

The Trouble with Tables

E014 scoring rubric

Math Domain

- | | | |
|---|--------------------------------------|---|
| <input checked="" type="checkbox"/> Number/Quantity | <input type="checkbox"/> Shape/Space | <input type="checkbox"/> Function/Pattern |
| <input type="checkbox"/> Chance/Data | <input type="checkbox"/> Arrangement | |

Math Actions (possible weights: 0 through 4)

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|--|--|
| <input type="checkbox"/> 0 Modeling/Formulating | <input type="checkbox"/> 4 Manipulating/Transforming |
| <input type="checkbox"/> 2 Inferring/Drawing Conclusions | <input type="checkbox"/> 0 Communicating |

Math Big Ideas

- | | | |
|---|---|--|
| <input type="checkbox"/> Scale | <input type="checkbox"/> Reference Frame | <input type="checkbox"/> Representation |
| <input type="checkbox"/> Continuity | <input type="checkbox"/> Boundedness | <input type="checkbox"/> Invariance/Symmetry |
| <input checked="" type="checkbox"/> Equivalence | <input type="checkbox"/> General/Particular | <input type="checkbox"/> Contradiction |
| <input type="checkbox"/> Use of Limits | <input type="checkbox"/> Approximation | <input type="checkbox"/> Other |

The intent of this task is to have students demonstrate their ability to reason in the context of simple arithmetic calculation.

1.

A	3	12	16	5	10	a number less than 8 but greater than 4.
B	1	5	7	4	7	a number less than 4.
A+B	4	17	23	9	17	8
A-B	2	7	9	1	3	4

All but the last column are easily found. In the last column, assuming positive number values, **A** would have to be between 4 and 8, and **B** would have to be a number less than 4, as it must fit between the sum and difference. A small amount of experimentation shows that **A=6**, **B=2** will work.

2.

The second table is more complicated. At first any appropriate numbers may be chosen. These, however, must be adjusted so that no two of them are the same. A possible solution is

C	7	5	21	14	33	34
D	6	3	9	4	17	15
C+D	13	8	30	18	50	19
C-D	1	2	12	10	16	49

There are many other ways to fill the cells with distinct numbers; the task may be simplified significantly if the numbers in successive columns are selected progressively larger, taking advantage of place value. An alternative reconstruction would produce:

C	7	20	19	31	33	42
D	6	3	11	21	17	40
C+D	13	23	30	52	50	82
C-D	1	17	8	10	16	2

3.

G	3	10	15	3	16	must be a divisor of 8
H	1	5	3	4	4	
G×H	3	50	45	12	64	8
G÷H	3	2	5	3/4	4	2

In this table, all but the last column are easily determined. Note that a fraction is needed to complete the fourth column. In the last column, the most reasonable guesses for G are the integer divisors of 8, namely $\{1,2,4,8\}$. Checking these possibilities, it is seen that **G=4,H=2** works.

	partial level	full level
Modeling/ Formulating (weight: 0)		
Transforming/ Manipulating (weight: 4)	Fill in most of the first table and some of the second table or Fill all of the first table completely and accurately.	Fill in both tables with accurate results.(the numbers need not be distinct in the second table for full level in this category) If question 3 is given as an extension, then correct results (including the fractional answer) should count for extra credit.
Inferring/ Drawing Conclusions (weight: 2)	Correctly handle instances where the columns are not uniquely determined or Develop an appropriate strategy to ensure that all table entries are different in question 2.	Satisfy both the criteria of being able to handle non-unique values, and using different entries for each cell in question 2.
Communicating (weight: 0)		