THE FOUR 4'S

Task Instructions:

Can you find every number between 1 and 20 using only four 4's and any operation?

$$\sqrt{4} + \sqrt{4} + \frac{4}{4} = 5$$

Write all the numbers from 1 to 20 on the board. The more solutions you get for each number the better.

Credit: YouCubed.org

THE FOUR 4'S VARIATION

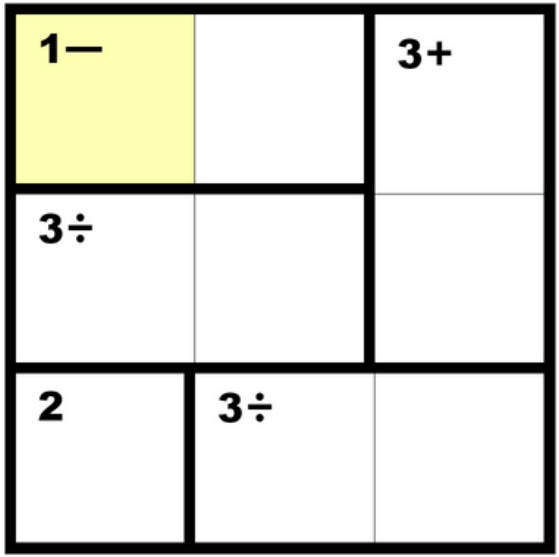
Option:

Assign 1–5, 6–10, 11–15, 16–20 etc. to a group.

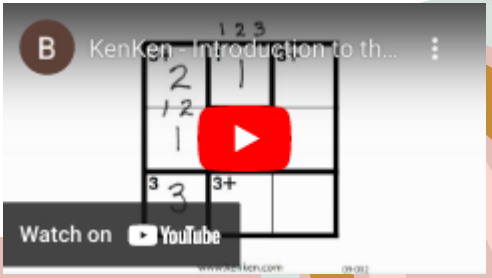
Have multiple groups working on each set and have them discuss the differences / similarities in their solutions.

KENKEN PUZZLES

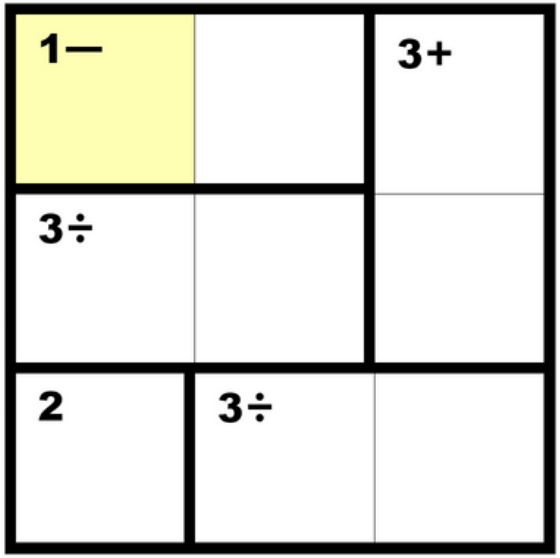
Task Instructions: Your goal is to fill in the grid with the numbers 1 – 3 so that no number is repeated in any row or column. The heavily outline areas contain a target number and math operation that you must use.



Video Instructions



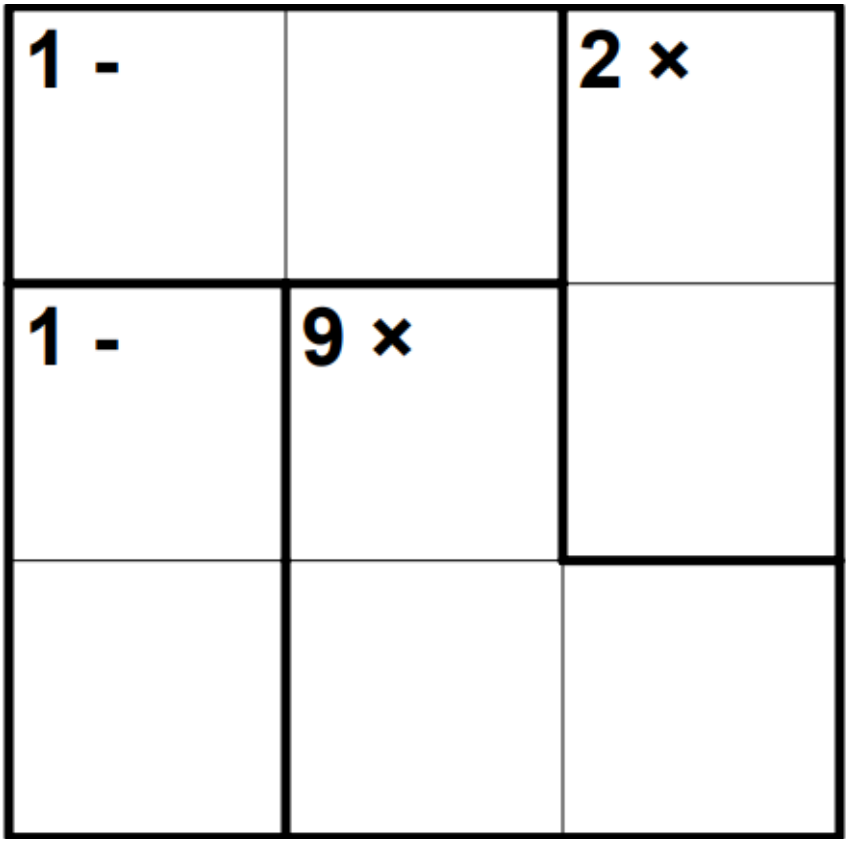
KENKEN PUZZLES



In the heavily outlined group in yellow, you must find two numbers that using subtraction, make 1.

Remember that each column and row needs the numbers 1–3.

KENKEN PUZZLES



KENKEN PUZZLES

Your goal is to fill in the grid with the numbers 1 - 4 so that no number is repeated in any row or column. The heavily outline areas contain a target number and math operation that you must use.

8 +	2 -		2 /
	2 /		
	24 ×	2 -	3 ×

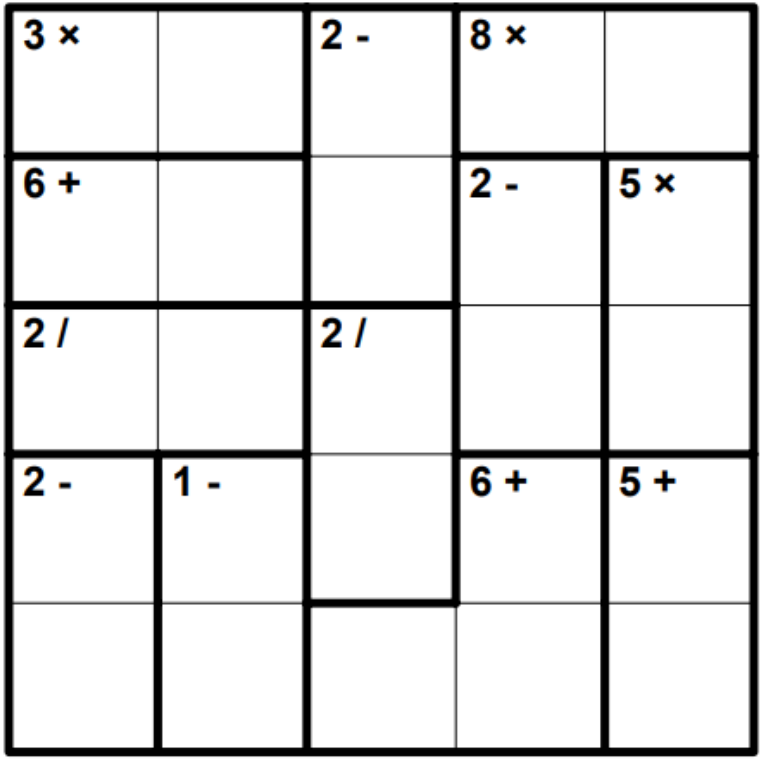
1 -		4 ×	
8 ×		6 +	1 -
	9 +		

KENKEN PUZZLES

Your goal is to fill in the grid with the numbers 1 – 5 so that no number is repeated in any row or column. The heavily outline areas contain a target number and math operation that you must use.

5 +	9 +			3 -
	36 ×	10 ×	6 +	
				3 -
3 -		12 ×		
5 ×			1 -	

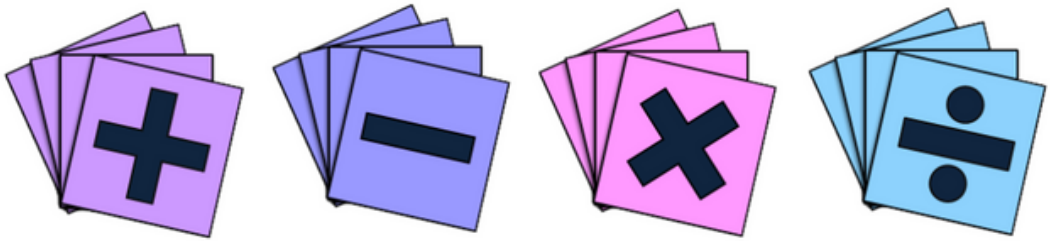
KENKEN PUZZLES



Your goal is to fill in the grid with the numbers 1 - 5 so that no number is repeated in any row or column. The heavily outline areas contain a target number and math operation that you must use.

MAKE 100

Task: Given the digits 1-9, make 100 using standard operators. Use each number only once.



Variation: use all of the numbers 1-9
Variation: use what you need (minimum 3)

Credit: Ian Stewart

FIFTEEN

Task: Using the numbers

1 2 3 4 5 6 7 8 9

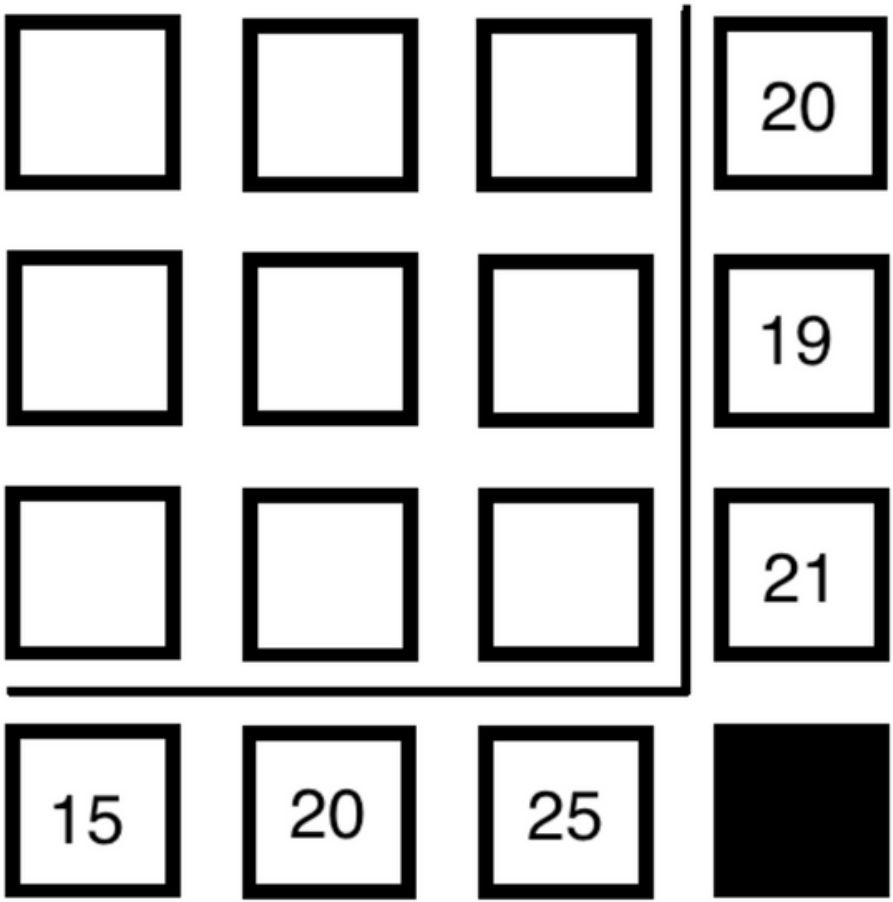
Alternate between partners to pick one number at a time. Once a number is picked, it is gone. The goal is to have 3 numbers that add to 15.

Credit: Peter Liljedahl and John Mason

YOHAKU

Yohaku is a puzzle game played on a square array grid. The game revolves around a single operation (usually addition or multiplication). This operation dictates the relationship between the numbers placed in the cells. The puzzle is solved when all conditions are satisfied simultaneously.

In an addition Yohaku, students must add the numbers in the cells so that the sum of each row and column matches the required numbers on the outside of the grid. In a multiplication Yohaku, students must place numbers in the cells so that their product matches the designated row and column target. Repeating numbers is allowed unless the special condition says otherwise.

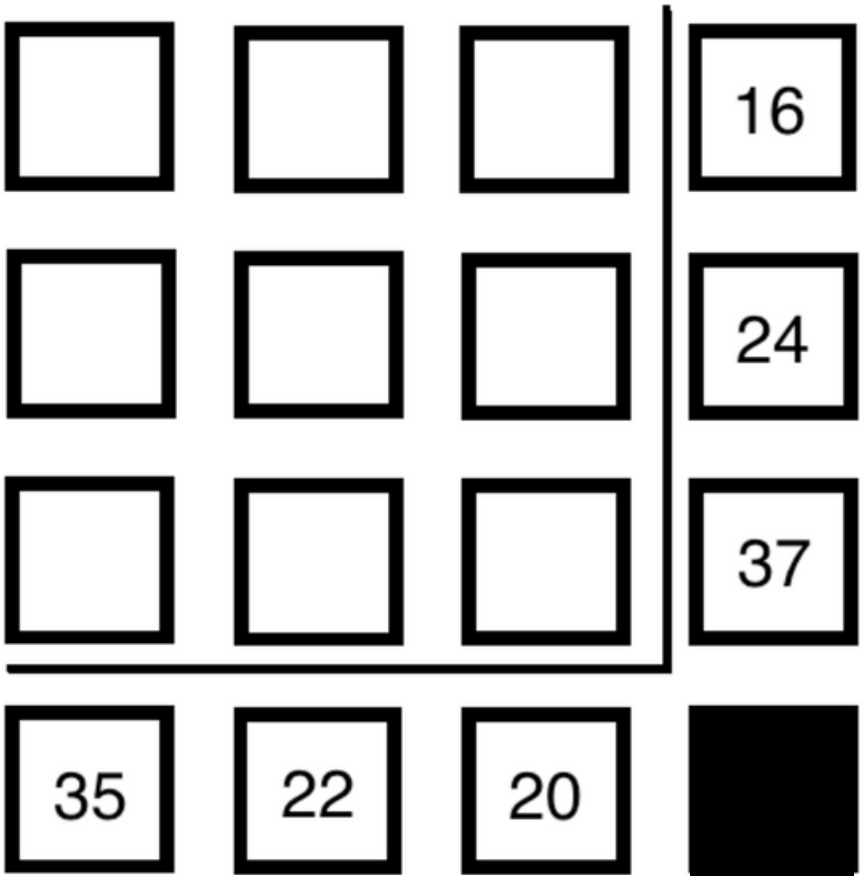


ADDITION YOHAKU

Rule:

You must get the outside numbers using multiplication.

You may use any numbers.

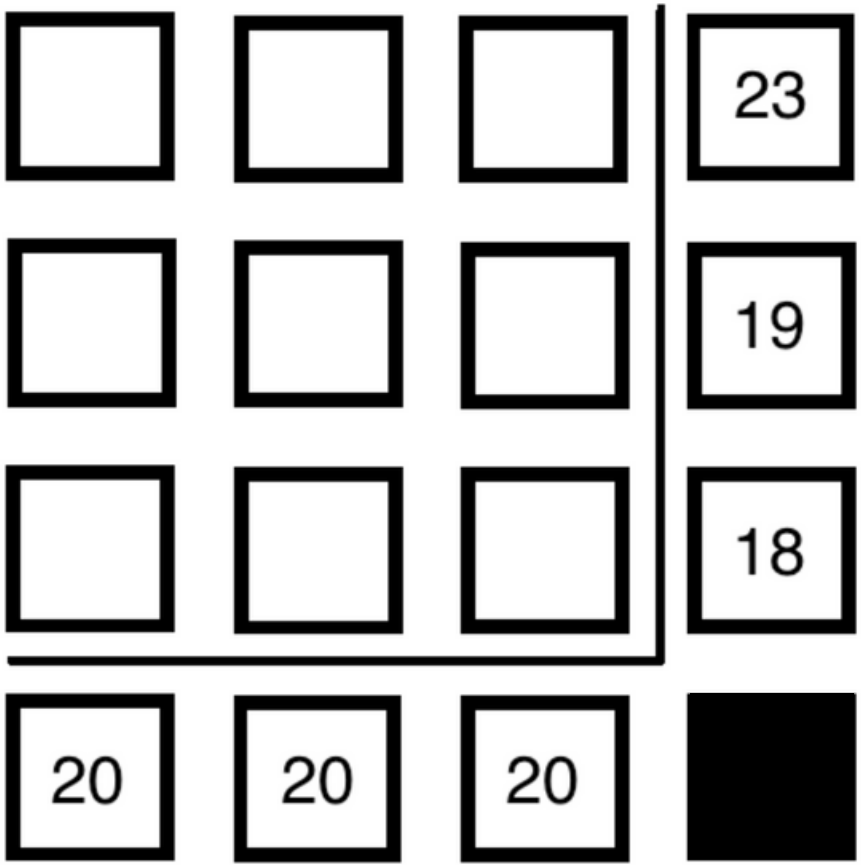


ADDITION YOHAKU

Rule:

You must get the outside numbers using addition.

No repeated numbers allowed.
You may use any numbers.



