


Ken-Ken Puzzles

0.3 

Name:

KenKen puzzles are a style of arithmetic and logic puzzle invented in 2004 by Japanese math teacher Tetsuya Miyamoto, who intended the puzzles to be an instruction-free method of training the brain. As in Sudoku, the goal of each puzzle is to fill a grid with digits — 1 through 4 for a 4×4 grid, 1 through 5 for a 5×5, 1 through 6 for a 6×6, etc. — so that no digit appears more than once in any row or any column. Additionally, KenKen grids are divided into heavily outlined groups of cells, often called “cages”, and the numbers in the cells of each cage must result in a certain “target” number when combined using a specified mathematical operation.

In 2016, IBM hosted an international tournament in New York city for students between the ages of 8 and 18. The contest was won by eight-year-old Gaurav Pandey from India, who beat out competitors more than twice his age. Pandey completed the final puzzle in less than half the time taken by any other participants.

1. In each of the following Ken Ken cages, identify the relationship between a and b? The first is done for you.

<div style="border: 2px solid black; padding: 5px; margin-bottom: 10px;"> 5+ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> A B </div> </div> <p style="text-align: center;">$A + B = 5$</p>	<div style="border: 2px solid black; padding: 5px; margin-bottom: 10px;"> 6× <div style="display: flex; justify-content: space-around; margin-top: 10px;"> A B </div> </div>	<div style="border: 2px solid black; padding: 5px; margin-bottom: 10px;"> 1− <div style="display: flex; justify-content: space-around; margin-top: 10px;"> A B </div> </div>	<div style="border: 2px solid black; padding: 5px; margin-bottom: 10px;"> 3÷ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> A B </div> </div>
--	--	--	--

2. Identify the numbers can be used in each of the following Ken Kens.

<div style="border: 2px solid black; padding: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 5px;">5+</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">1−</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">1</td> <td style="border: 1px solid black; padding: 5px;">6+</td> <td style="border: 1px solid black; width: 20px;"></td> </tr> <tr> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">3</td> </tr> </table> </div>	5+		1−	1	6+				3	<div style="border: 2px solid black; padding: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 5px;">2−</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">8+</td> <td style="border: 1px solid black; padding: 5px;">8×</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">8+</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> </tr> <tr> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">2÷</td> <td style="border: 1px solid black; padding: 5px;">4</td> <td style="border: 1px solid black; width: 20px;"></td> </tr> <tr> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">4+</td> <td style="border: 1px solid black; width: 20px;"></td> </tr> </table> </div>	2−		8+	8×	8+					2÷	4				4+		<div style="border: 2px solid black; padding: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 5px;">3÷</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">2−</td> <td style="border: 1px solid black; padding: 5px;">11+</td> <td style="border: 1px solid black; padding: 5px;">6−</td> <td style="border: 1px solid black; width: 20px;"></td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">2</td> <td style="border: 1px solid black; padding: 5px;">72×</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">30×</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">12+</td> </tr> <tr> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">14+</td> <td style="border: 1px solid black; padding: 5px;">1−</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">2−</td> <td style="border: 1px solid black; padding: 5px;">3+</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">11+</td> <td style="border: 1px solid black; padding: 5px;">3</td> <td style="border: 1px solid black; width: 20px;"></td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">1−</td> <td style="border: 1px solid black; padding: 5px;">14+</td> <td style="border: 1px solid black; padding: 5px;">3÷</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> </tr> <tr> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">16+</td> <td style="border: 1px solid black; padding: 5px;">4−</td> <td style="border: 1px solid black; padding: 5px;">5</td> <td style="border: 1px solid black; padding: 5px;">10+</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">3÷</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> </tr> </table> </div>	3÷		2−	11+	6−		2	72×		30×		12+		14+	1−				2−	3+		11+	3		1−	14+	3÷						16+	4−	5	10+	3÷						<div style="border: 2px solid black; padding: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 5px;">6+</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">24×</td> <td style="border: 1px solid black; padding: 5px;">1−</td> <td style="border: 1px solid black; width: 20px;"></td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">9+</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">2÷</td> <td style="border: 1px solid black; width: 20px;"></td> </tr> <tr> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">2</td> <td style="border: 1px solid black; padding: 5px;">75×</td> <td style="border: 1px solid black; padding: 5px;">6×</td> <td style="border: 1px solid black; width: 20px;"></td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">1−</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">2÷</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">1−</td> <td style="border: 1px solid black; width: 20px;"></td> </tr> </table> </div>	6+		24×	1−		9+			2÷			2	75×	6×		1−					2÷			1−	
5+		1−																																																																																													
1	6+																																																																																														
		3																																																																																													
2−		8+	8×																																																																																												
8+																																																																																															
	2÷	4																																																																																													
		4+																																																																																													
3÷		2−	11+	6−																																																																																											
2	72×		30×		12+																																																																																										
	14+	1−																																																																																													
2−	3+		11+	3																																																																																											
1−	14+	3÷																																																																																													
		16+	4−	5	10+																																																																																										
3÷																																																																																															
6+		24×	1−																																																																																												
9+			2÷																																																																																												
	2	75×	6×																																																																																												
1−																																																																																															
2÷			1−																																																																																												

3. Solve these Ken Kens.

<div style="border: 2px solid black; padding: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 5px;">4+</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">8+</td> </tr> <tr> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">1−</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">1</td> </tr> </table> </div>	4+		8+				1−		1	<div style="border: 2px solid black; padding: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 5px;">5+</td> <td style="border: 1px solid black; padding: 5px;">1−</td> <td style="border: 1px solid black; padding: 5px;">1</td> </tr> <tr> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">1−</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">2−</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> </tr> </table> </div>	5+	1−	1			1−	2−			<div style="border: 2px solid black; padding: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 5px;">2×</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">3</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">3</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; padding: 5px;">2÷</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">1−</td> <td style="border: 1px solid black; width: 20px;"></td> <td style="border: 1px solid black; width: 20px;"></td> </tr> </table> </div>	2×		3	3		2÷	1−		
4+		8+																											
1−		1																											
5+	1−	1																											
		1−																											
2−																													
2×		3																											
3		2÷																											
1−																													

4. Solve as many of these Ken Kens as you can in the time provided.

5+		6×
1		
2÷		3

3	6×	
5+		3÷

2	18×	
2−		
2÷		

7+	3−		2÷
	1−		
2−		6×	
4+			4

2÷		7+	2÷
3	6×		
		24×	
	3−		

18×	2	9+		12×
		4−		
6+	2÷		2÷	
	1−			3−
1−		4+		

3+	2−		2÷	
	9+	15×		2−
1−		2÷		
	8×	1	1−	3−
5				