Math Domain

☑ Number/Quantity	☐ Shape/Space	☑ Function
☐ Chance/Data	☐ Arrangement	

Math Actions (possible weights: 0 through 4)

2 Modeling/Formulating	2 Manipulating/Transforming
3 Inferring/Drawing Conclusions	2 Communicating

Math Big Ideas

☐ Scale	☐ Reference Frame	☑ Representation
☐ Continuity	☐ Boundedness	☐ Invariance/Symmetry
☐ Equivalence	☐ General/Particular	☐ Contradiction
☐ Use of Limits	☐ Approximation	☐ Other

1.

a–b. Inspection of the numbers already present and perhaps some reasoning about the "distance" between the squares directly above and below each other reveals that, to move to the square directly below, one needs to add 10 to the number in the original square. A simpler observation particular to the column under the number 5 would be that the second digit of all the numbers in the column is 5 and the first digit increases as one moves down the column, so the numbers are 5, 15, 25, 35, 45, 55, 65, 75, 85, 95.

2. The second digit of the number in the square matches the top number. The first digit matches the side number. The slight complication of the first row is resolved by either a rule specific to the first row (the row number 0 means that the numbers in the row only have one digit), or by introducing a more arithmetic rule saying that the leading 0 does not affect the value of the number (in this case, the general rule applies also to the first row).

3.

 a–b. Moving down one square adds 10, moving up one square subtracts 10. Clearly, 10 cannot be subtracted from the first row.

c. To add 11, one can add 10 and then add 1. The first operation is moving one row down. The second operation is moving one square to the right. So moving diagonally one square down and to the right (passing through the lower right corner of the square) adds 11 to the number in the original square.

d. To add 9, one can add 10 and then subtract 1. In the table, this means moving one square down and one to the left, or moving diagonally one square down and to the left (passing through the lower left corner).

4. Even number are numbers whose last digit is 0, 2, 4, 6 or 8. These are the numbers in the columns with top numbers 0, 2, 4, 6 and 8. The pattern in the completed table will be alternating columns of colored and uncolored squares.

	partial level (1 or 2)	**full level (3)**
Modeling/ Formulating (weight: 2)	Student conceives an inconsistent model for completing the table.	Student understands that the completion of the table translates to the process of adding 10 in each column.
Transforming/ Manipulating (weight: 2)	Student completes some of the computations correctly.	Student completes all computations correctly.
Inferring/ Drawing Conclusions (weight: 3)	Student formulates a rule for adding 10 that results in locating some correct numbers, or gives a rule for finding the number in each square from its row and column numbers that relies on specific examples for its completion.	Student formulates clear rules for adding 9, 10 and 11, and a general process for finding numbers in each square from row and column numbers.
Communicating (weight: 2)	Student completes only one column, not the entire table. Is able to explain rules only by showing examples, instead of general strategies.	Student provides a complete description of the general strategies used, with no partial rules or sentence fragments.