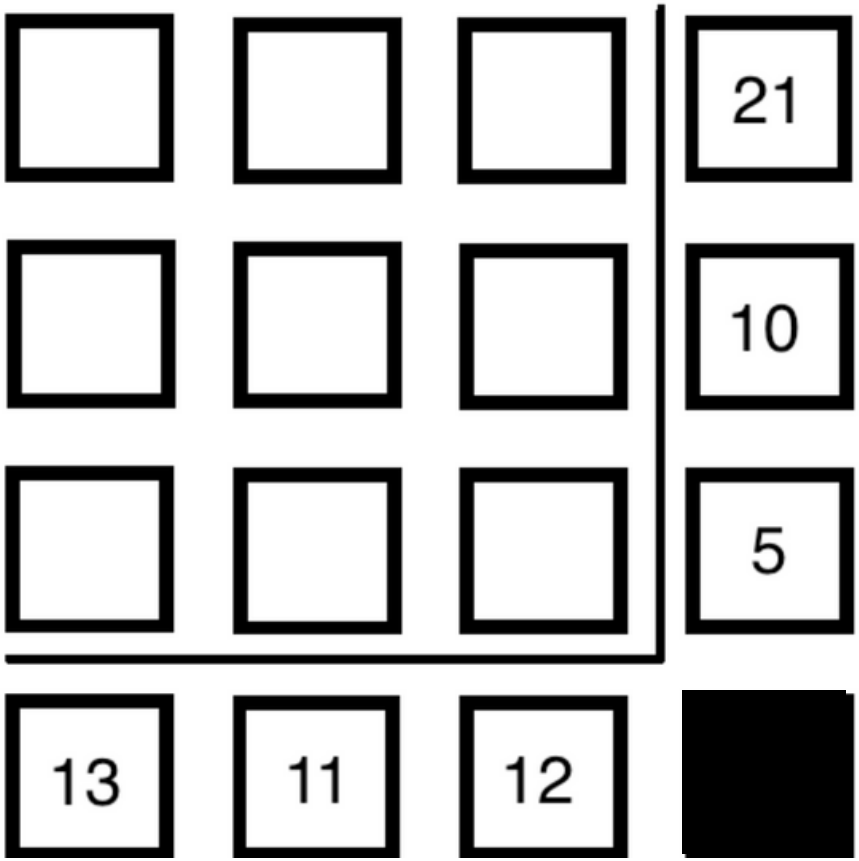
ADDITION YOHAKU

Rule:

You must get the outside numbers using addition.

Do not use a 10.

You may use any numbers.



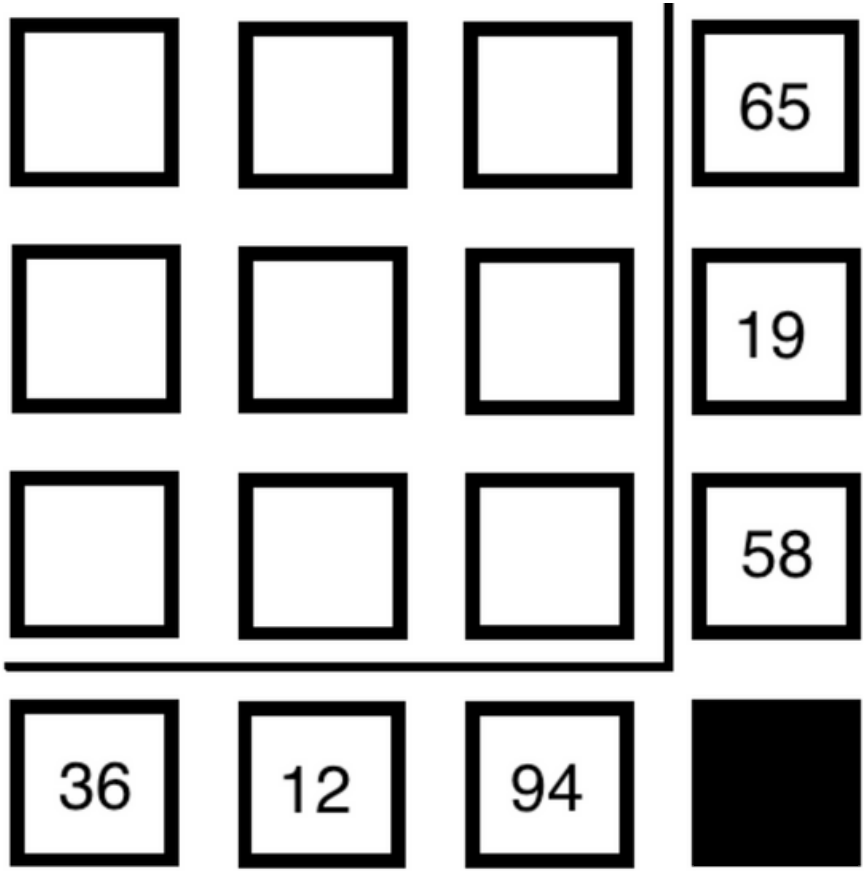
ADDITION YOHAKU

Rule:

You must get the outside numbers using addition.

Use 9 consecutive numbers in the boxes.

You may use any numbers.



ADDITION YOHAKU

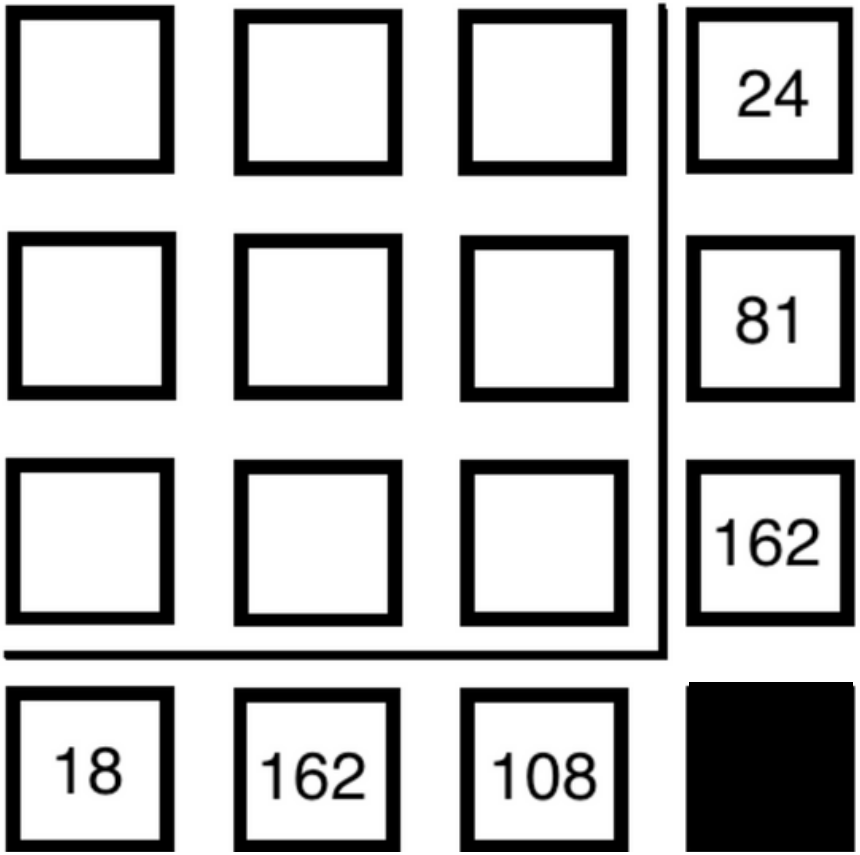
Rule:

You must get the outside numbers using addition.

Use Fibonacci numbers.

You may use any numbers.

