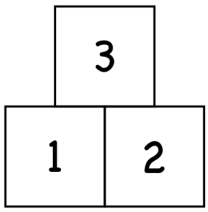
THE CHALLENGE: Fill in this Sujiko puzzle.

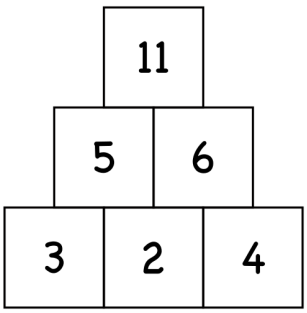


1 2 3 4 6 8 9

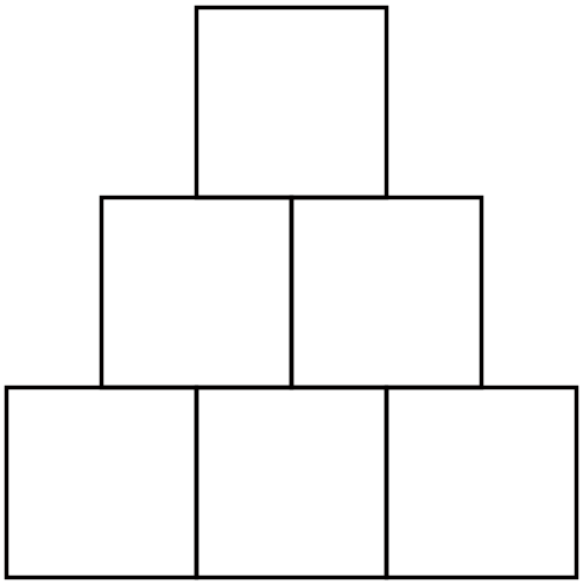
Puzzle of the Week
Sum Pyramids – 1

These pyramids are called *Sum Pyramids*. The number above each pair of connected numbers is their sum.





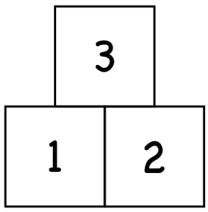
THE CHALLENGE: Place some of the numbers from 1 to 10, not repeating any number, to make a Sum Pyramid with the smallest possible number on top. Can you do better than 11?

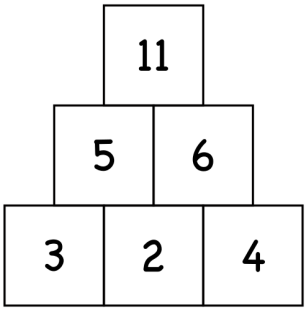


1 2 3 4 5 6 7 8 9 10

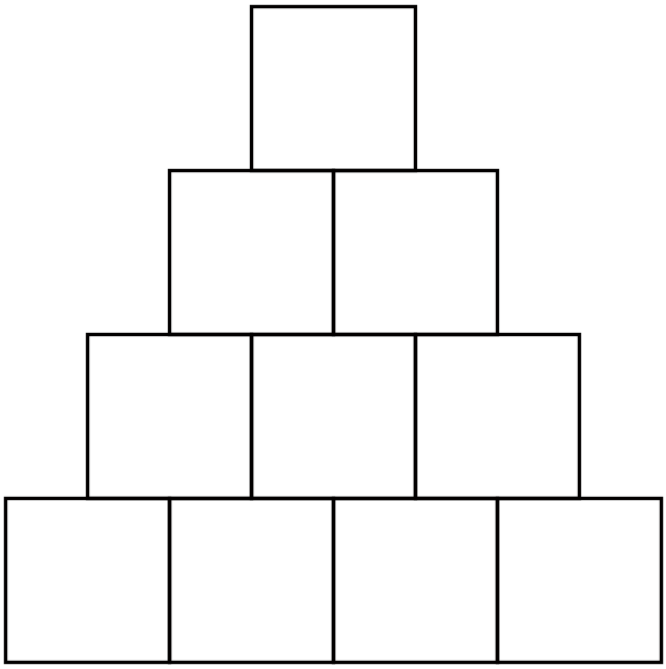
Puzzle of the Week
Sum Pyramids – 2

These pyramids are called *Sum Pyramids*. The number above each pair of connected numbers is their sum.





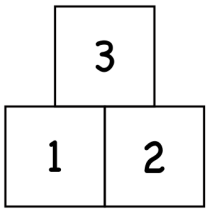
THE CHALLENGE: Place some of the numbers from 1 to 25, not repeating any number, to make a Sum Pyramid with the smallest possible number on top. Can you do better than 25?

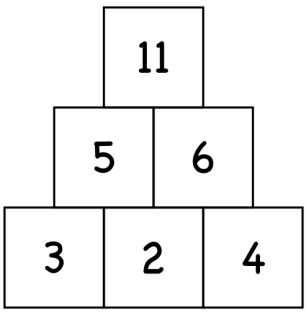


Puzzle of the Week

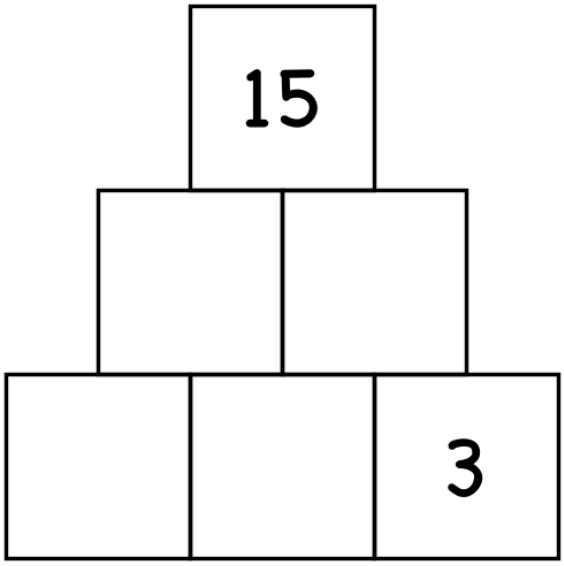
Sum Pyramids – 3

These pyramids are called *Sum Pyramids*. The number above each pair of connected numbers is their sum.





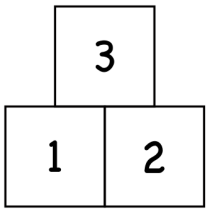
THE CHALLENGE: Place some of the numbers from 1 to 15, not repeating any number, to complete this Sum Pyramid. Can you find more than one solution?

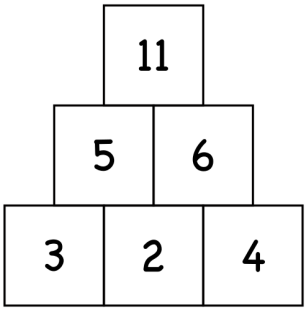


Puzzle of the Week

Sum Pyramids – 4

These pyramids are called *Sum Pyramids*. The number above each pair of connected numbers is their sum.





THE CHALLENGE: Place some of the numbers from 1 to 24, not repeating any number, to complete this Sum Pyramid. Can you find more than one solution?