

## Hinweise zu den Anregungen zum Nachdenken und für eigene Untersuchungen

### zu A 7.1:

- **Kontrolle der Endziffern:**  $58^2$  hat die gleichen Endziffern wie  $8^2 = \underline{64}$ .

- **Methode 1 (schrittweise Berechnung)**

Hilfsgröße:  $55^2 = 50 \cdot 60 + 5^2 = 3025$

$$58^2 = 55^2 + (55 + 56) + (56 + 57) + (57 + 58) = 55^2 + 6 \cdot 56,5 = 3025 + 339 = \underline{3364}$$

Hinweis: 56,5 ist der Mittelwert der sechs Summanden.

Hilfsgröße:  $60^2 = 3600$

$$58^2 = 60^2 - (60 + 59) - (59 + 58) = 60^2 - 4 \cdot 59 = 3600 - 236 = \underline{3364}$$

Hinweis: 59 ist der Mittelwert der vier Summanden.

- **Methode 2 (Berechnung mithilfe einer Zehnerzahl und eines symmetrisch liegenden Partners)**

$$58^2 = (60 - 2) \cdot (56 + 2) = 60 \cdot 56 + 2^2 = 3360 + 4 = \underline{3364}$$

$$58^2 = (50 + 8) \cdot (66 - 8) + 8^2 = 50 \cdot 66 + 8^2 = 3300 + 64 = \underline{3364}$$

- **Methode 3 (Anwenden der 1. binomischen Formel und Umlegen)**

$$58^2 = (50 + 8)^2 = 50^2 + 2 \cdot 50 \cdot 8 + 8^2 = 50 \cdot (50 + 2 \cdot 8) + 8^2 = 50 \cdot 66 + 8^2 = 3300 + 64 = \underline{3364}$$

$$58^2 = (60 - 2)^2 = 60^2 - 2 \cdot 60 \cdot 2 + 2^2 = 60 \cdot (60 - 2 \cdot 2) + 2^2 = 60 \cdot 56 + 4 = \underline{3364}$$

- **Kontrolle der Endziffern:**  $84^2$  hat die gleichen Endziffern wie  $16^2 = \underline{256}$ .

- **Methode 1 (schrittweise Berechnung)**

Hilfsgröße:  $85^2 = 80 \cdot 90 + 5^2 = 7225$

$$84^2 = 85^2 - (85 + 84) = 85^2 - 2 \cdot 84,5 = 7225 - 169 = \underline{7056}$$

Hilfsgröße:  $80^2 = 6400$

$$84^2 = 80^2 + (80 + 81) + (81 + 82) + (82 + 83) + (83 + 84) = 80^2 + 8 \cdot 82 = 6400 + 656 = \underline{7056}$$

- **Methode 2 (Berechnung mithilfe einer Zehnerzahl und eines symmetrisch liegenden Partners)**

$$84^2 = (80 + 4) \cdot (88 - 4) = 80 \cdot 88 + 4^2 = 7040 + 16 = \underline{7056}$$

$$84^2 = (90 - 6) \cdot (78 + 6) + 6^2 = 90 \cdot 78 + 6^2 = 7020 + 36 = \underline{7056}$$

- **Methode 3 (Anwenden der 1. binomischen Formel und Umlegen)**

$$84^2 = (80 + 4)^2 = 80^2 + 2 \cdot 80 \cdot 4 + 4^2 = 80 \cdot (80 + 2 \cdot 4) + 4^2 = 80 \cdot 88 + 4^2 = 7040 + 16 = \underline{7056}$$

$$84^2 = (90 - 6)^2 = 90^2 - 2 \cdot 90 \cdot 6 + 6^2 = 90 \cdot (90 - 2 \cdot 6) + 6^2 = 90 \cdot 78 + 6^2 = 7020 + 36 = \underline{7056}$$

- **Kontrolle der Endziffern:**  $73^2$  hat die gleichen Endziffern wie  $23^2 = \underline{529}$ .

- **Methode 1 (schrittweise Berechnung)**

Hilfsgröße:  $75^2 = 70 \cdot 80 + 5^2 = 5625$

$$73^2 = 75^2 - (75 + 74) - (74 + 73) = 75^2 - 4 \cdot 74 = 5625 - 296 = \underline{5329}$$

Hilfsgröße:  $70^2 = 4900$

$$73^2 = 70^2 + (70 + 71) + (71 + 72) + (72 + 73) = 70^2 + 6 \cdot 71,5 = 4900 + 429 = \underline{5329}$$

- **Methode 2 (Berechnung mithilfe einer Zehnerzahl und eines symmetrisch liegenden Partners)**

$$73^2 = (70 + 3) \cdot (76 - 3) = 70 \cdot 76 + 3^2 = 5320 + 9 = \underline{5329}$$

$$73^2 = (80 - 7) \cdot (66 + 7) + 7^2 = 80 \cdot 66 + 7^2 = 5280 + 49 = \underline{5329}$$

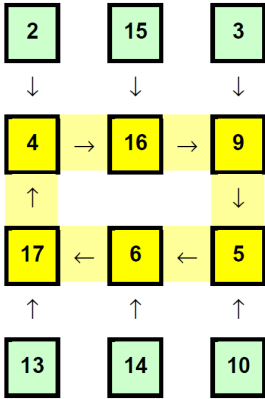
**Methode 3 (Anwenden der 1. binomischen Formel und Umlegen)**

$$73^2 = (70 + 3)^2 = 70^2 + 2 \cdot 70 \cdot 3 + 3^2 = 70 \cdot (70 + 2 \cdot 3) + 3^2 = 70 \cdot 76 + 3^2 = 5320 + 9 = 5329$$

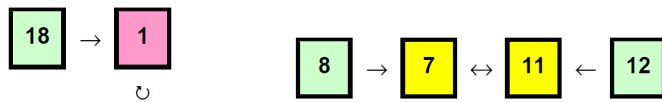
$$73^2 = (80 - 7)^2 = 80^2 - 2 \cdot 80 \cdot 7 + 7^2 = 80 \cdot (80 - 2 \cdot 7) + 7^2 = 80 \cdot 66 + 7^2 = 5280 + 49 = 5329$$

**zu A 7.2:**

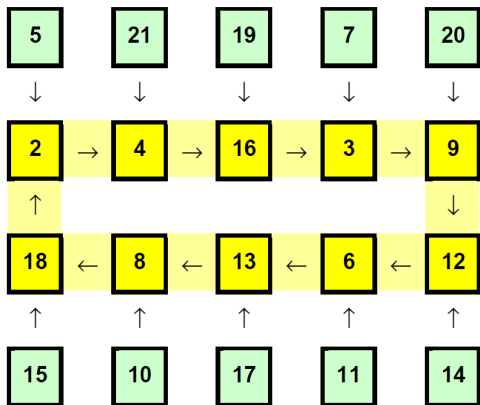
**(1) mod 19**



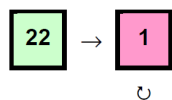
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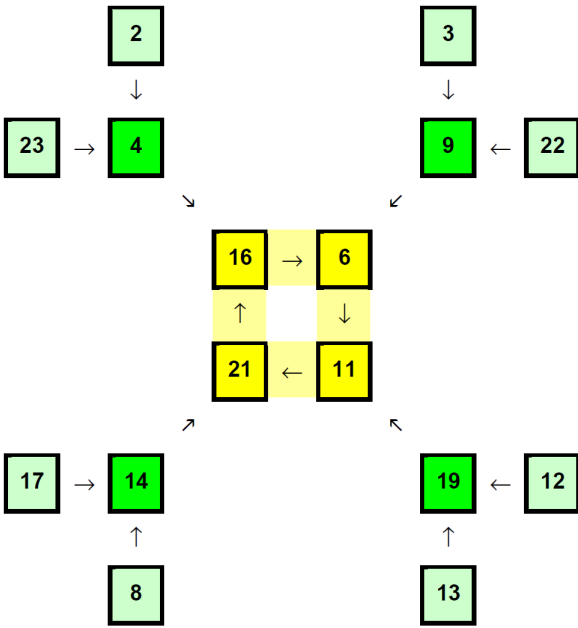
**(2) mod 23**



