

Study Mersennes Exponents - Geometry and Decomposition framework

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GitHub: [\[gatanegro\]](https://github.com/gatanegro) | Zenodo: [\[Zenodo\]](https://zenodo.org/record/1000000)

We select and code color the Mersennes Exponents by end digit and number of digits:

Shell 1, - 0:

2, 3, 5, 7,

1, 2, 3, 4,

Shell 2. - 00:

13, 17, 19, 31, 61, 89,

5, 6, 7, 8, 9, 10,

Shell 3. - 000:

107, 127, 521, 607,

11, 12, 13, 14,

Shell 4. - 0.000:

1279, 2203, 2281, 3217, 4253, 4423, 9689, 9941,

15, 16, 17, 18, 19, 20, 21, 22,

Shell 5. - 00.000:

11213, 19937, 21701, 23209, 44497, 86243,

23, 24, 25, 26, 27, 28,

Shell 6. - 000.000:

110503, 132049, 216091, 756839, 859433,
29, 30, 31, 32, 33,

Shell 7. - 0.000.000:

1257787, 1398269, 2976221, 3021377, 6972593,
34, 35, 36, 37, 38,

Shell 8. - 00.000.000:

13466917, 20996011, 24036583, 25964951, 30402457, 32582657, 37156667, 42643801, 43112609, 57885161, 74207281, 77232917, 82589933,
39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51

0.000.000.000

136279841

52

end digit 3:

02 05 16 19 20 23 28 29 33 38 41 51

end digit 7:

04 06 11 12 14 18 24 27 34 37 39 43 44 45 50

end digit 9:

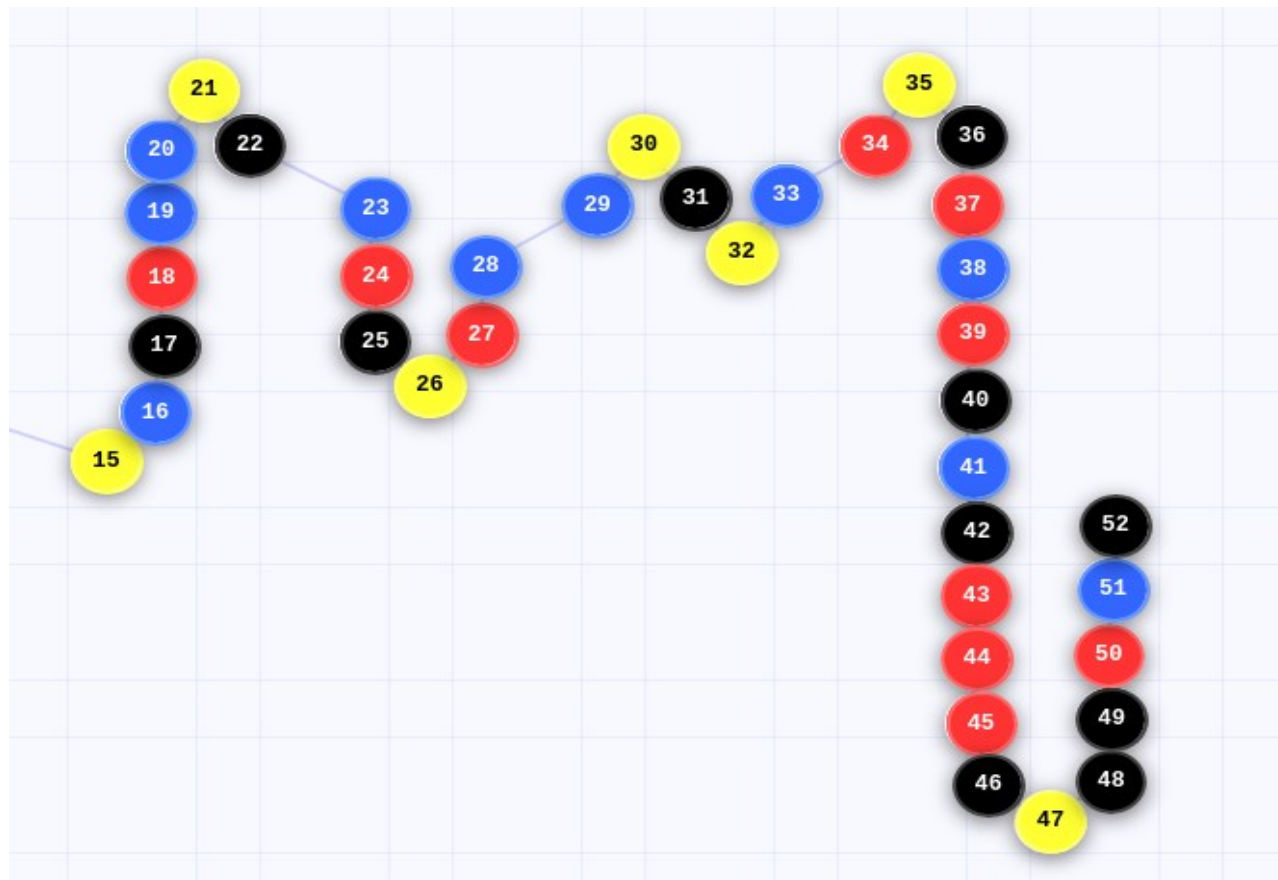
07 10 15 21 26 30 32 35 47

end digit 1:

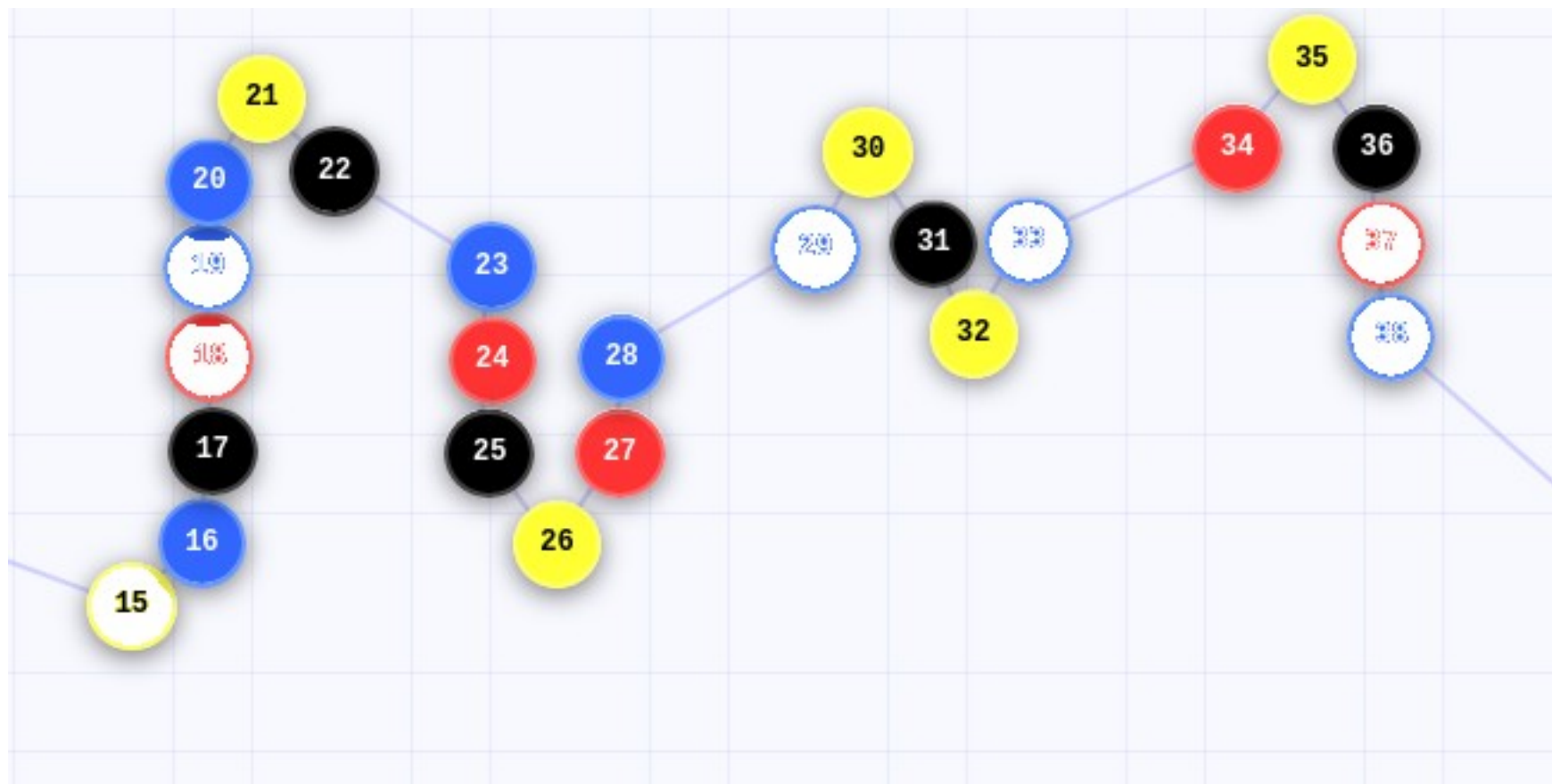
08 09 13 17 22 25 31 36 40 42 46 48 49 52

Mersennes Exponents SUM of smallest Mersennes Exponents start from M15.
(all exponents bellow M15 was not used).

Curved Geometry arrangement by shells:



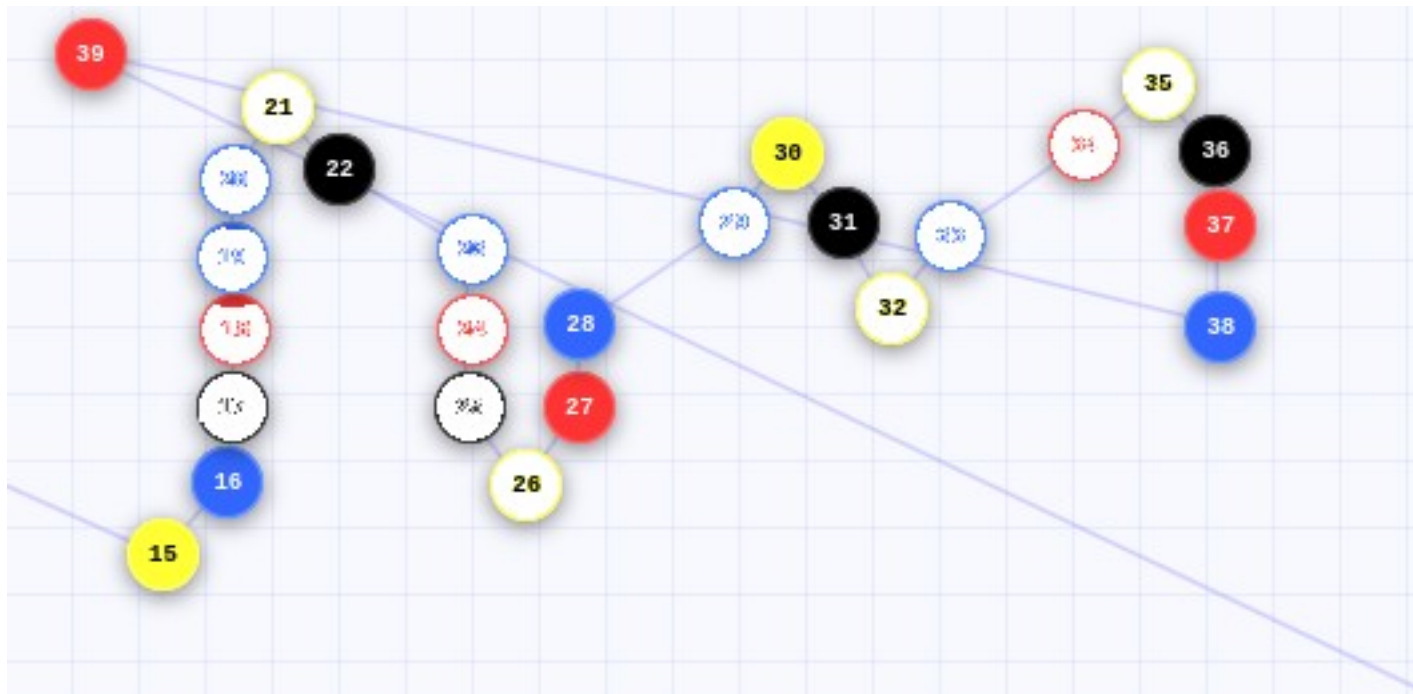
$$\text{M38} = 36 + 35 + 34 + 32 + 31 + 30 + 28 + 27 + 26 + 25 + 24 + 23 + 22 + 21 + 20 + 17 + 16$$



M38 Symmetry:

- 5 black
- 5 yellow
- 4 blue
- 3 red

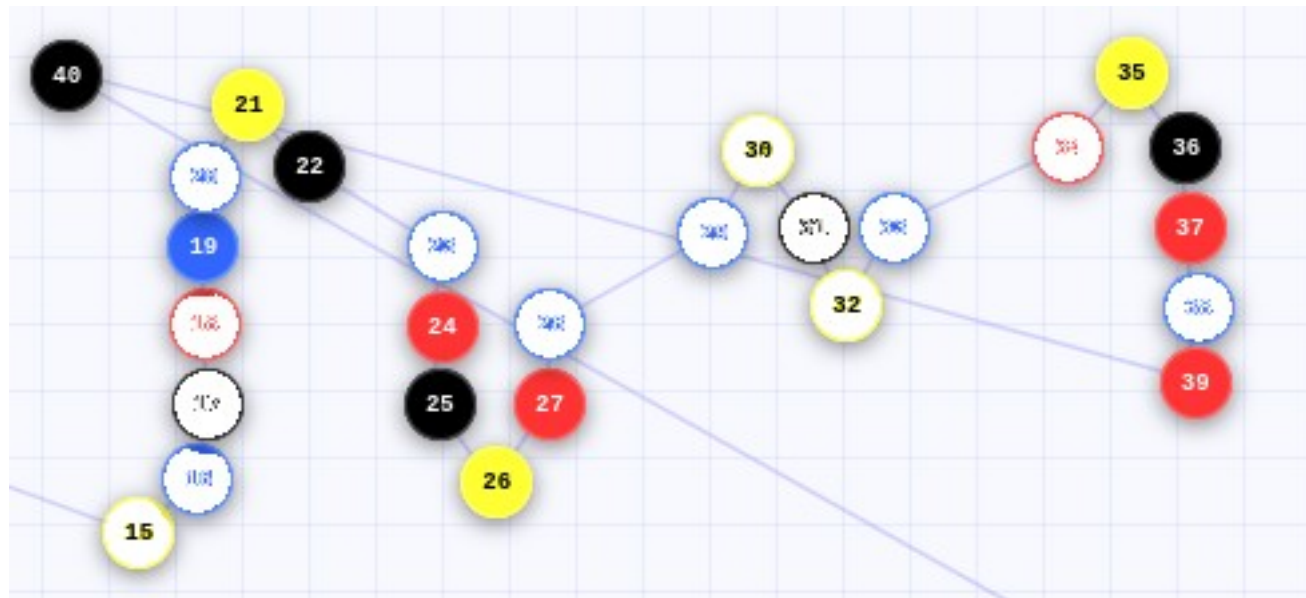
$$M39 = 38 + 37 + 36 + 31 + 30 + 28 + 27 + 22 + 20 + 16 + 15$$



M39 Symmetry:

- 3 blue
- 3 black
- 2 yellow
- 2 red

$$\underline{M40} = 39 + 37 + 36 + 35 + 27 + 26 + 25 + 24 + 22 + 21 + 19$$

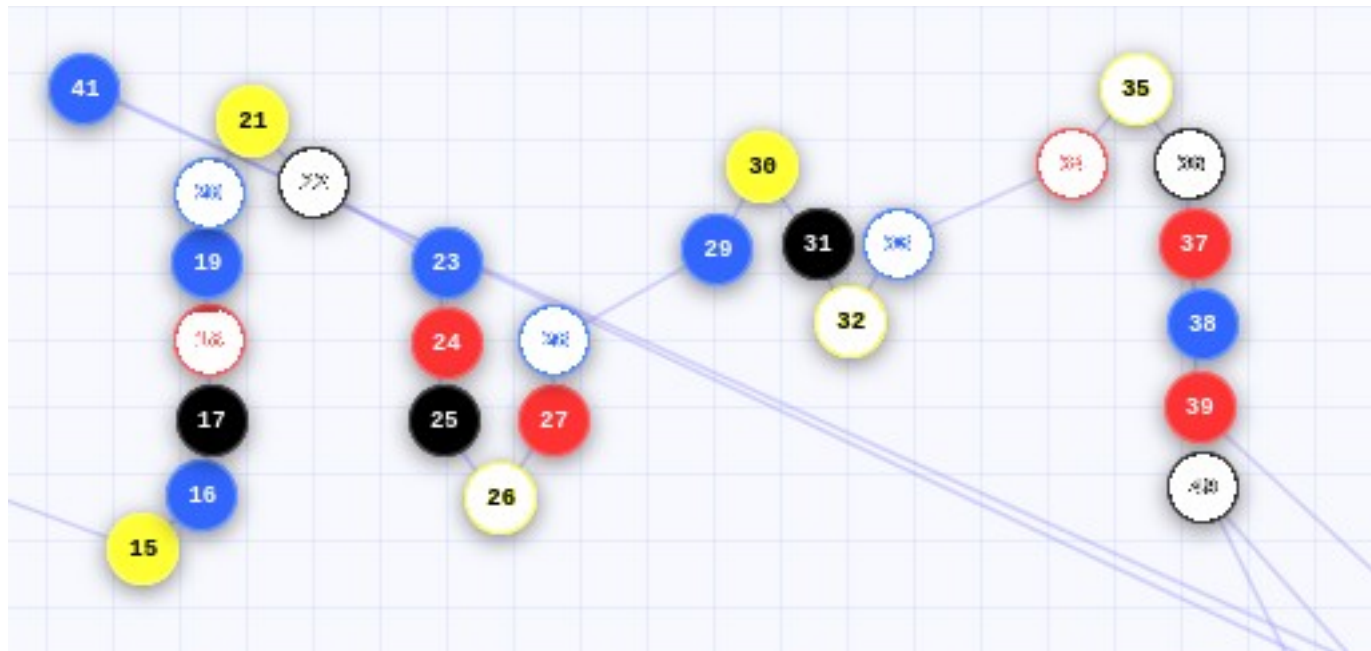


M40 Symmetry:

- 3 black
- 3 yellow
- 4 red
- 1 blue

11 terms

$$\underline{M41} = 39 + 38 + 37 + 31 + 30 + 29 + 27 + 25 + 24 + 23 + 21 + 19 + 17 + 16 + 15$$

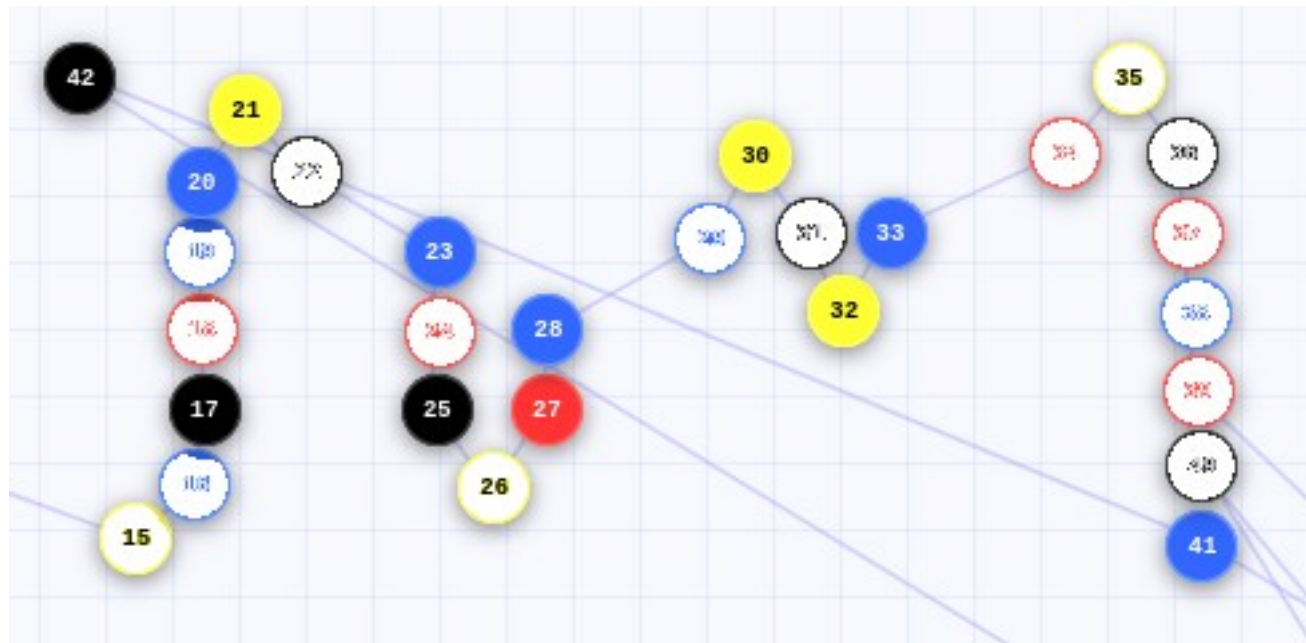


M41 Symmetry:

- 3 yellow
- 3 black
- 5 blue
- 4 red

17 terms

$$\underline{M42} = 41 + 33 + 32 + 30 + 28 + 27 + 25 + 23 + 21 + 20 + 17$$

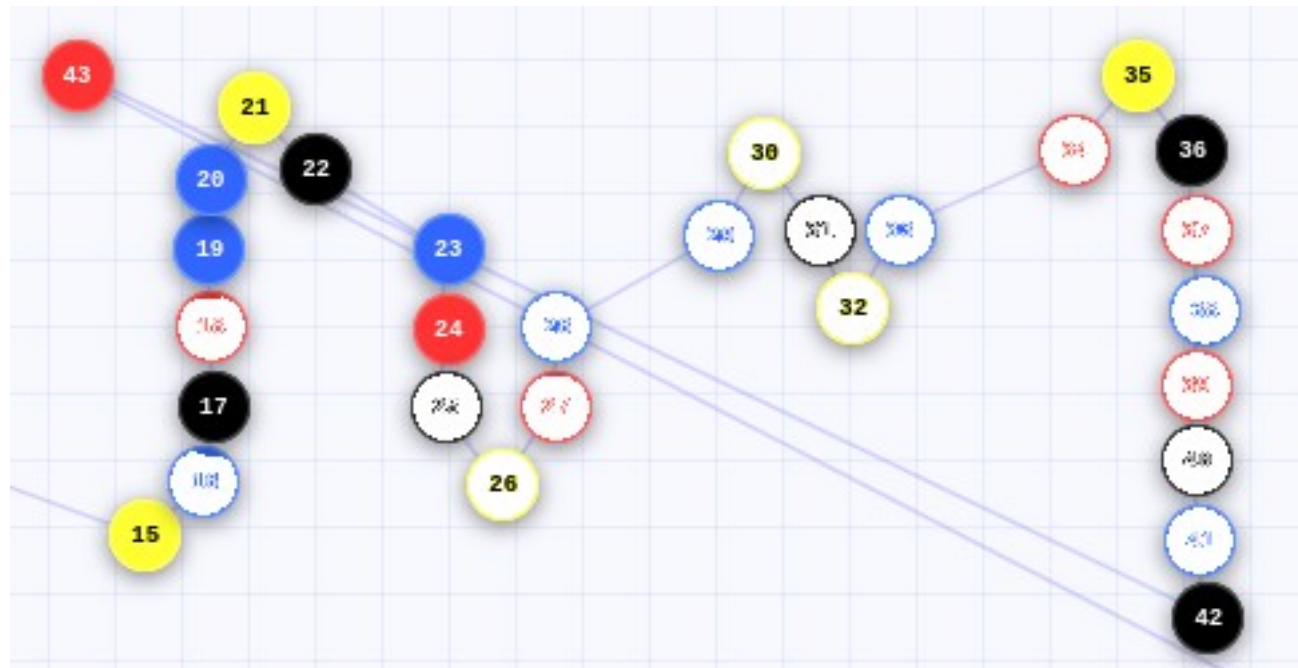


M42 Symmetry:

- 5 blue
- 3 yellow
- 2 black
- 1 red

11 terms

$$\text{M43} = 42 + 36 + 35 + 24 + 23 + 22 + 21 + 20 + 19 + 17 + 15$$

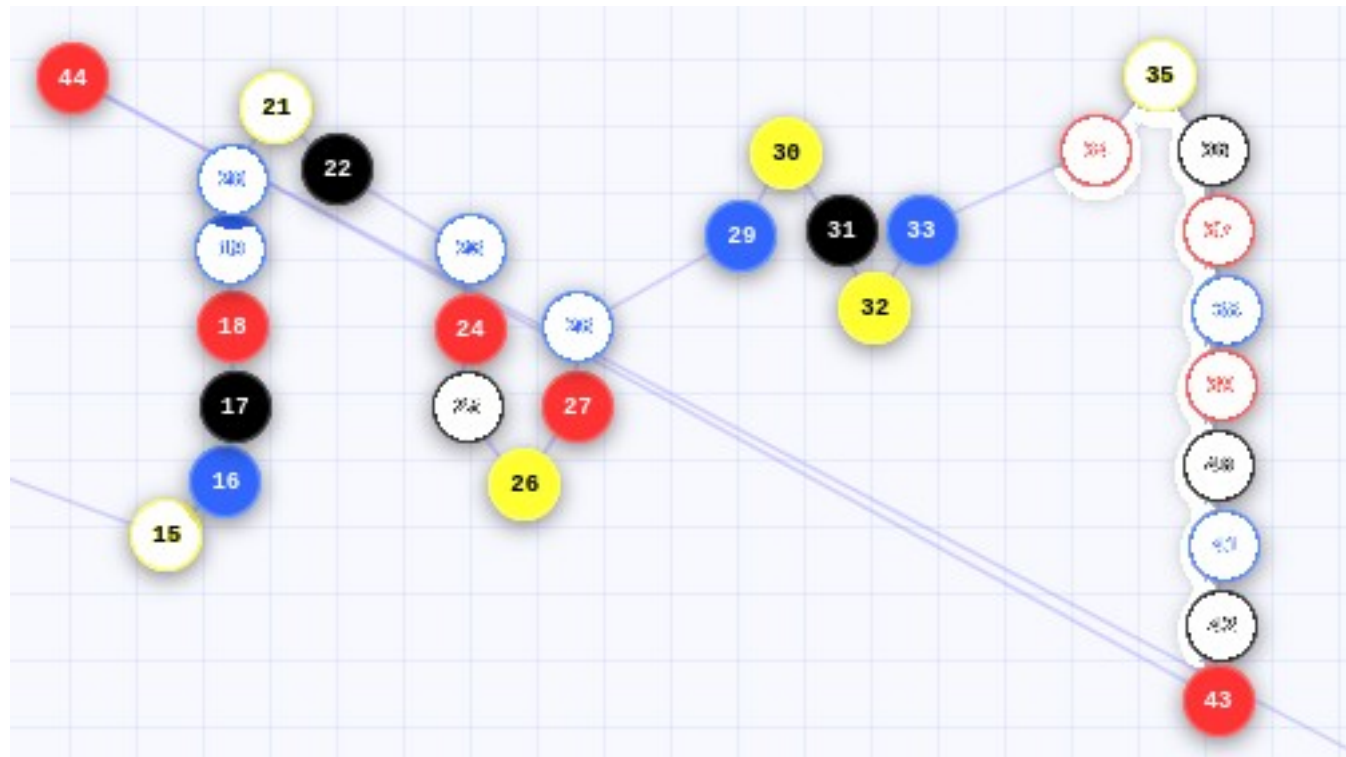


M43 Symmetry:

- 3 blue
- 3 yellow
- 4 black
- 1 red

11 terms

$$\underline{M44} = 43 + 33 + 32 + 31 + 30 + 29 + 27 + 26 + 24 + 22 + 18 + 17 + 16$$

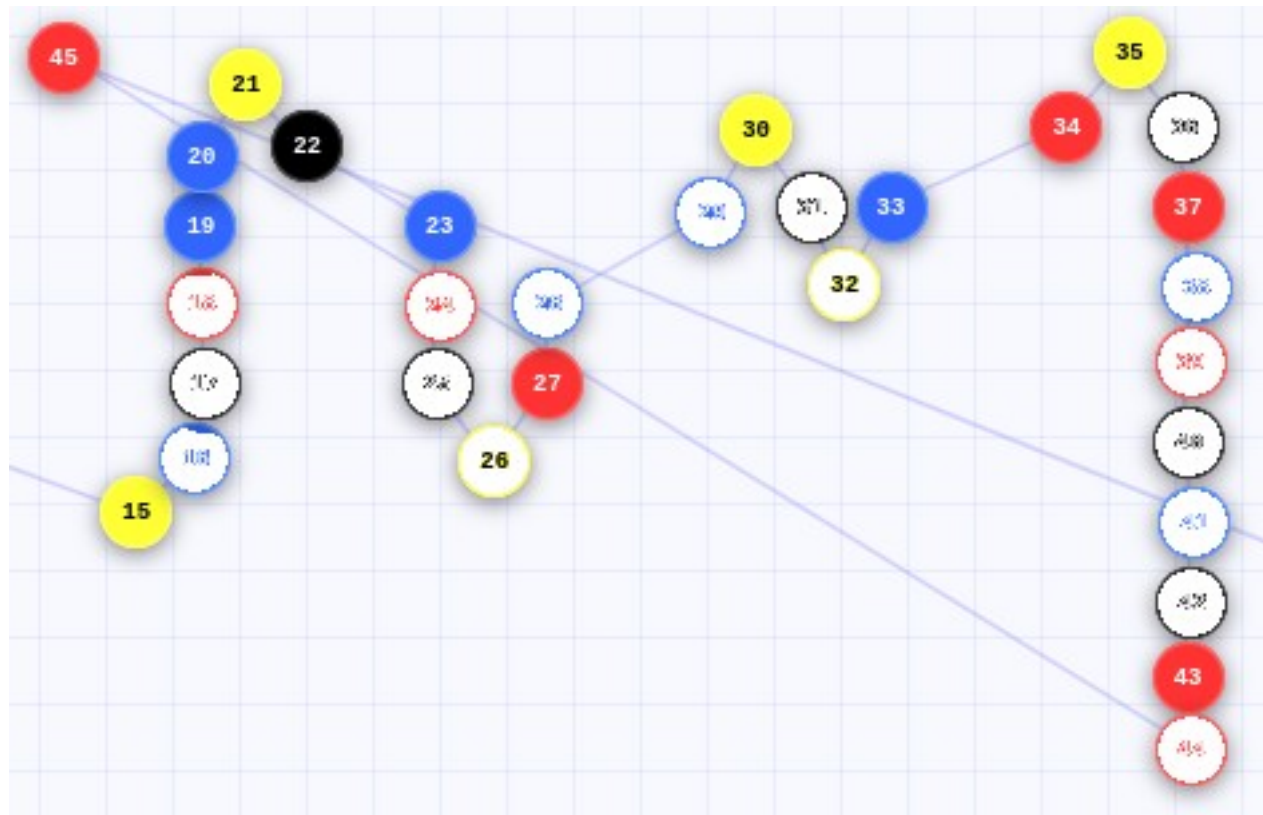


M44 Symmetry:

- 3 blue
- 3 yellow
- 3 black
- 4 red

13 terms

$$\underline{M45} = 43 + 37 + 35 + 34 + 33 + 30 + 27 + 23 + 22 + 21 + 20 + 19 + 15$$

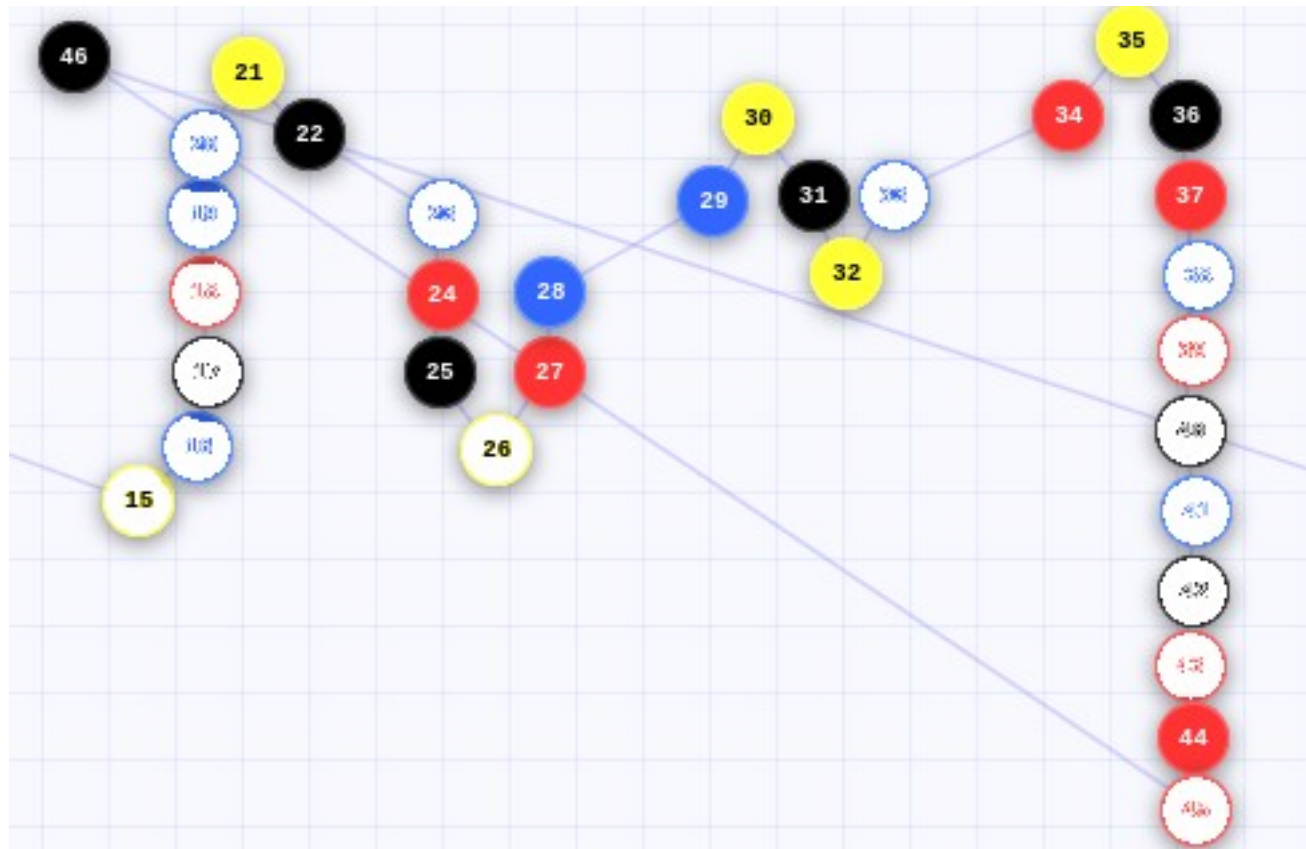


M45 Symmetry:

- 4 blue
- 4 yellow
- 4 red
- 1 black

13 terms

$$\underline{M46} = 44 + 37 + 36 + 35 + 34 + 32 + 31 + 30 + 29 + 28 + 27 + 25 + 24 + 22 + 21$$

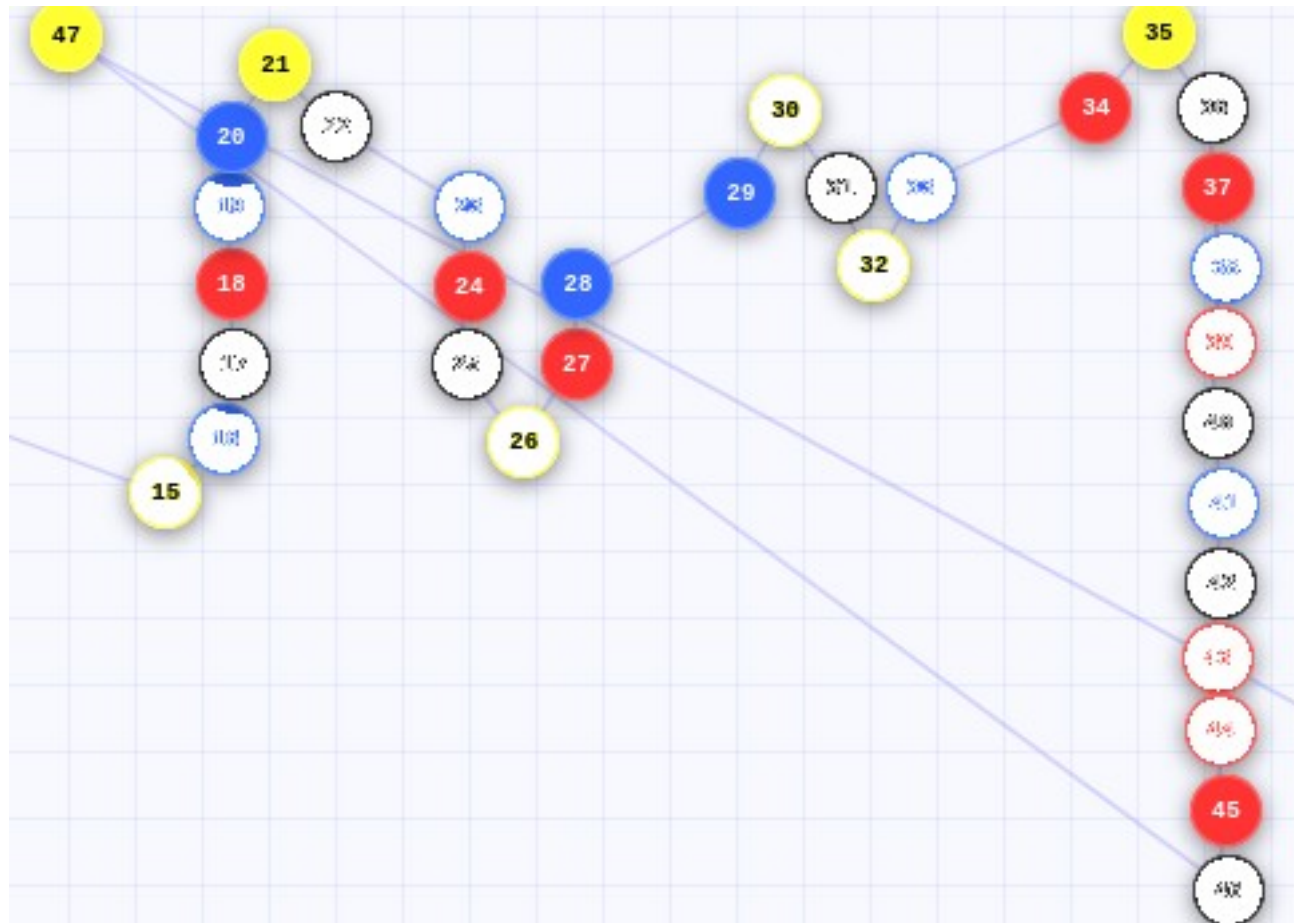


M46 Symmetry:

- 4 black
- 4 yellow
- 5 red
- 2 blue

15 terms

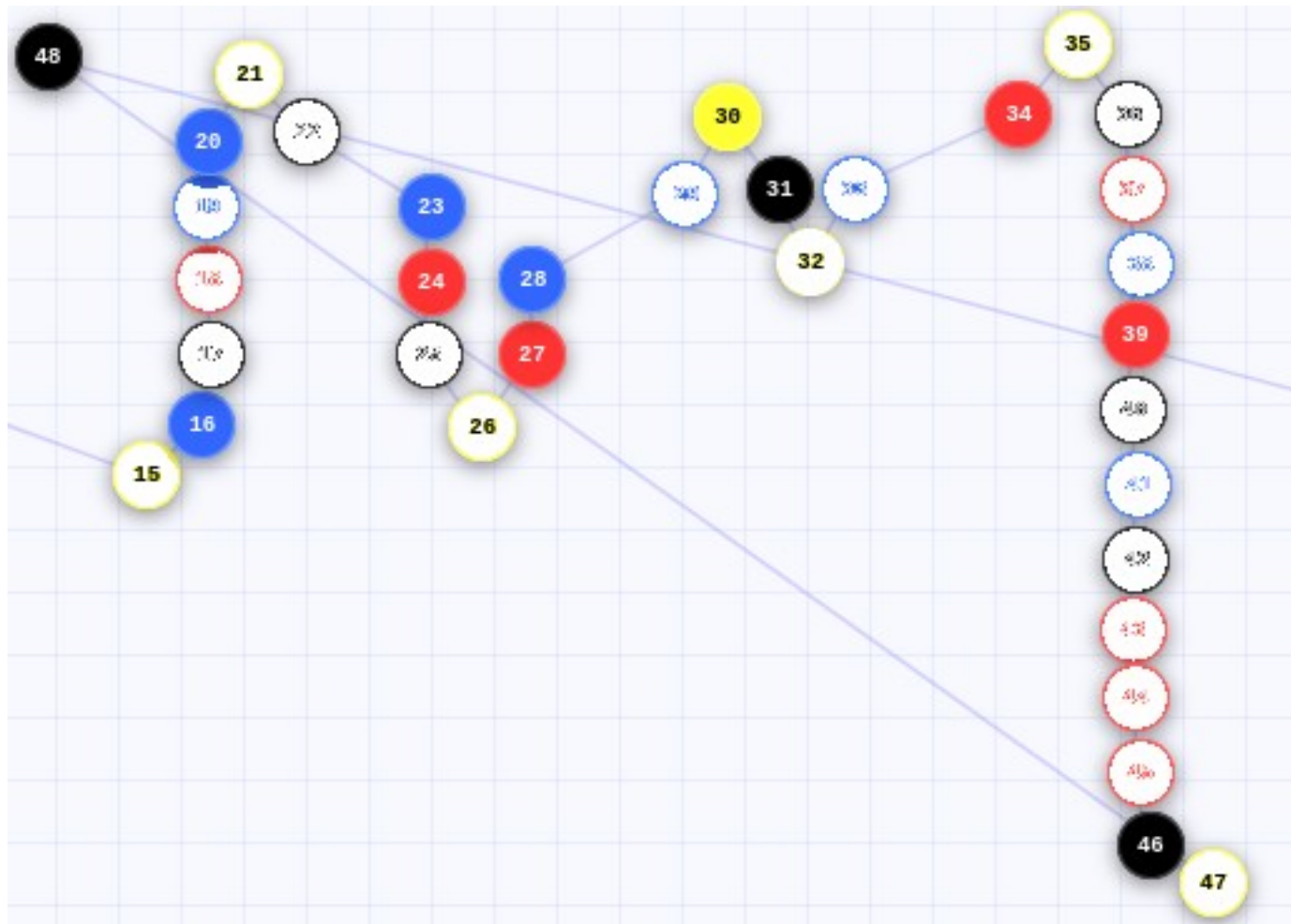
$$M_{47} = 45 + 37 + 35 + 34 + 29 + 28 + 27 + 24 + 21 + 20 + 18$$



M₄₇ Symmetry:

- 3 blue
- 2 yellow
- 6 red
- 0 black / **11 terms**

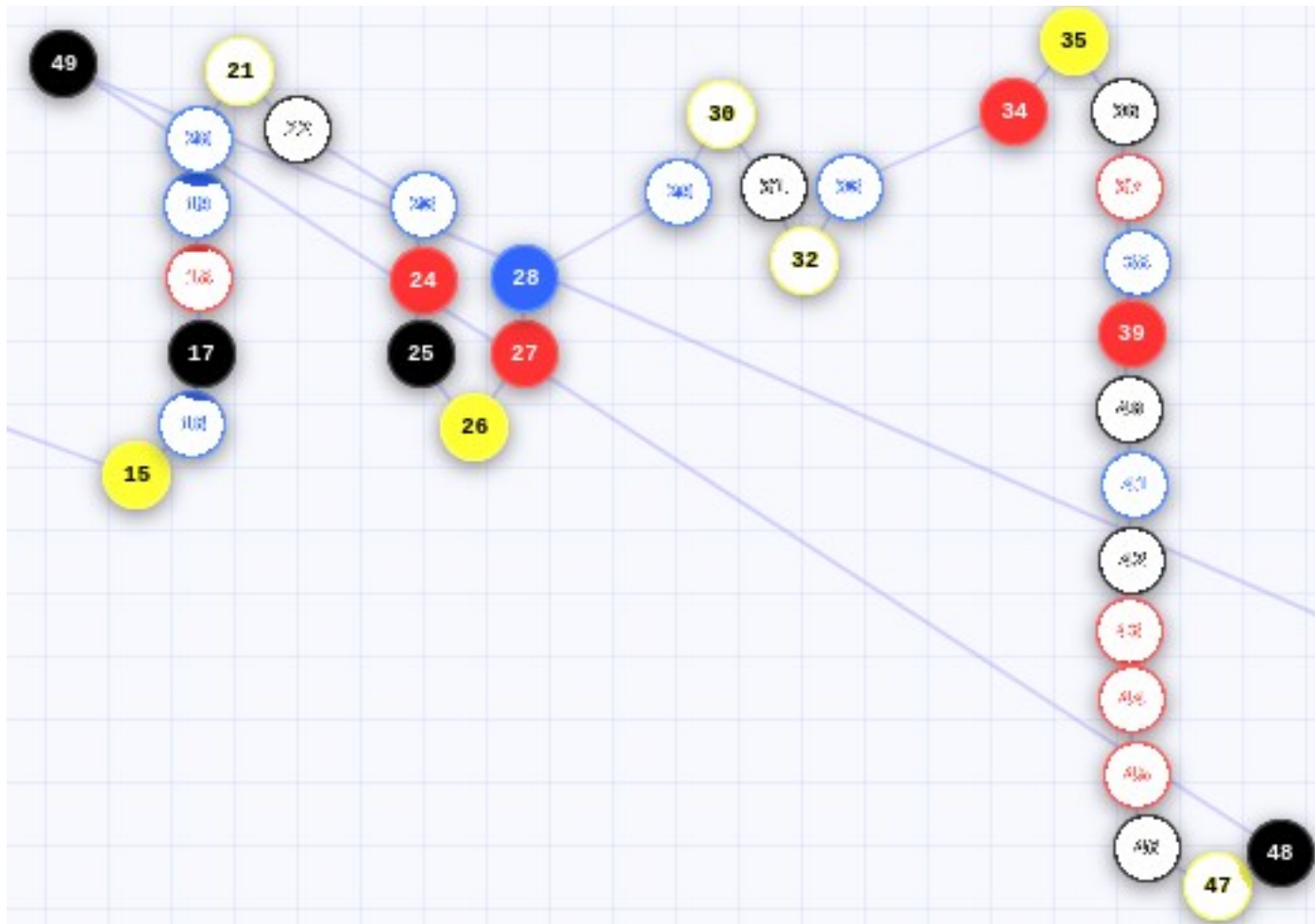
$$\underline{M48} = 46 + 39 + 34 + 31 + 30 + 28 + 27 + 24 + 23 + 20 + 16$$



M48 Symmetry:

- 4 red
- 4 blue
- 2 black / - 1 yellow / **11 terms**

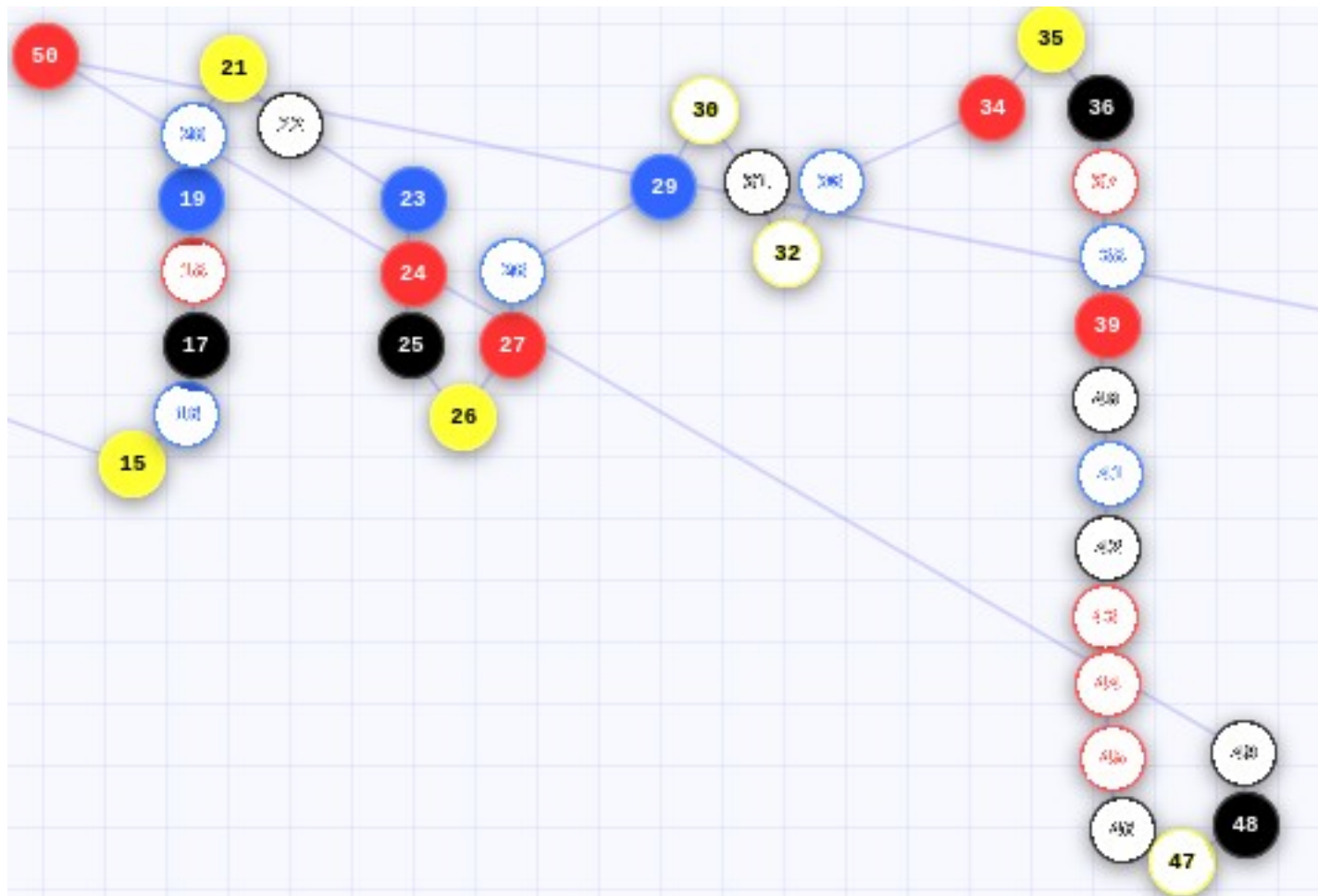
$$\underline{\text{M49}} = 48 + 39 + 35 + 34 + 28 + 27 + 26 + 25 + 24 + 17 + 15$$



M49 Symmetry:

- 3 yellow
- 3 black
- 4 red / - 1 blue / **11 terms**

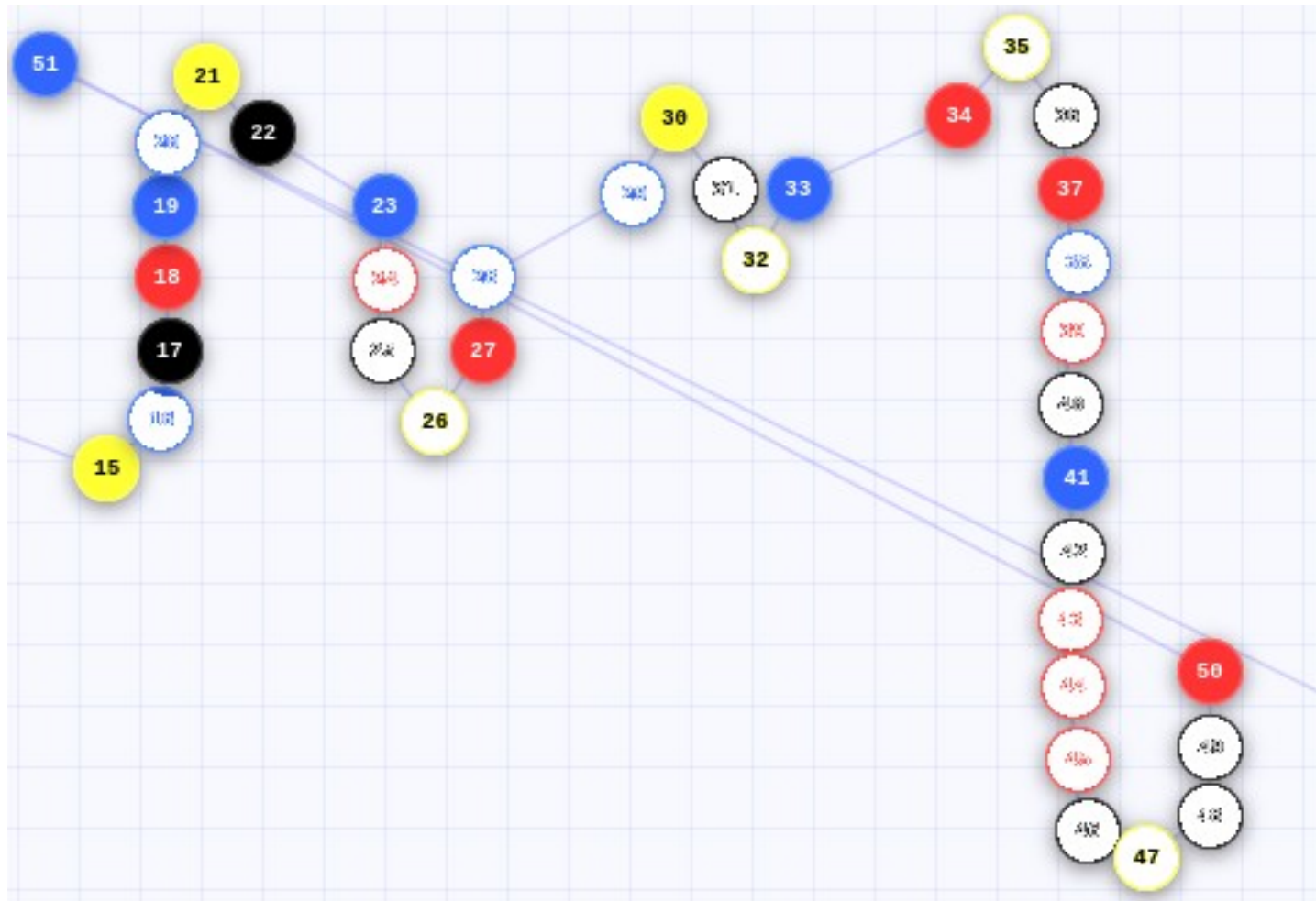
$$\text{M50} = 48 + 39 + 36 + 35 + 34 + 29 + 27 + 26 + 25 + 24 + 23 + 21 + 19 + 17 + 15$$



M50 Symmetry:

- 4 yellow
- 4 red
- 4 black / - 3 blue / **15 terms**

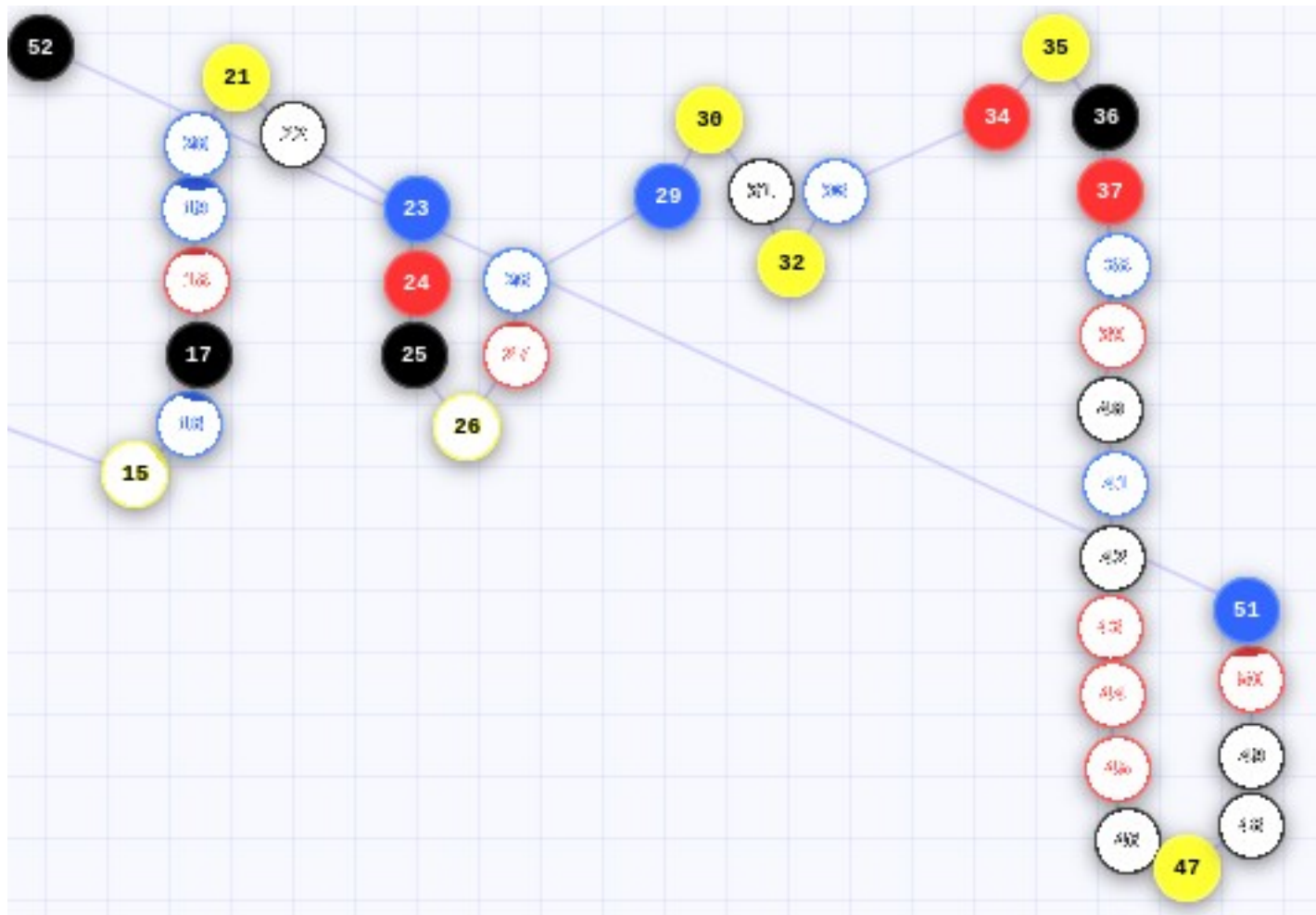
$$\underline{M51} = 50 + 37 + 34 + 33 + 30 + 27 + 23 + 22 + 21 + 19 + 18 + 17 + 15$$



M51Symmetry:

- 5 red/ - 4 blue/ - 3 yellow/ - 2 black / **13 terms**

$$M52 = 51 + 47 + 37 + 36 + 35 + 34 + 33 + 32 + 30 + 29 + 25 + 24 + 23 + 21 + 17$$



M52 Symmetry:

- 3 black
- 3 red
- 3 blue / 5 yellow / **17 terms**

Mersennes Exponents as SUM of smallest Mersennes Exponents:

1279 last number:

$$82589933 + 43112609 + 3021377 + 2976221 + 1398269 + 1257787 + 859433 + 756839 + 132049 + 110503 + 21701 + 19937 + 11213 + 9689 + 2281 = \mathbf{136279841}$$

$$77232917 + 3021377 + 1257787 + 859433 + 132049 + 44497 + 11213 + 9941 + 9689 + 4253 + 3217 + 2281 + 1279 = \mathbf{82589933}$$

$$57885161 + 13466917 + 2976221 + 1398269 + 1257787 + 110503 + 44497 + 23209 + 21701 + 19937 + 11213 + 9689 + 4253 + 2281 + 1279 = \mathbf{77232917}$$

$$57885161 + 13466917 + 1398269 + 1257787 + 86243 + 44497 + 23209 + 21701 + 19937 + 2281 + 1279 = \mathbf{74207281}$$

$$42643801 + 13466917 + 1257787 + 216091 + 132049 + 86243 + 44497 + 19937 + 11213 + 4423 + 2203 = \mathbf{57885161}$$

$$37156667 + 3021377 + 1398269 + 1257787 + 110503 + 86243 + 44497 + 19937 + 9689 + 4423 + 3217 = \mathbf{43112609}$$

$$32582657 + 3021377 + 2976221 + 1398269 + 1257787 + 756839 + 216091 + 132049 + 110503 + 86243 + 44497 + 21701 + 19937 + 9941 + 9689 = \mathbf{42643801}$$

$$30402457 + 3021377 + 1398269 + 1257787 + 859433 + 132049 + 44497 + 11213 + 9941 + 9689 + 4423 + 4253 + 1279 = \mathbf{37156667}$$

$$30402457 + 859433 + 756839 + 216091 + 132049 + 110503 + 44497 + 23209 + 19937 + 9941 + 3217 + 2281 + 2203 = \mathbf{32582657}$$

$$25964951 + 2976221 + 1398269 + 19937 + 11213 + 9941 + 9689 + 4423 + 4253 + 2281 + 1279 = \mathbf{30402457}$$

$$24036583 + 859433 + 756839 + 132049 + 86243 + 44497 + 21701 + 11213 + 9689 + 4423 + 2281 = \mathbf{25964951}$$

$$13466917 + 6972593 + 3021377 + 216091 + 132049 + 110503 + 44497 + 21701 + 19937 + 11213 + 9689 + 4253 + 2281 + 2203 + 1279 = \mathbf{24036583}$$

$$13466917 + 3021377 + 2976221 + 1398269 + 44497 + 23209 + 21701 + 19937 + 9941 + 9689 + 4253 = \mathbf{20996011}$$

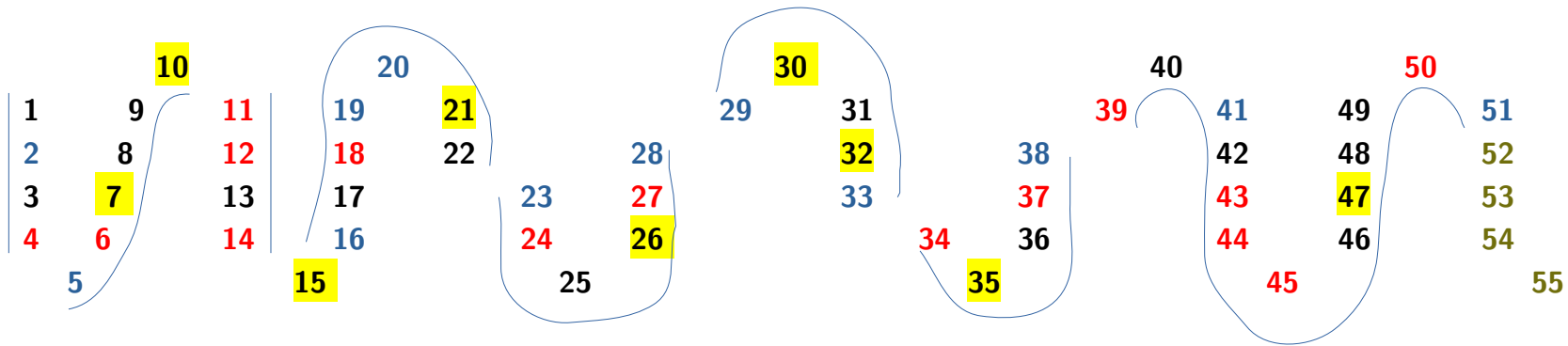
$$6972593 + 3021377 + 2976221 + 216091 + 132049 + 86243 + 44497 + 9941 + 4423 + 2203 + 1279 = \mathbf{13466917}$$

$$2976221 + 1398269 + 1257787 + 756839 + 216091 + 132049 + 86243 + 44497 + 23209 + 21701 + 19937 + 11213 + 9941 + 9689 + 4423 + 2281 + 2203 = \mathbf{6972593}$$

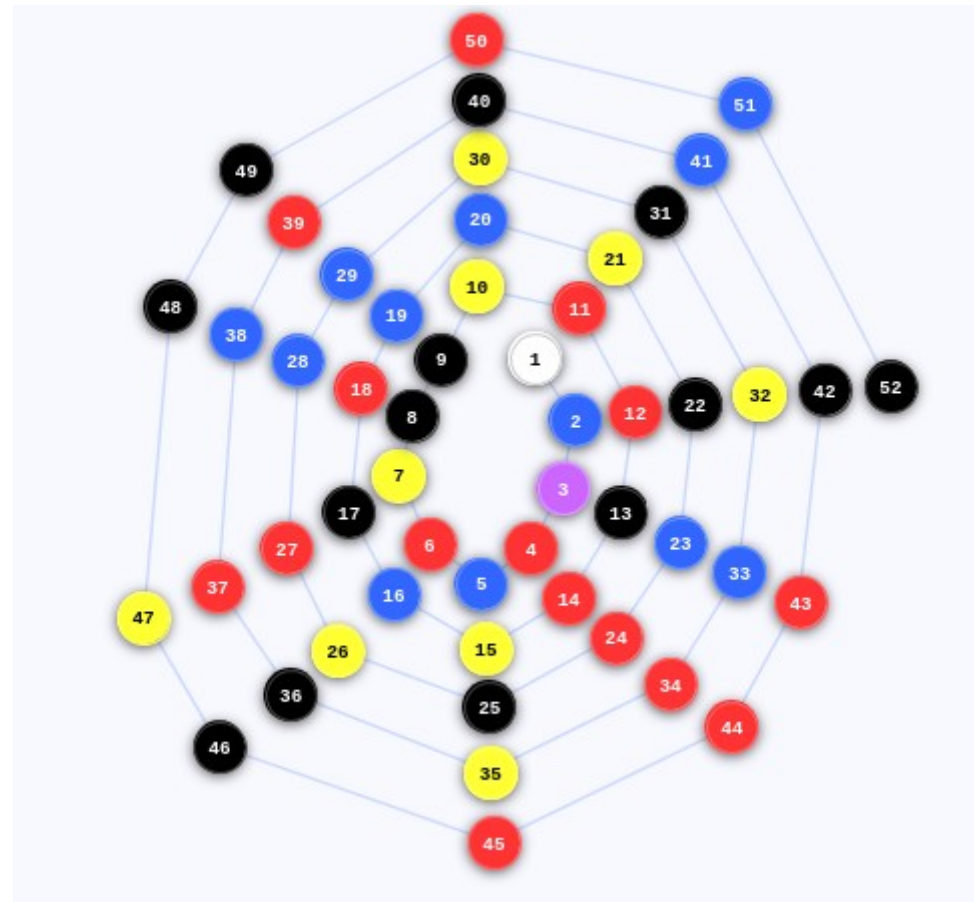
fail **3021377** for single nr.

Curved Geometry arrangement by shells:

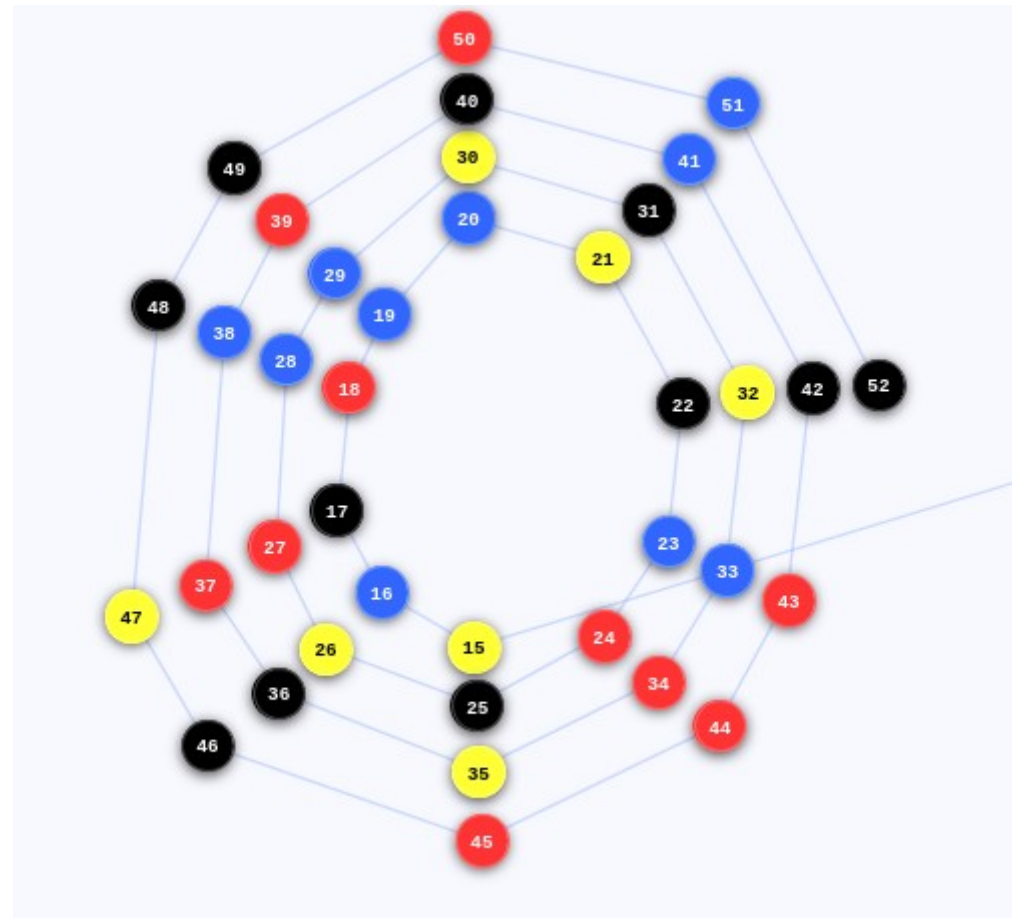
Shell 1. Shell 2. Shell 3. Shell 4. Shell 5. Shell 6. Shell 7. Shell 8. Shell 9.



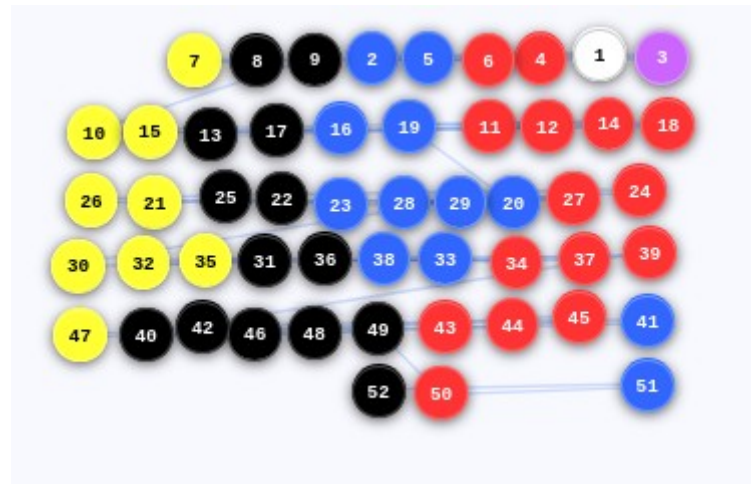
Spider Spiral Geometry - Mersennes Exponents:



Mersennes Exponents from M32 Spiral Spider Geometry:



Symmetry By colors (end digits) GEOMETRY:



M1 -M10

If we consider M1 and M3 to be placeholder for black and yellow:

Symmetry: -2 red

-2 blue

-3 yellow

-3 black

M20 ...

Symmetry: -4 blue

-2 black

-2 yellow

-2 red

M30 ...

Symmetry: -3 yellow

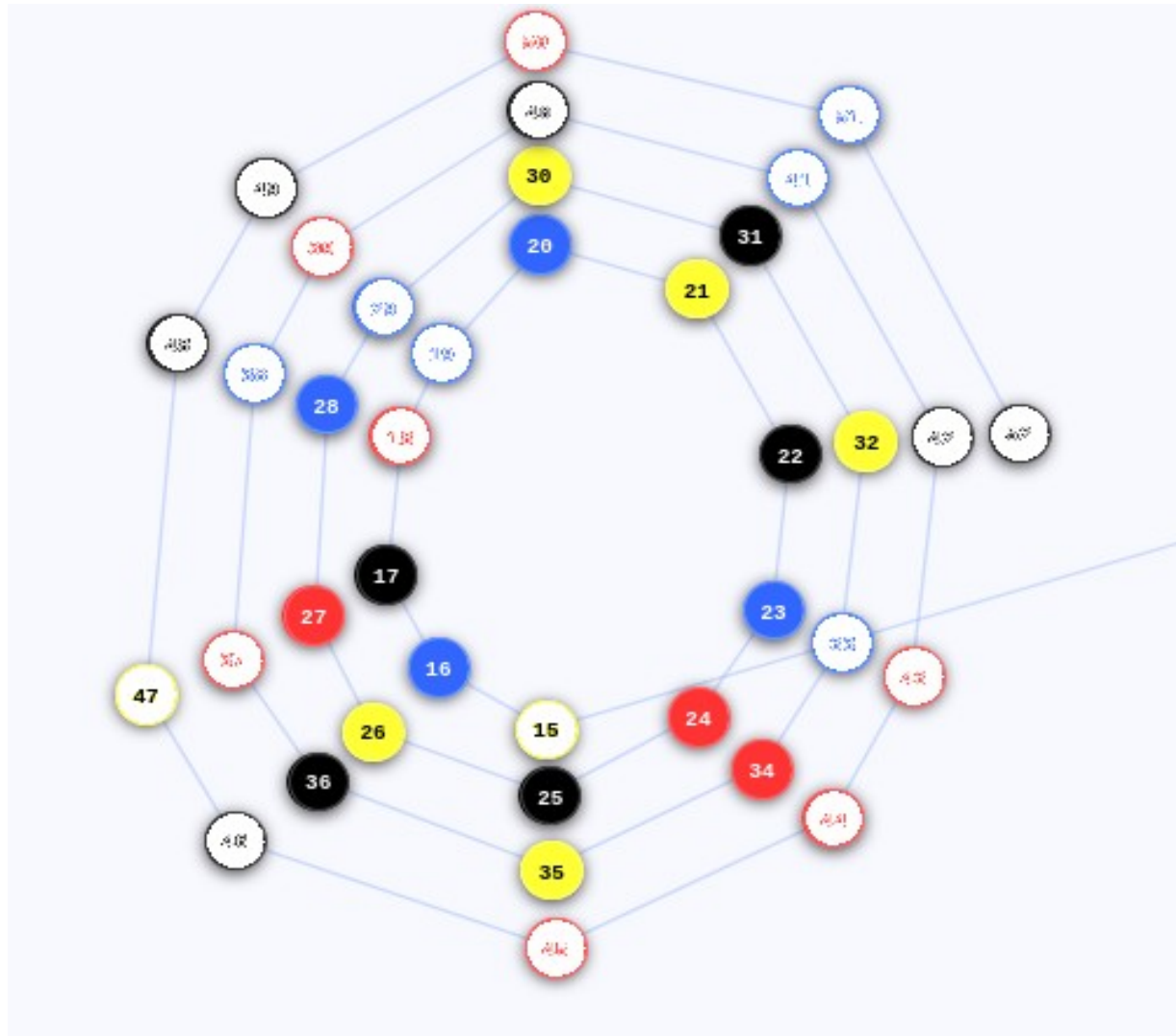
-3 red
-2 black
-2 blue

M40...

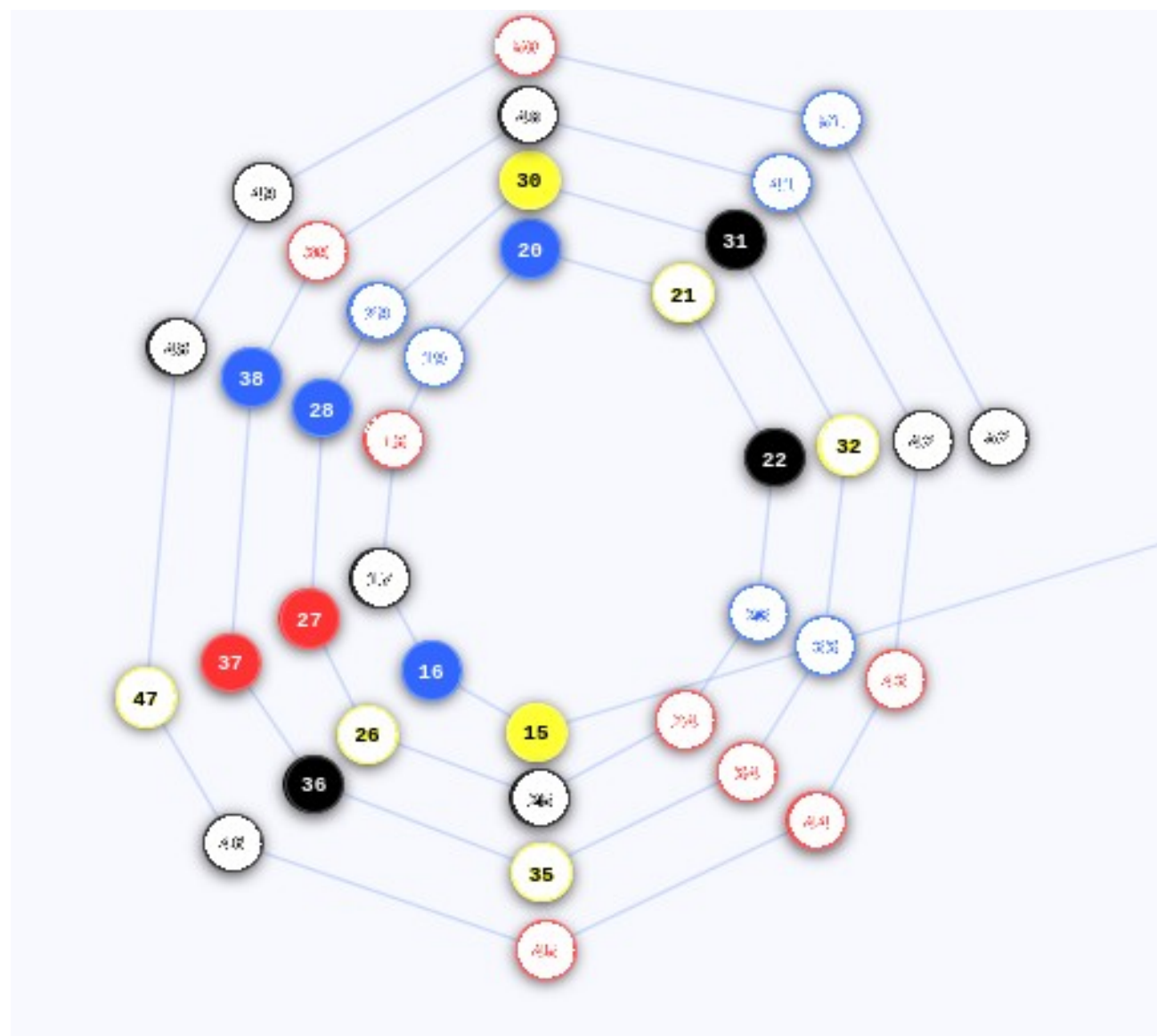
Symmetry: -1 yellow
-1 blue
-5 black
-3 red

COLOR NUMBERS SYMMETRY IN SPIDER GEOMETRY - DECOMPOSITION SUM

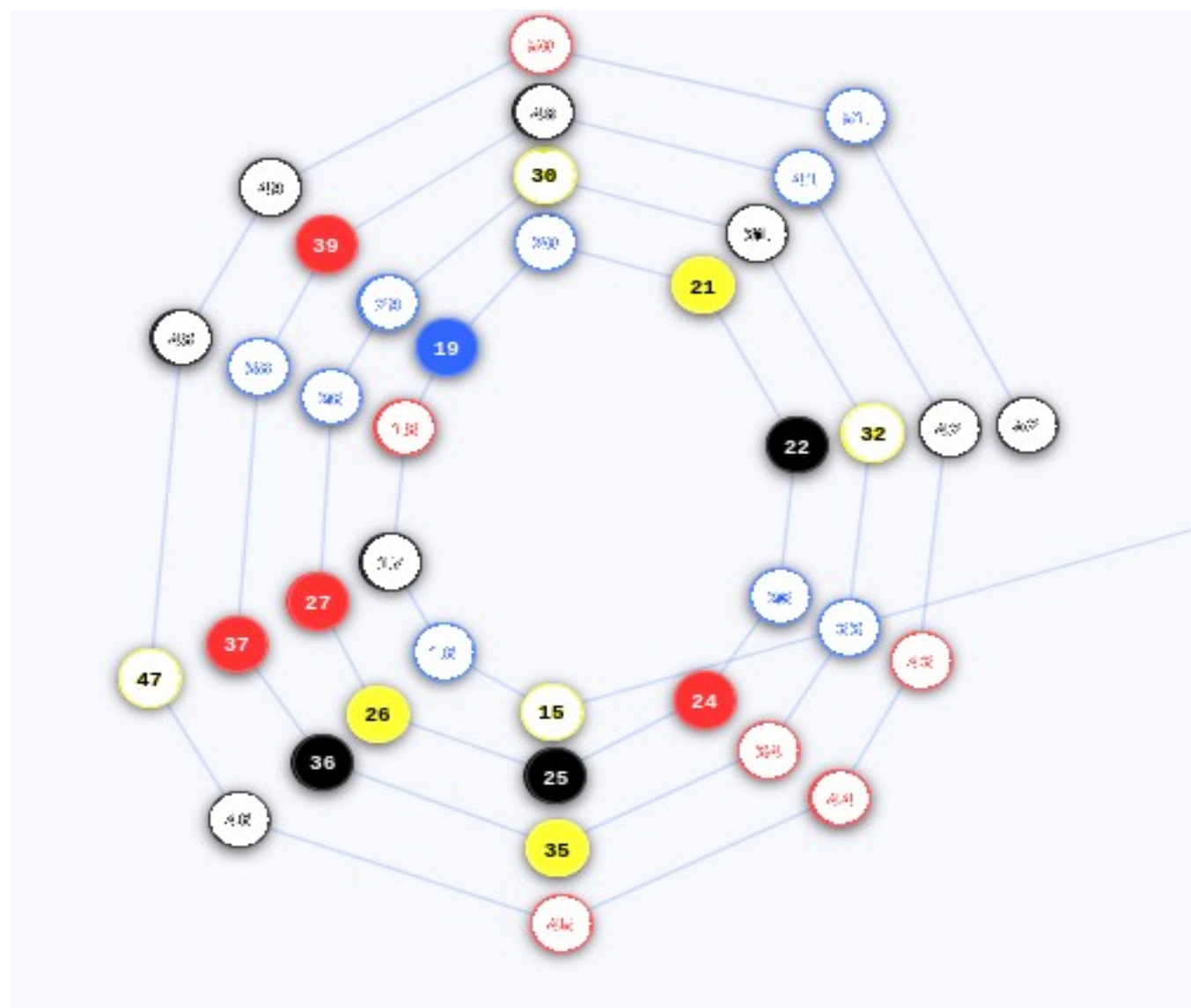
M38:



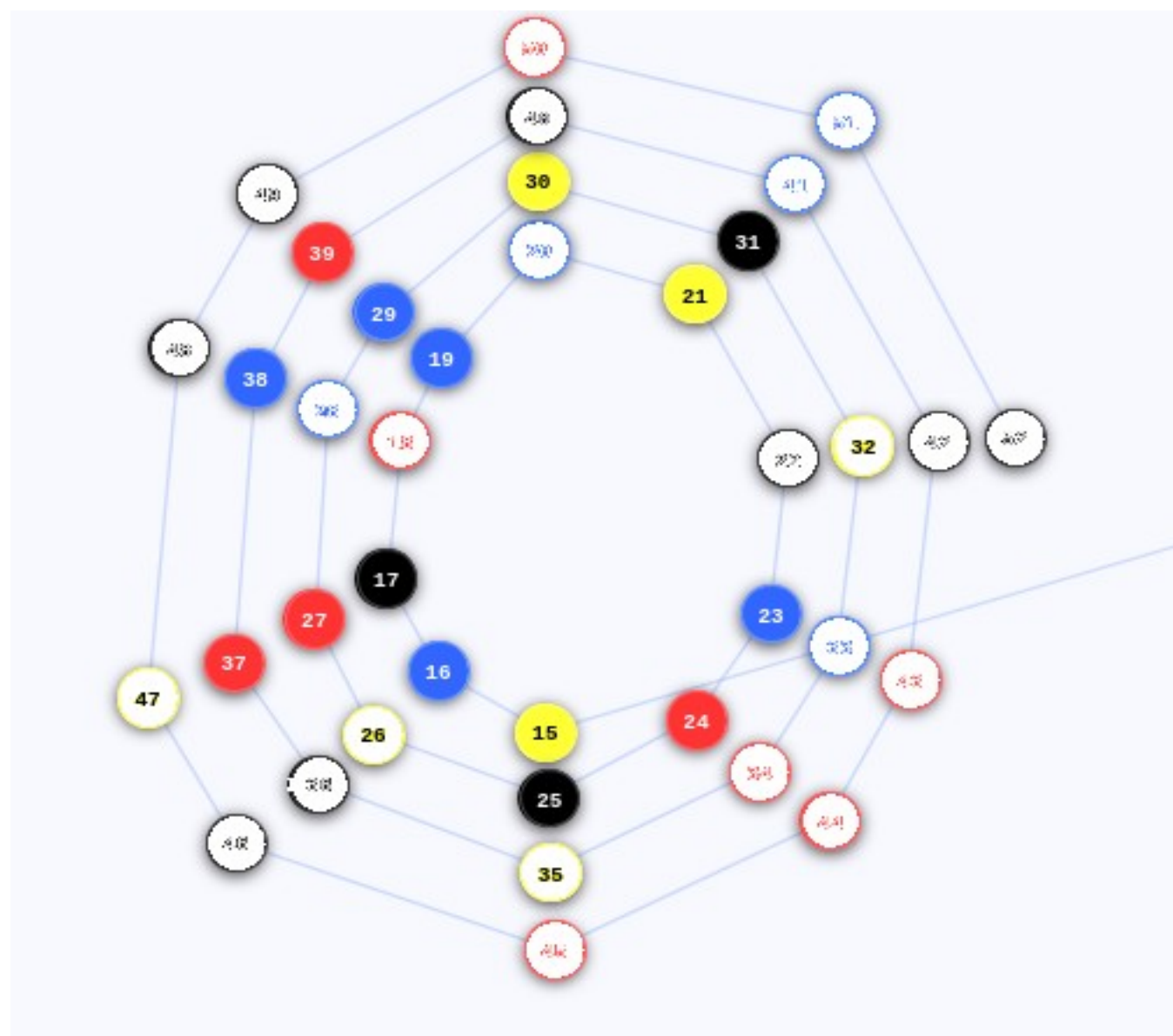
M39:



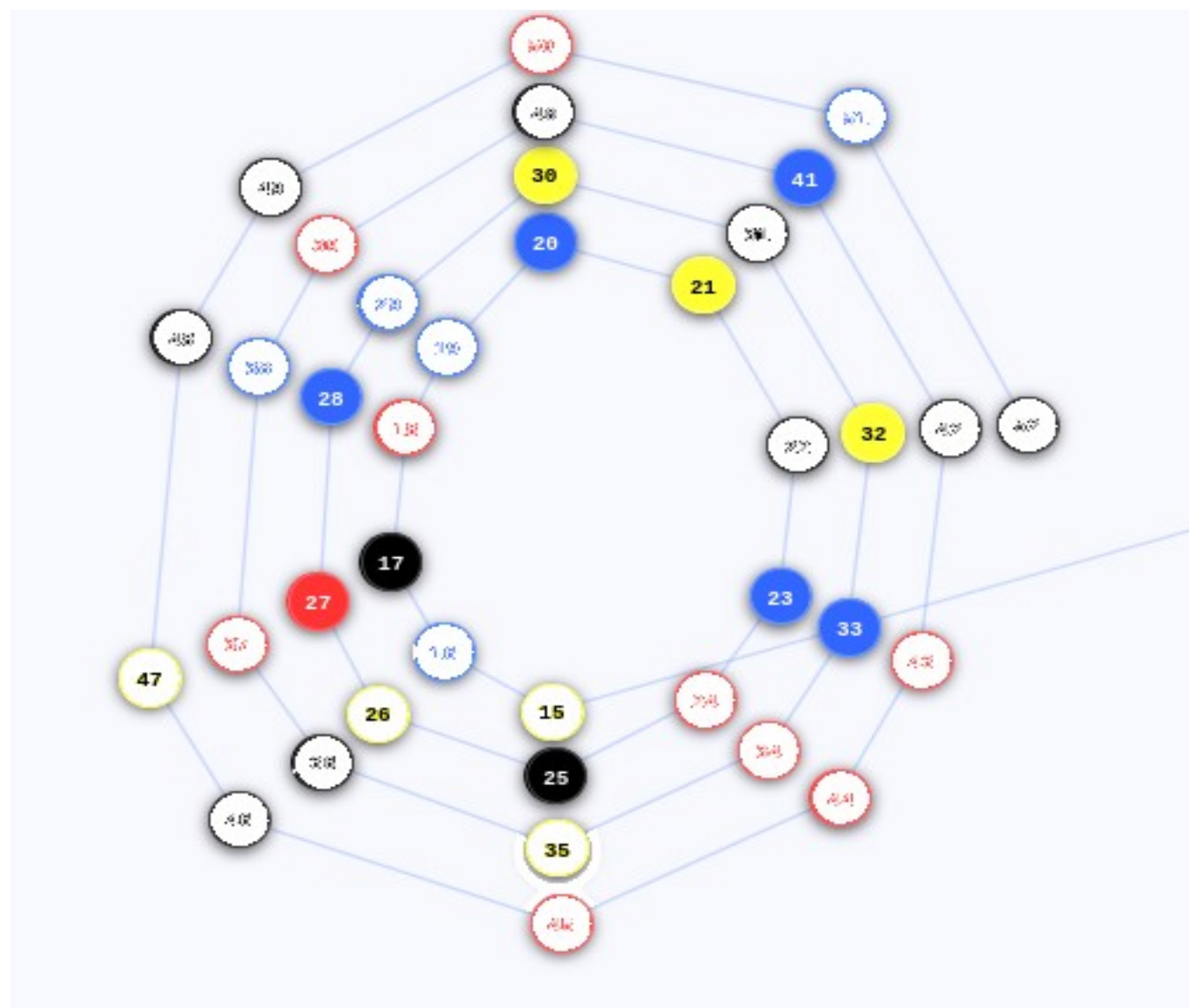
M40:



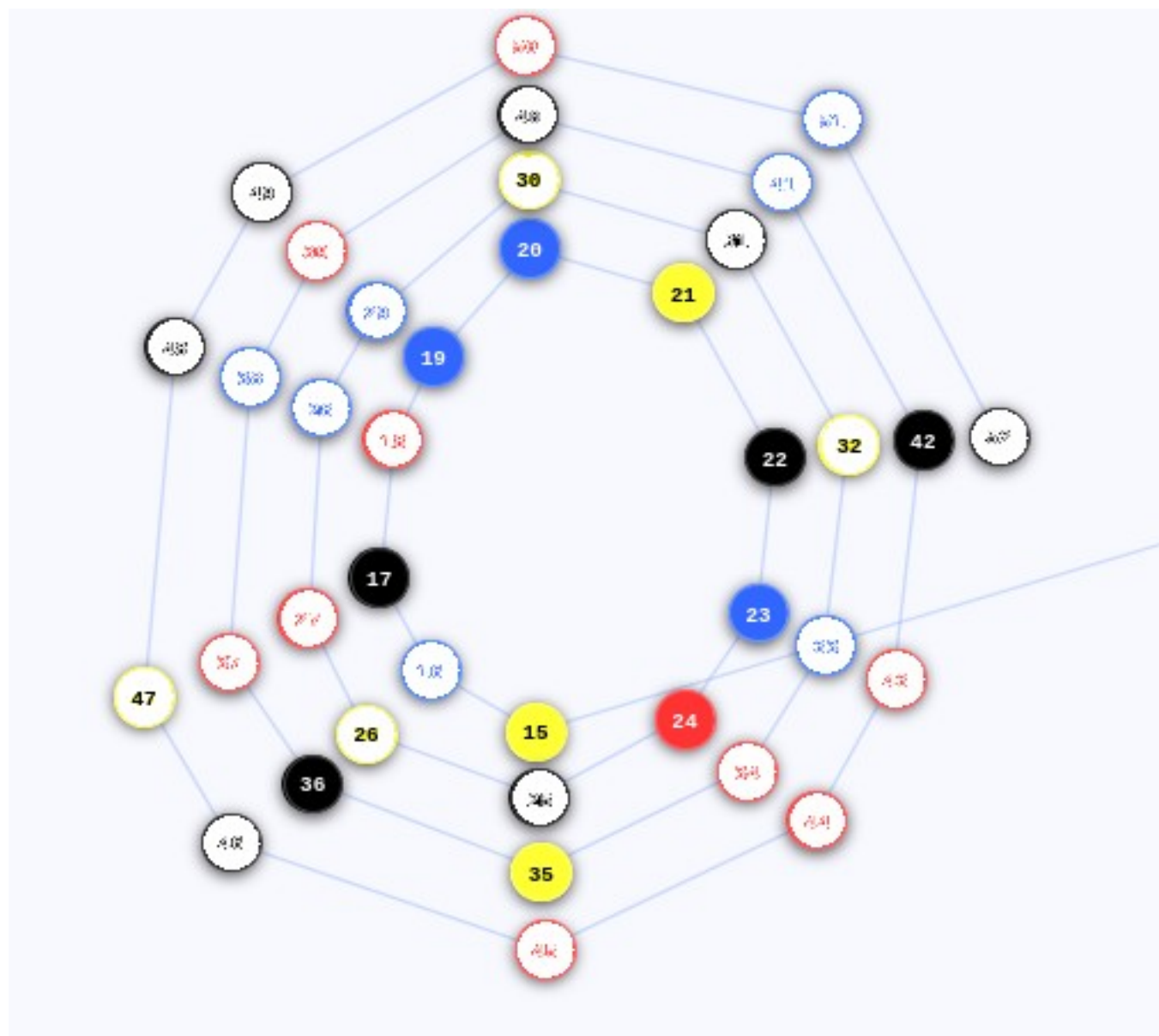
M41:



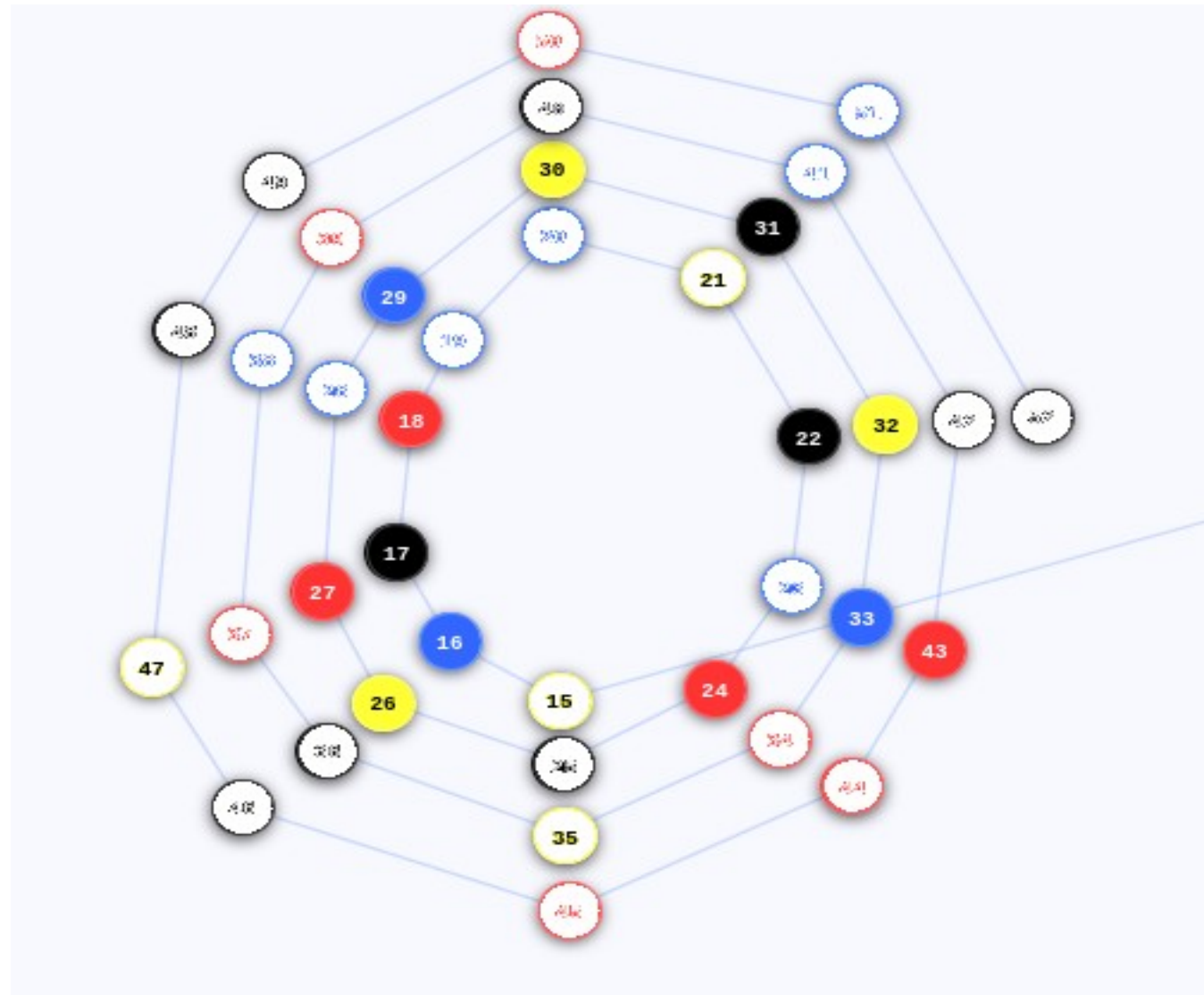
M42:



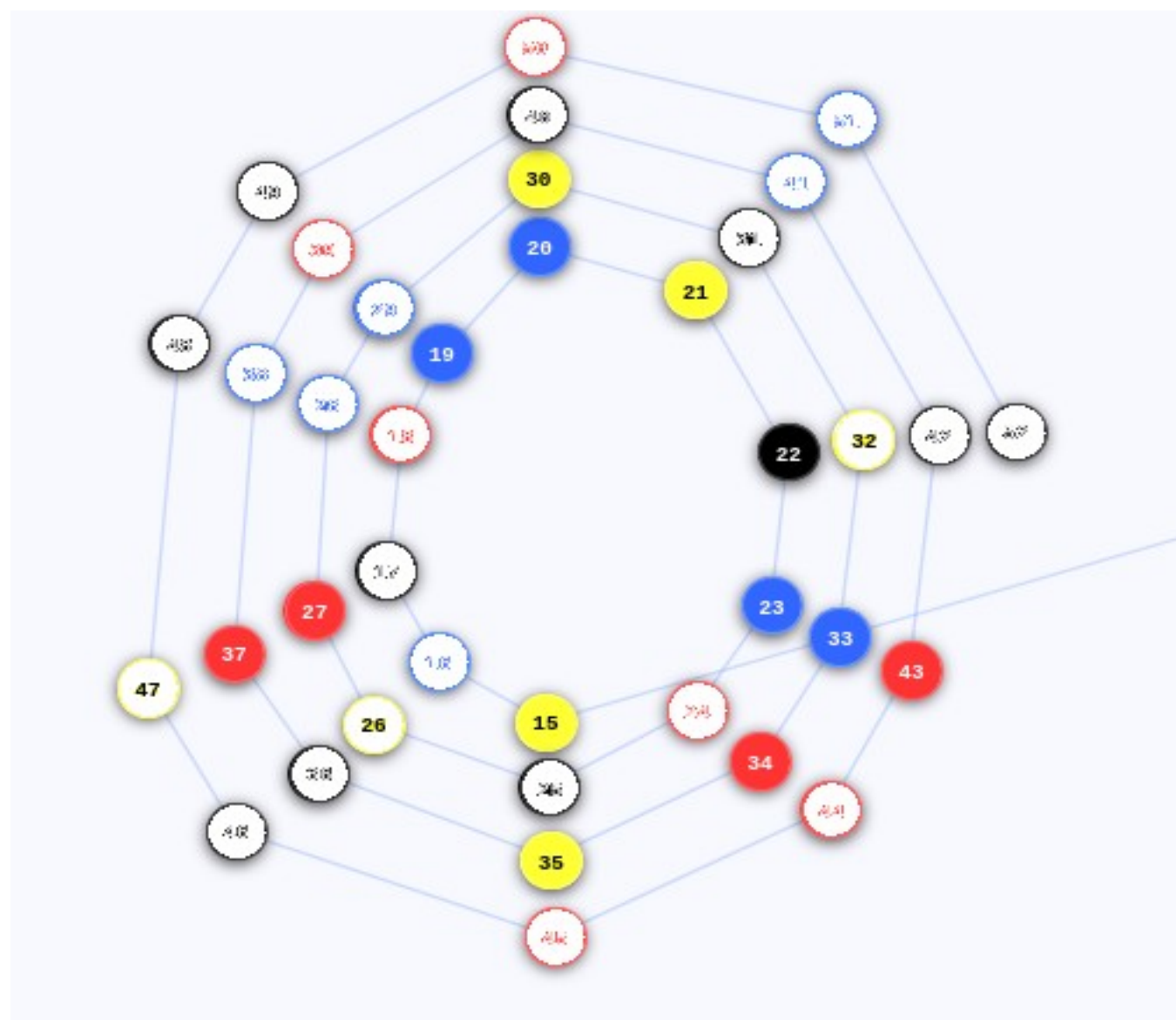
M43:



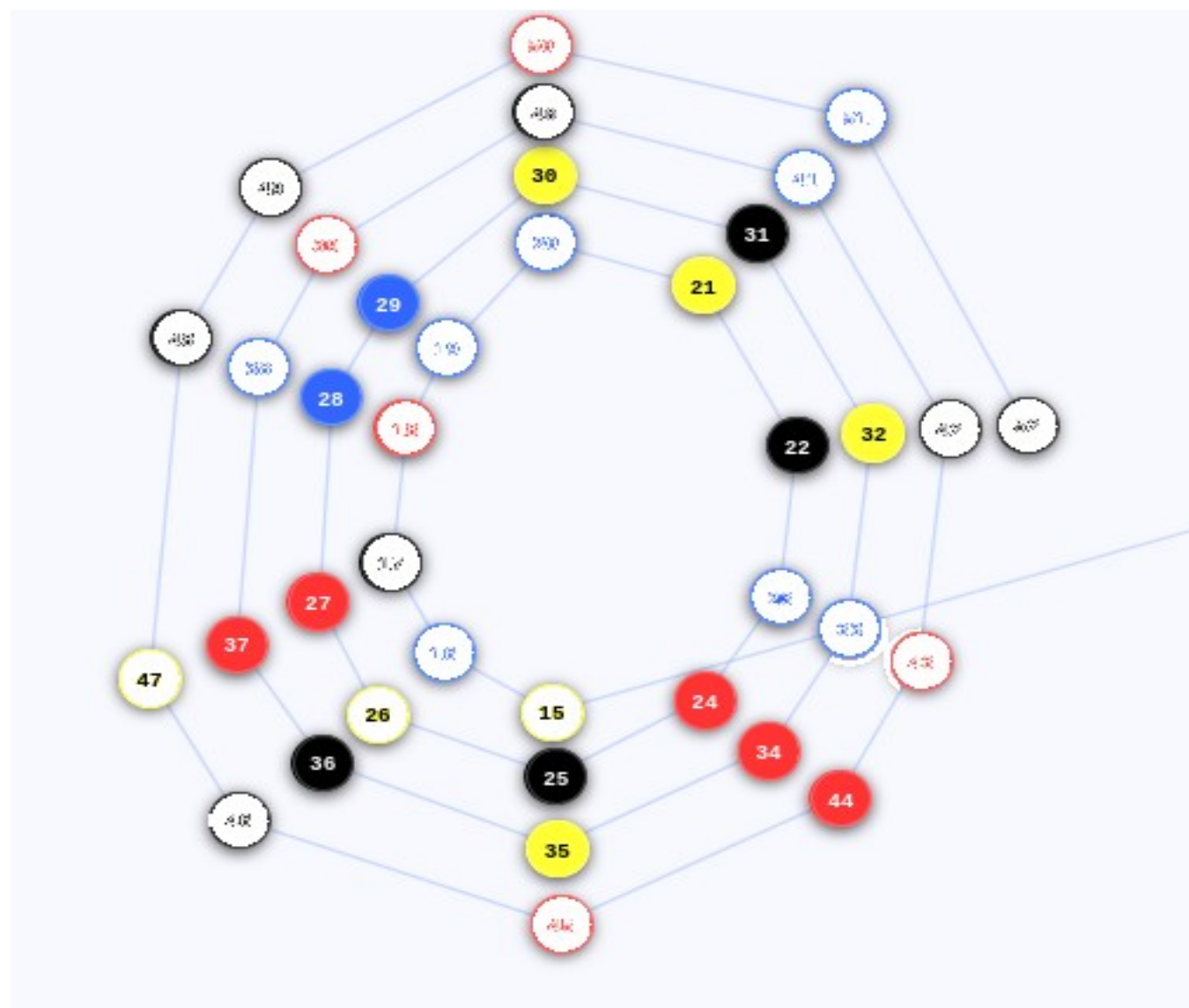
M44:



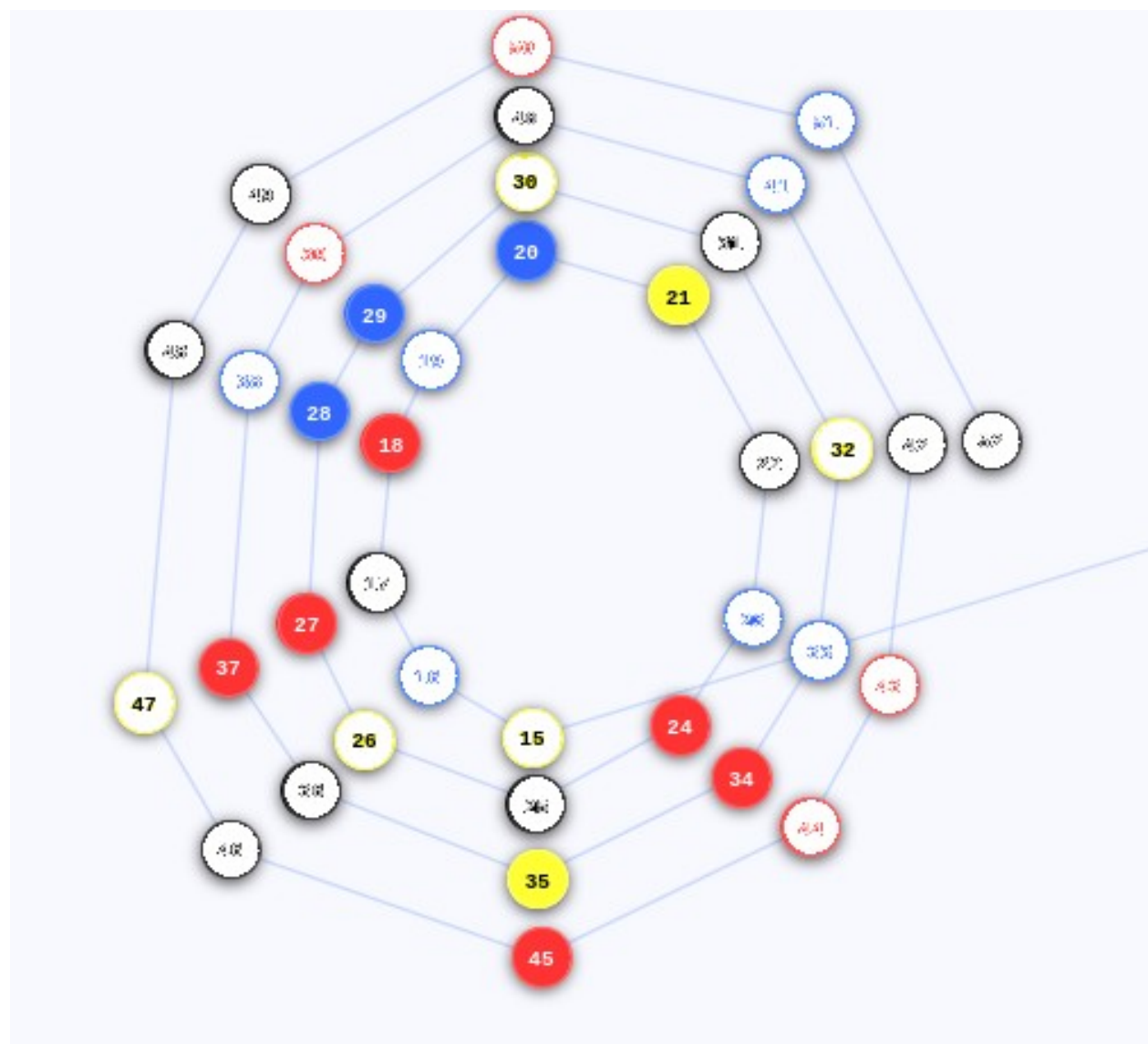
M45:



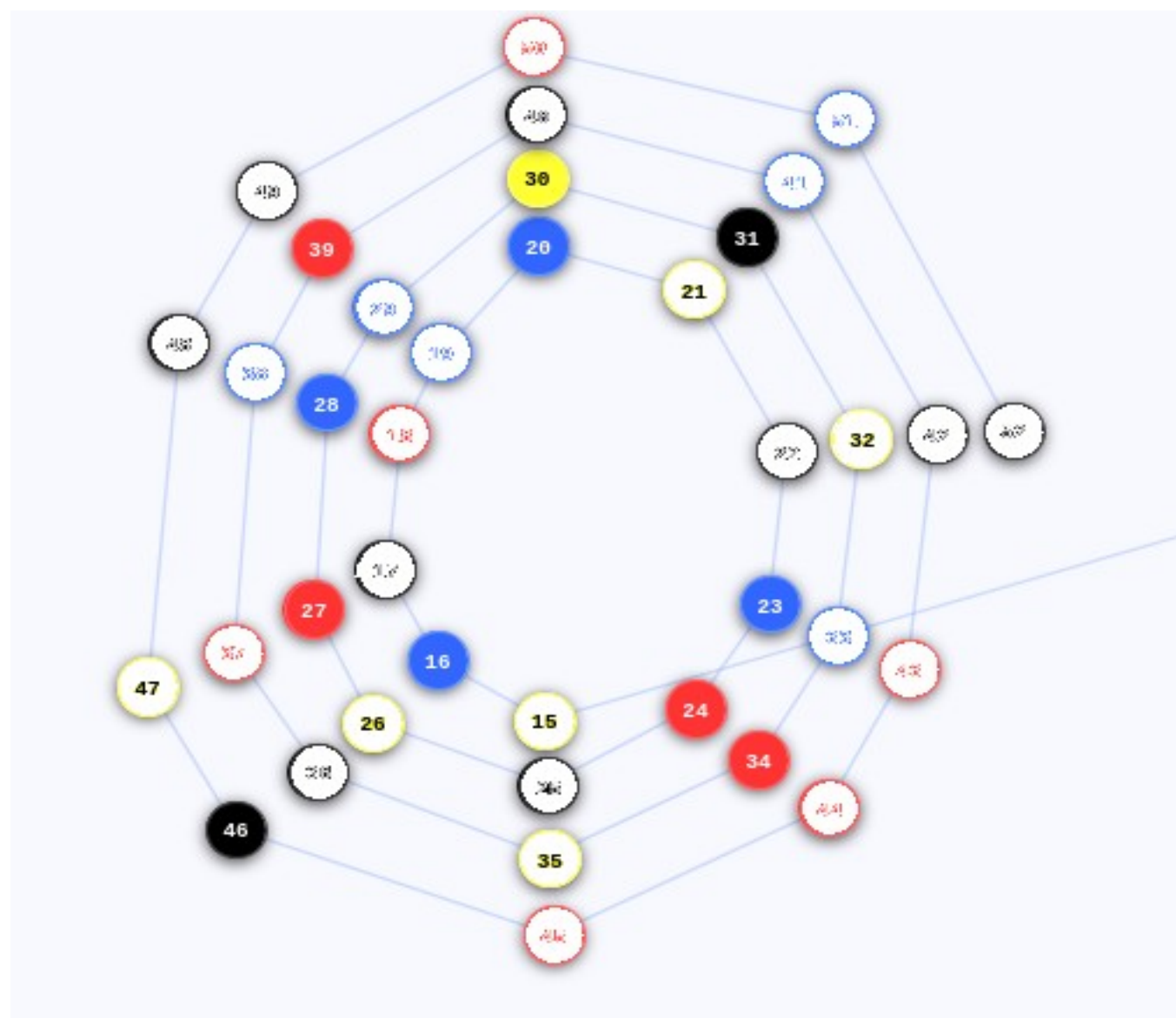
M46:



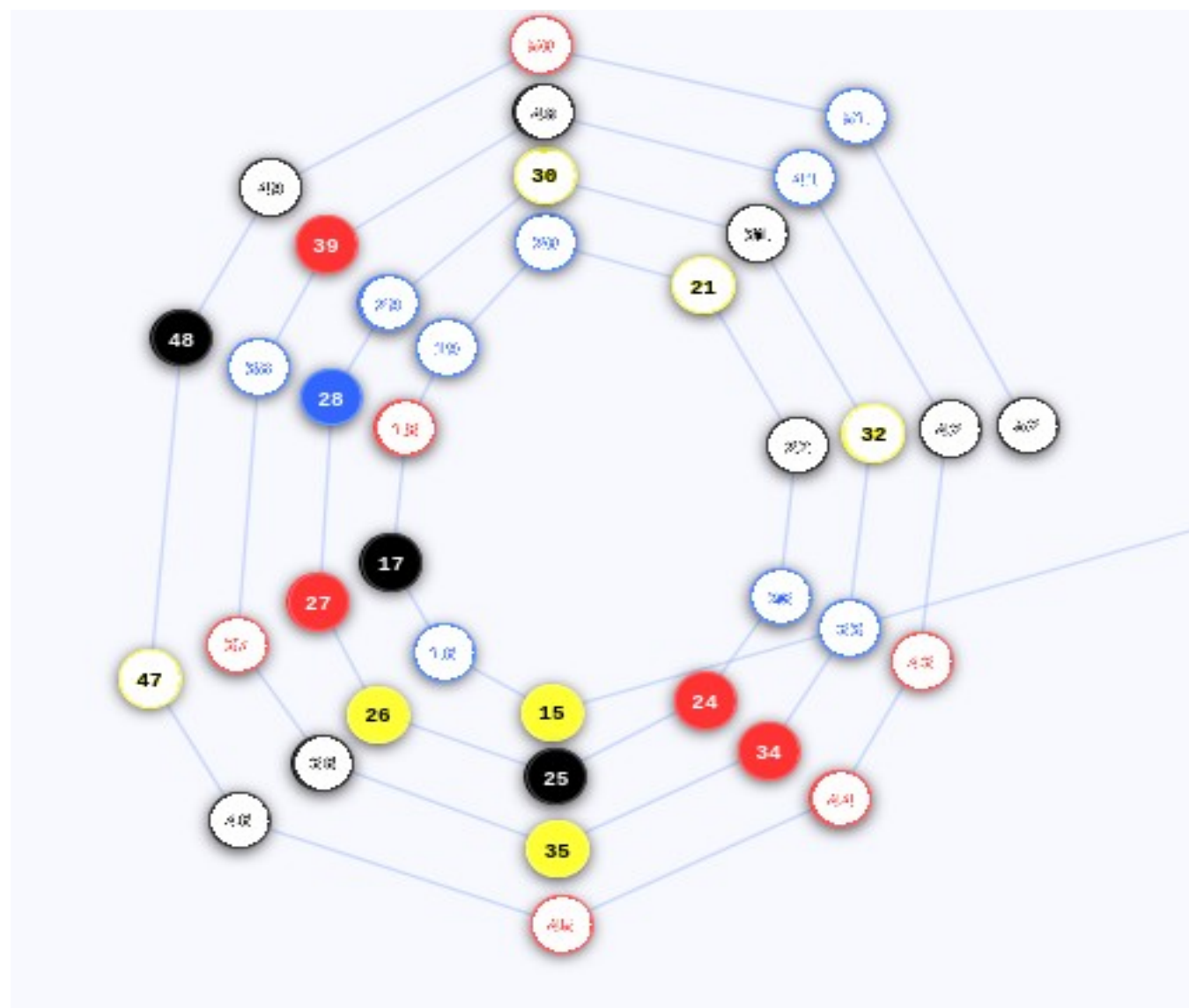
M47:



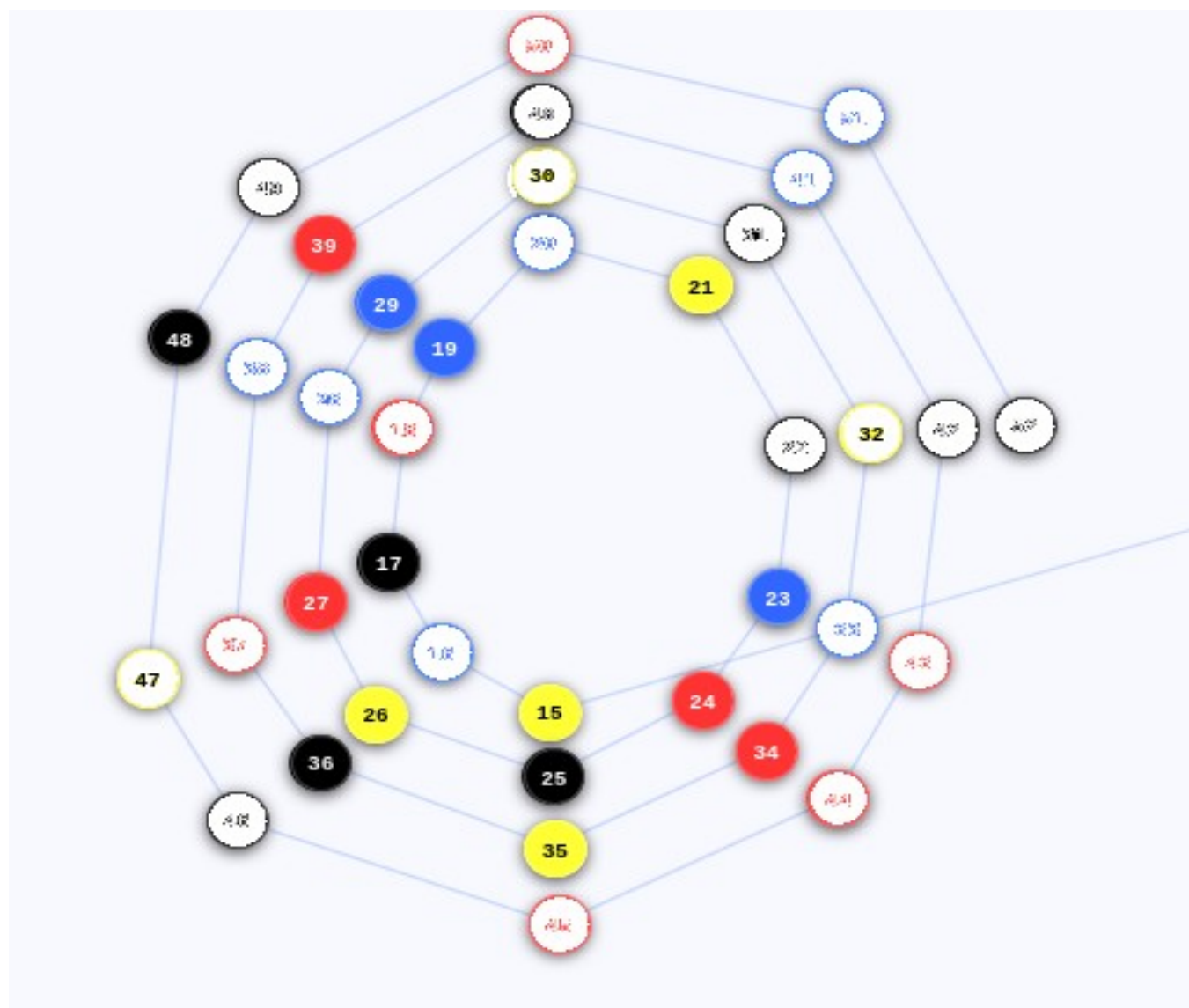
M48:



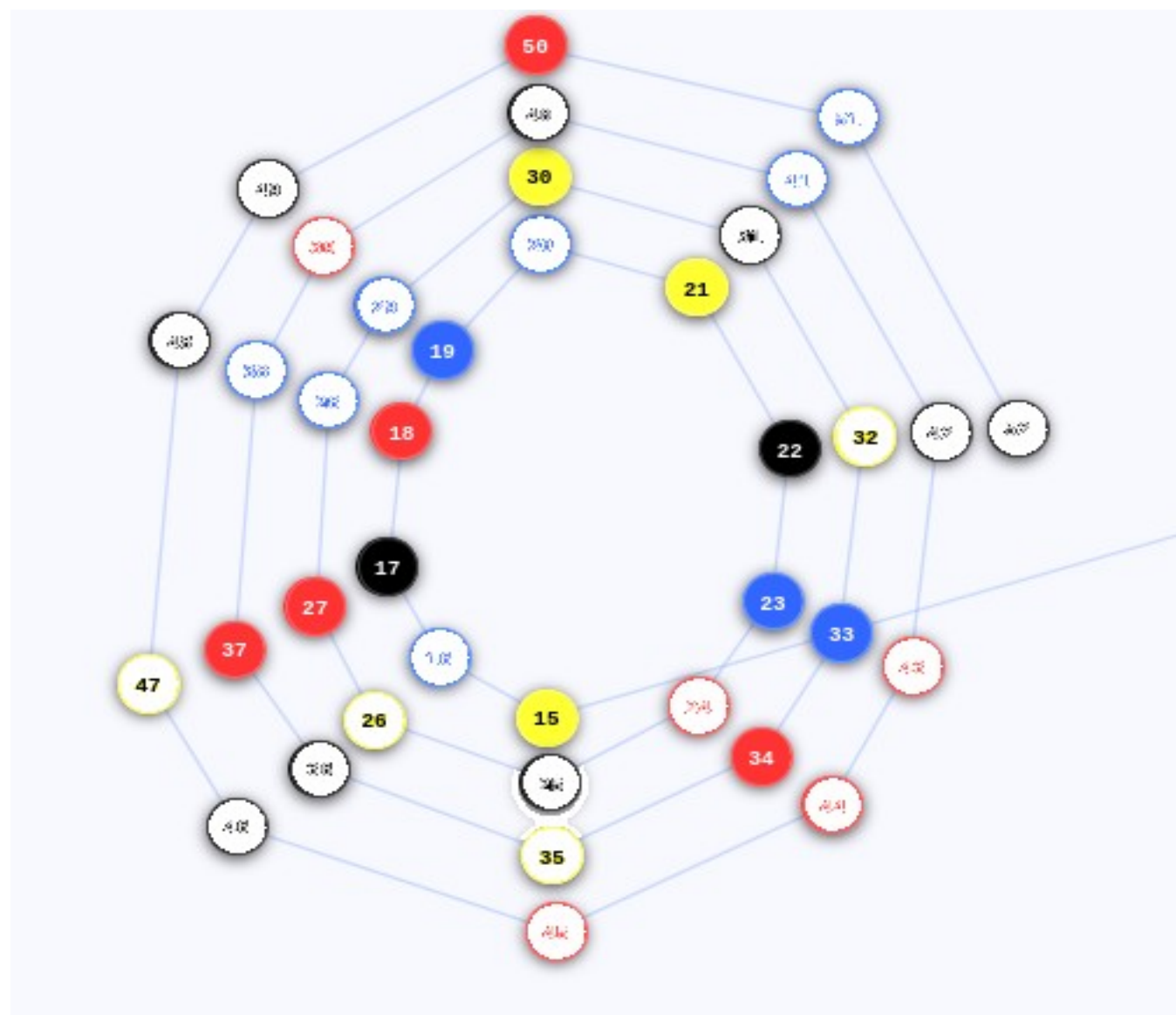
M49:



M50:



M51:



M52:

