

Study Mersennes Exponents - Geometry and Decomposition framework

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GitHub: [\[gatanegro\]](#) | Zenodo: [\[Zenodo\]](#)

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:

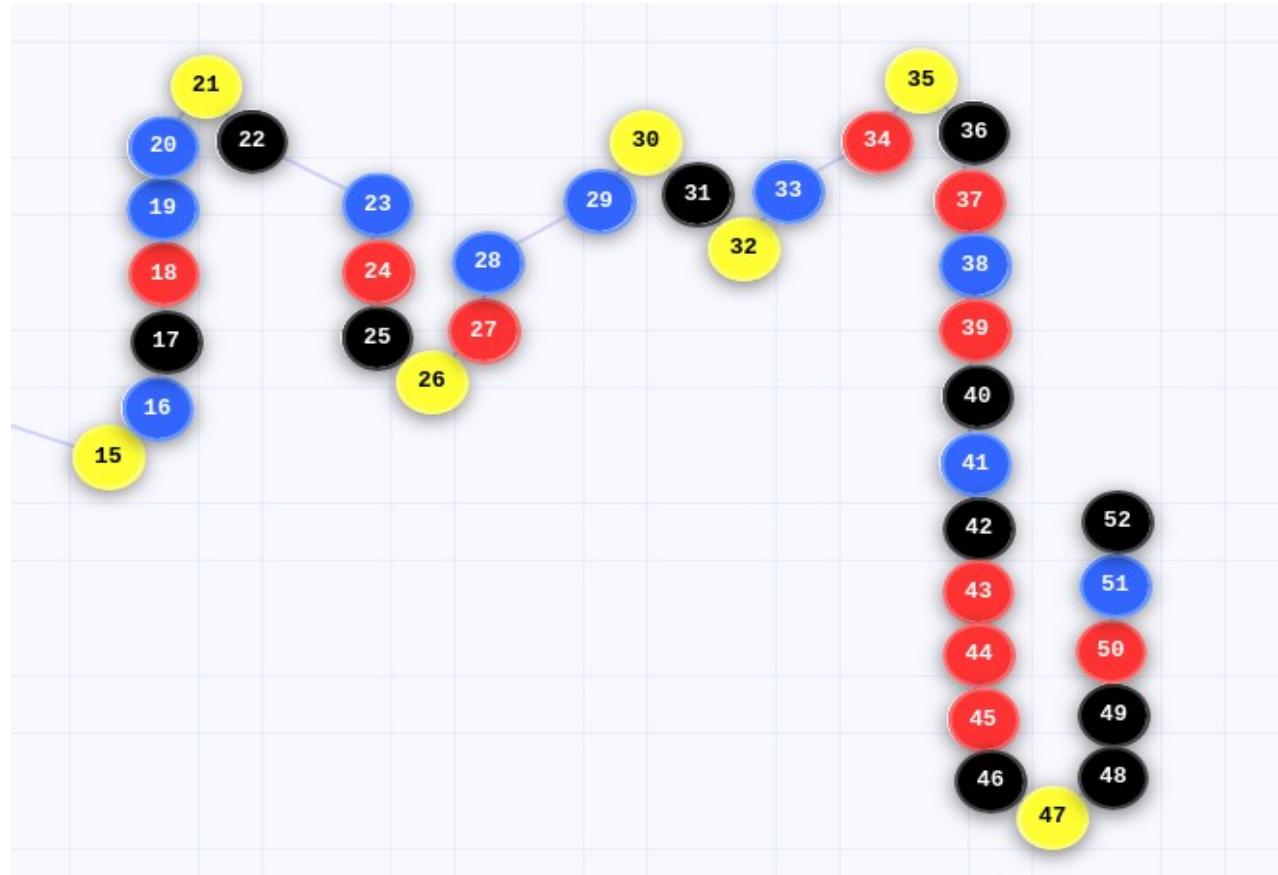
07 10 15 21 26 30 32 35 47

end digit 1:

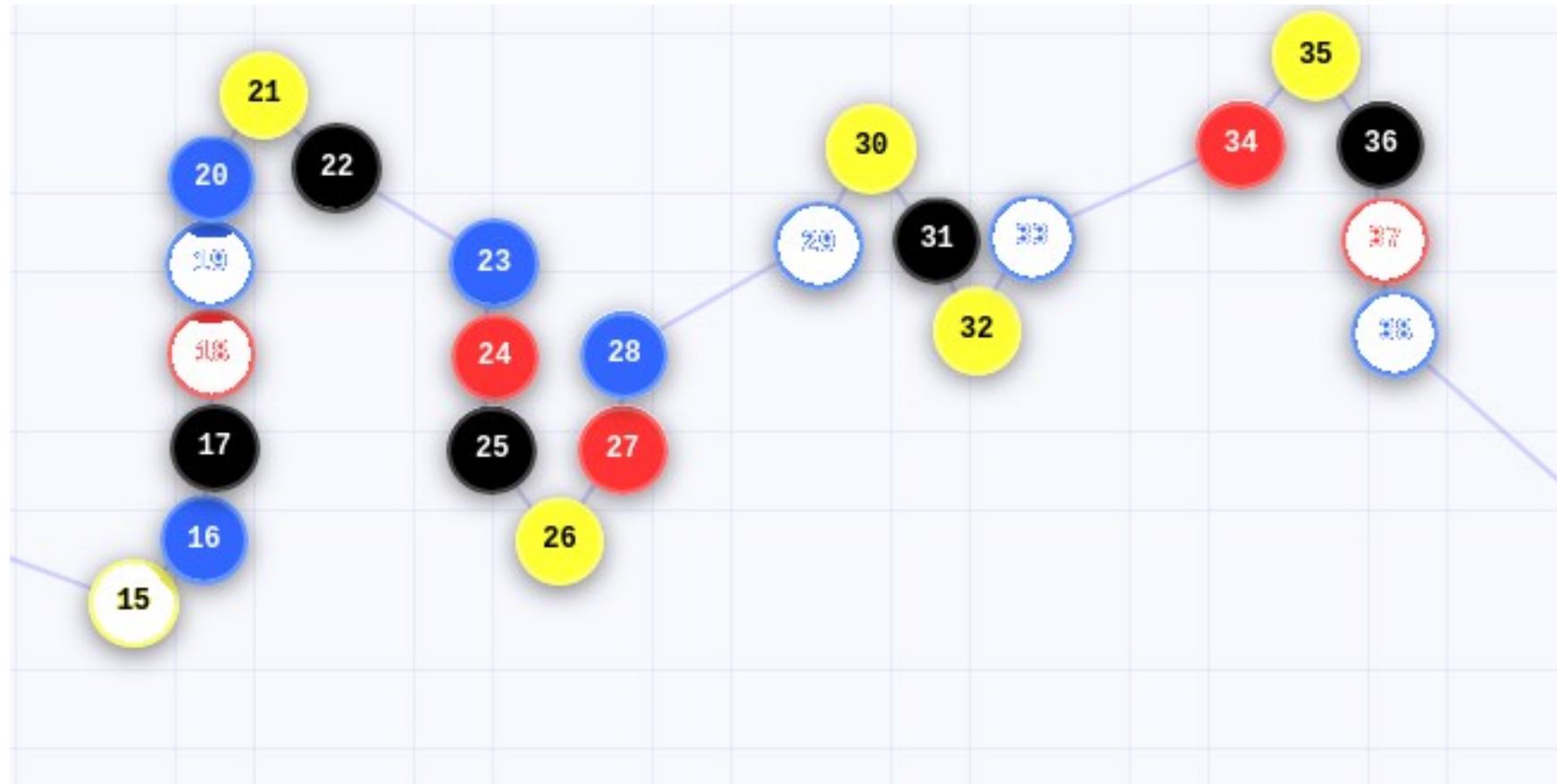
08 09 13 17 22 25 31 36 40 42 46 48 49 52

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

Curved Geometry arrangement by shells:



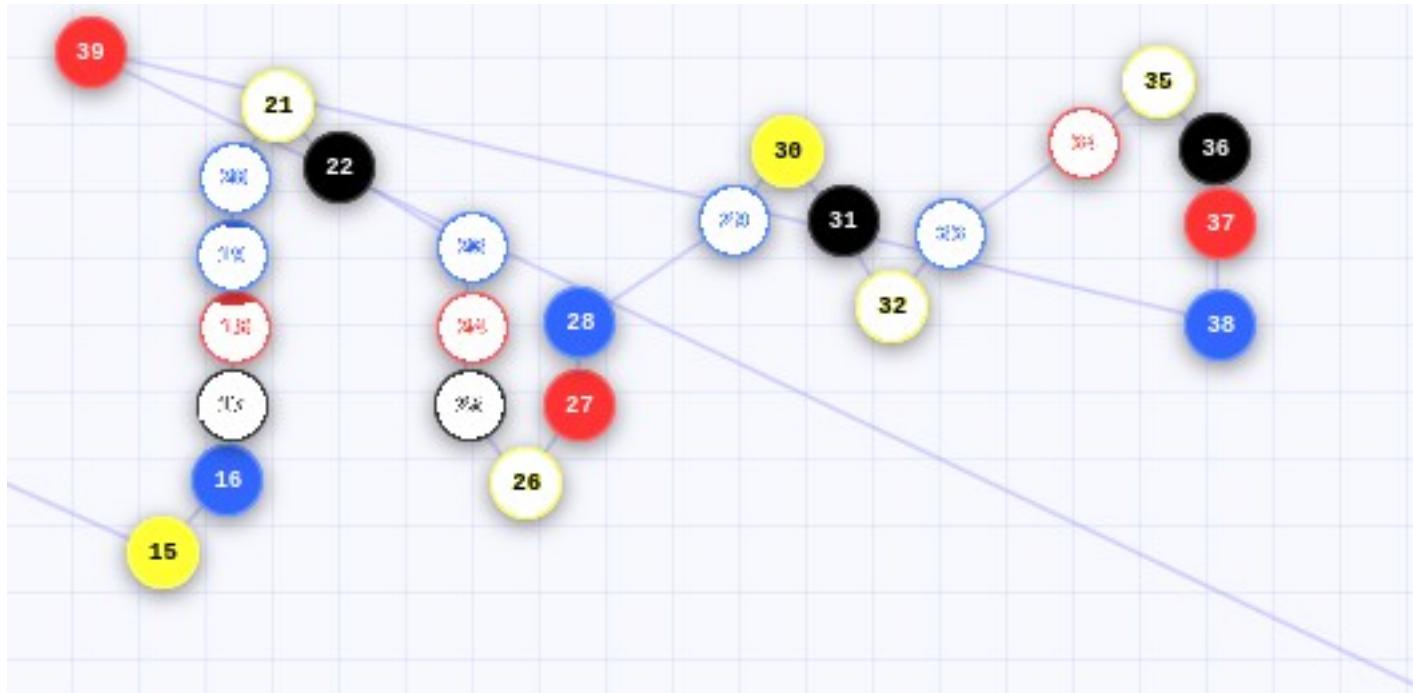
$$\underline{M38} = 36 + 35 + 34 + 32 + 31 + 30 + 28 + 27 + 26 + 25 + 24 + 23 + 22 + 21 + 20 + 17 + 16$$



M38 Symmetry:

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

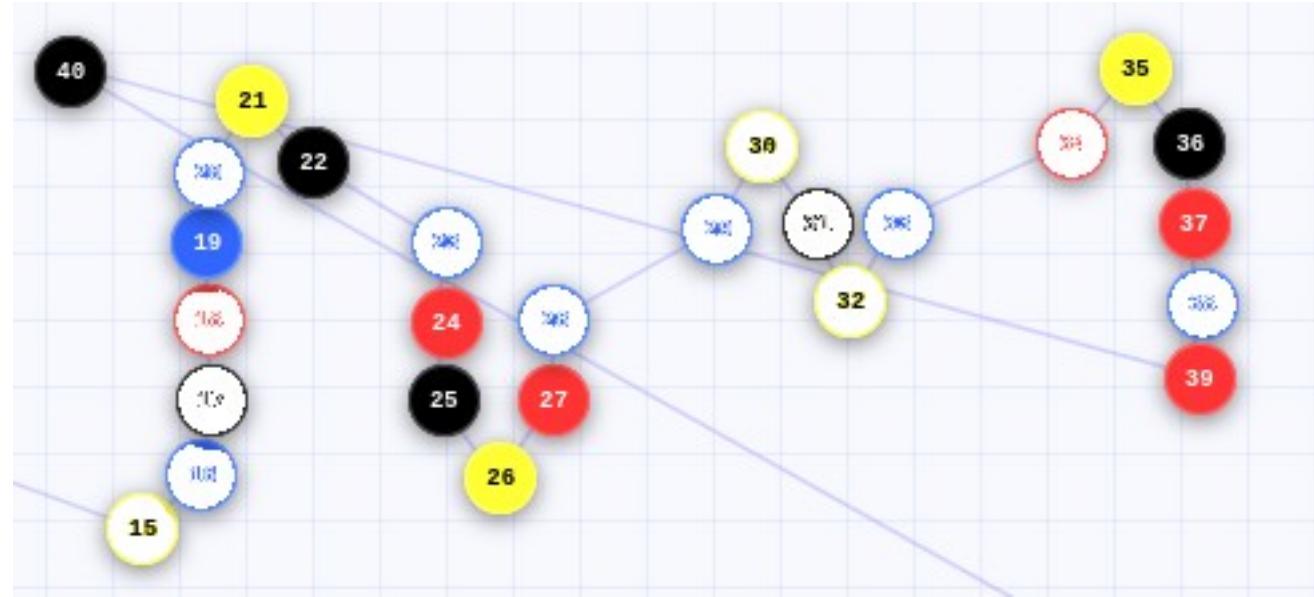
$$\text{M39} = 38 + 37 + 36 + 31 + 30 + 28 + 27 + 22 + 20 + 16 + 15$$



M39 Symmetry:

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

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

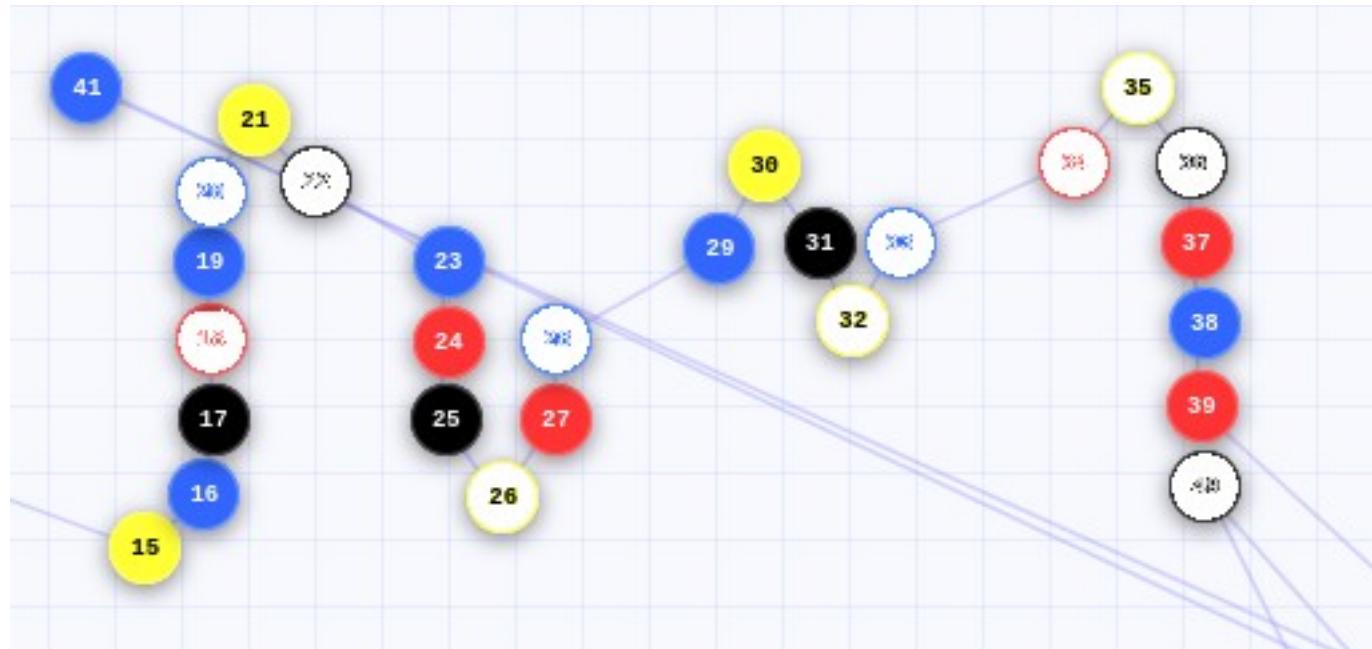


M40_Symmetry:

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

11 terms

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

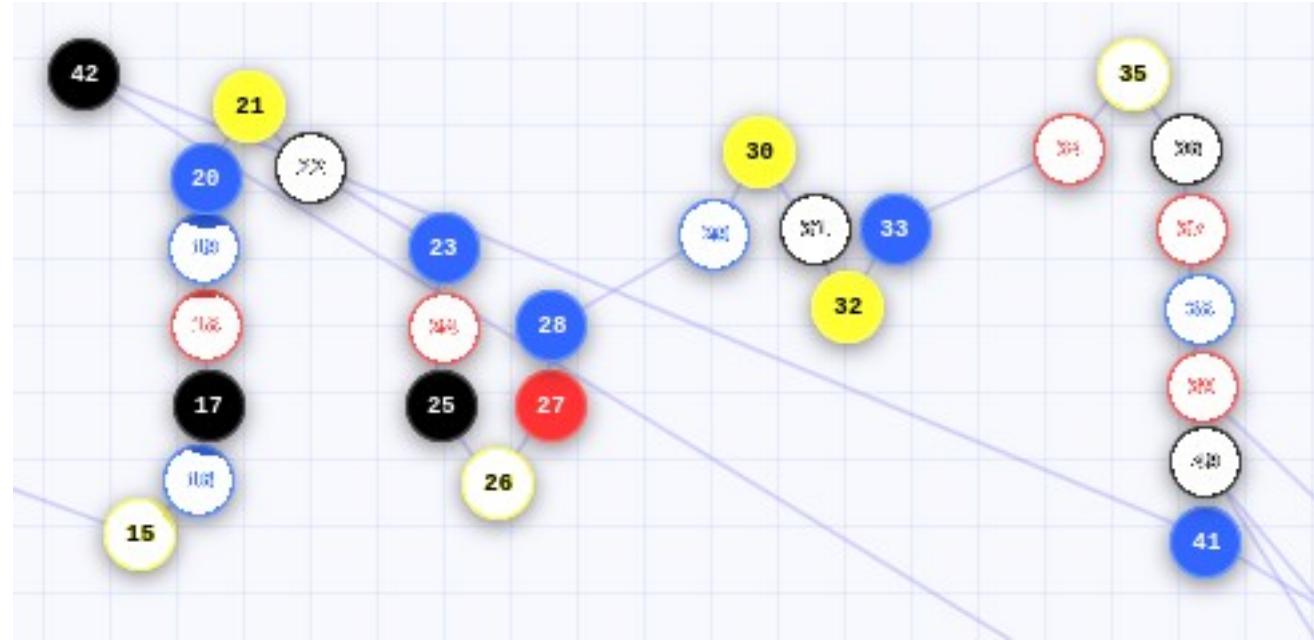


M41_Symmetry:

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

17 terms

$$\underline{\text{M42}} = 41 + 33 + \textcolor{yellow}{32} + \textcolor{blue}{30} + 28 + \textcolor{red}{27} + \textcolor{blue}{25} + 23 + \textcolor{yellow}{21} + \textcolor{blue}{20} + 17$$

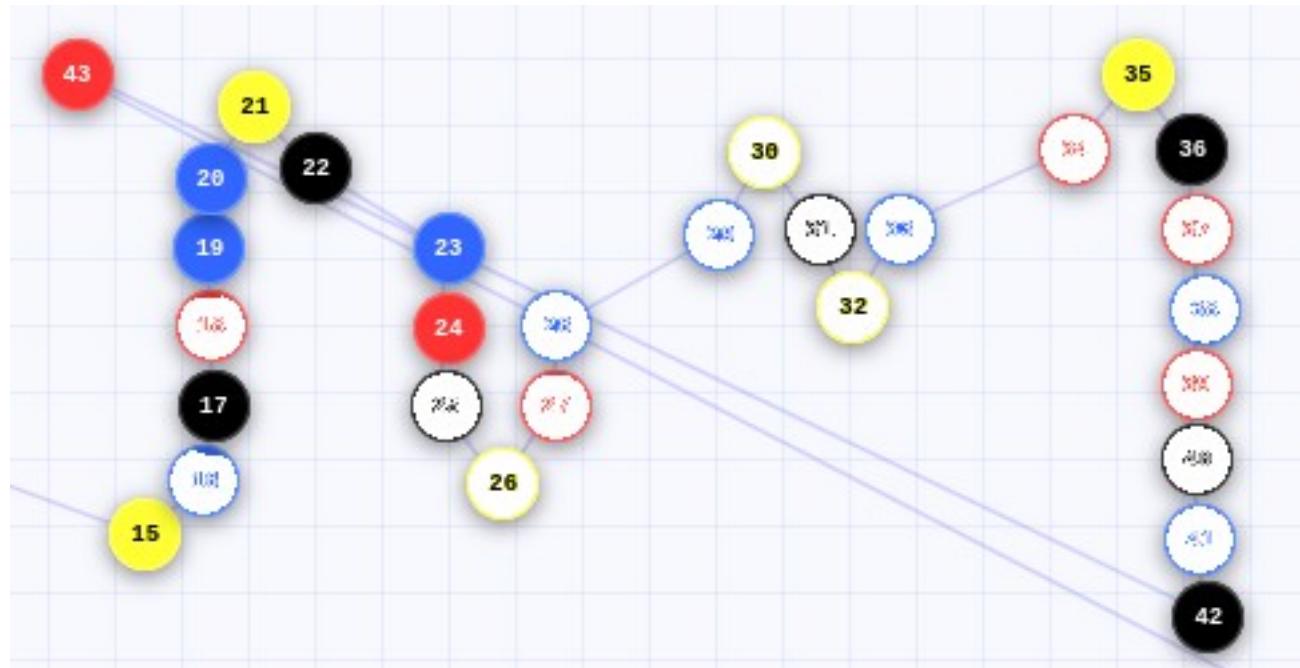


M42_Symmetry:

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

11 terms

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

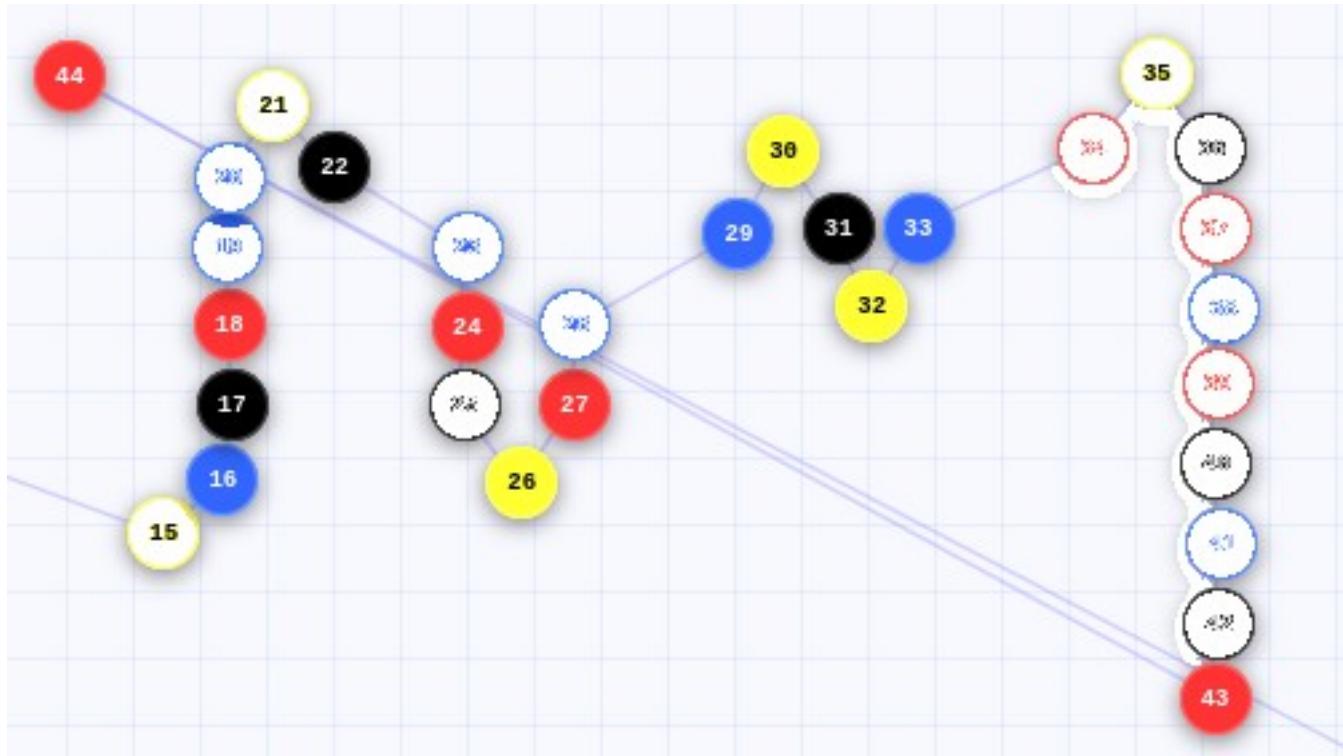


M43 Symmetry:

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

11 terms

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

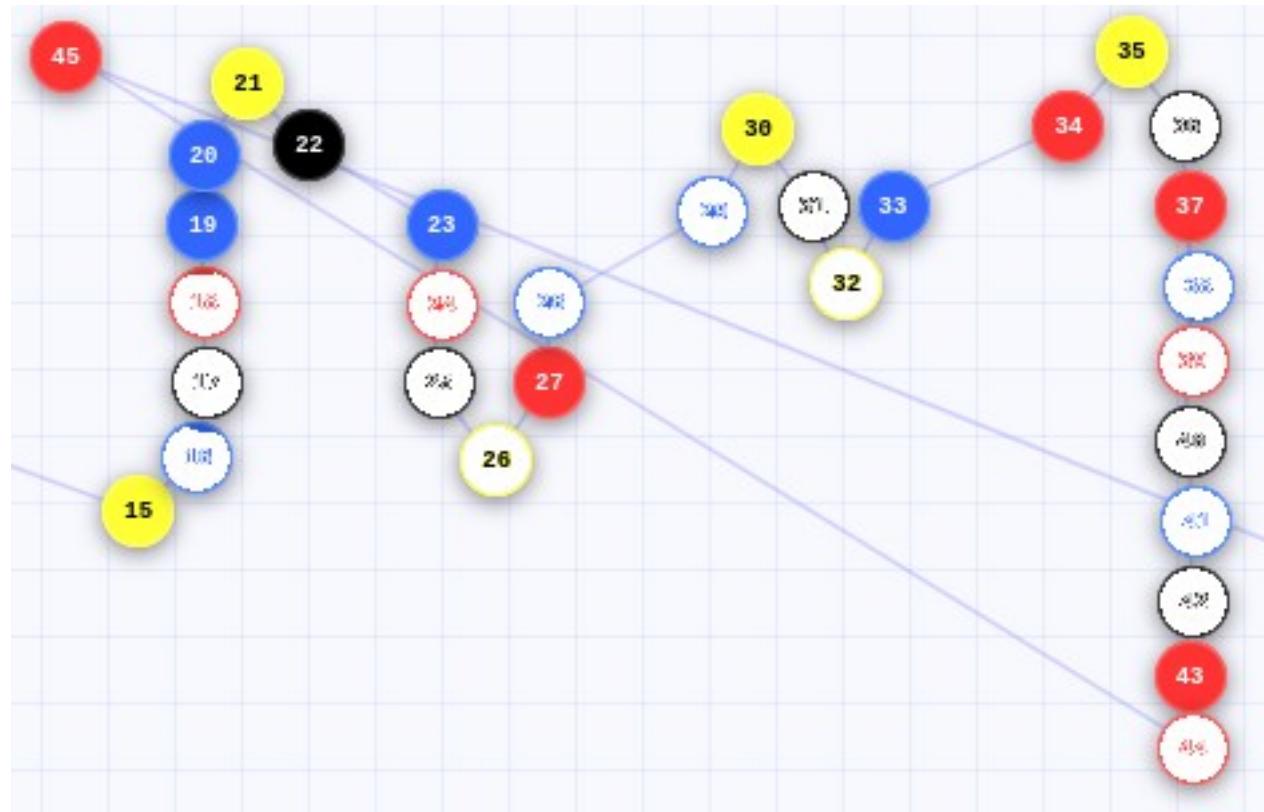


M44 Symmetry:

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

13 terms

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

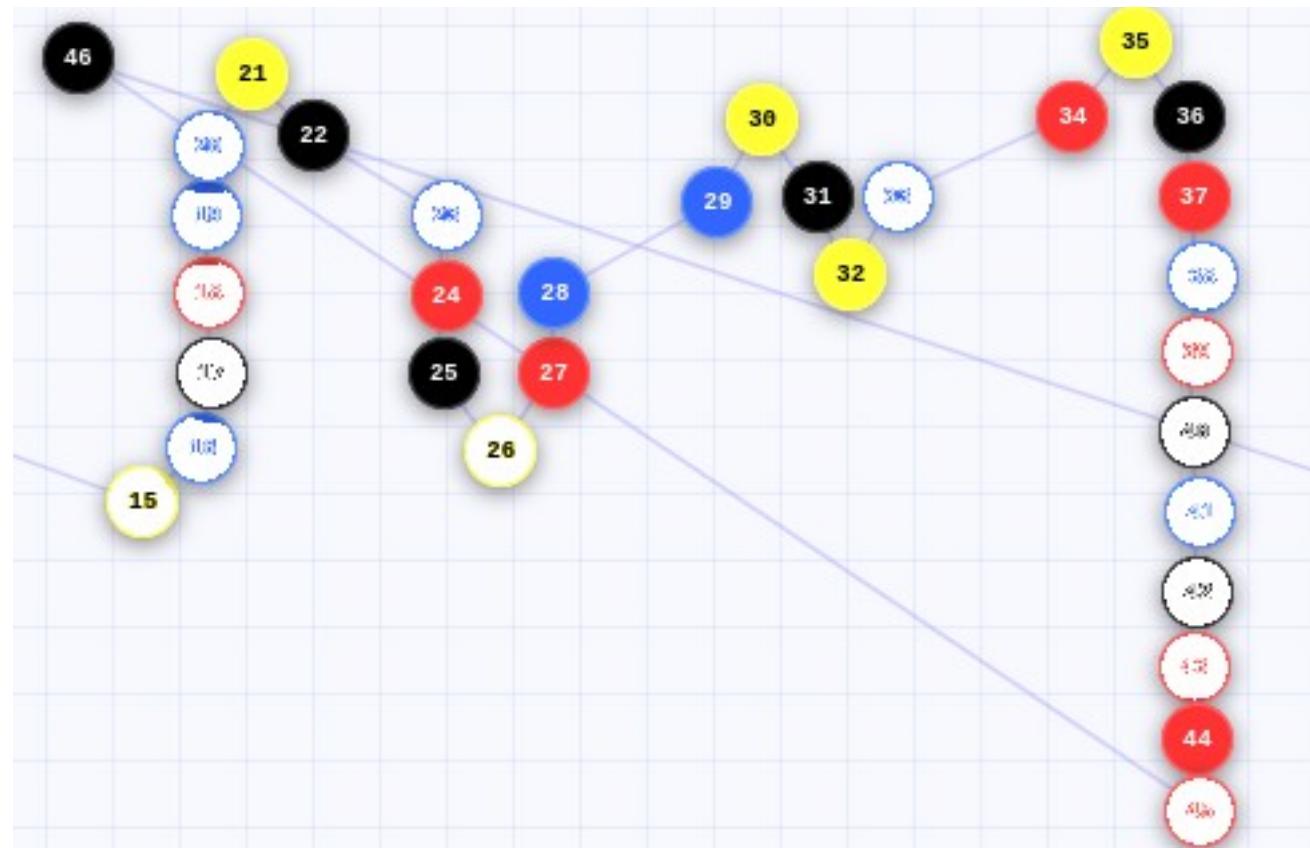


M45 Symmetry:

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

13 terms

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

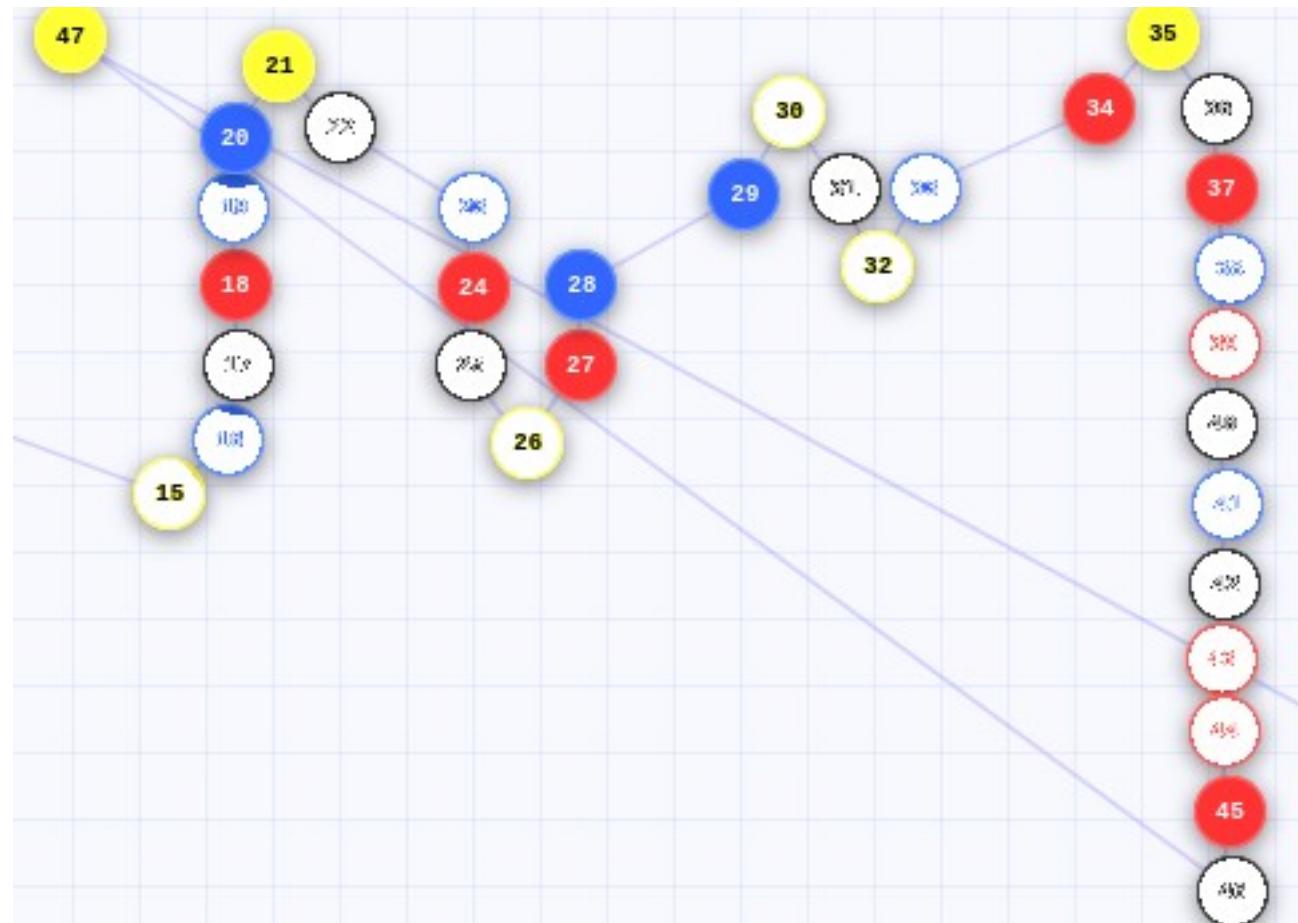


M46 Symmetry:

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

15 terms

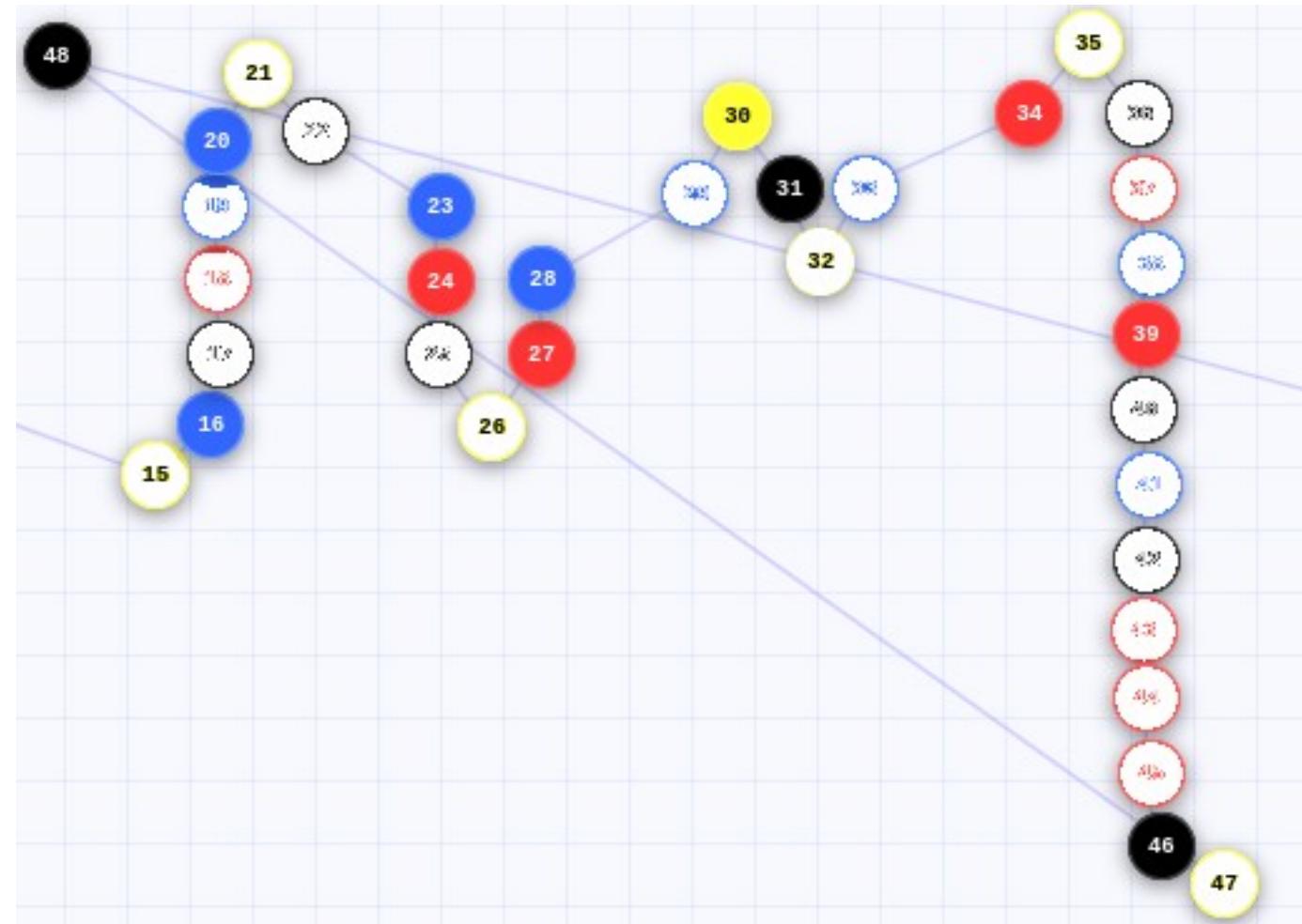
$$\underline{\text{M47}} = 45 + 37 + 35 + 34 + 29 + 28 + 27 + 24 + 21 + 20 + 18$$



M47 Symmetry:

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

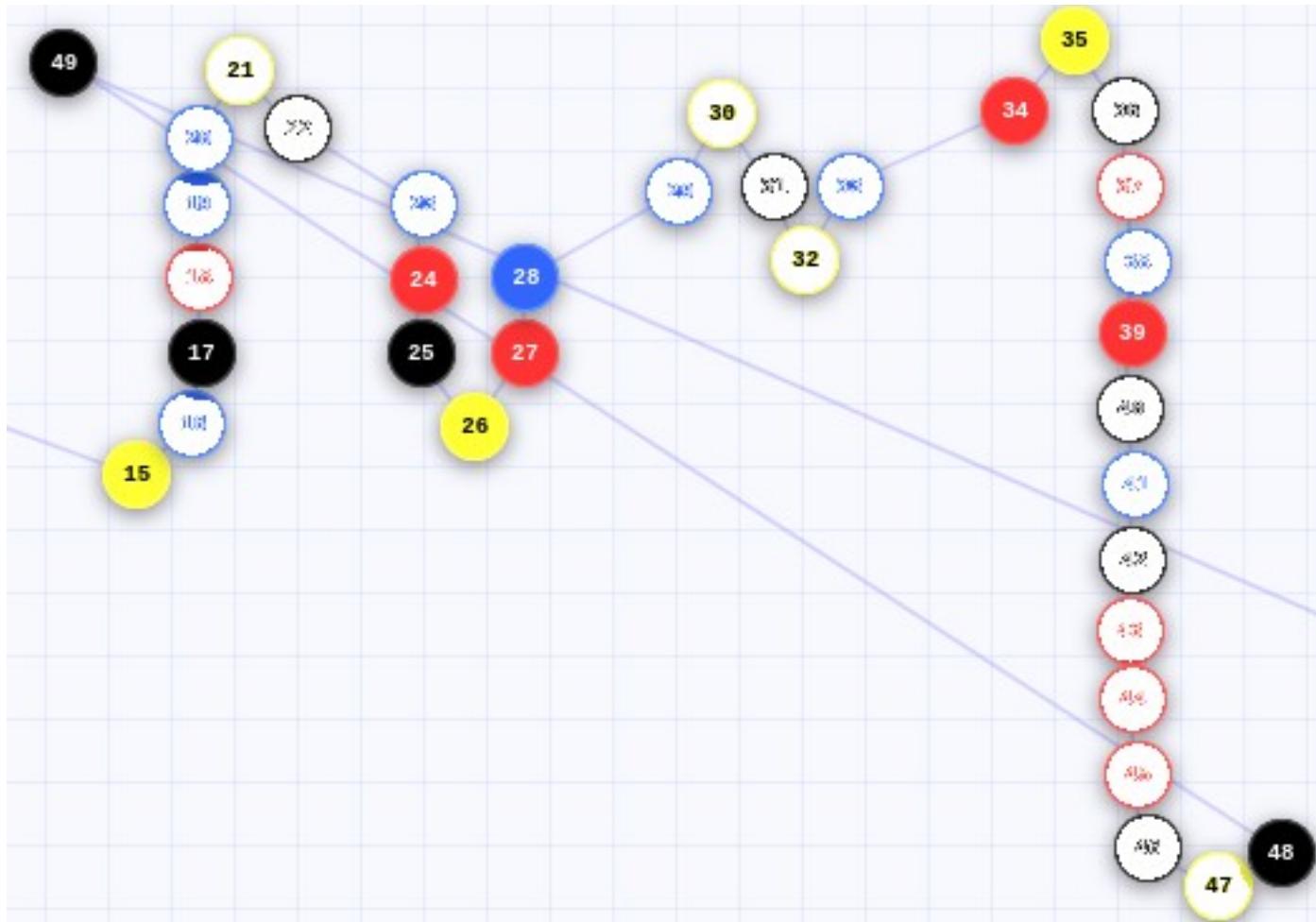
$$\underline{\text{M48}} = 46 + 39 + 34 + 31 + 30 + 28 + 27 + 24 + 23 + 20 + 16$$



M48 Symmetry:

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

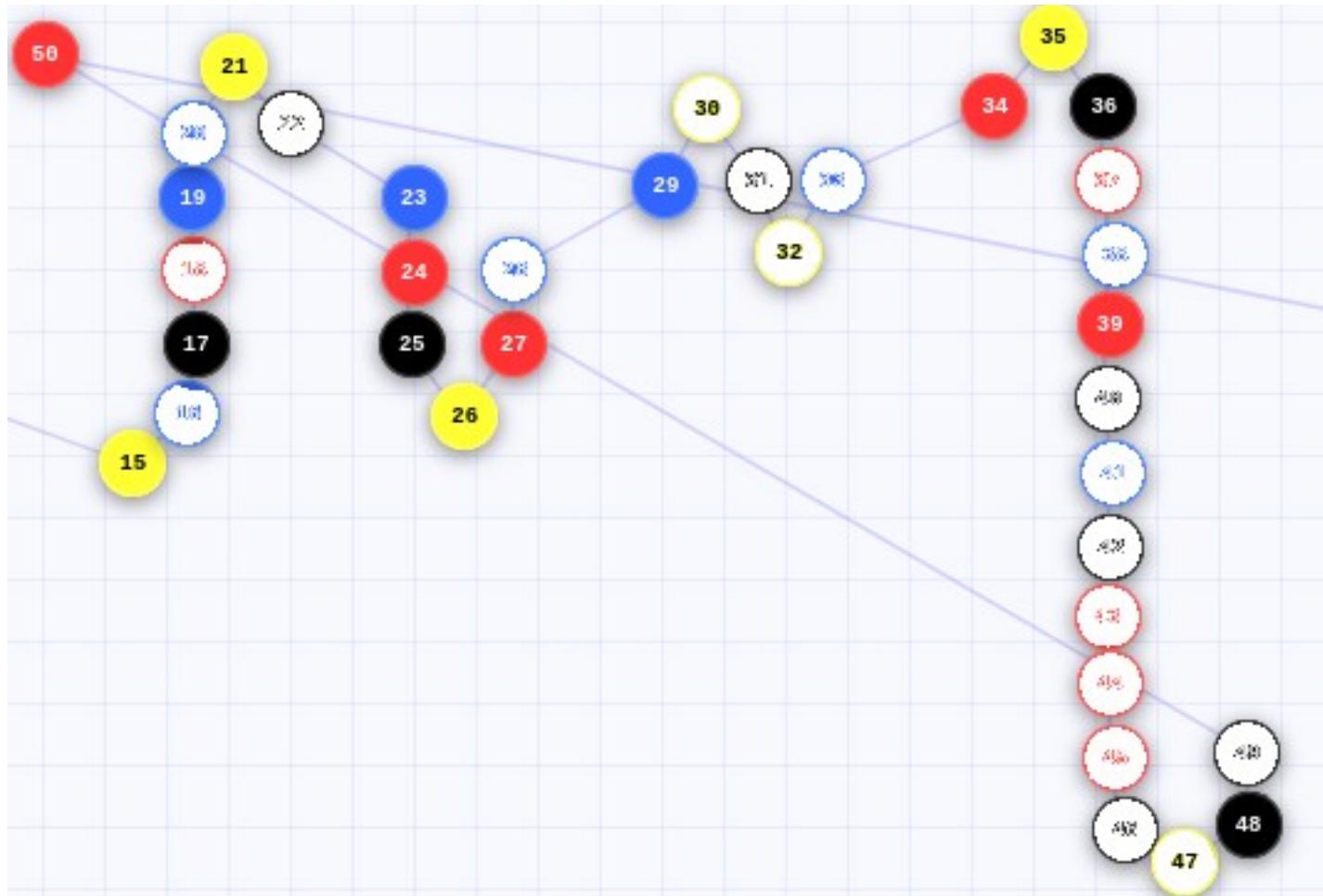
$$\underline{M49} = 48 + 39 + \boxed{35} + 34 + 28 + 27 + \boxed{26} + 25 + 24 + 17 + \boxed{15}$$



M49 Symmetry:

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

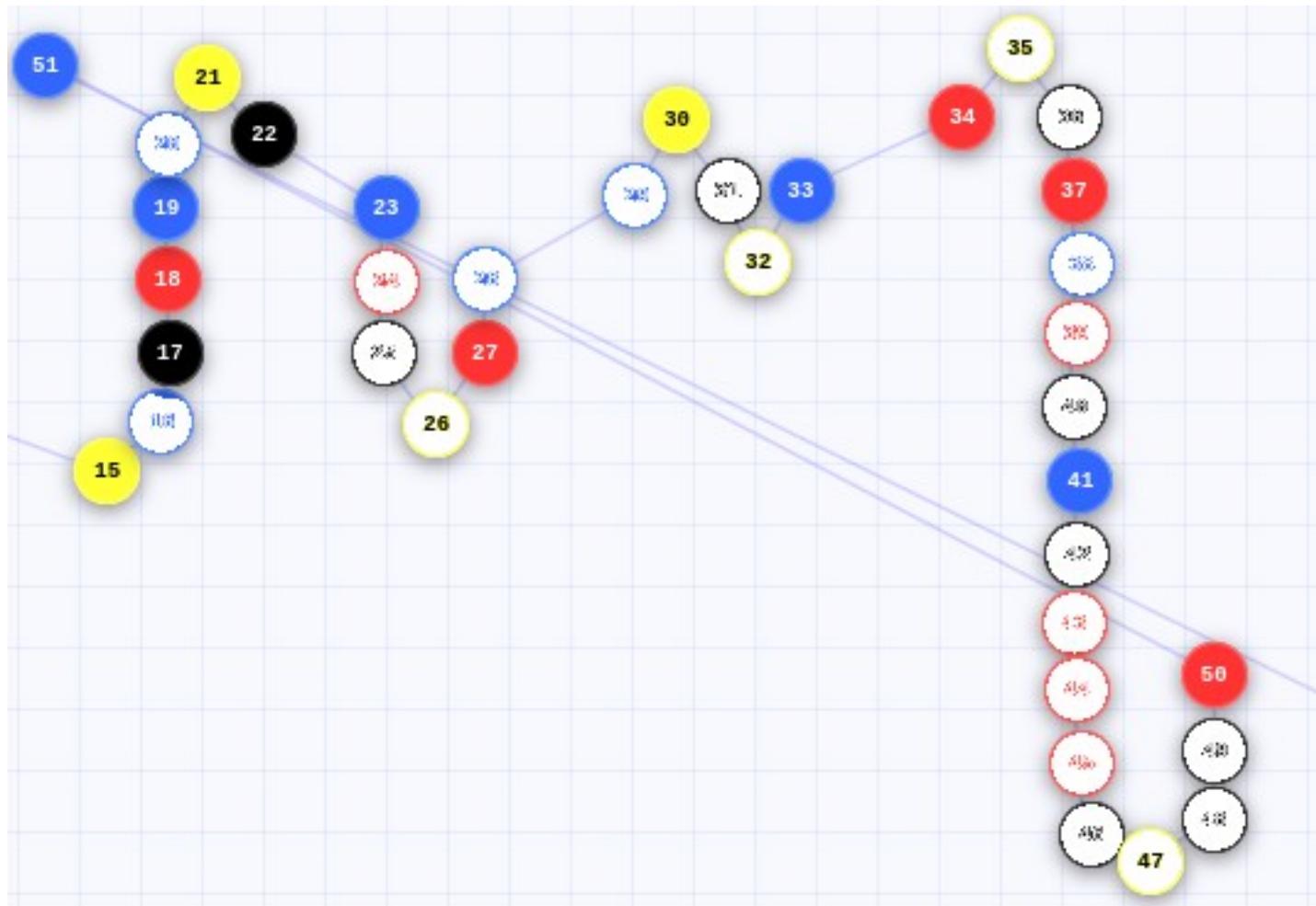
$$\underline{M50} = 48 + 39 + 36 + 35 + 34 + 29 + 27 + 26 + 25 + 24 + 23 + 21 + 19 + 17 + 15$$



M50 Symmetry:

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

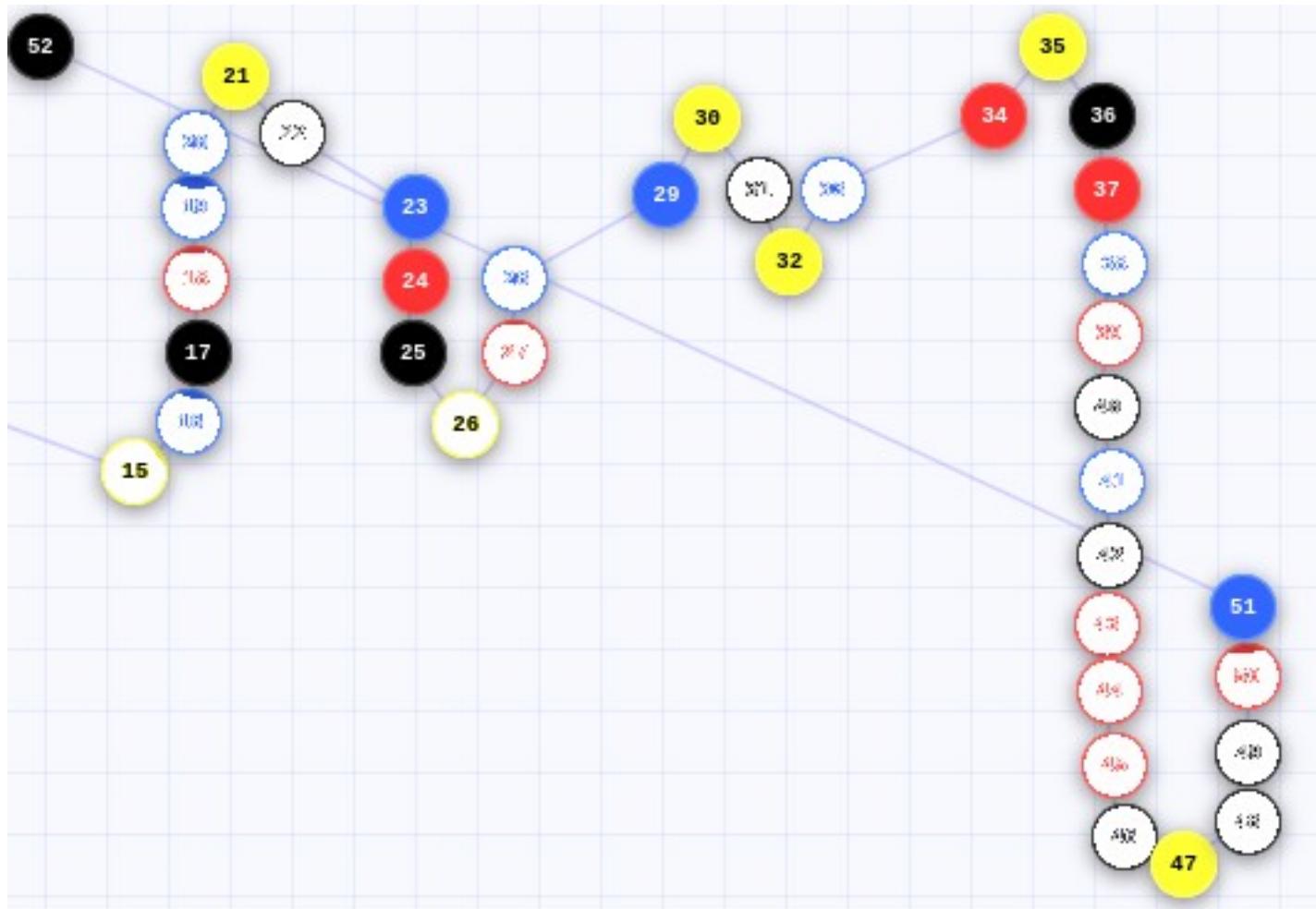
$$\underline{M51} = 50 + 37 + 34 + 33 + \boxed{30} + 27 + 23 + 22 + \boxed{21} + 19 + 18 + 17 + \boxed{15}$$



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 = **136279841**

77232917 + 3021377 + 1257787 + 859433 + 132049 + 44497 + 11213 + 9941 + 9689 + 4253 + 3217 + 2281 + 1279 = **82589933**

57885161 + 13466917 + 2976221 + 1398269 + 1257787 + 110503 + 44497 + 23209 + 21701 + 19937 + 11213 + 9689 + 4253 + 2281 + 1279 = **77232917**

57885161 + 13466917 + 1398269 + 1257787 + 86243 + 44497 + 23209 + 21701 + 19937 + 2281 + 1279 = **74207281**

42643801 + 13466917 + 1257787 + 216091 + 132049 + 86243 + 44497 + 19937 + 11213 + 4423 + 2203 = **57885161**

37156667 + 3021377 + 1398269 + 1257787 + 110503 + 86243 + 44497 + 19937 + 9689 + 4423 + 3217 = **43112609**

32582657 + 3021377 + 2976221 + 1398269 + 1257787 + 756839 + 216091 + 132049 + 110503 + 86243 + 44497 + 21701 + 19937 + 9941 + 9689 = **42643801**

30402457 + 3021377 + 1398269 + 1257787 + 859433 + 132049 + 44497 + 11213 + 9941 + 9689 + 4423 + 4253 + 1279 = **37156667**

30402457 + 859433 + 756839 + 216091 + 132049 + 110503 + 44497 + 23209 + 19937 + 9941 + 3217 + 2281 + 2203 = **32582657**

25964951 + 2976221 + 1398269 + 19937 + 11213 + 9941 + 9689 + 4423 + 4253 + 2281 + 1279 = **30402457**

24036583 + 859433 + 756839 + 132049 + 86243 + 44497 + 21701 + 11213 + 9689 + 4423 + 2281 = **25964951**

13466917 + 6972593 + 3021377 + 216091 + 132049 + 110503 + 44497 + 21701 + 19937 + 11213 + 9689 + 4253 + 2281 + 2203 + 1279 = **24036583**

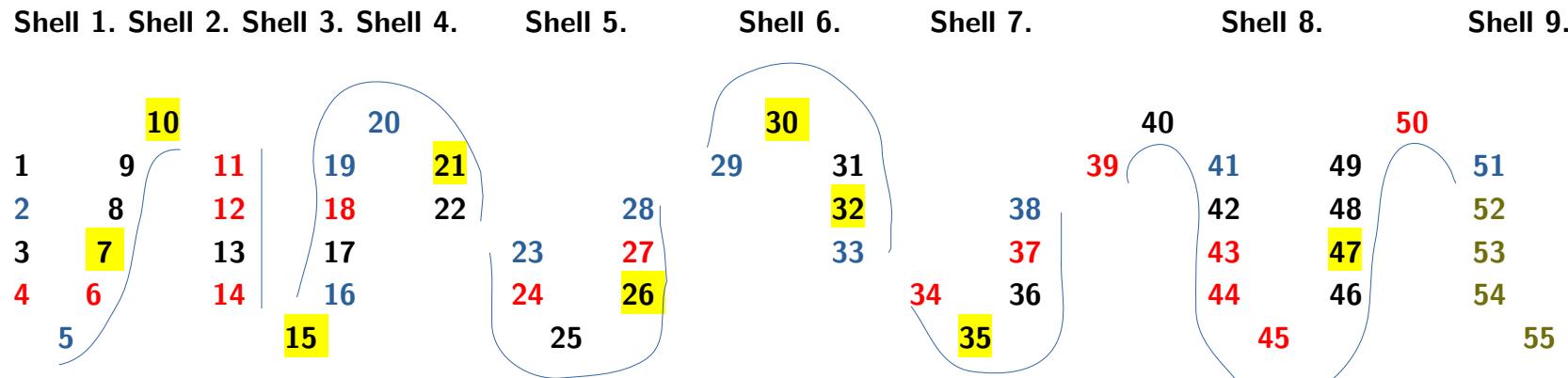
13466917 + 3021377 + 2976221 + 1398269 + 44497 + 23209 + 21701 + 19937 + 9941 + 9689 + 4253 = **20996011**

6972593 + 3021377 + 2976221 + 216091 + 132049 + 86243 + 44497 + 9941 + 4423 + 2203 + 1279 = **13466917**