MULTIPLICATION YOHAKU



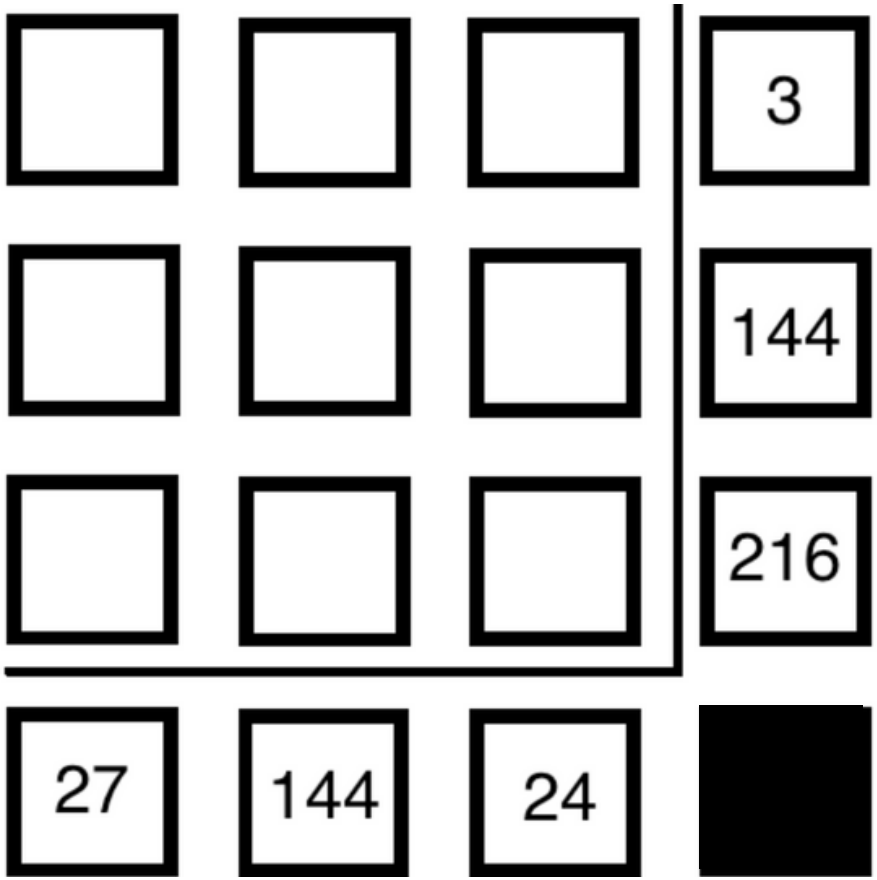
Rule:

You must get the outside numbers using multiplication.

Variation:

Use factors of 18.

Use positive and negative numbers.



MULTIPLICATION YOHAKU

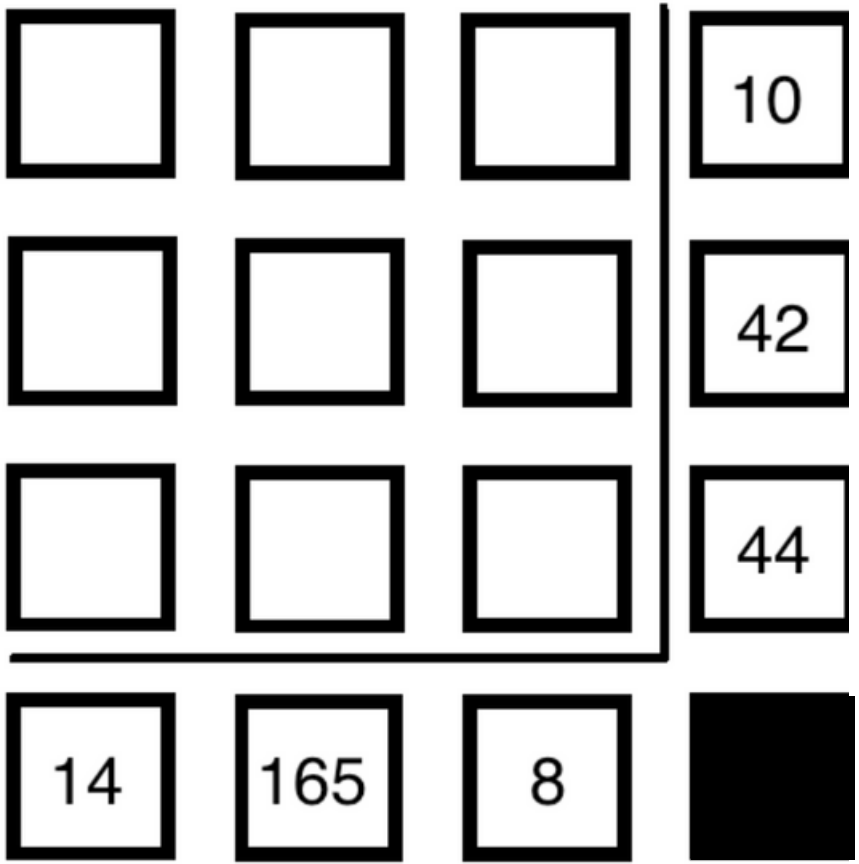
Rule:

You must get the outside numbers using multiplication.

Variation:

Use factors of 12.

Use positive and negative numbers.



MULTIPLICATION YOHAKU

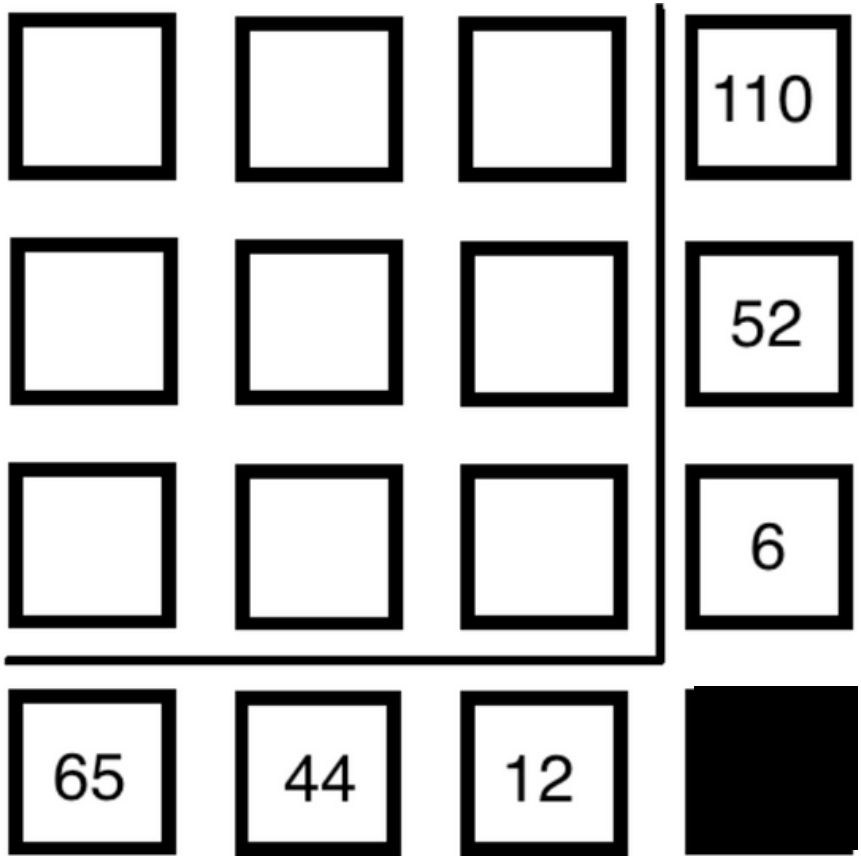
Rule:

You must get the outside numbers using multiplication.

Variation:

Sum of 9 boxes is 36.

Use positive and negative numbers.



MULTIPLICATION YOHAKU

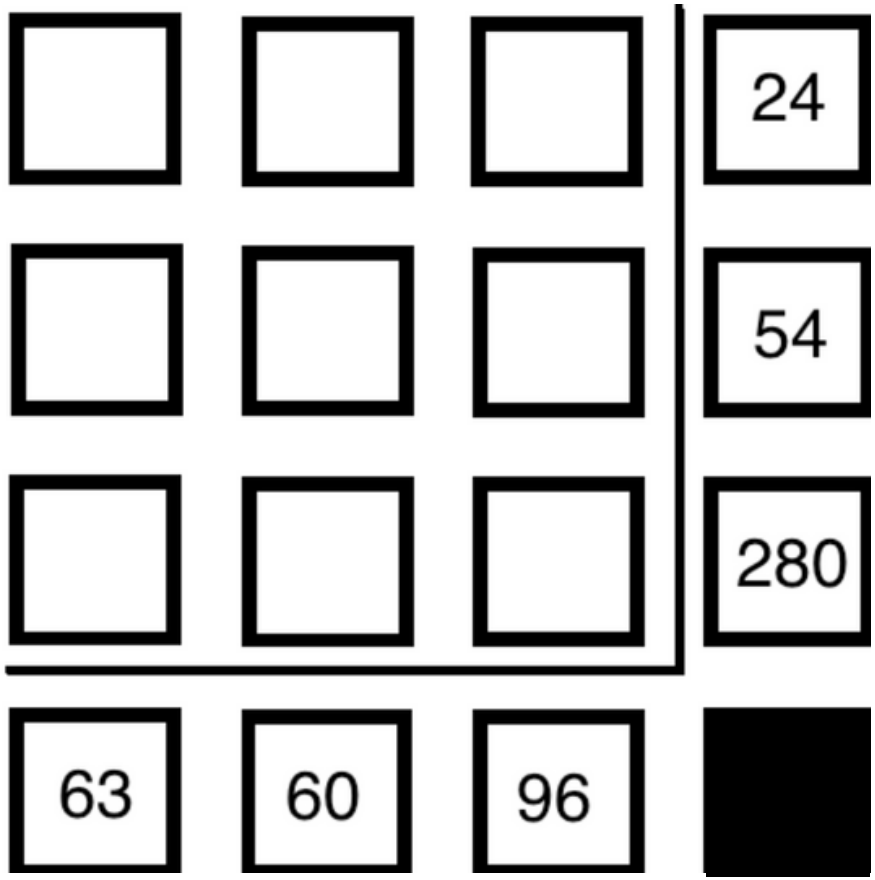
Rule:

You must get the outside numbers using multiplication.

Variation:

Sum of 9 boxes is 41.

Use positive and negative numbers.



MULTIPLICATION YOHAKU

Rule:

You must get the outside numbers using multiplication.

Variation:

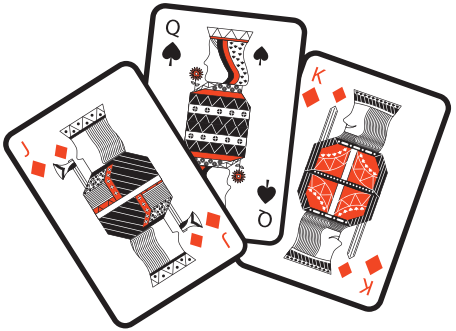
Use 9 consecutive numbers in the boxes.

Use positive and negative numbers.

31-DERFUL

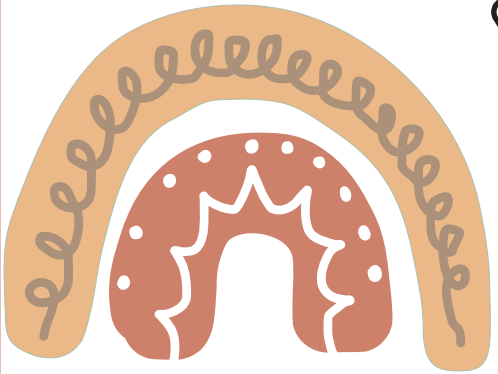
Goal: you need to create a 5 x 5 grid (25 cards) in which the rows and columns of cards all have a sum of 31

To Win: Each row and column needs to add up to exactly 31.



= 10

= 11



Credit: Sarah Rubin

FRAME THE CARDS

Problem: Arrange the cards from the ace to the ten into a picture frame so that each the top, bottom, and sides add to the same total of spots (hearts/diamonds...) Right now the top row adds to 23, the bottom adds to 12, the left side is 22 and the right side is 22. These four numbers should be the same. Apparently there are 10 solutions to this problem.

Credit: Ian Stewart

30 SCRATCH

Problem: Roll a die to choose 4 digits from 2–9 e.g. 3 5 7 9 Use these digits in combination with any operation to make the numbers 1–30.

There are three basic "not allowed rules":

- Digits cannot be used twice. So 3 x 5 =15 and then minus 3 would not be acceptable for 12.
- Digits cannot be put together to make two-digit numbers, so 3 and 5 cannot be used to write 35
- Only basic operations are allowed (no square roots, exponents, etc.)....brackets are allowed. Extension: What if we did allow other operations?

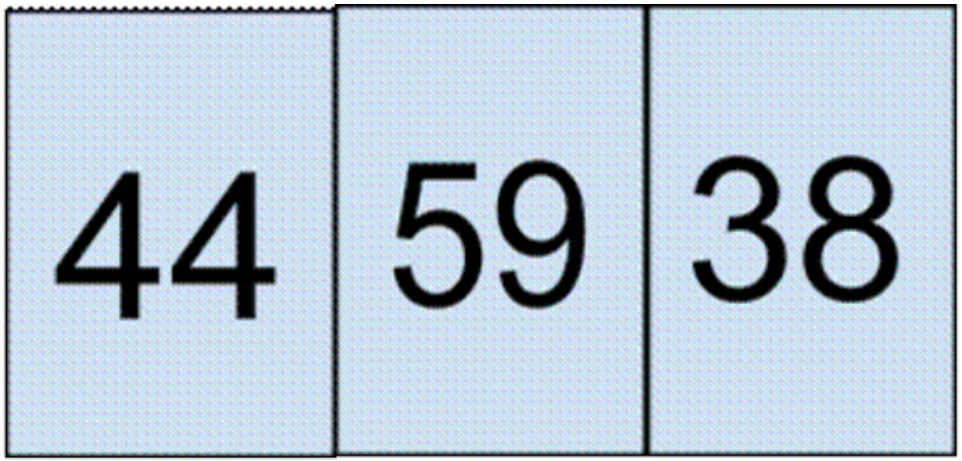
Variation: What if we did allow other operations?

Credit: John Grant McLoughlin

SAME SUM

Problem: You have three cards in front of you. On the back of each of the cards is a different prime number. The sum of the number on the front and the number on the back is the same for each card.

–What are the prime numbers on the back of the cards?



Credit: Rina Zazkis

CHARACTERISTICS OF NUMBERS MENU TASK:

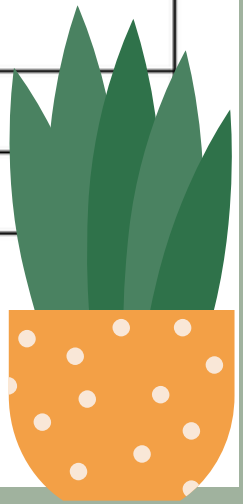
Build as few numbers as possible to satisfy each constraint at least once.

A.	Is even	B.	Is a multiple of 3
C.	Is a perfect cube	D.	Is prime
E.	Is a factor of 72	F.	Is a perfect square
G.	Has exactly 4 factors	H.	Is odd
I.	Is composite	J.	Has both 4 and 6 as factors

Which constraints pair nicely?

Which constraints cannot be paired?

Is it possible to solve in 2, 3, or 4 numbers?



Credit: Chris Hunter

CHARACTERISTICS OF NUMBERS MENU TASK 2:

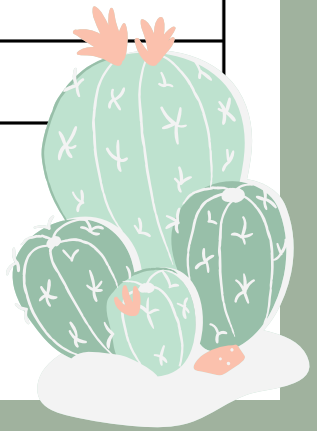
Build as few numbers as possible to satisfy each constraint at least once.

A.	Is double-digit	B.	Is greater than 10
C.	Is less than 50	D.	Is even
E.	Is 30 when rounded to the nearest 10	F.	Is prime
G.	Is a multiple of 5	J.	Has a 3 in the 10s place

Which constraints pair nicely?

Which constraints cannot be paired?

Is it possible to solve in 2, 3, or 4 numbers?



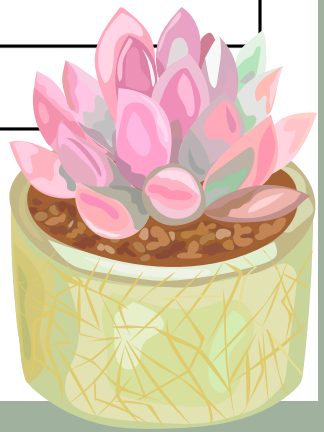
Credit: Chad Williams

CHARACTERISTICS OF NUMBERS

MENU TASK 3:

Build as few numbers as possible to satisfy each constraint at least once.

A.	Is double-digit	B.	Is even
C.	Is between 30 & 70	D.	Is divisible by 3
E.	Has an odd digit in the tens place	F.	Is a multiple of 10
G.	Is 50 when rounded to nearest ten	H.	Is composite



Which constraints pair nicely?

Which constraints cannot be paired?

Is it possible to solve in 2, 3, or 4 numbers?

Credit: Chad Williams

NUMBERS AND OPERATIONS MENU TASK:

Build as few groups of numbers as possible to satisfy each constraint at least once. Each group must have at least 4 numbers in it.

A.	The product of all the numbers in the group is an odd number	B.	The product of all the numbers in the group is greater than 50
C.	The sum of all the numbers in the group is an even number	D.	The group contains at least one negative number
E.	The group of numbers contains exactly five numbers	F.	The group has no repeat numbers

Which constraints pair nicely?

Which constraints cannot be paired?

Is it possible to solve in 2, 3, or 4 numbers?

Credit: Chad Williams

ORDER OF OPERATIONS MENU TASK:

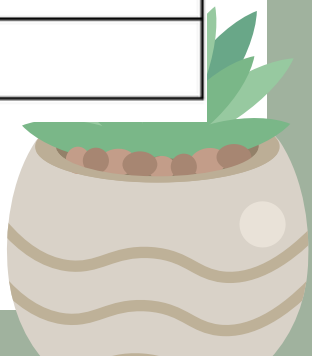
Build as few expressions as possible to satisfy each constraint at least once. Use whichever numbers you wish and the operations along with addition, subtraction, multiplication, division, and/or exponentiation.

A.	Contains only the numbers 2, 3, 4 & 5	B.	Contains only the operators +, - and x
C.	Uses division but still evaluates to an integer	D.	Contains an exponent and two different operators
E.	Evaluates to 54	F.	Has two sets of necessary brackets
G.	Only uses double digit numbers	H.	Evaluates to -4

Which constraints pair nicely?

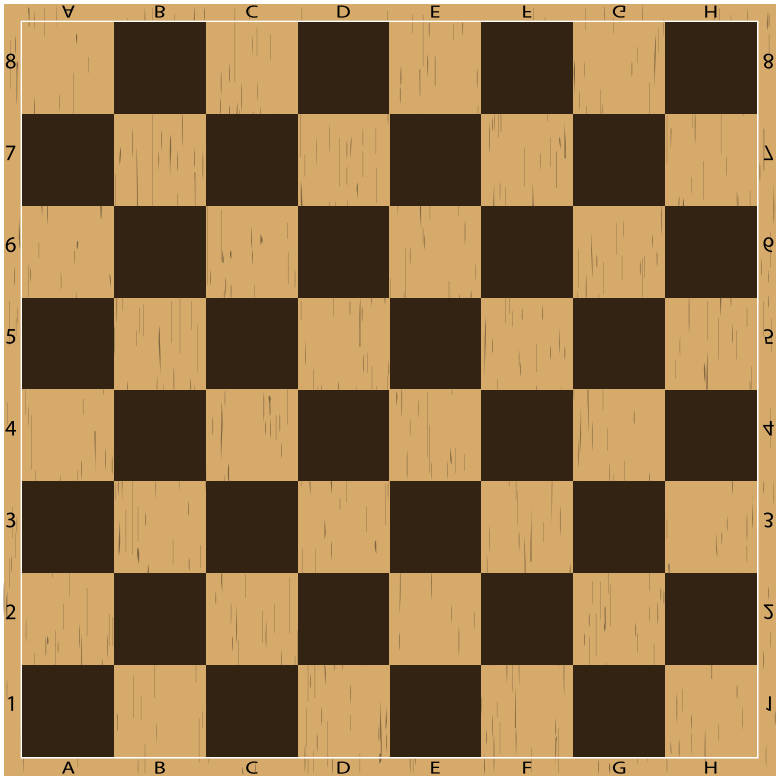
Which constraints cannot be paired?

Is it possible to solve in 2, 3, or 4 numbers?

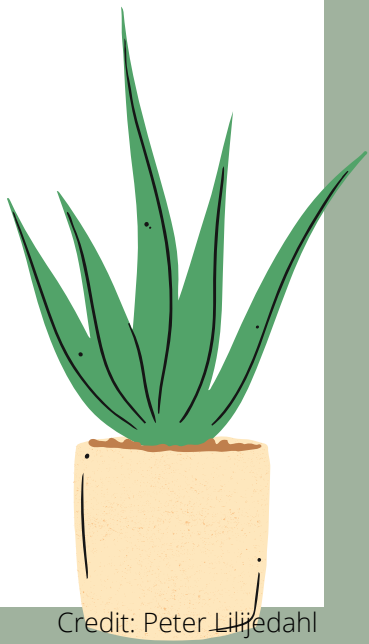


Credit: Chad Williams

CHESSBOARD



How many squares on a chessboard? How many rectangles?



Credit: Peter Liljedahl

SUM OF 51

How many 6 digit numbers are there whose digits sum to 51?

Credit: Peter Lilijedahl

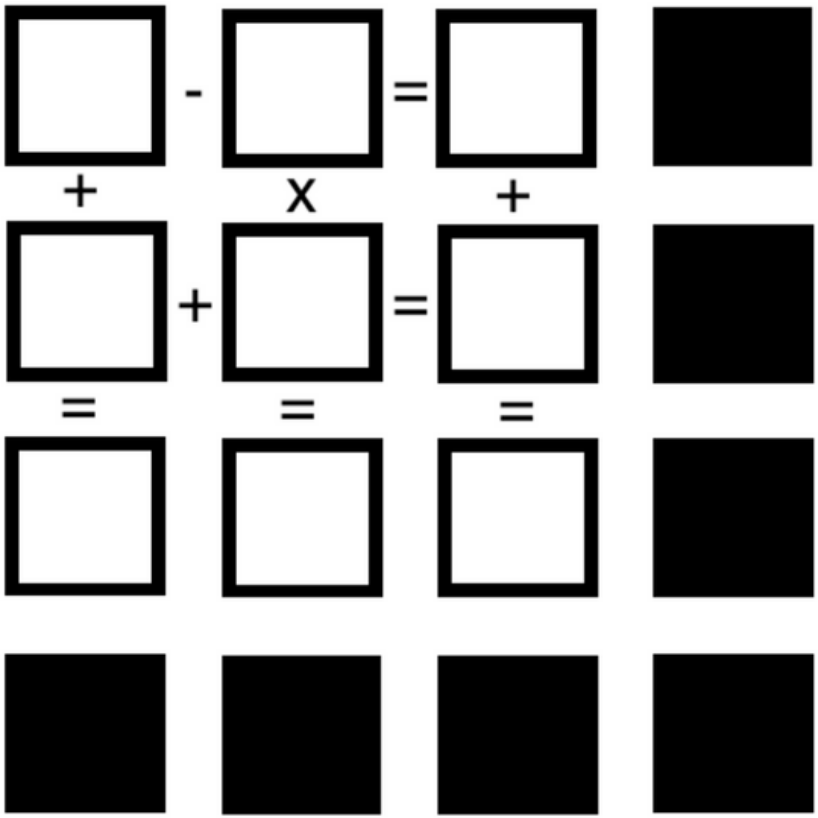
SWEET 16

TASK INSTRUCTIONS

The numbers from one to sixteen (inclusive) must be placed in the cells of the four-by-four grid, you may not use negative numbers and you may only use each number once.

Two cells are connected if an operation is placed in the space between them. A series of these operations create equality relationships that must all be satisfied. Note that if an operation does not exist in the space between two cells, there is no relationship between those two numbers. It is possible to have a number that has no relationships to any of its neighbours.

SWEET 16



SWEET 16

		+	1	=			
16		÷		=			
-		-		x		+	
			-		=		
=		=		=		=	
	x	2	=				

SWEET 16

	x	3	=	
+		+		
	+		=	
+		+		-
	=		=	
8	-		=	1
=		=		=
		-	=	

SWEET 16

5	x		=	
	+			
		+	=	15
+		-		-
	-		=	
=		=		=
16		-	=	

SWEET 16

15		+		=
	+		+	
		+		=
÷	=		=	-
4		÷		= 2
=				=
	+		=	

SWEET 16

5	x		=	
+		+		
	+		=	15
+		-		-
	-		=	
=		=		=
16		-		=

SWEET 16

15		+		=
	+		+	
		+		=
÷	=		=	-
4		÷		= 2
=				=
	+		=	

SWEET 16

		+		=			
				+			
12	÷		=				
+		+		=		+	
			+	9	=		
=		=				=	
			+		=	15	

SWEET 16

☐	>	9	+	☐	=	☐	
-		+		-		-	
☐		☐	+	☐	=	☐	
=		=		=		=	
☐		☐	x	6	=	☐	
=		=		=		=	
11	-	☐	=	☐	<	☐