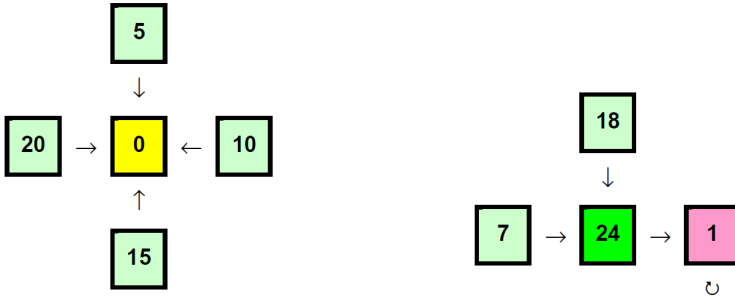
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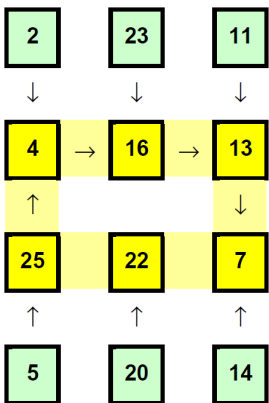
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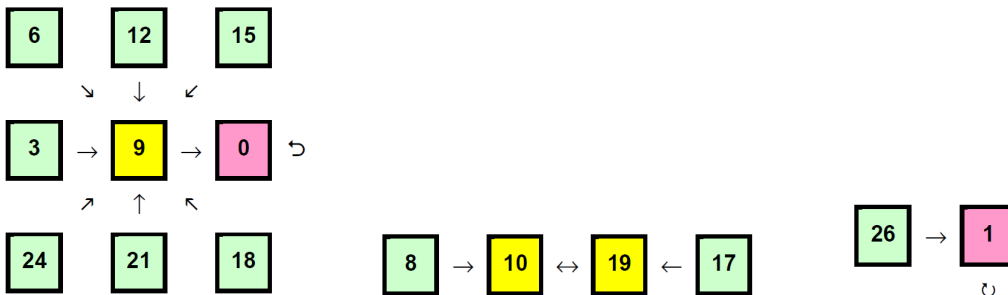
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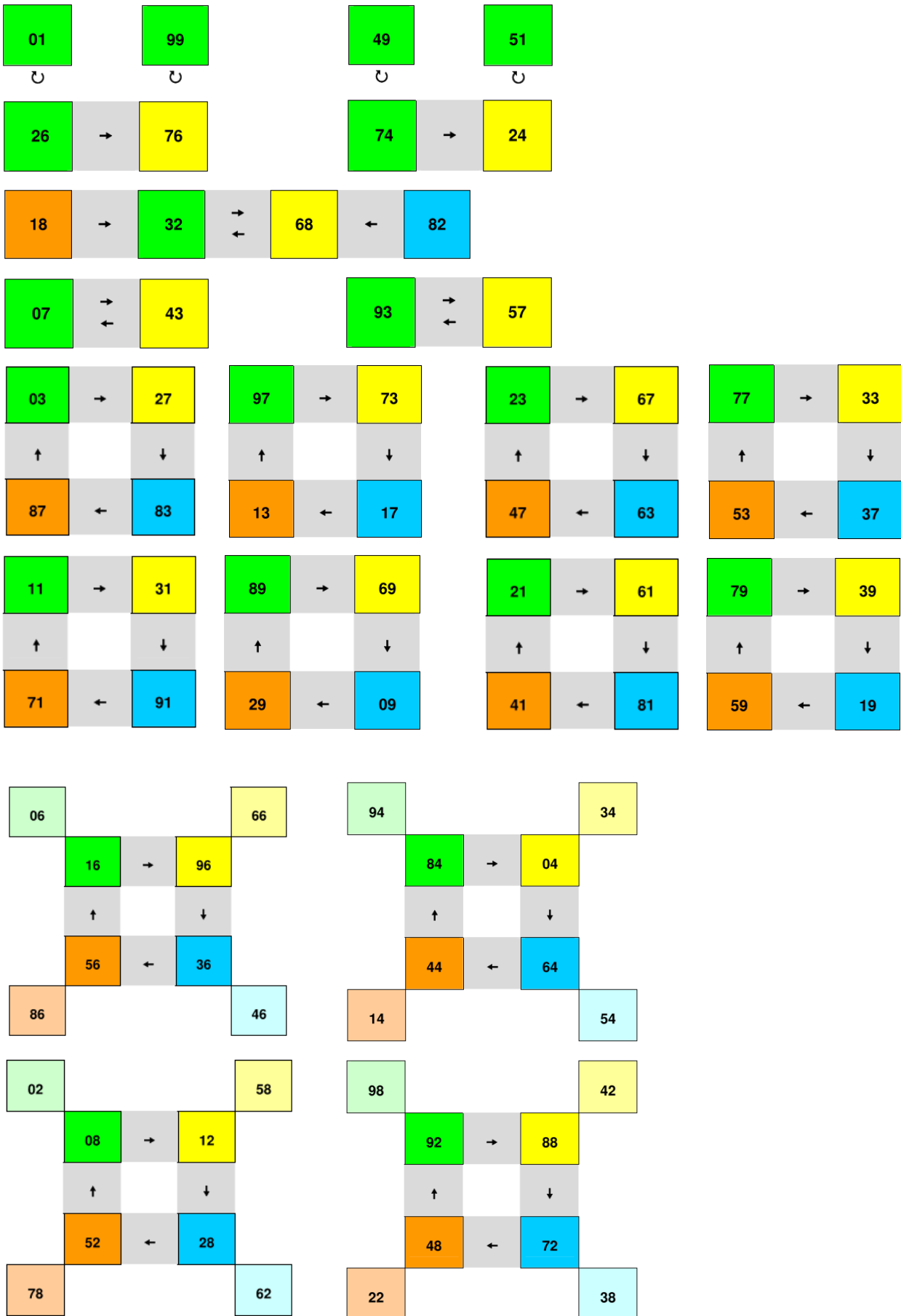
(4) mod 27



außerdem:

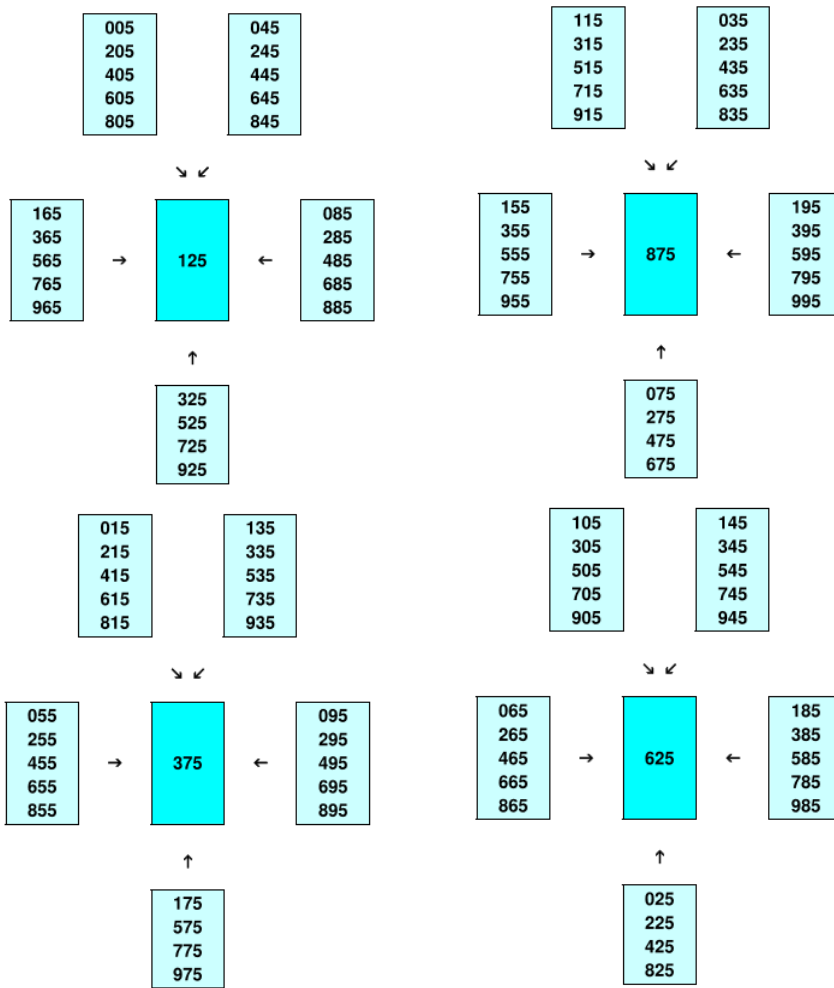


zu A 7.3:

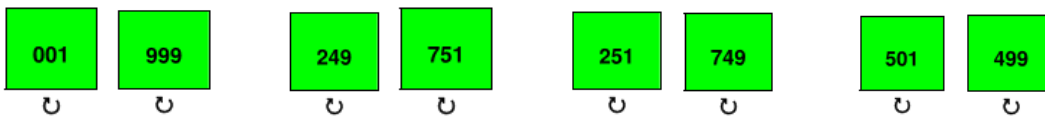


zu A 7.4

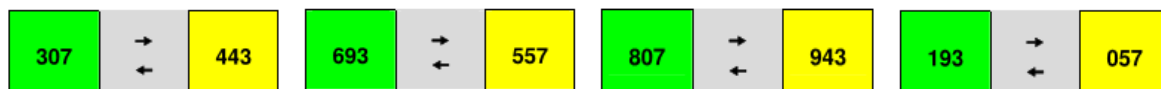
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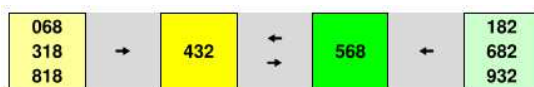
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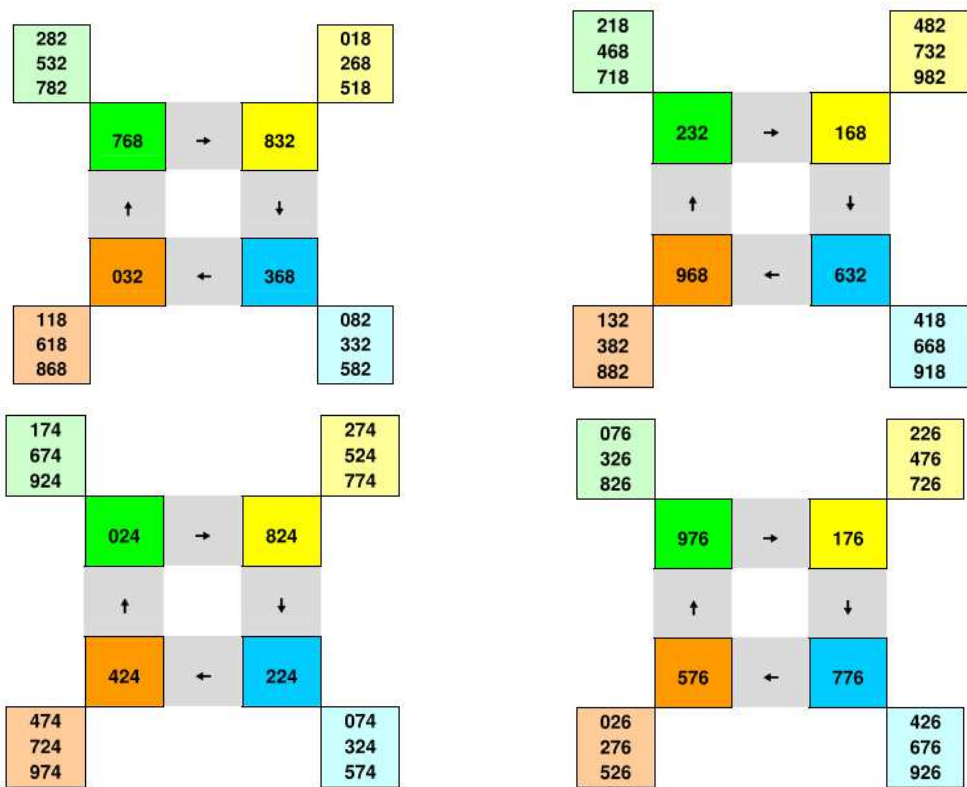
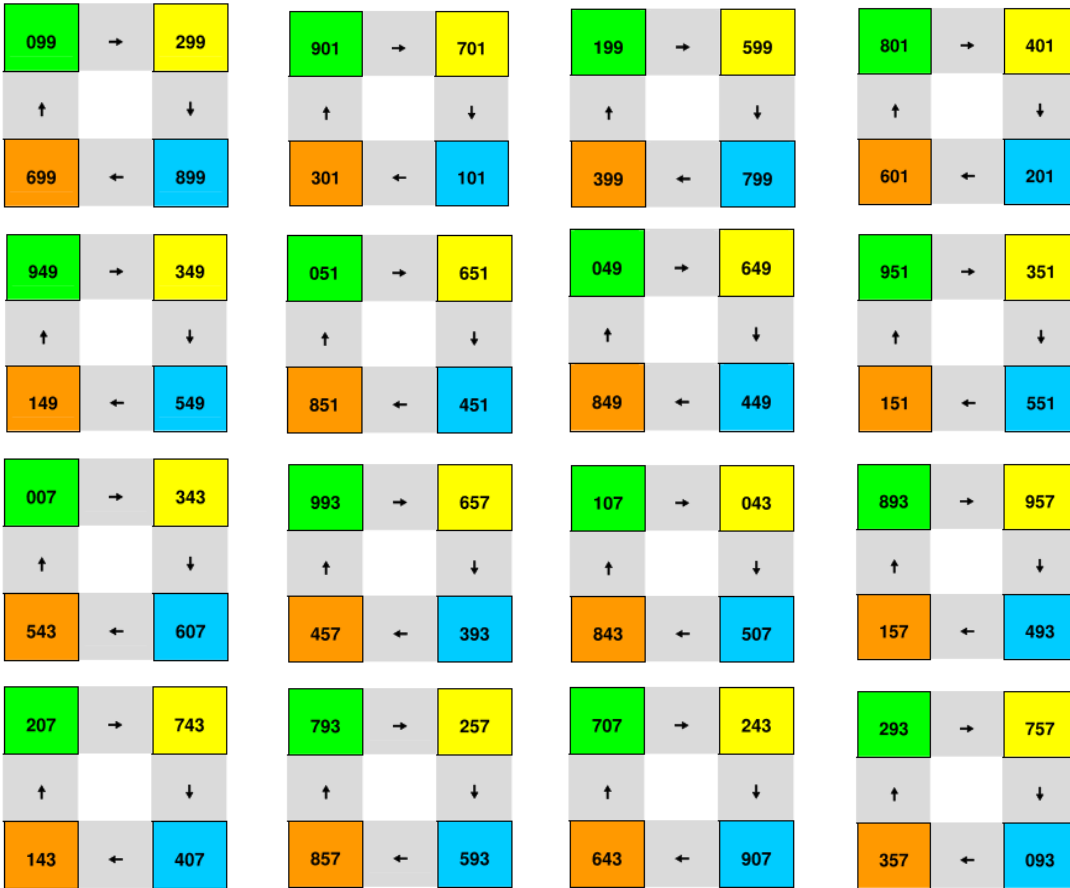
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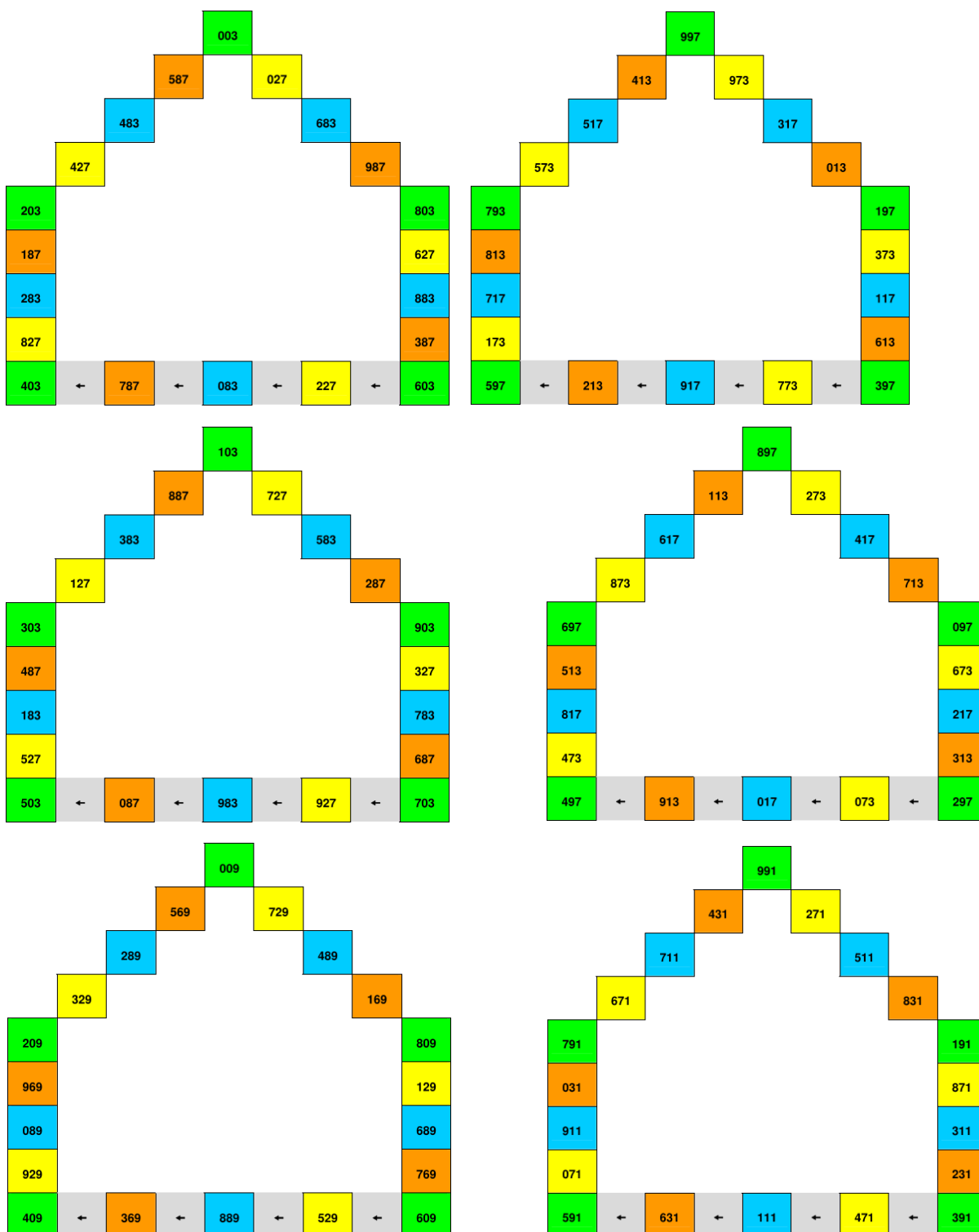


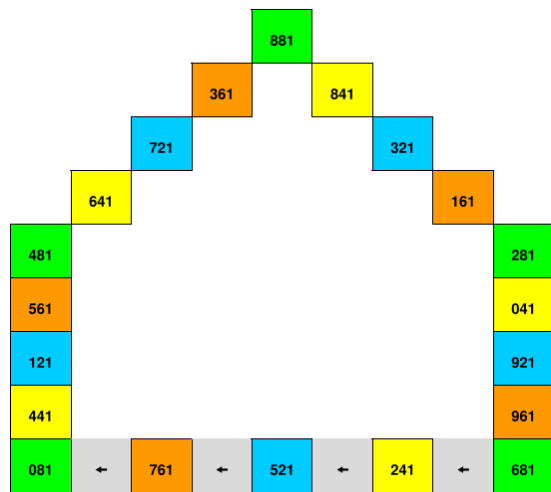
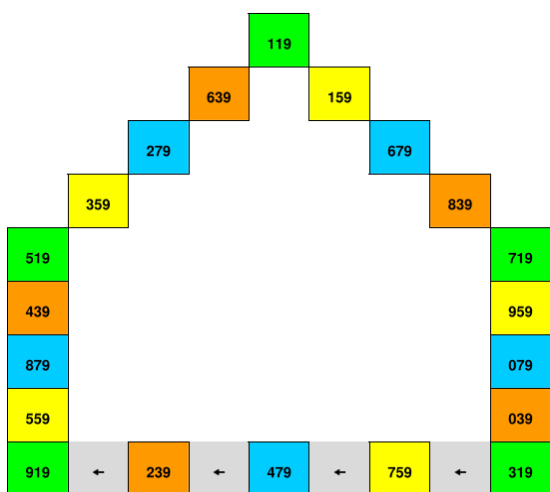
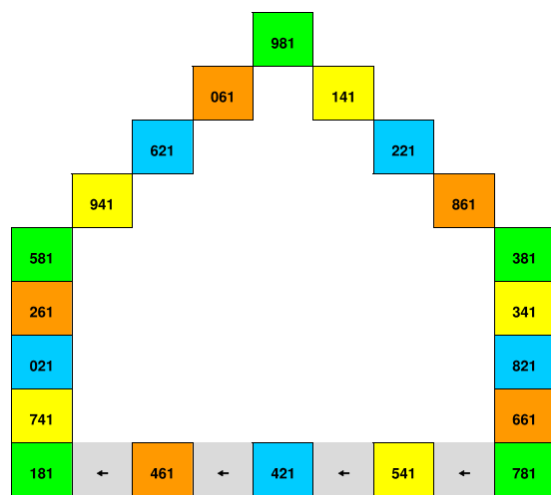
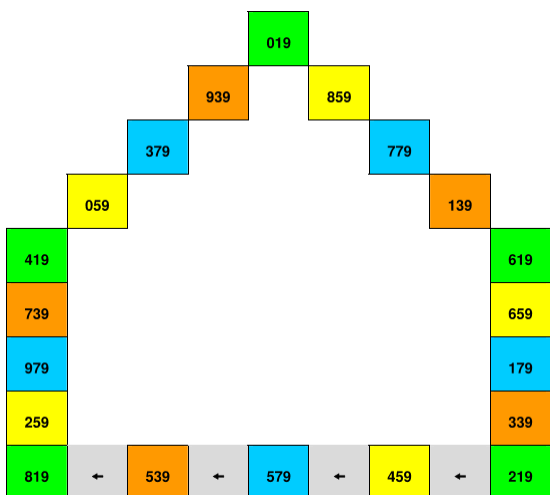
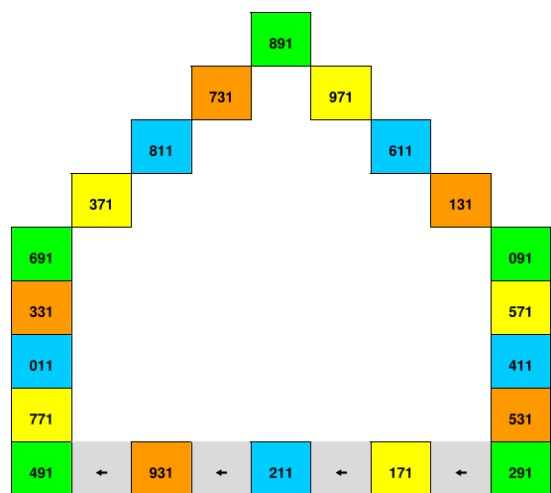
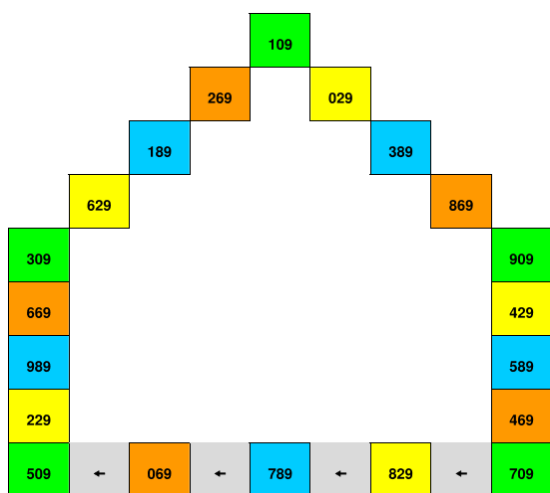
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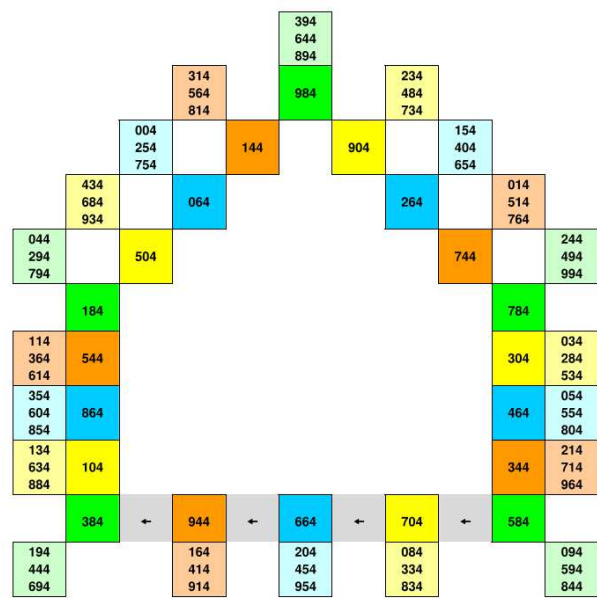
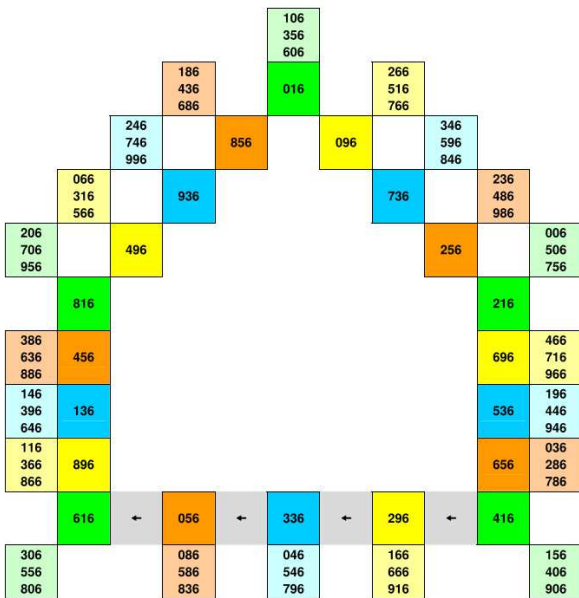
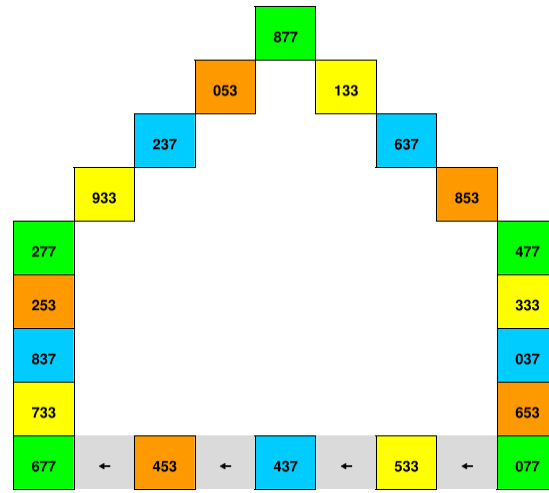
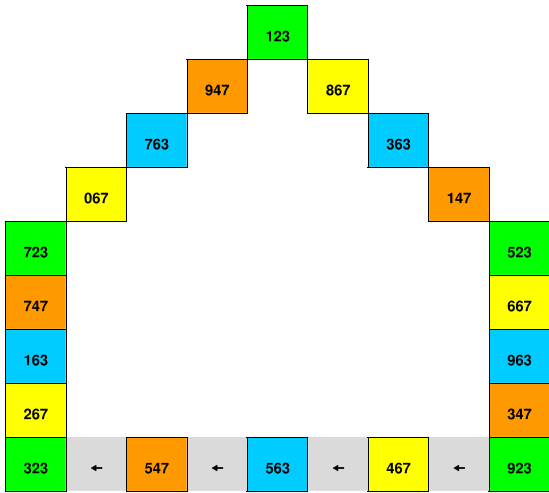
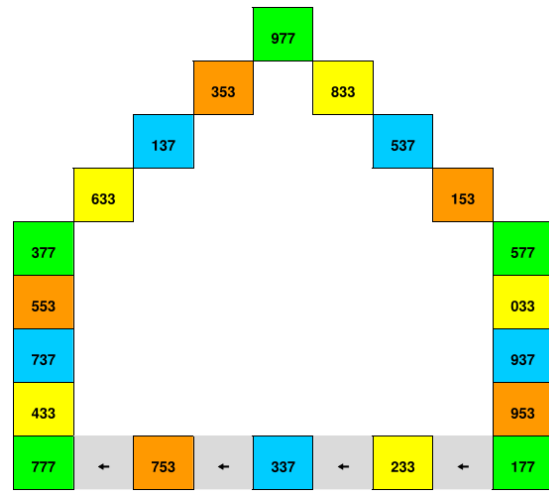
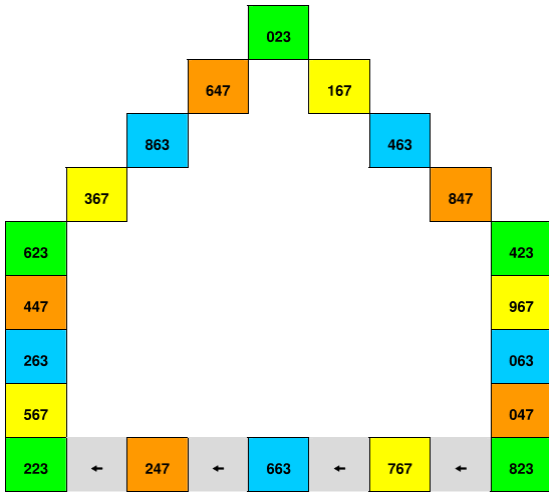
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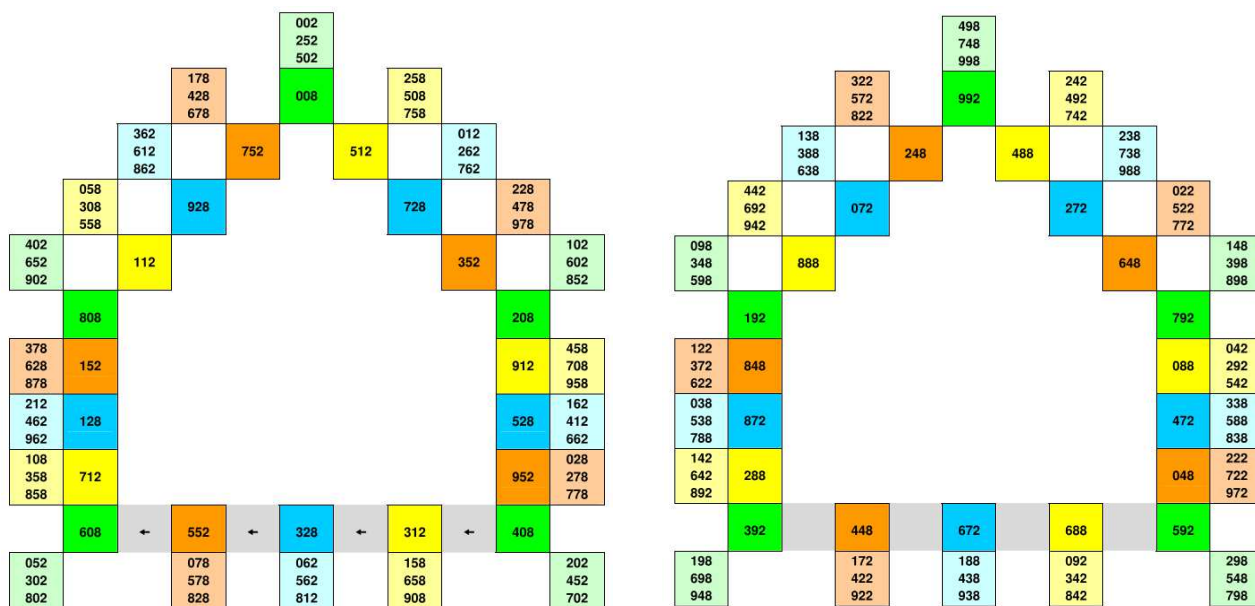
















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