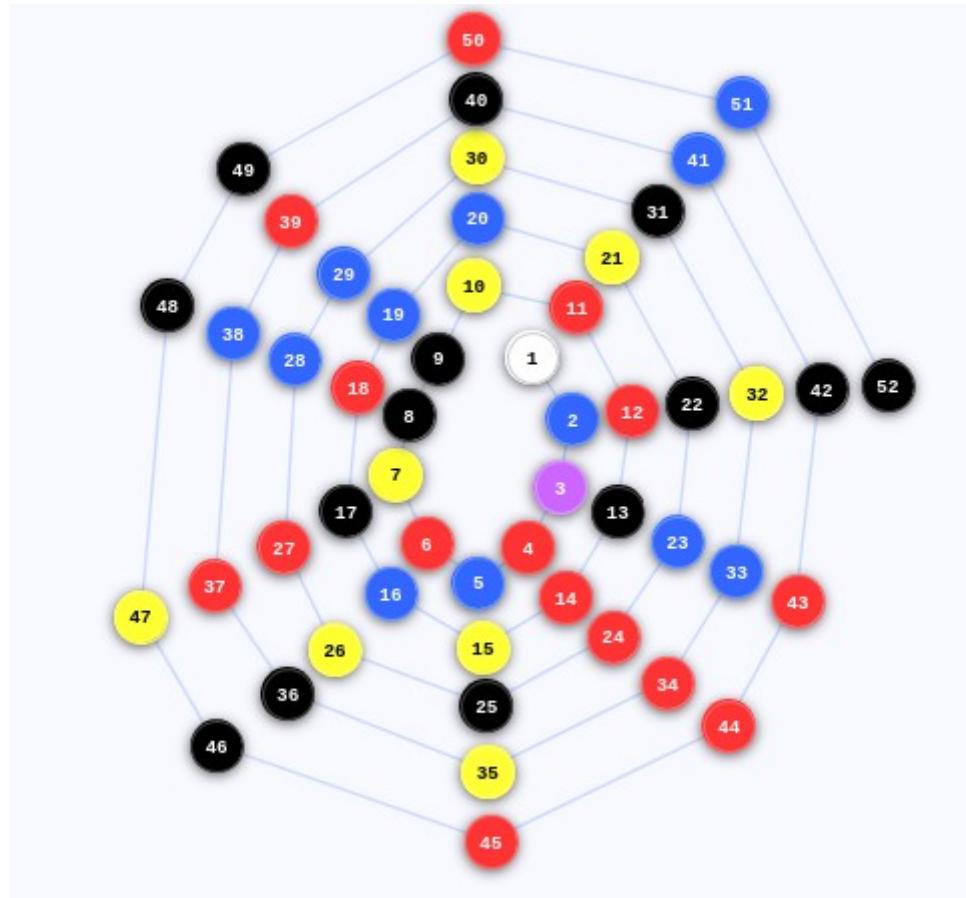
2976221 + 1398269 + 1257787 + 756839 + 216091 + 132049 + 86243 + 44497 + 23209 + 21701 + 19937 + 11213 + 9941 + 9689 + 4423 + 2281 + 2203 = **6972593**

fail **3021377** for single nr.

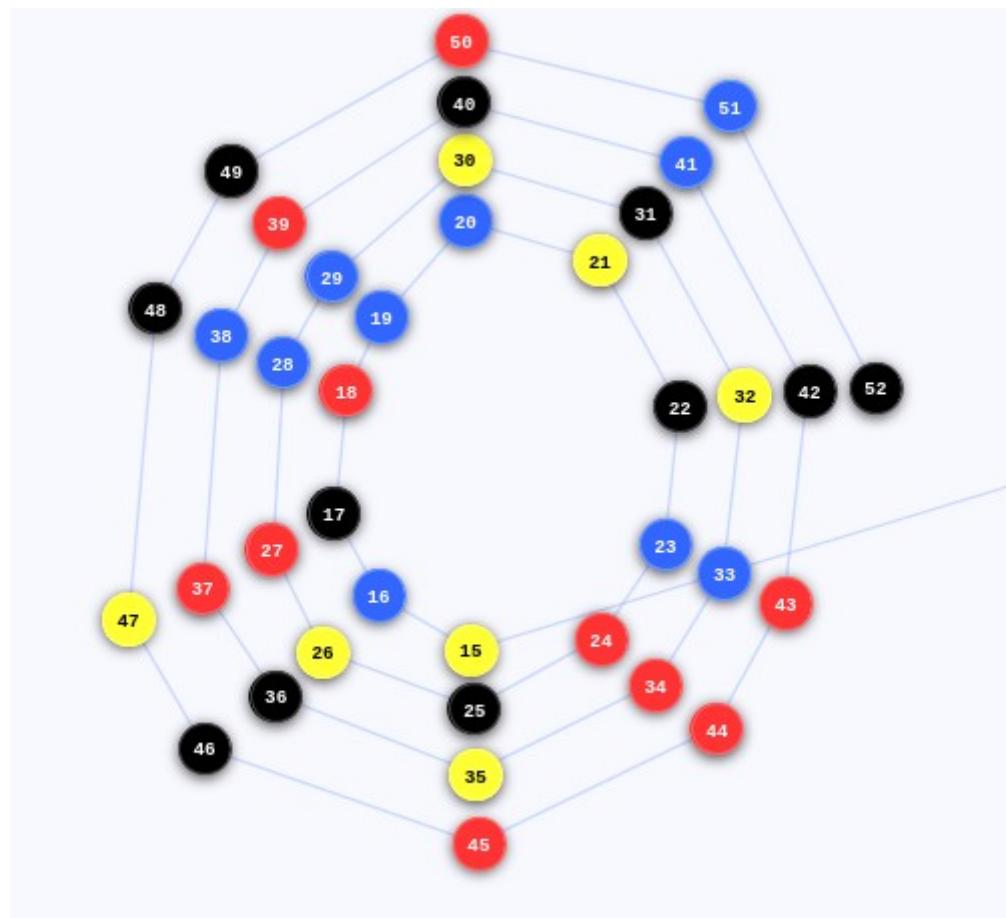
Curved Geometry arrangement by shells:



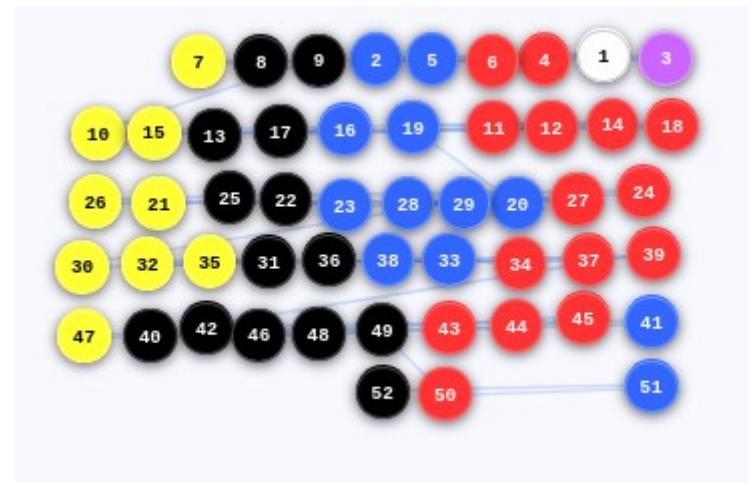
Spider Spiral Geometry - Mersennes Exponents:



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

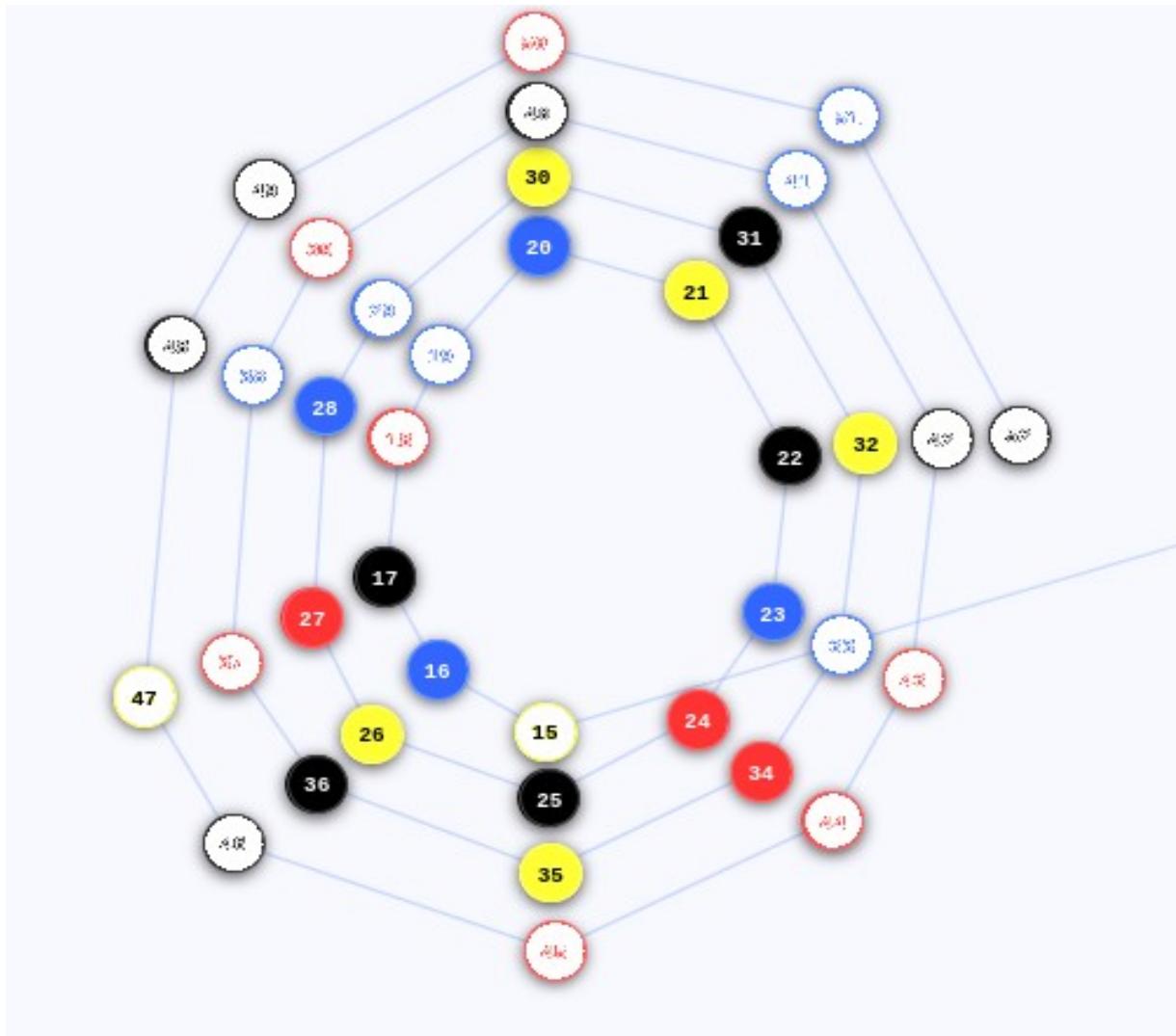
-1 blue

-5 black

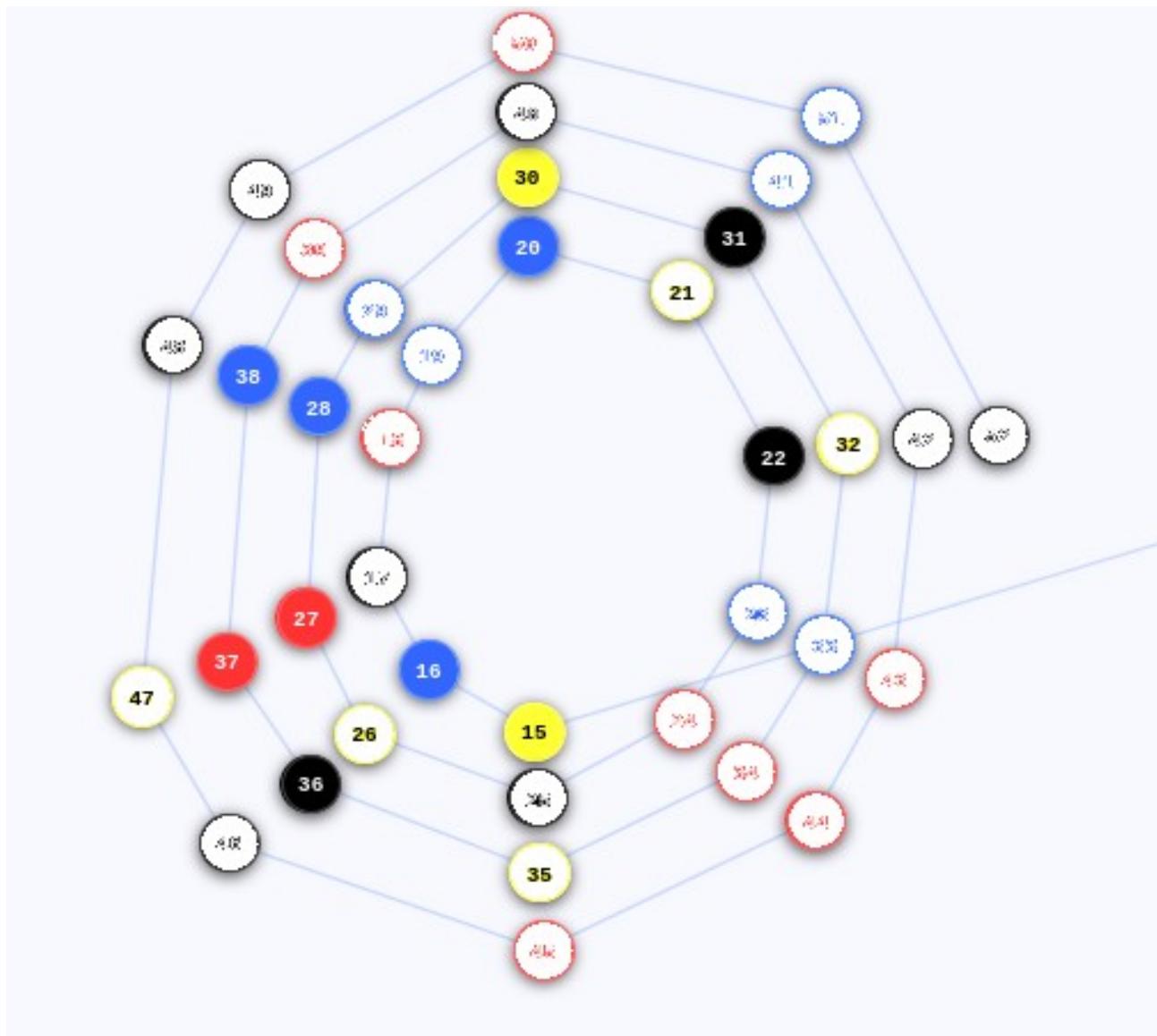
-3 red

COLOR NUMBERS SYMMETRY IN SPIDER GEOMETRY - DECOMPOSITION SUM

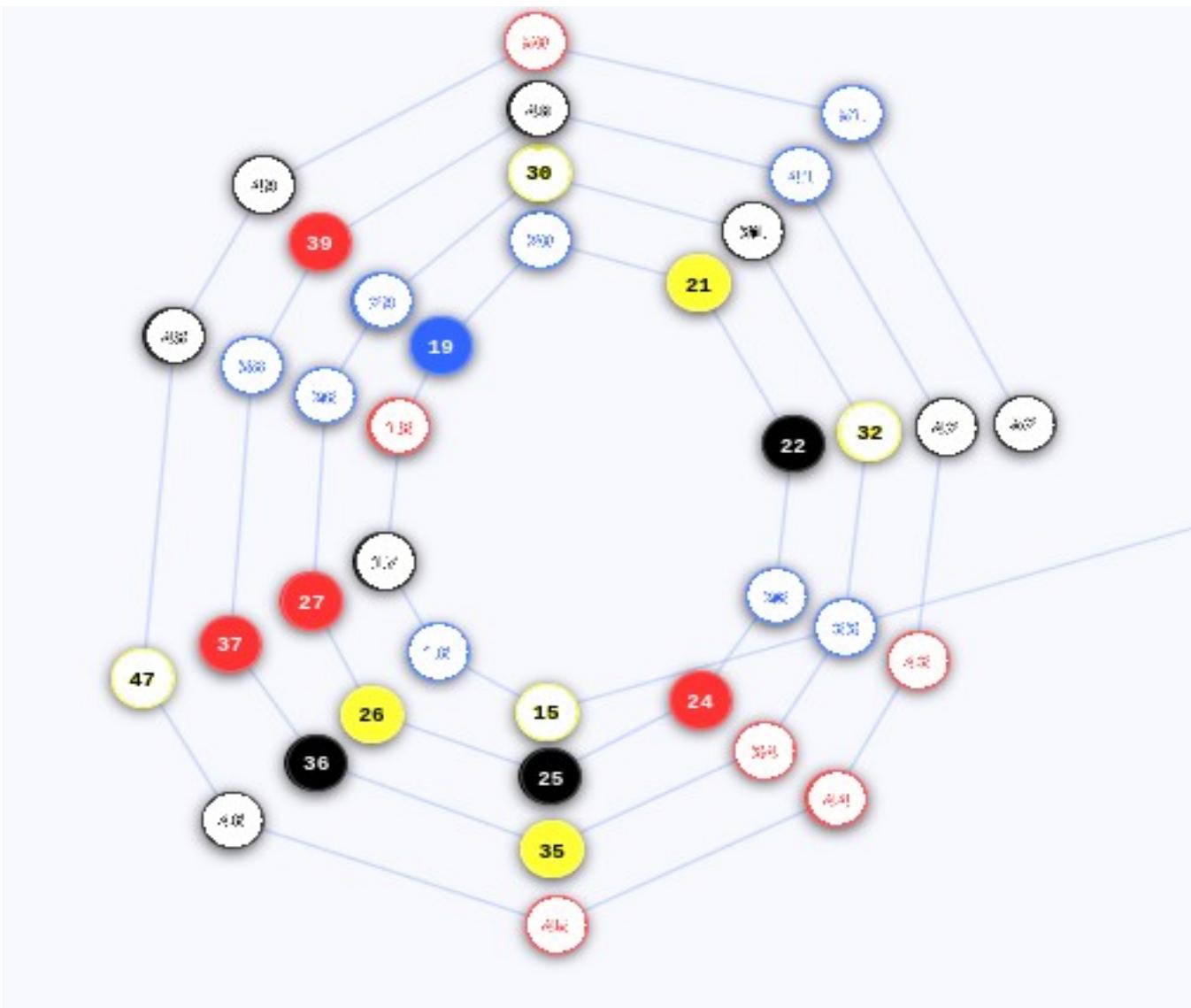
M38:



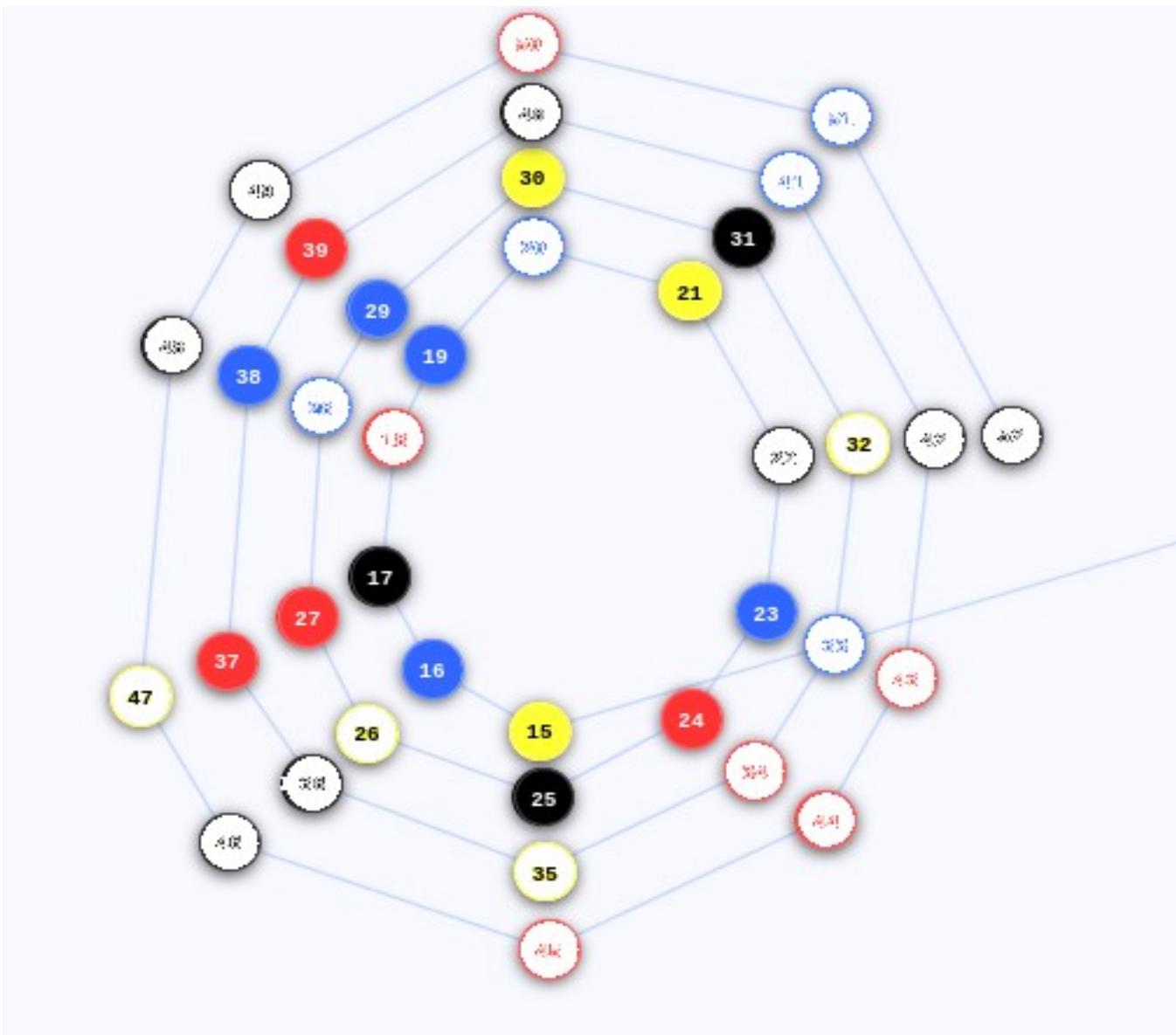
M39:



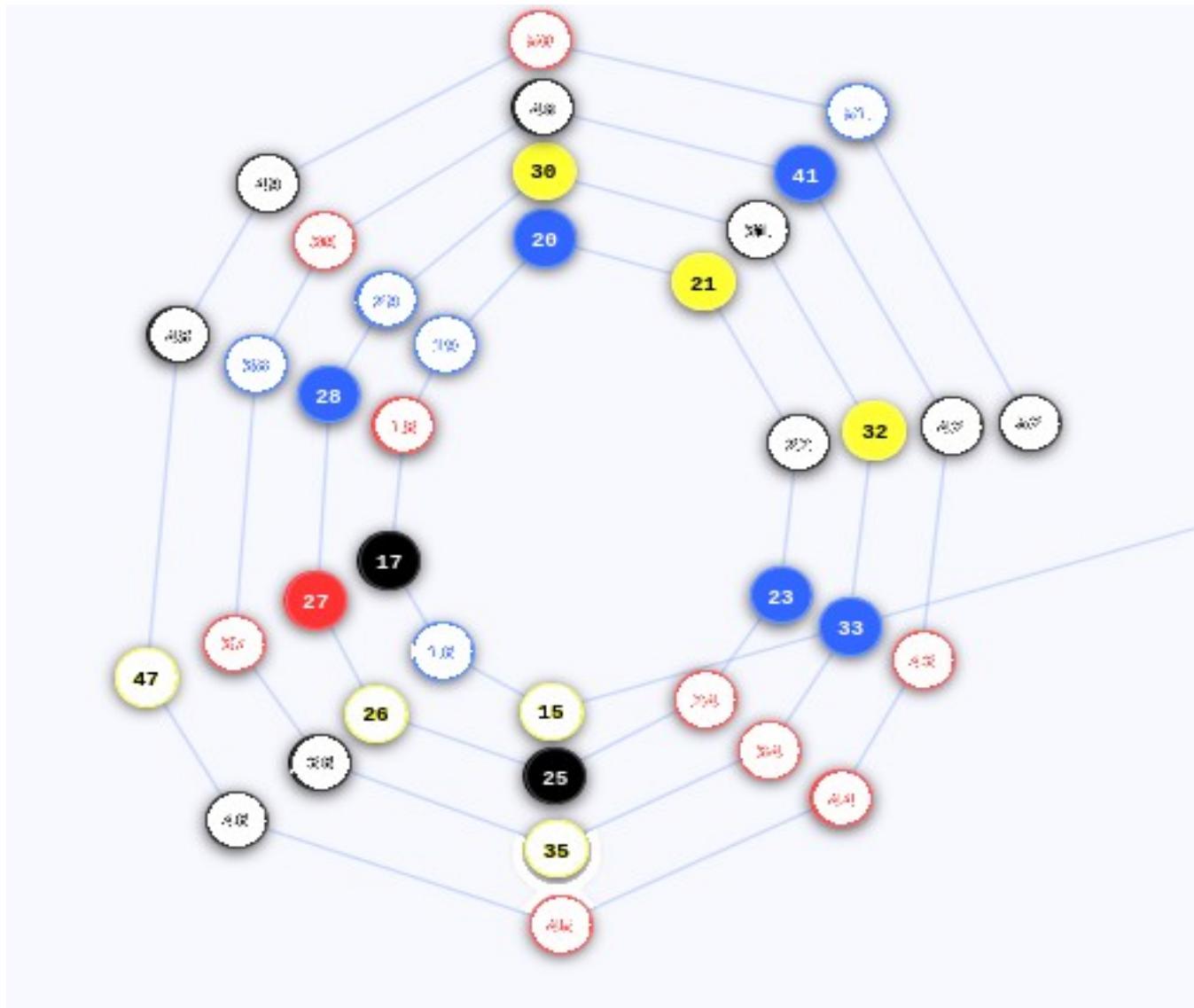
M40:



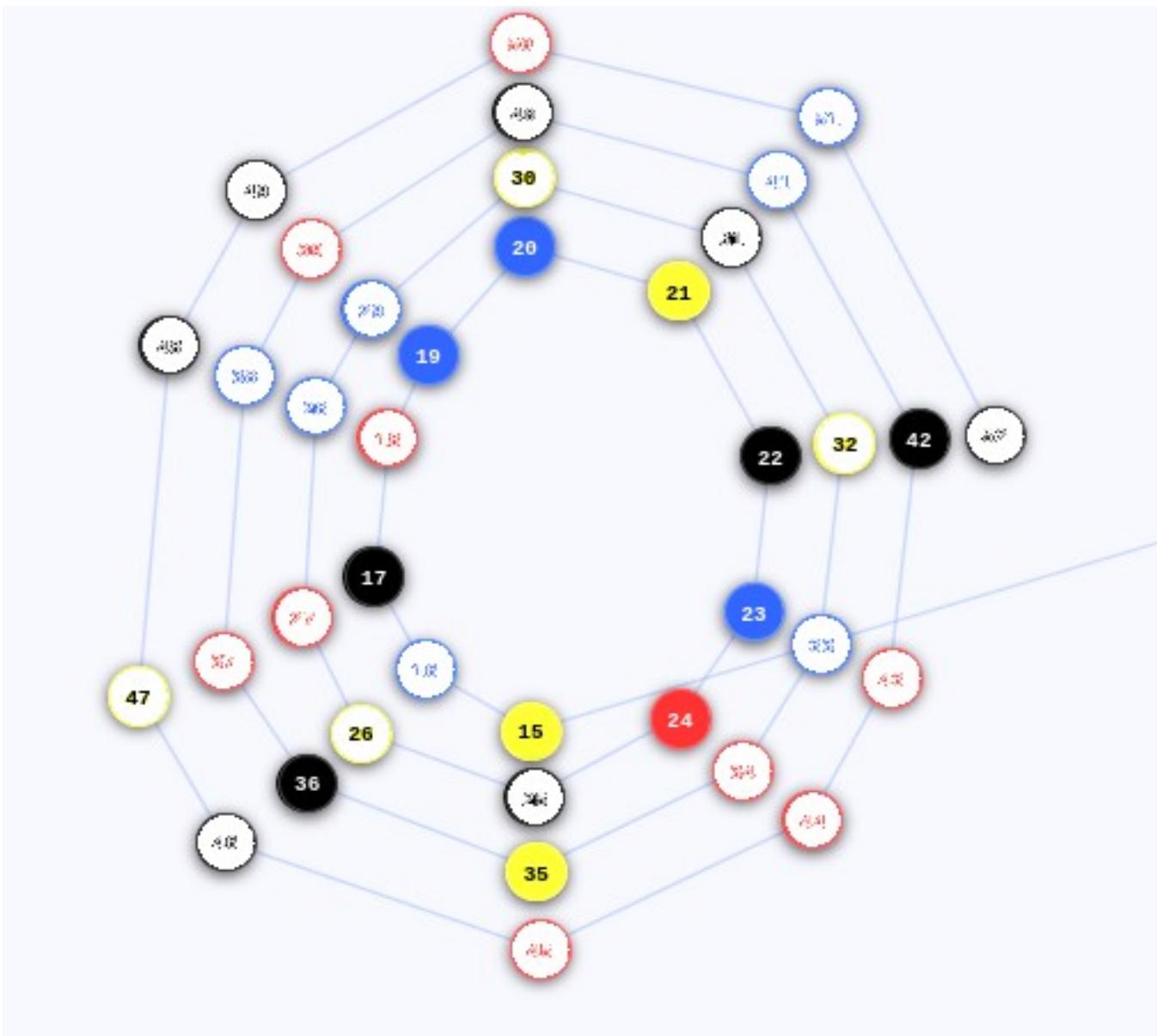
M41:



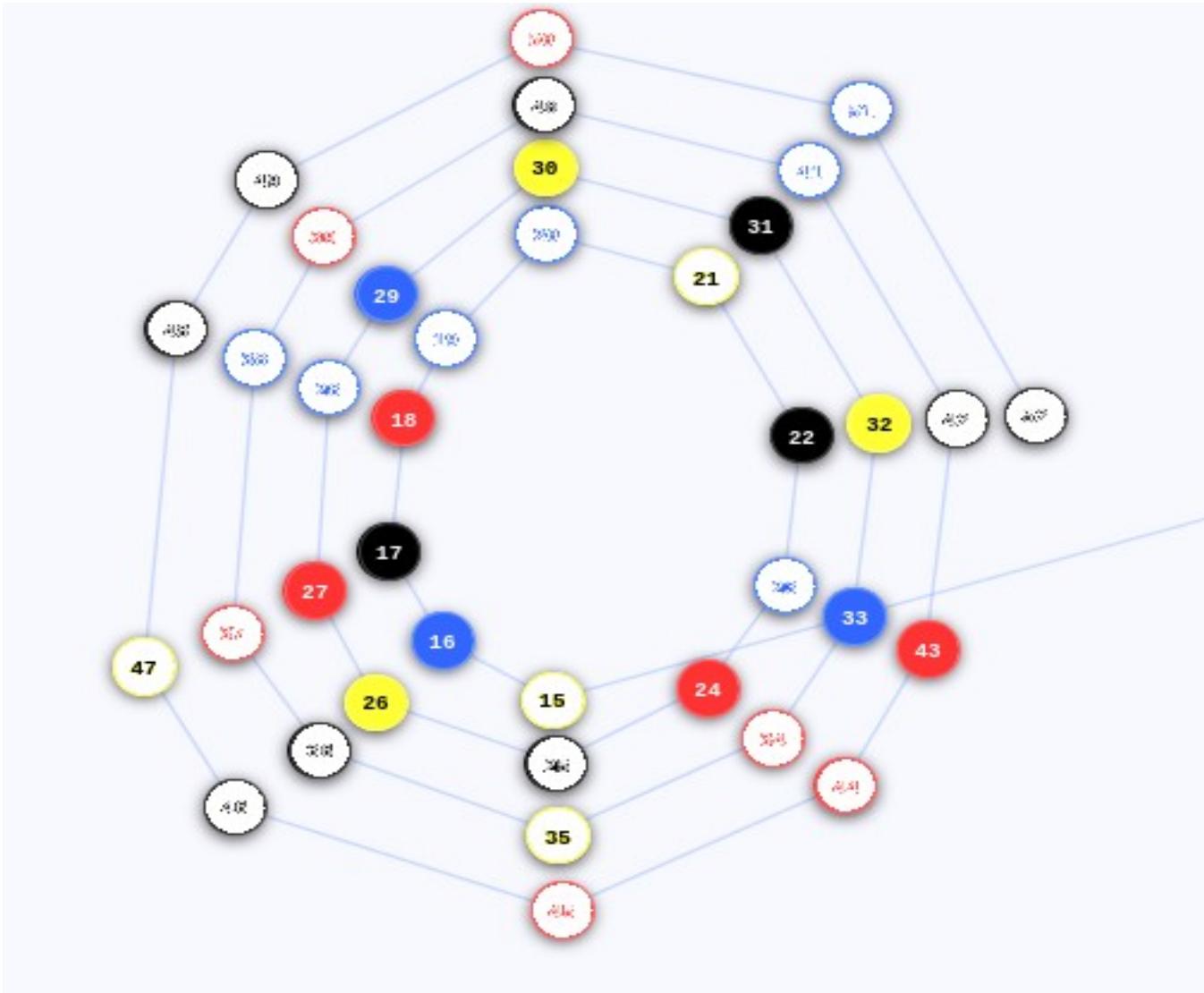
M42:



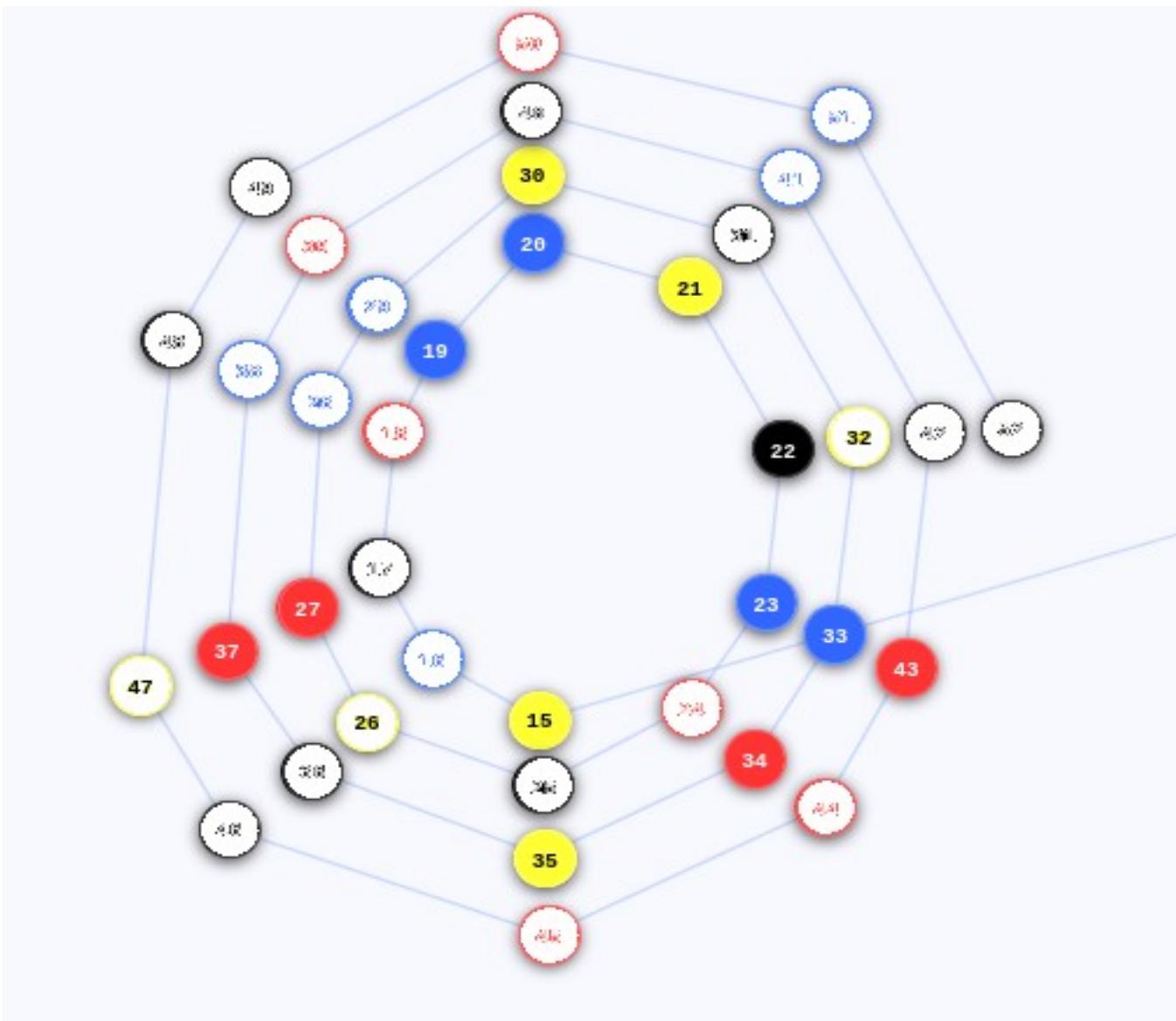
M43:



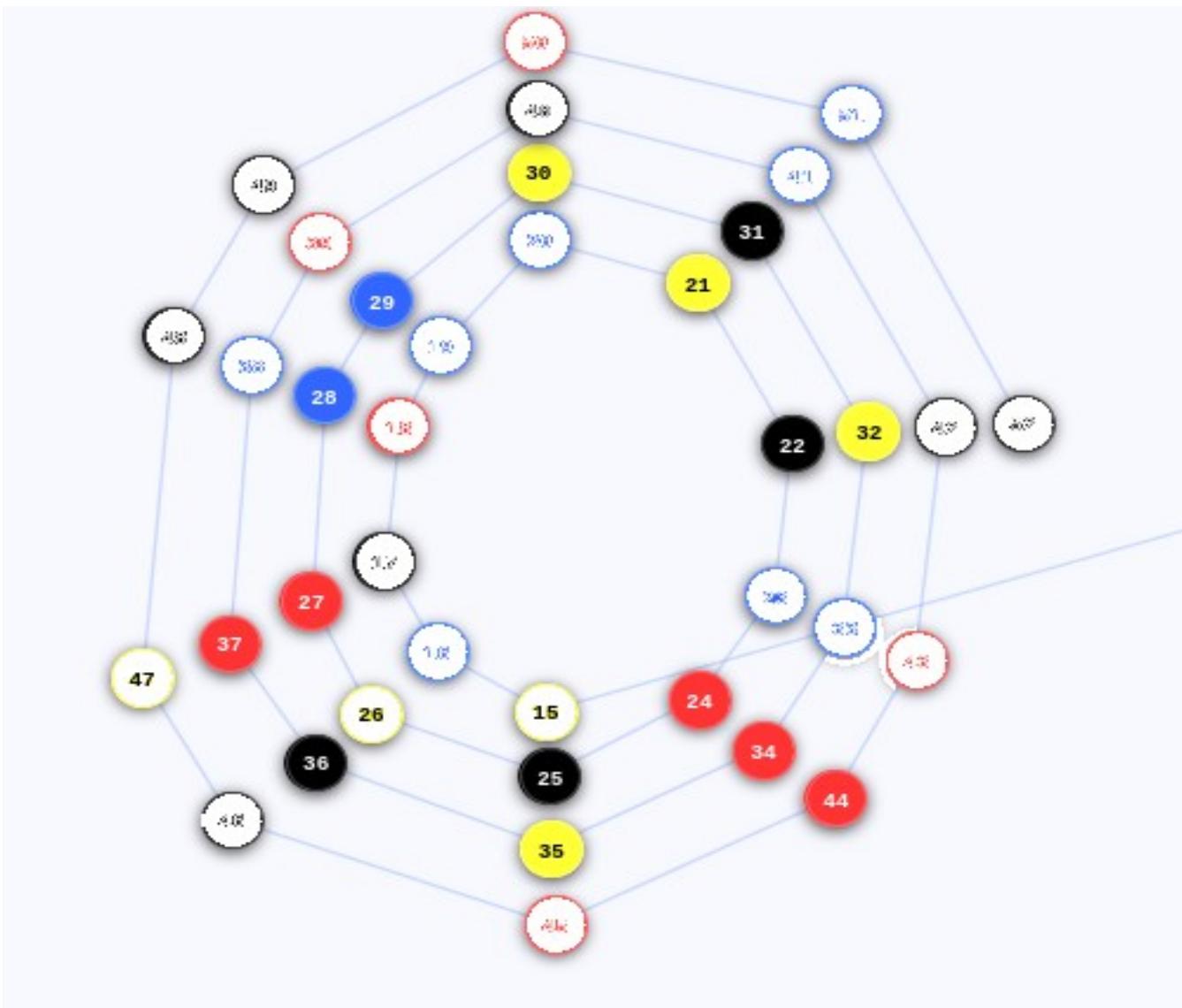
M44:



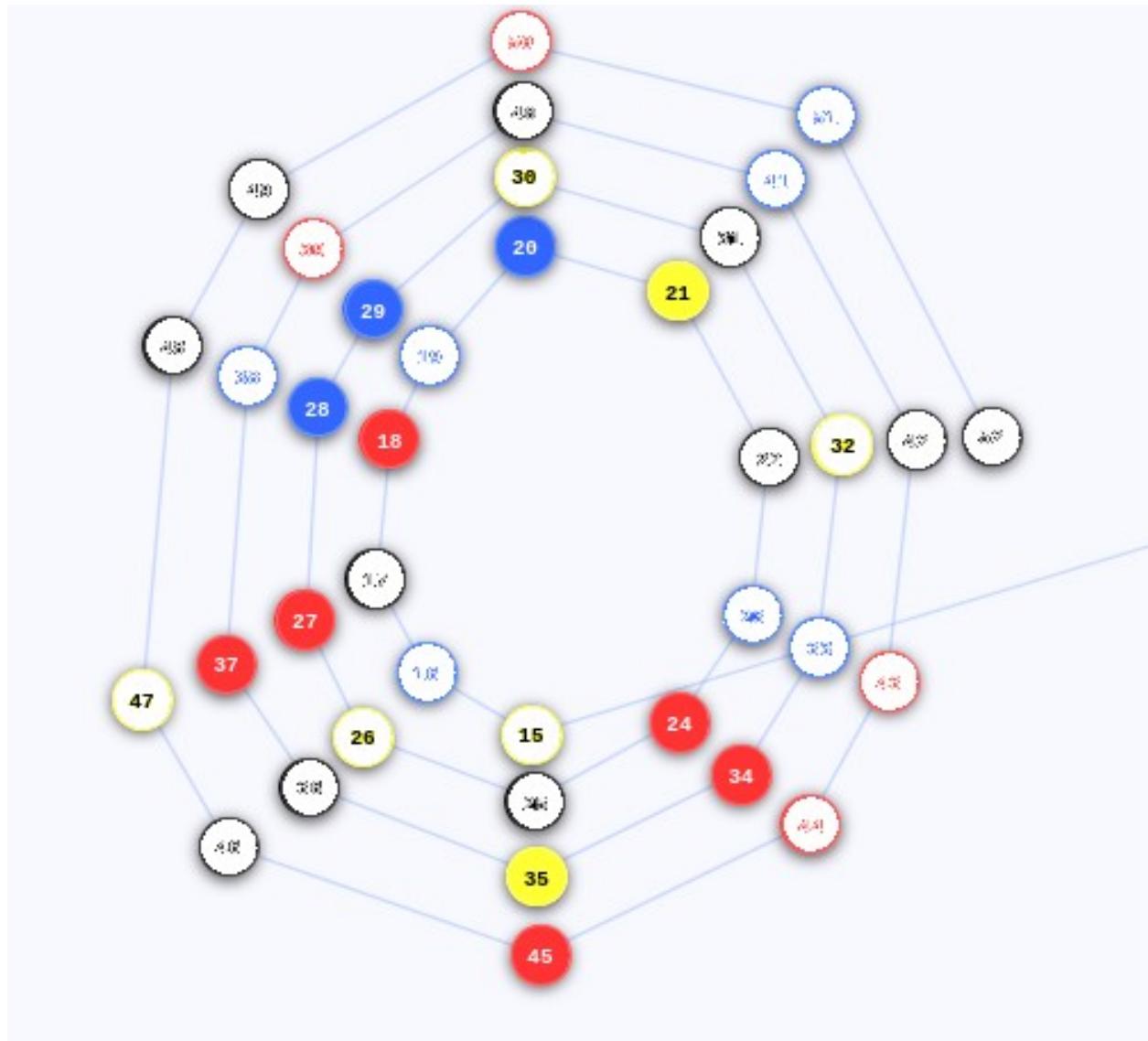
M45:



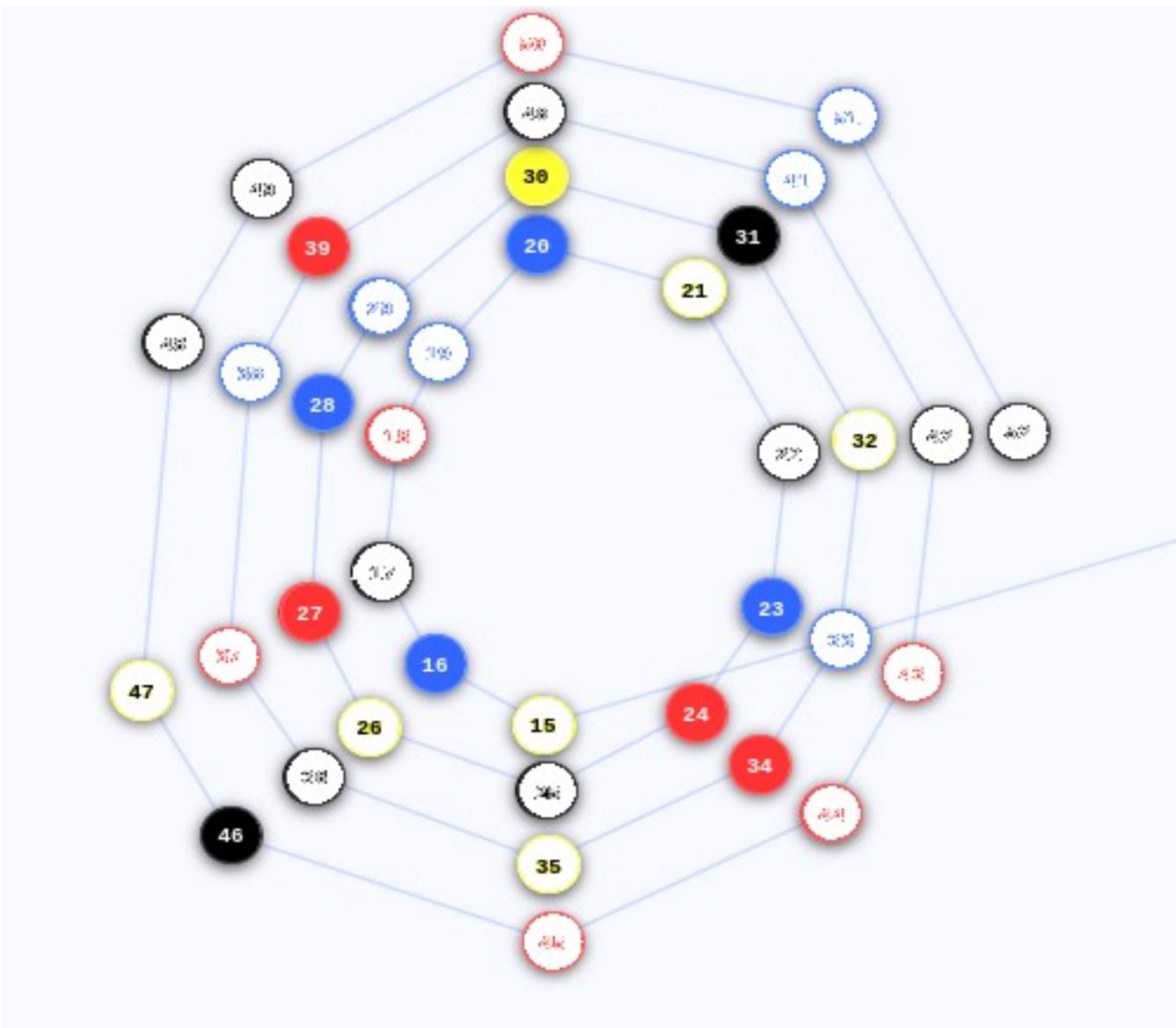
M46:



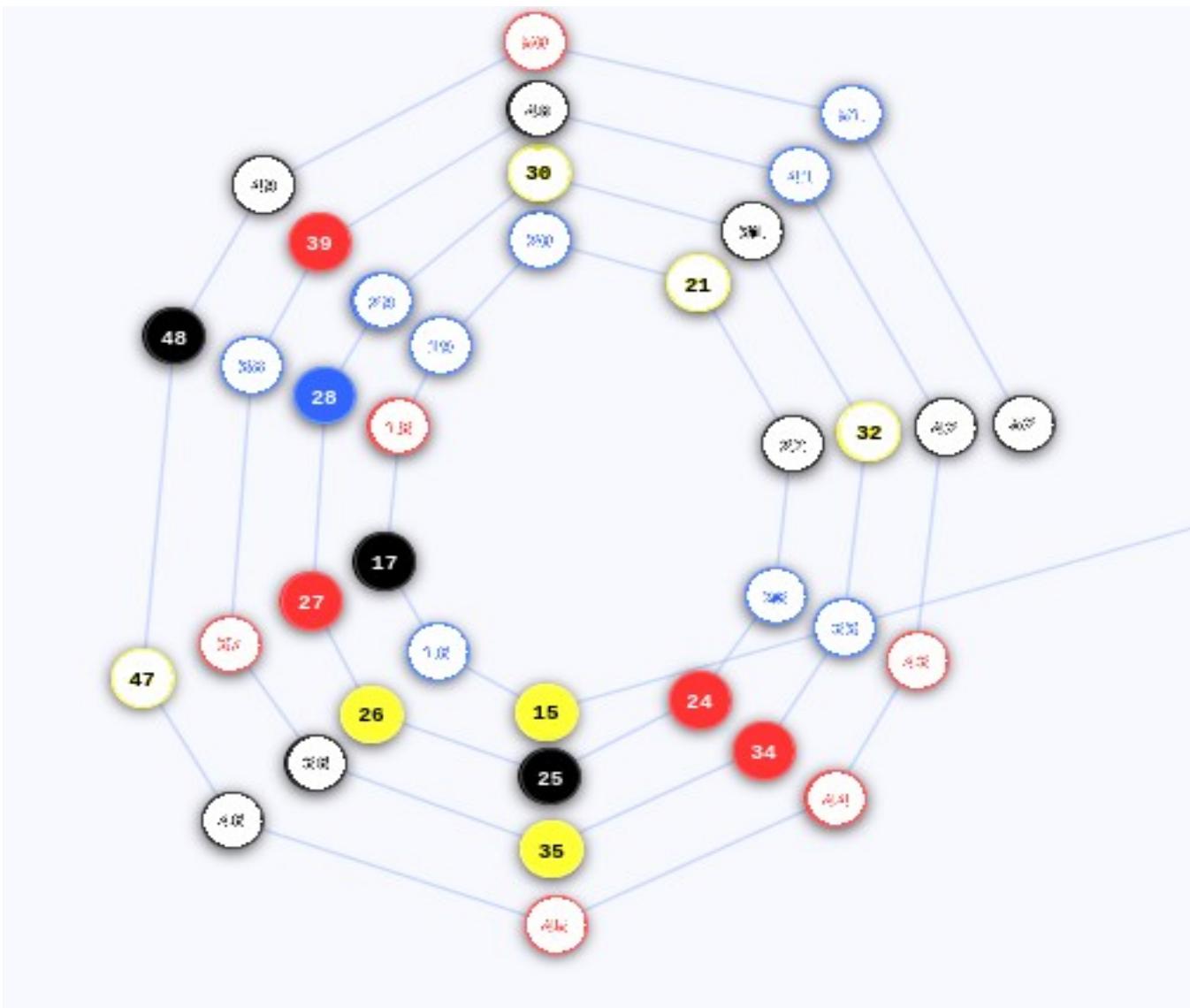
M47:



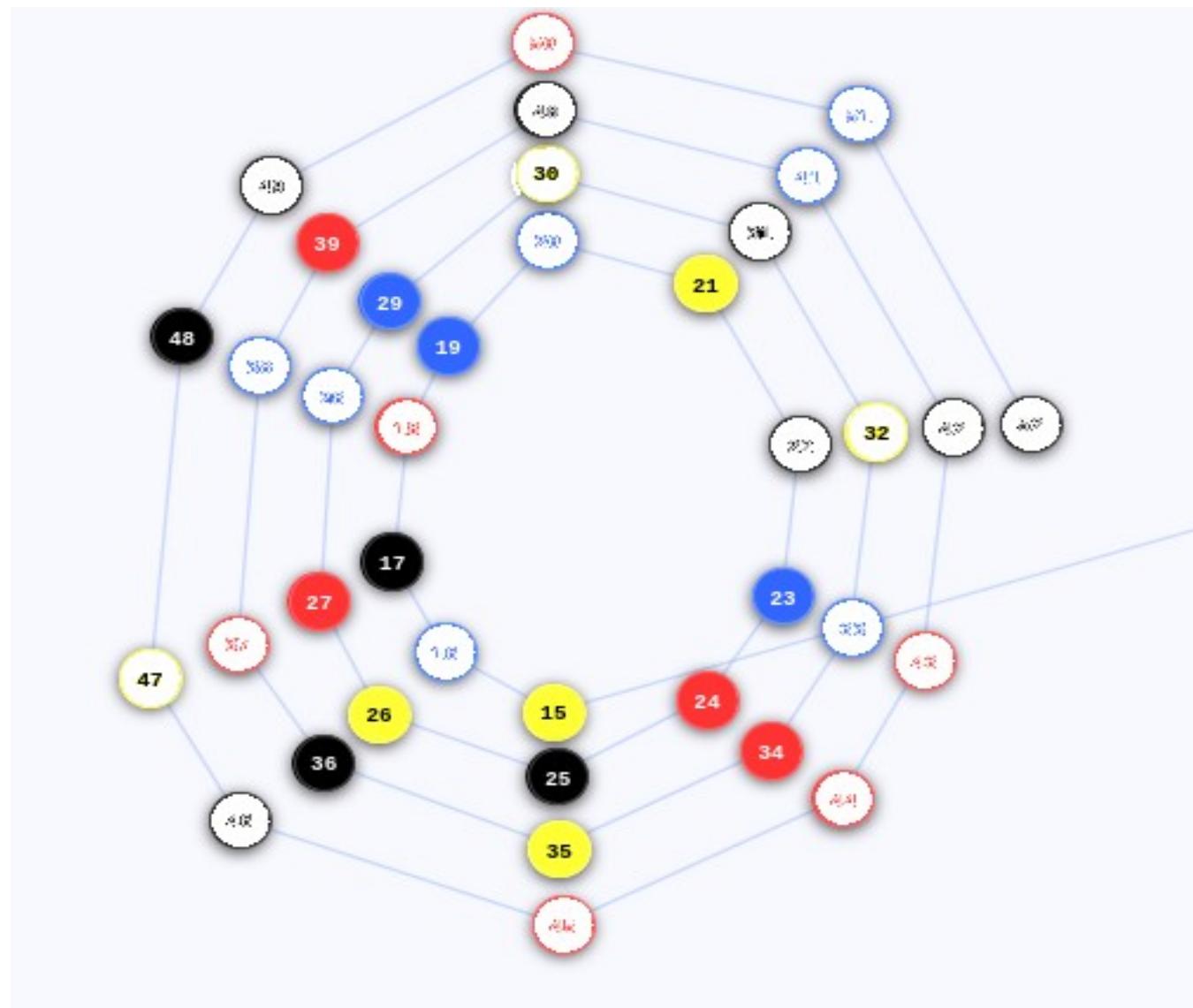
M48:



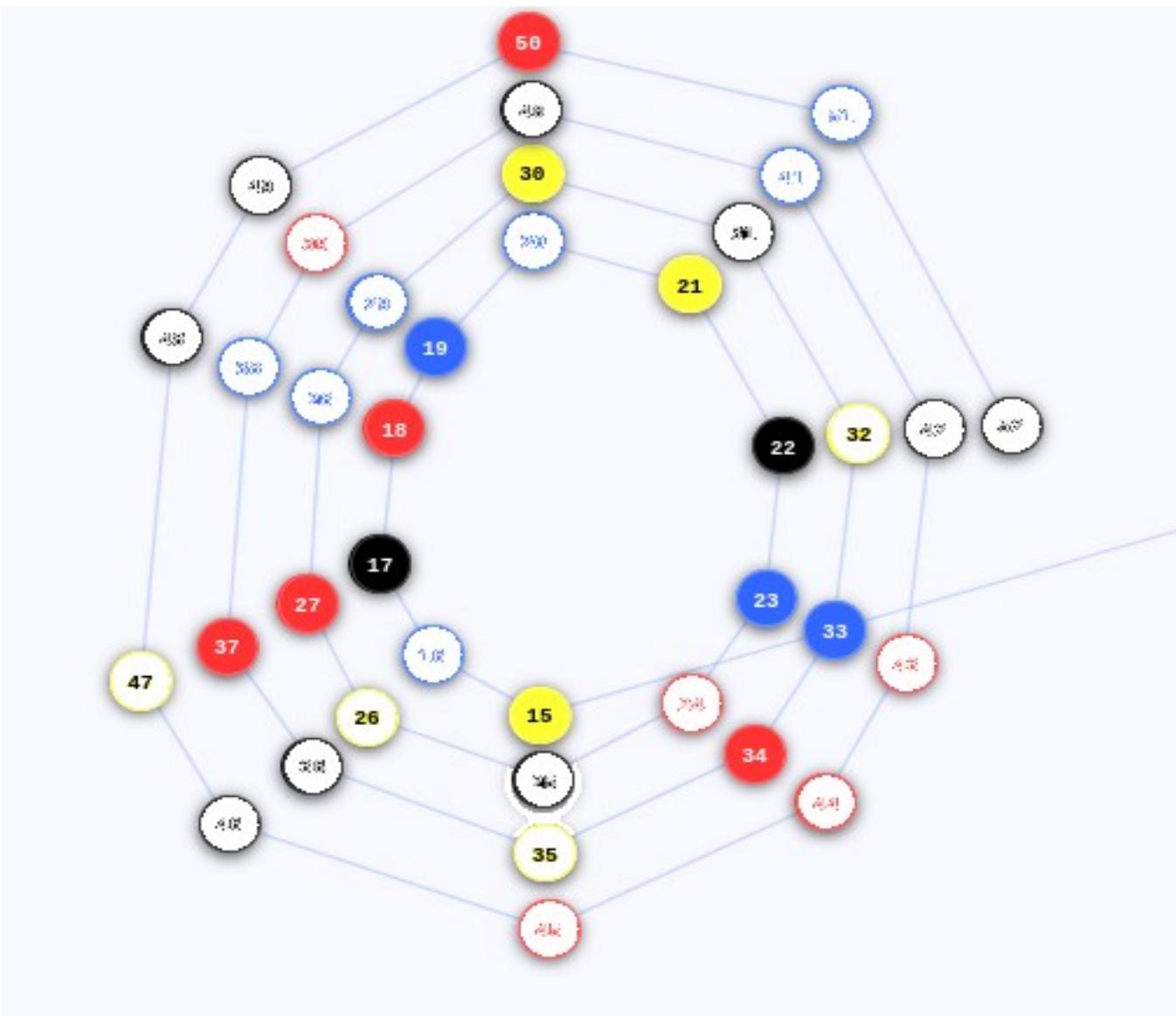
M49:



M50:



M51:



M52:

