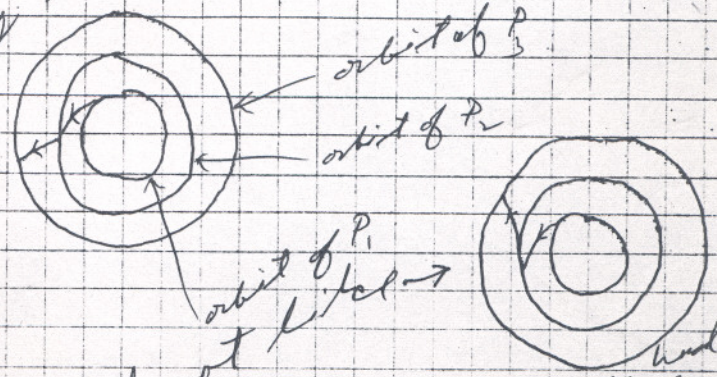
Interplanetary Free-Fall Reconnaissance Trajectories

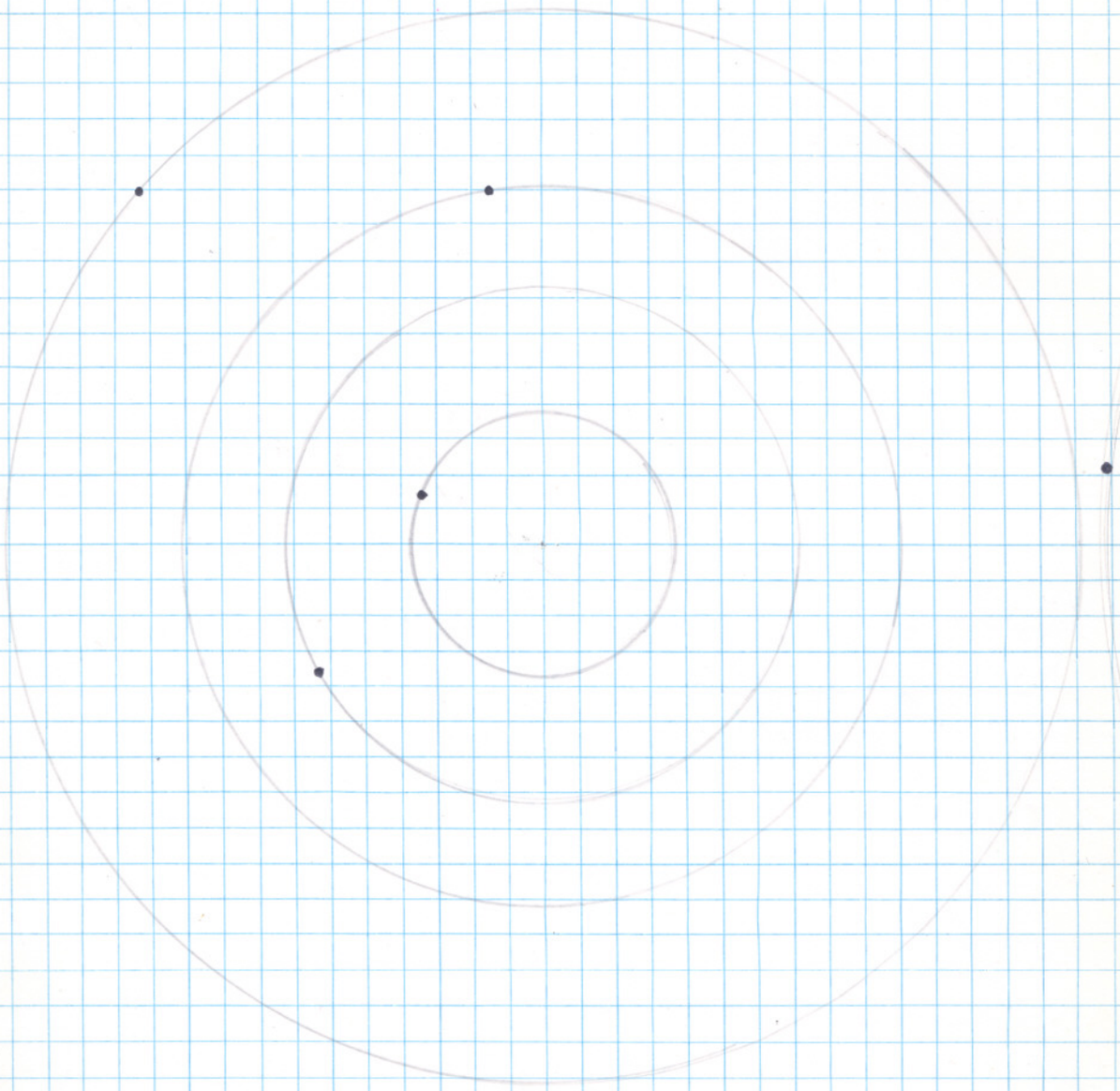
Feb. 20 1962 MA 11 Begin tests of one-way program

I kept track of my trade-offs in log books. First use of the IBM 704 computer to calculate orbits was carried out by the author for the Air Force Ballistic Missile Division. One problem was to identify $P_1 - P_2 - P_3 - \cdots - P_n$ trajectory probes which resemble a particular $P_1 - P_2$ example but not identical.



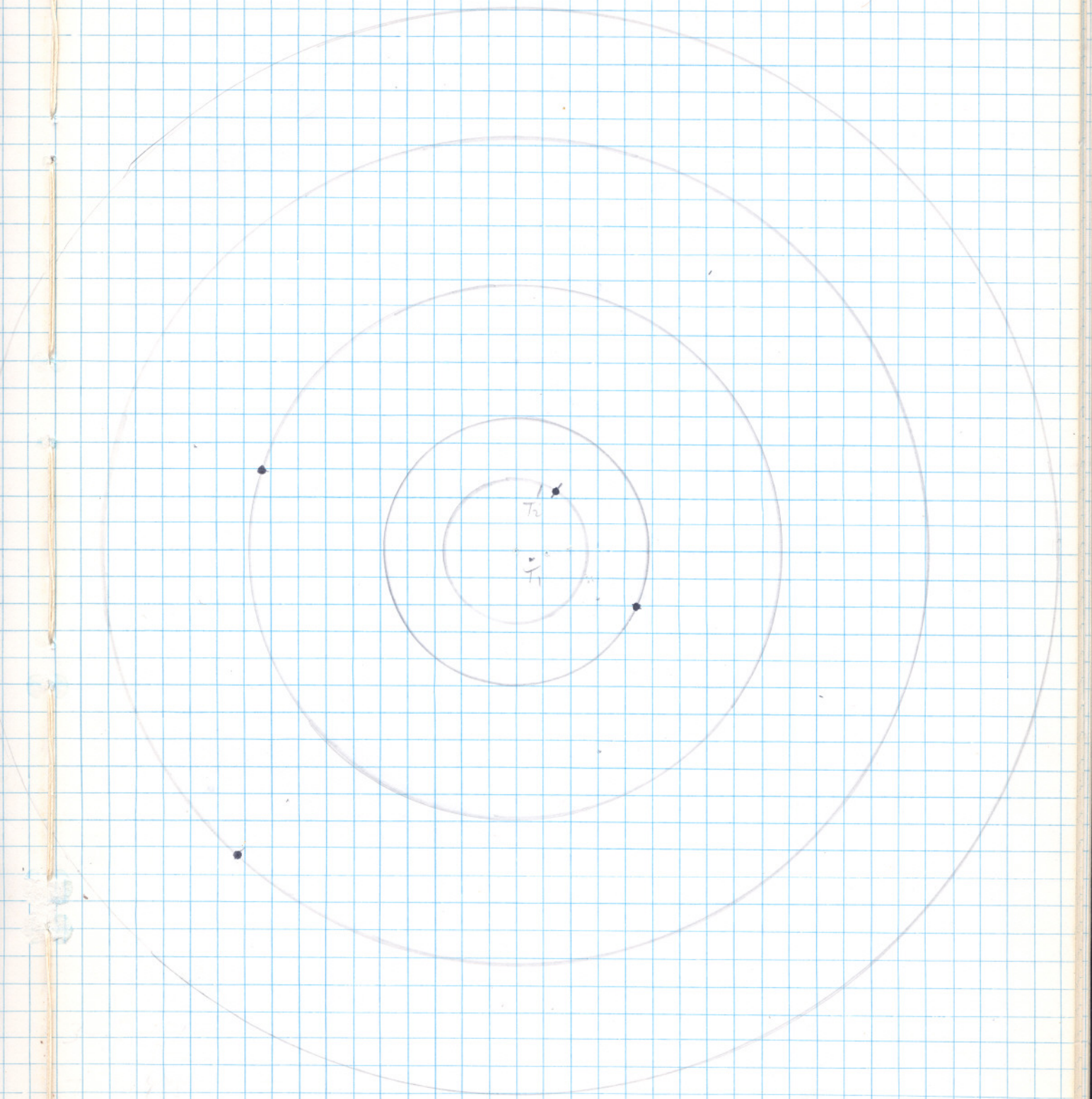
Hence planetary configurations I could expect to be known before a certain probe $P_1 - P_2 - \cdots - P_n$ could ~~be~~ have a good chance of being physically realized.

Jan 1 1965 38761 Planets 1-4



Jan 1 1965

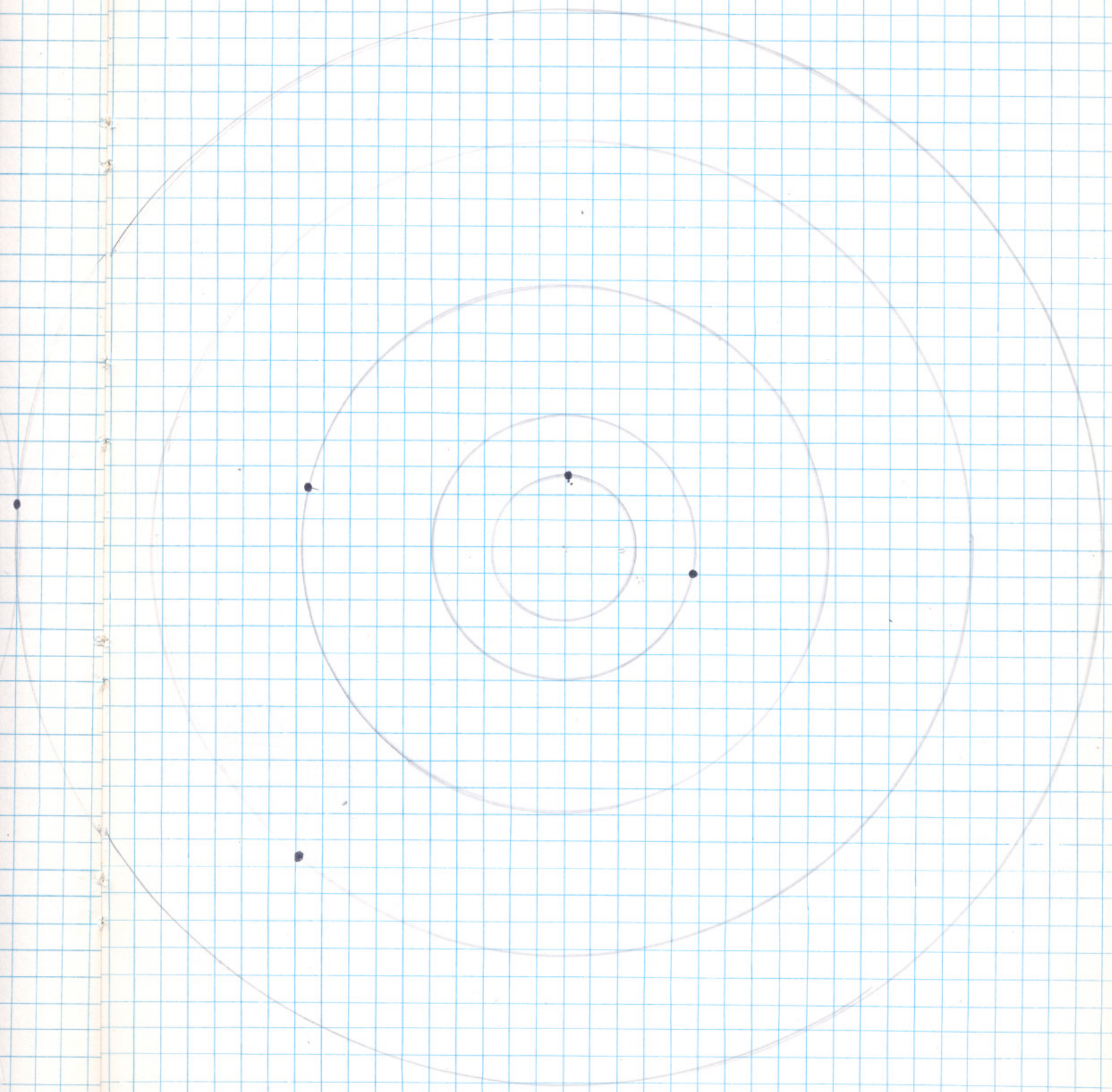
Planets 5-9



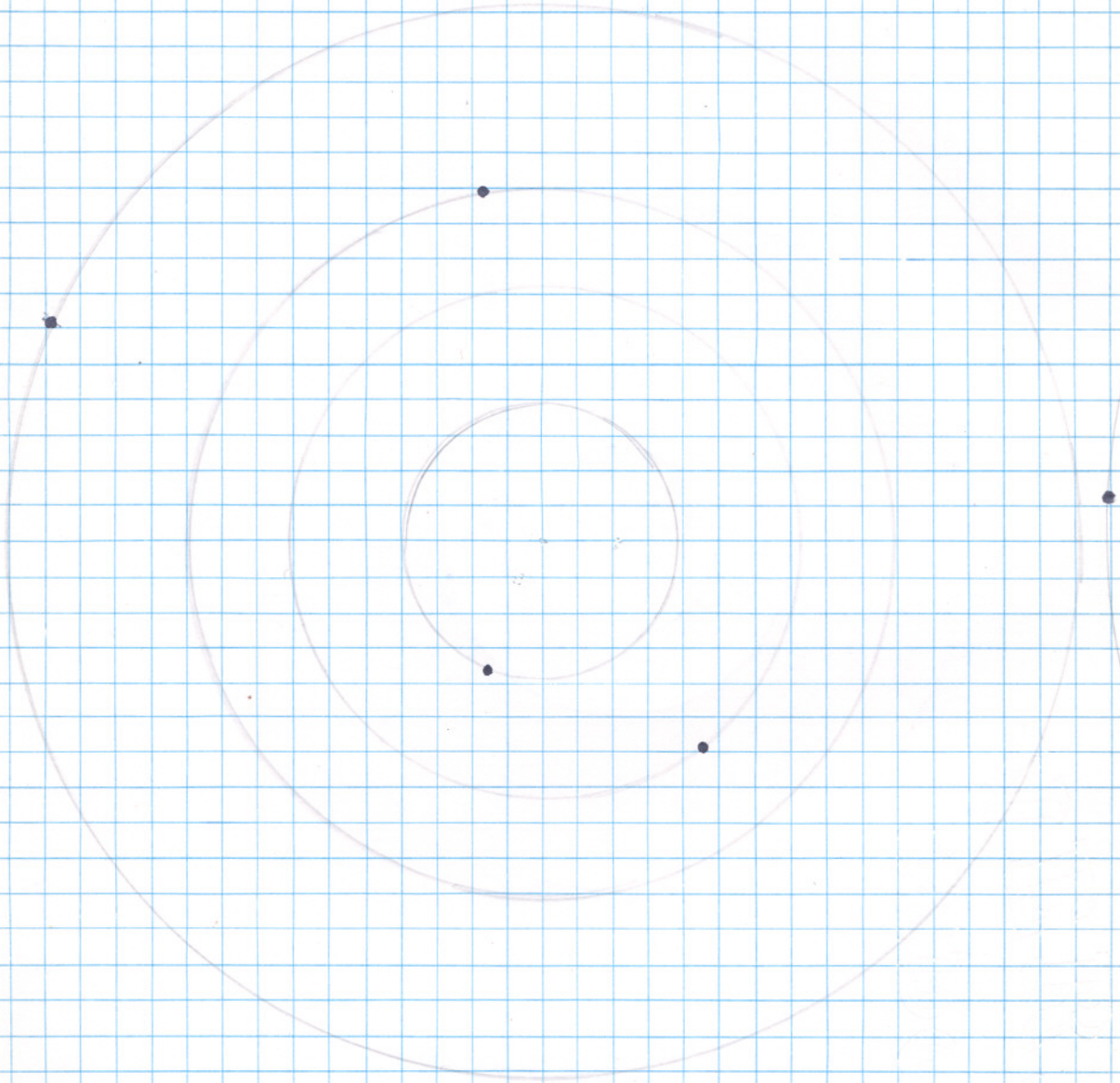
Jan 1 1966 39126 Planets 1 – 4



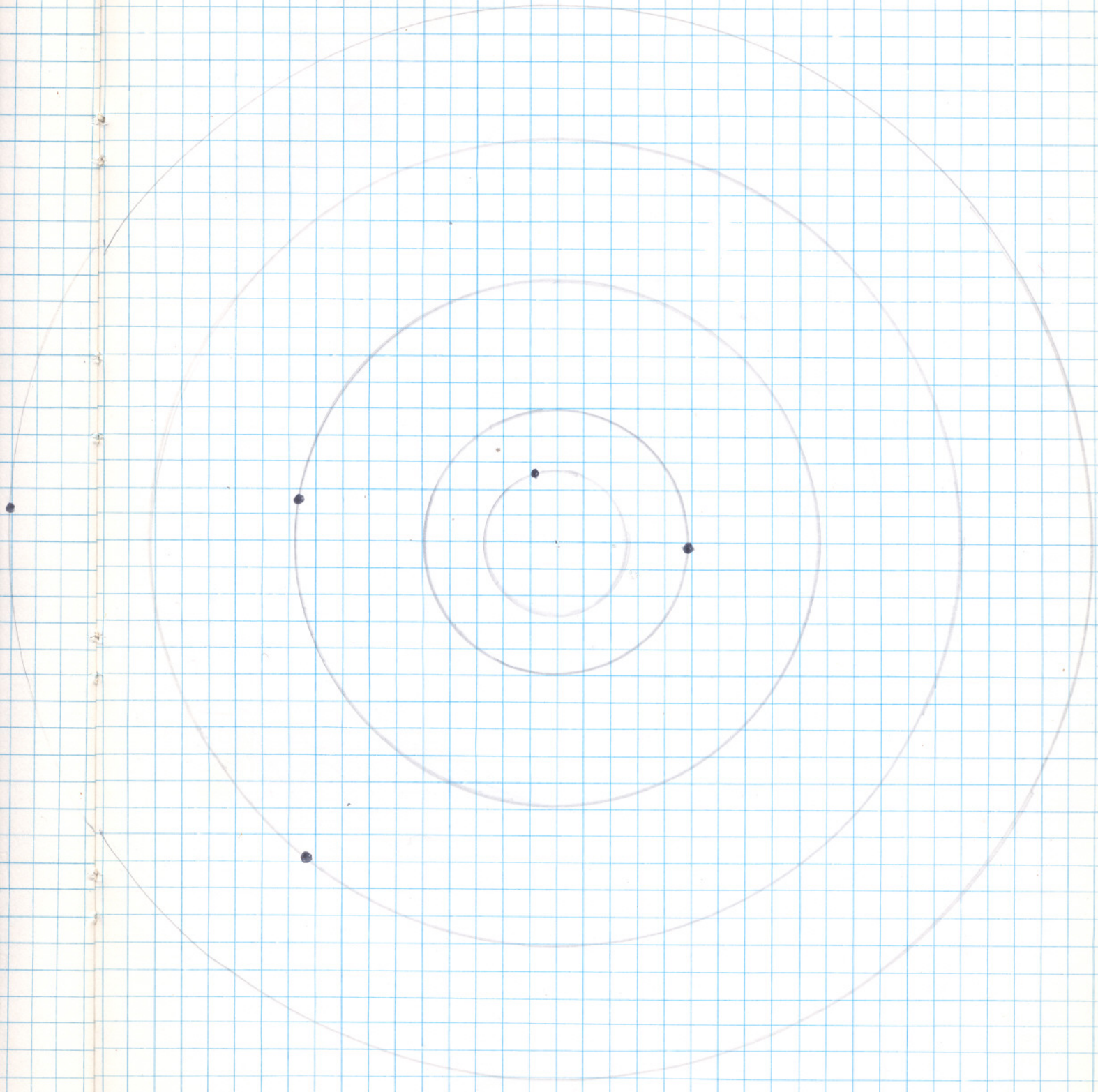
Jan 1 1966 planets v - 9



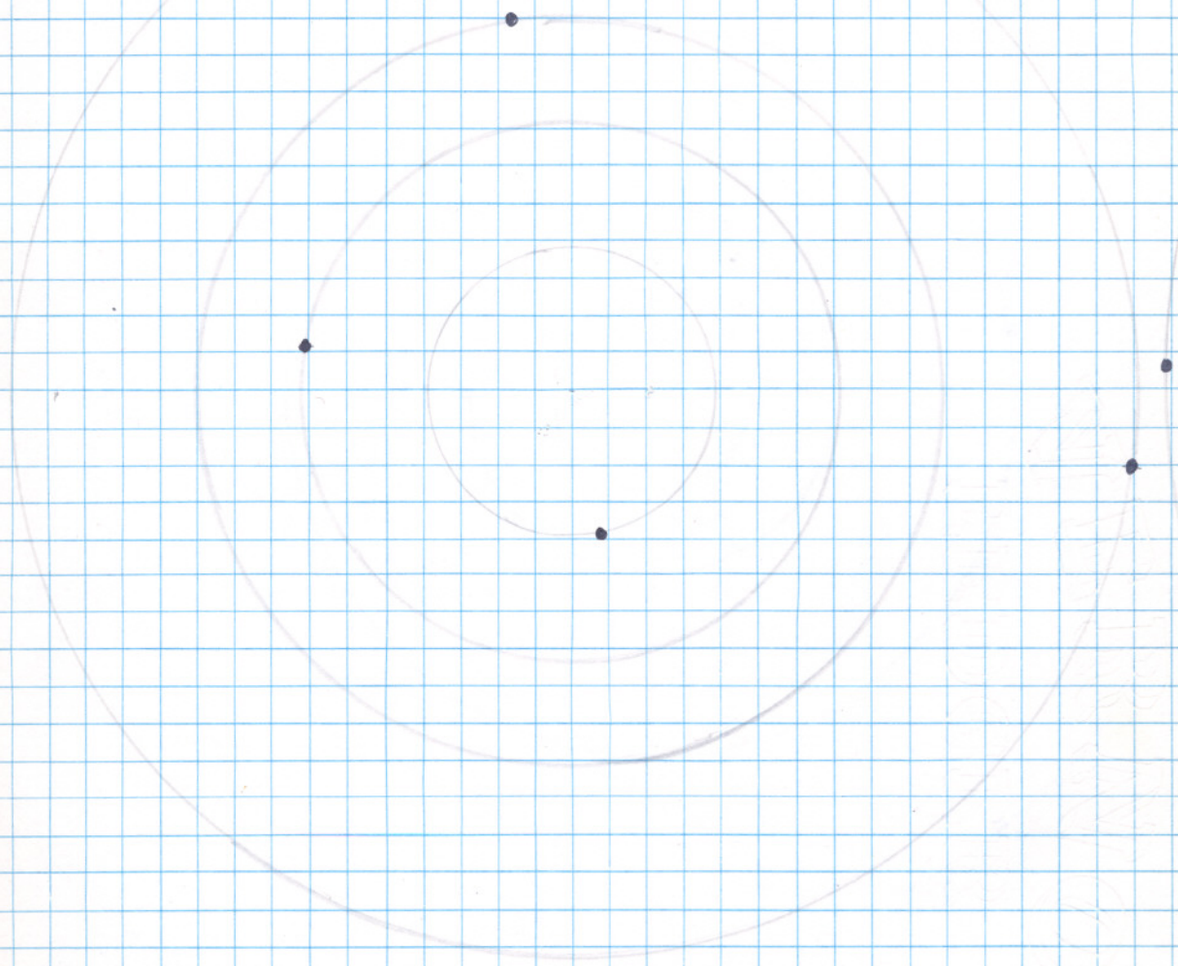
Jan 1 1767 3744/ planeta 1 – 4



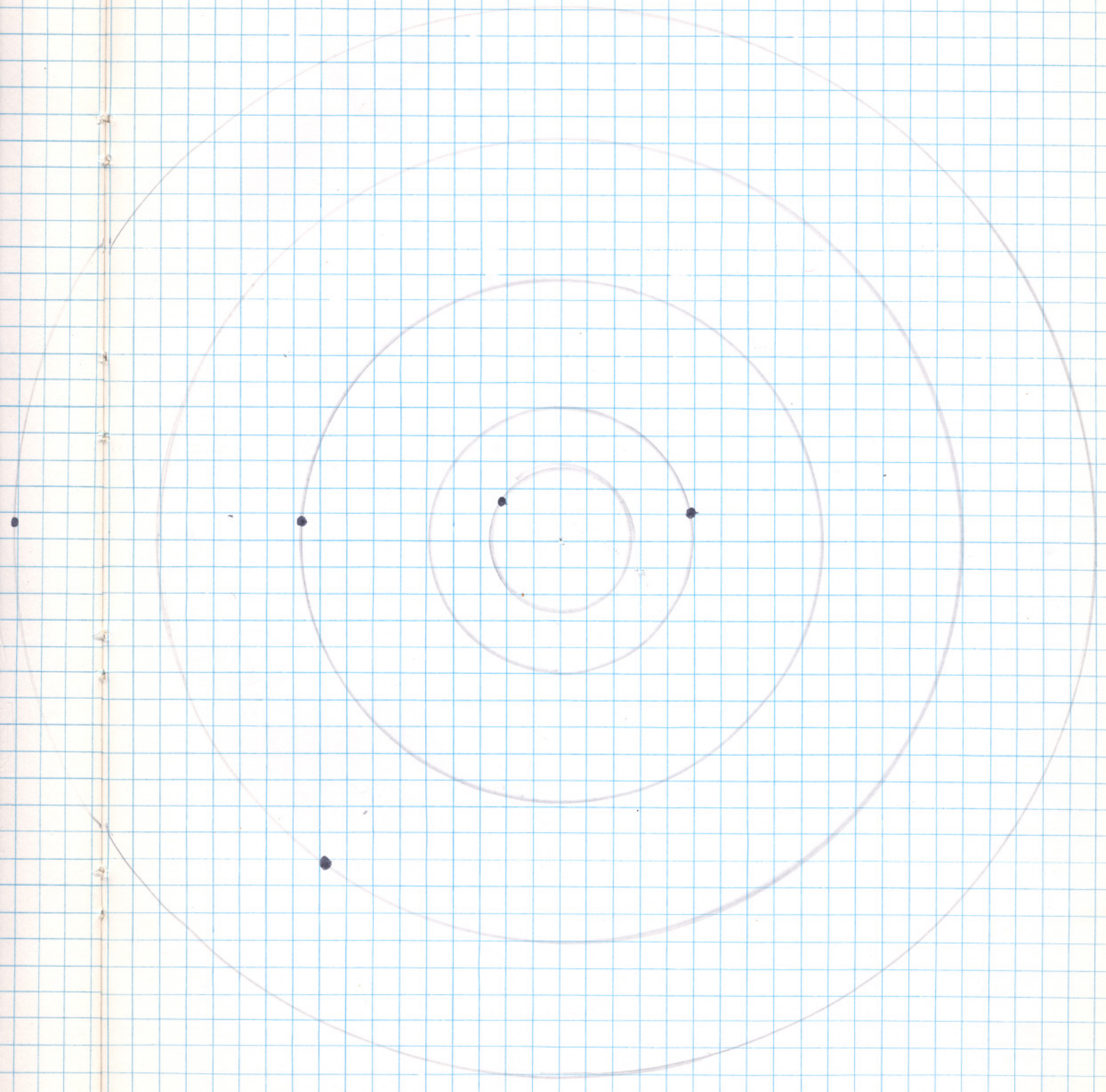
Jan 1 1967 Planeta 5 - 9



Jan 1 1968 39856 planets 1-4



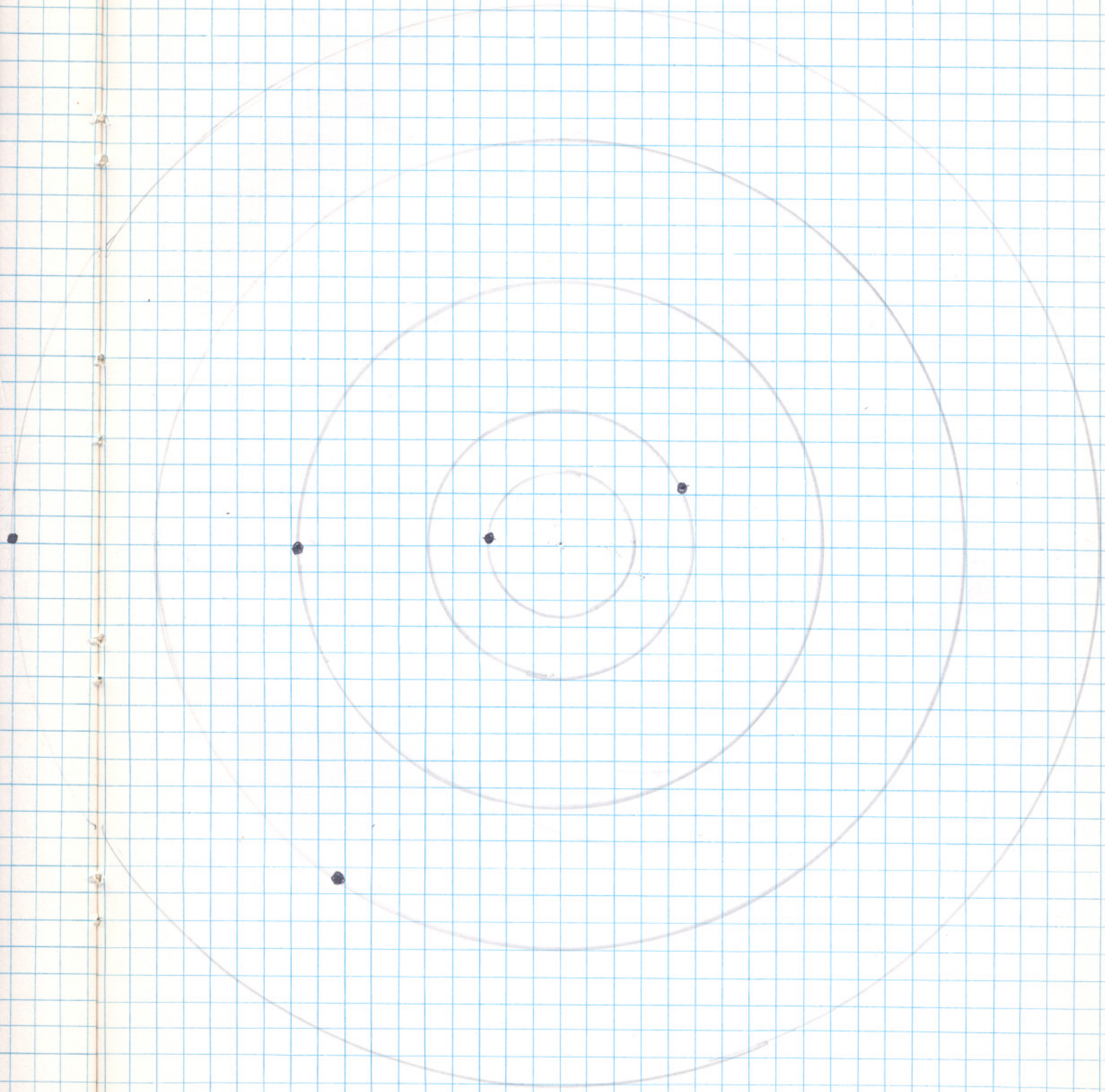
Jan 1 1968 Planets 5 - 9



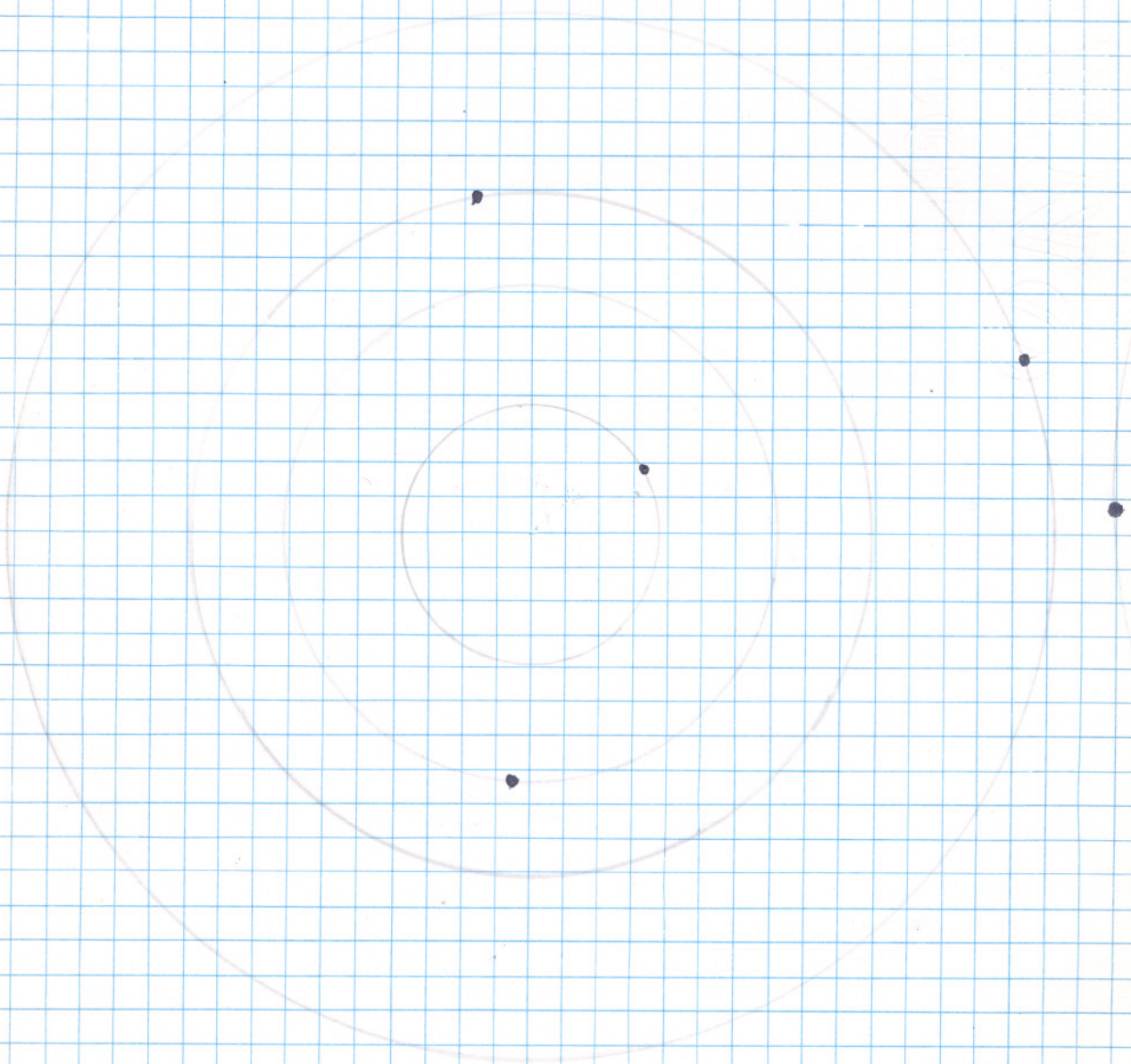
Jan 1 1967 40222 planets 1-4



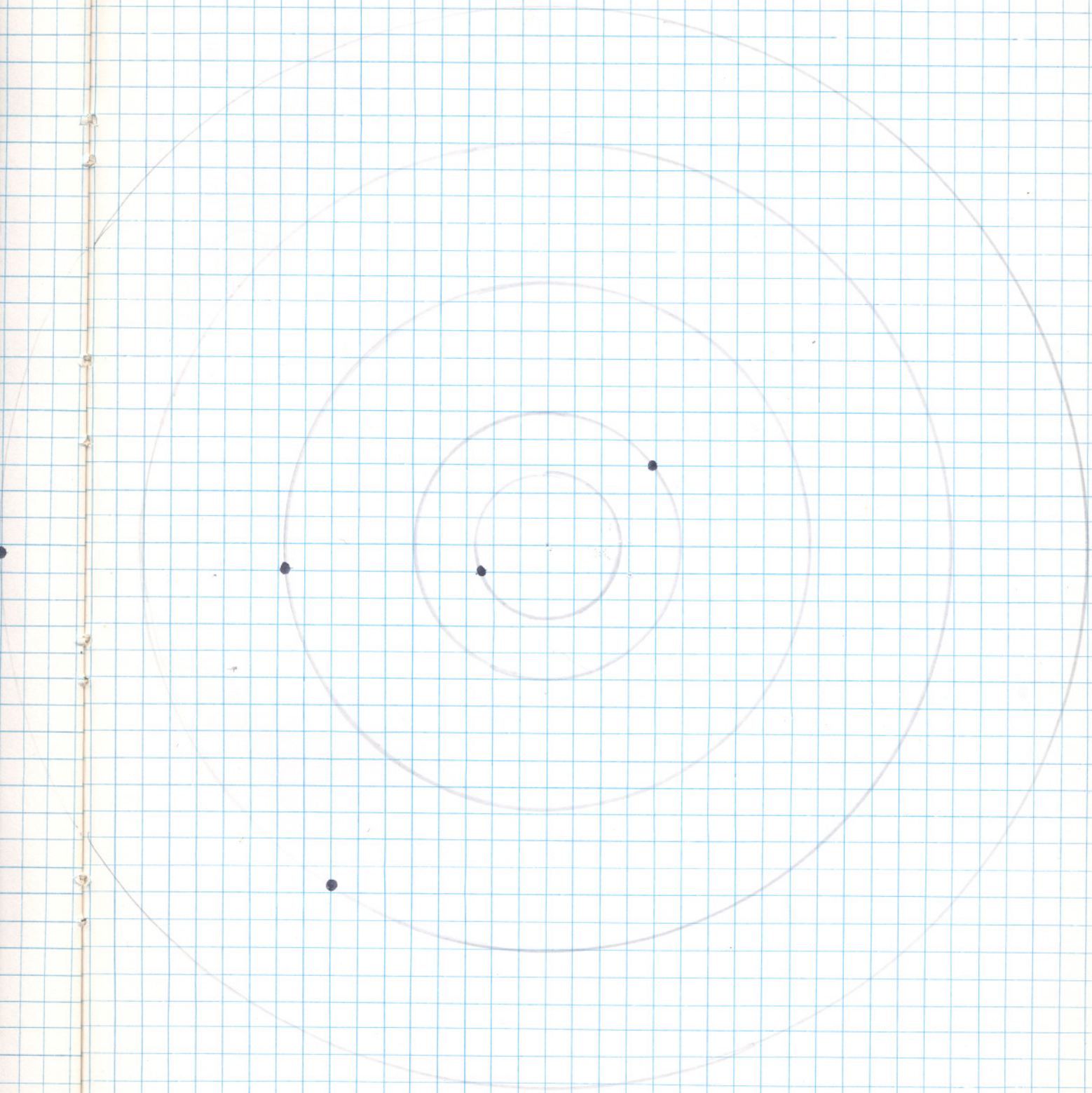
June 1 1969 Planets 5-9



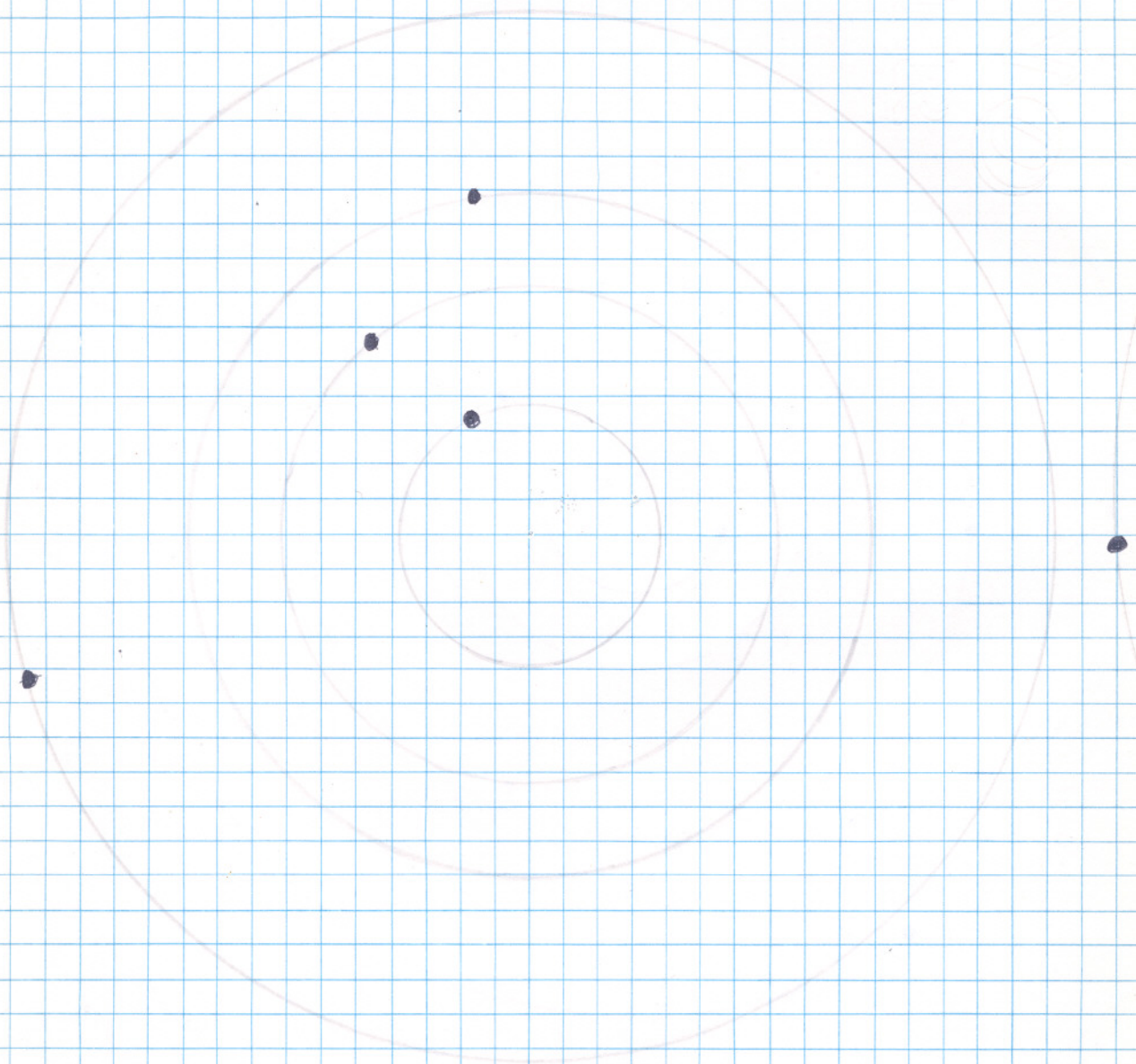
Jan 1 1970 40587 Planets 1-4



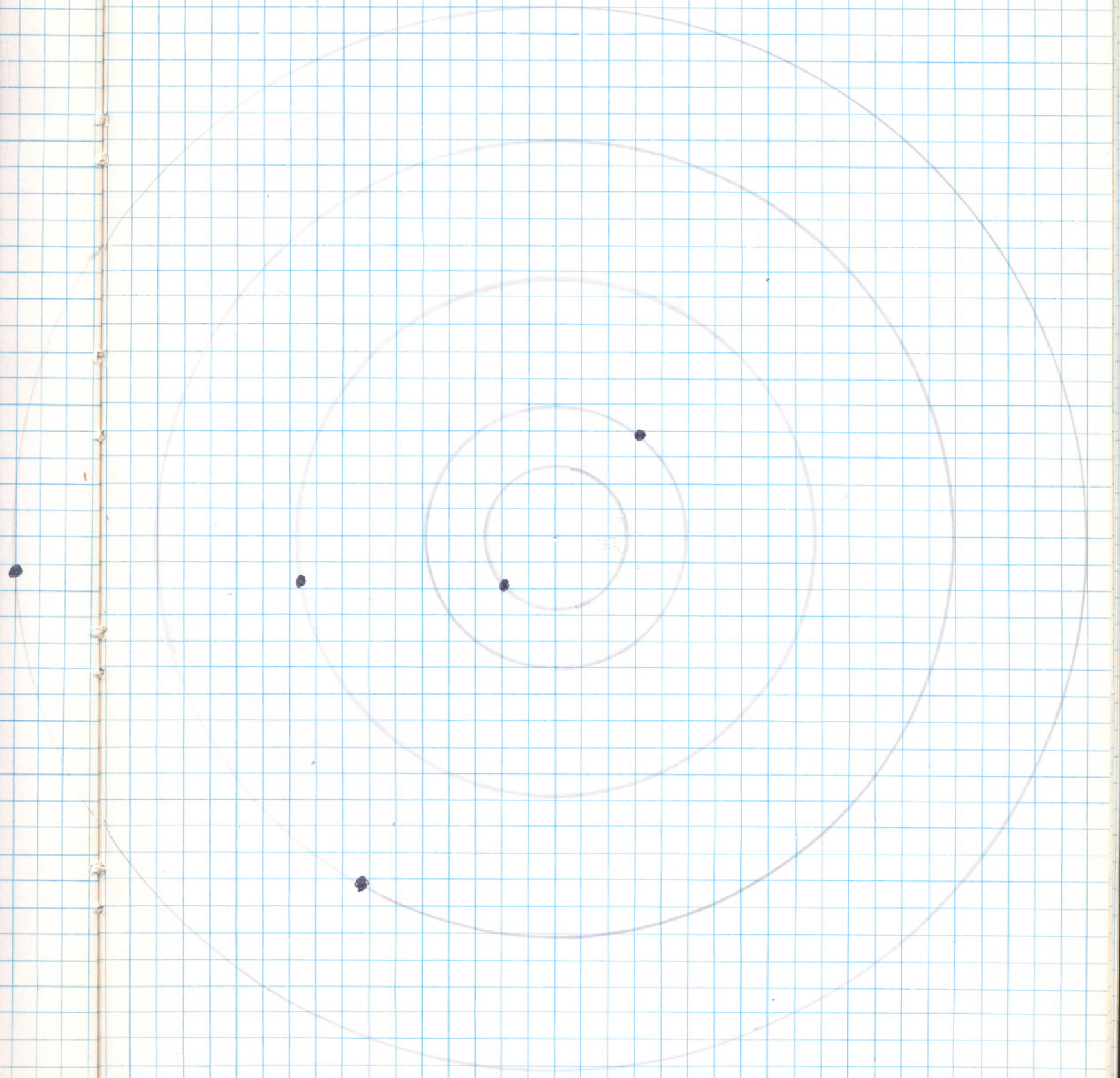
Jan 1 1970 Planets J-9



jan 1 1971 ~~40587~~ 40952 planets 1-4



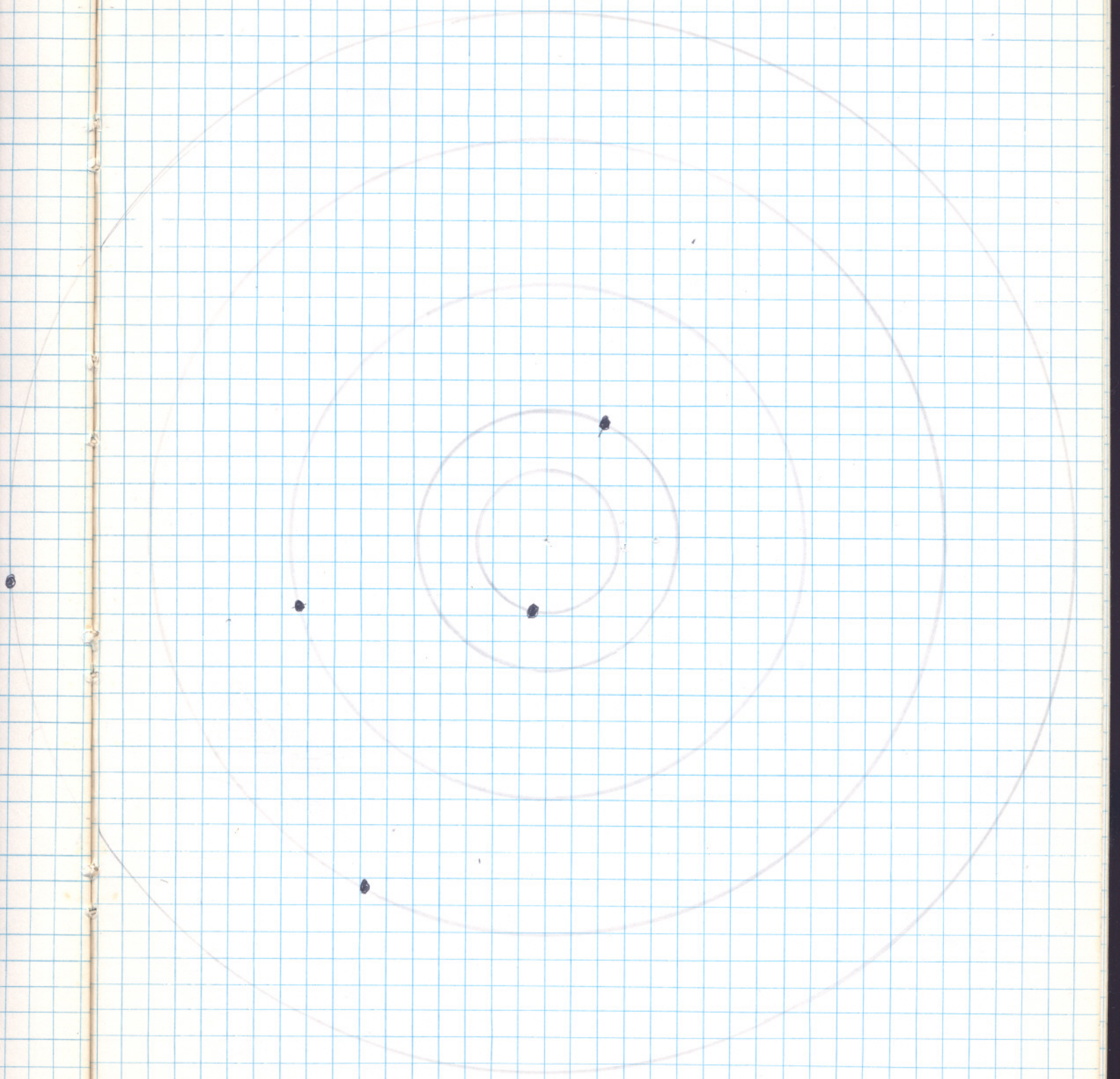
June 1 1971 Planets 5 - 9



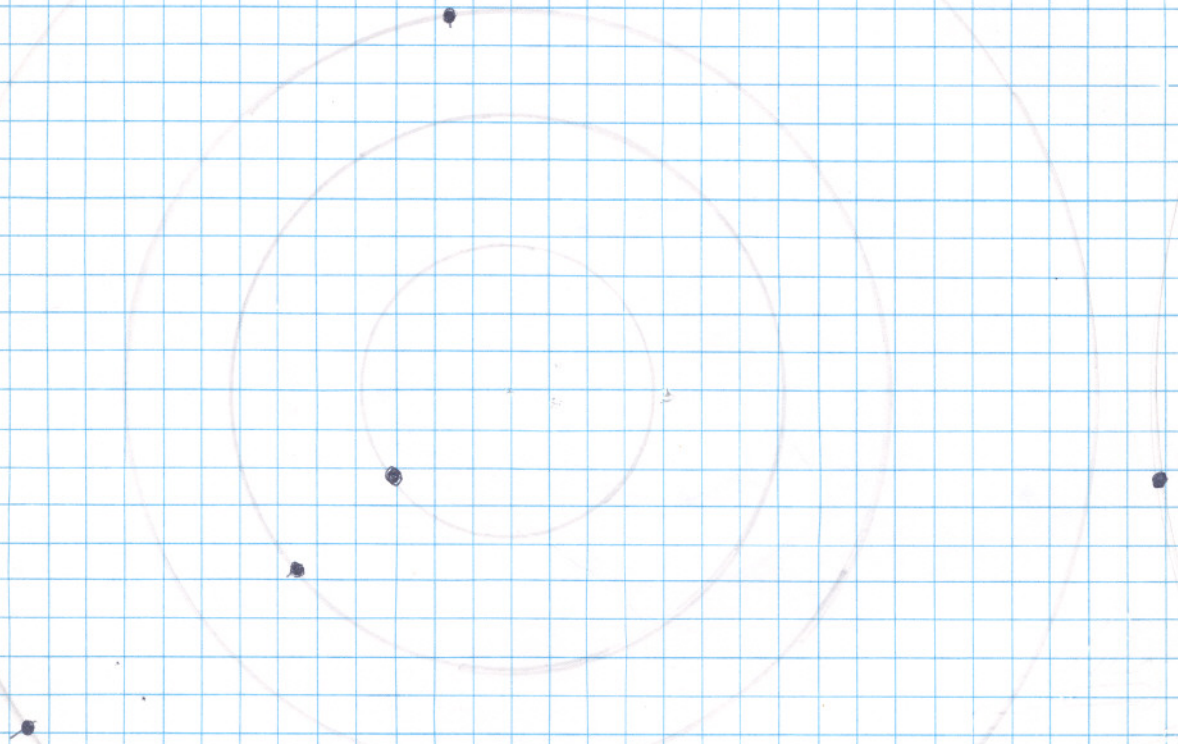
Jan 1 1972. 41317 Planets 1-4



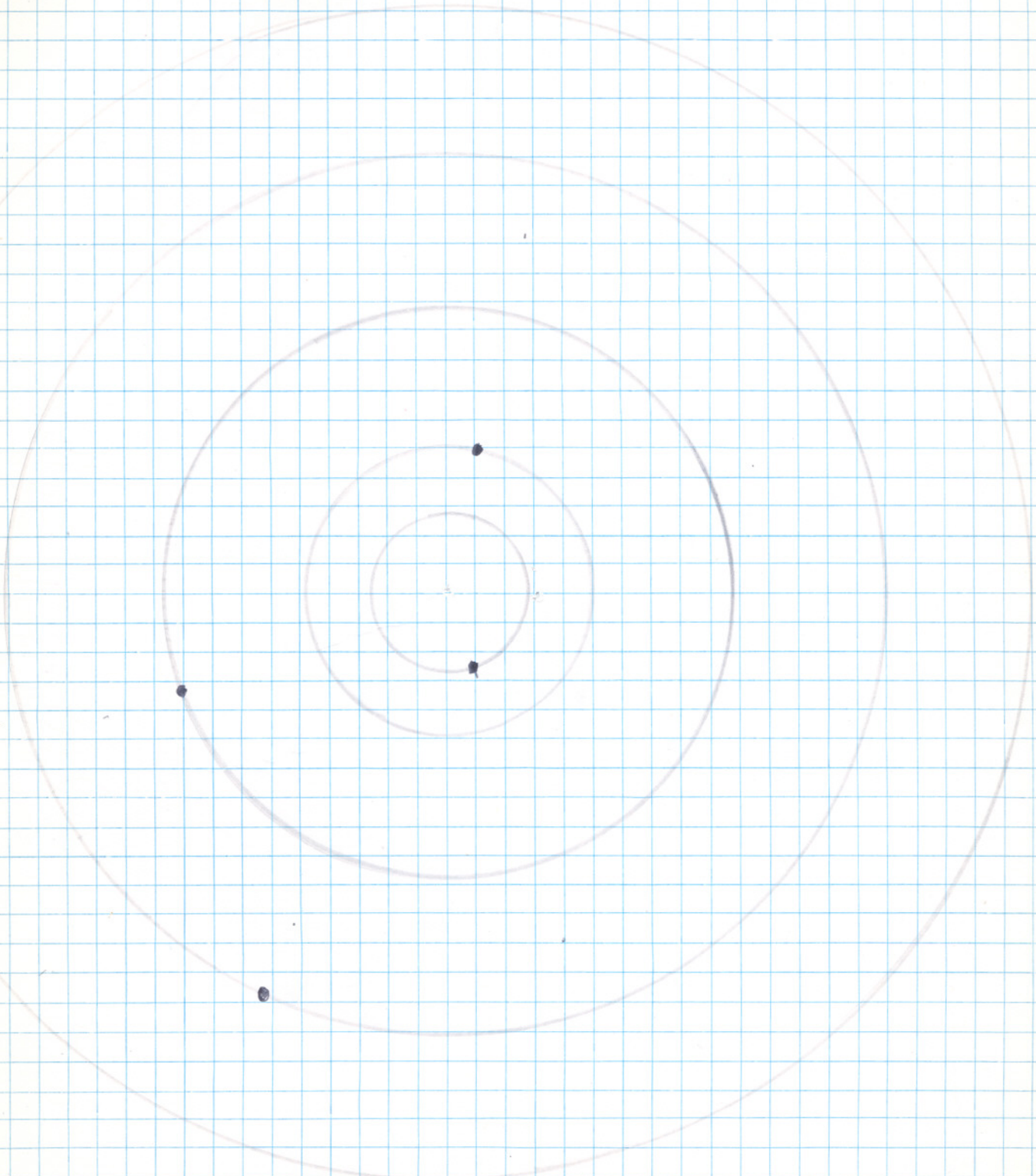
jan 1 1972 Planeta J — 9



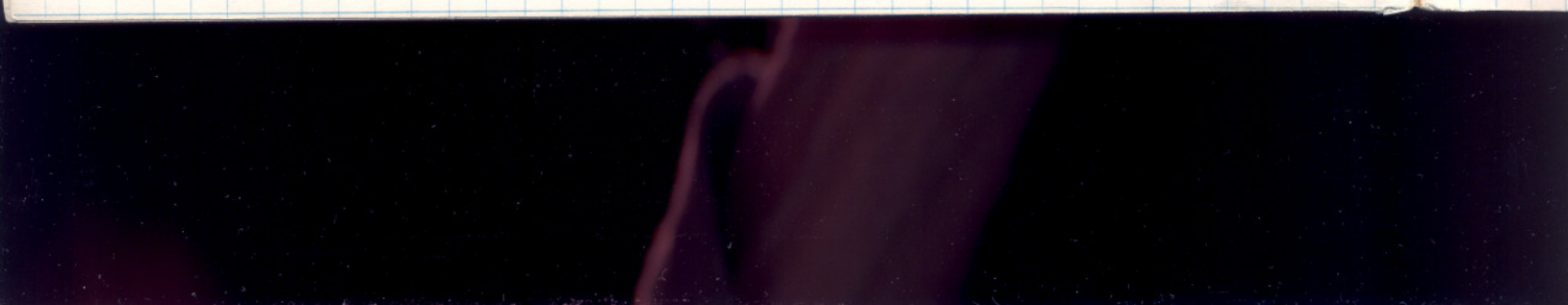
jan 1 1973 41683 Planets 1-4



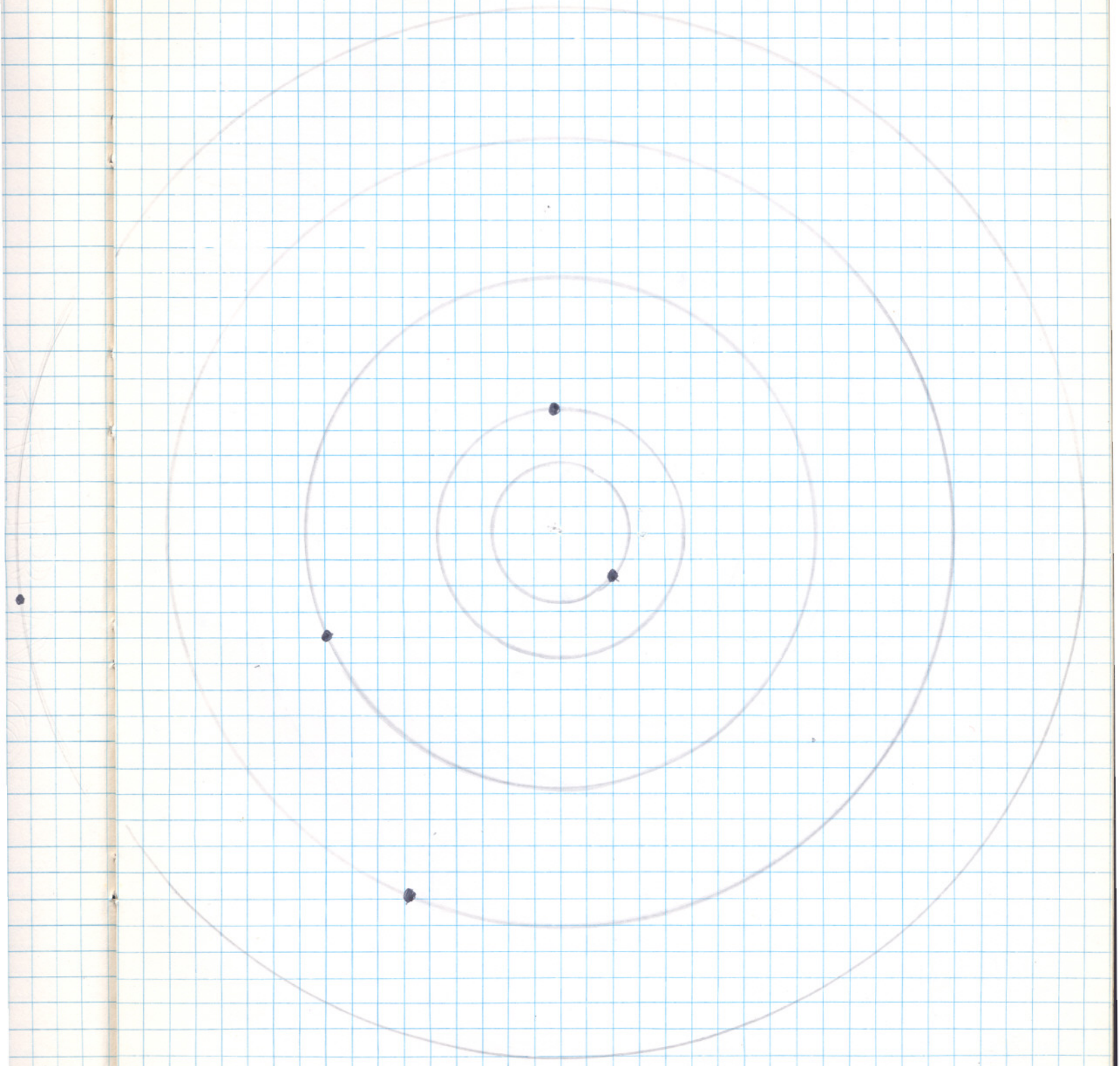
jan 1 1973 Planets 5-7



Jan 1 1774 42048 Planets 1-4



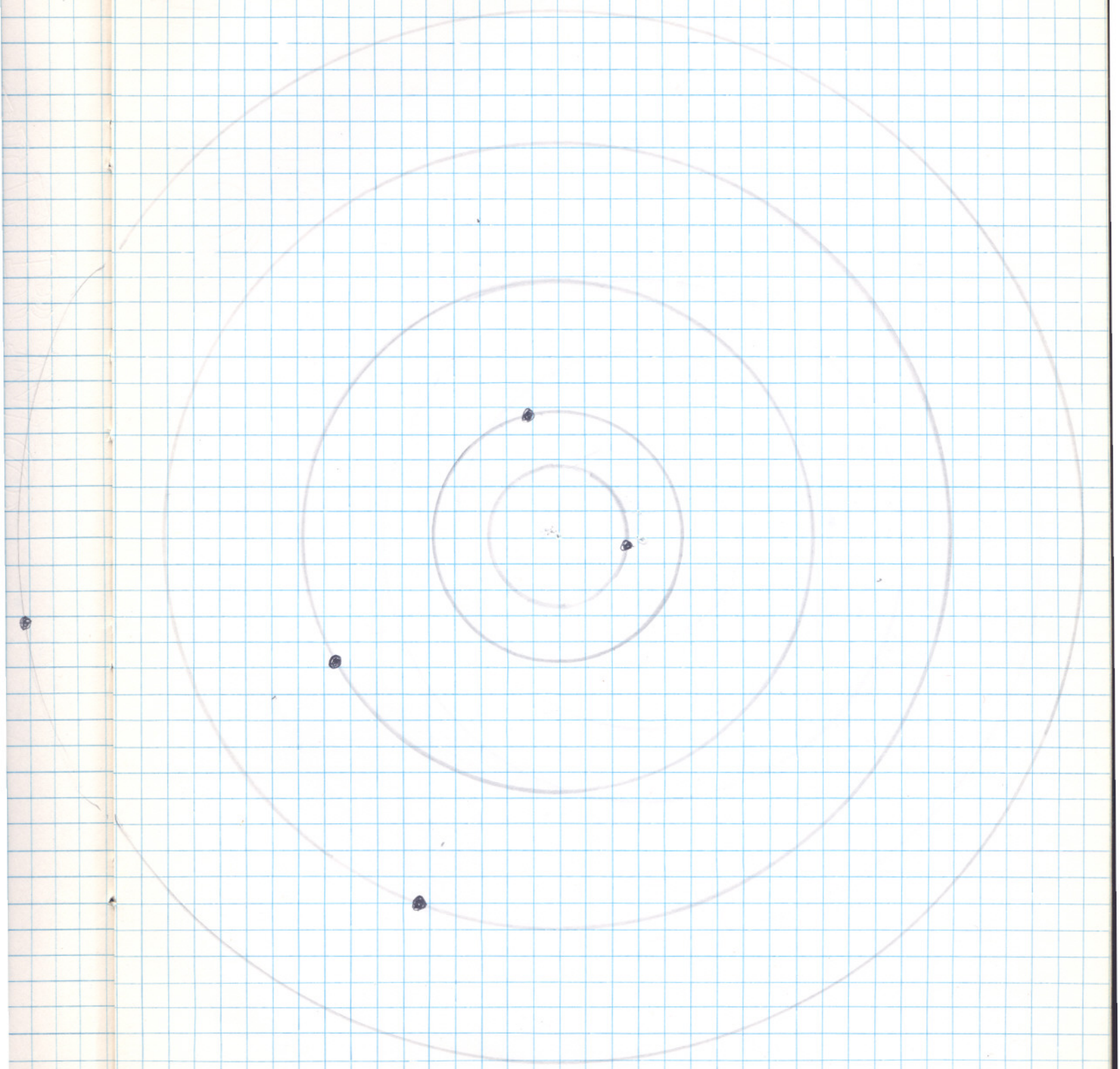
Jan 1 1974 Planets 5-9



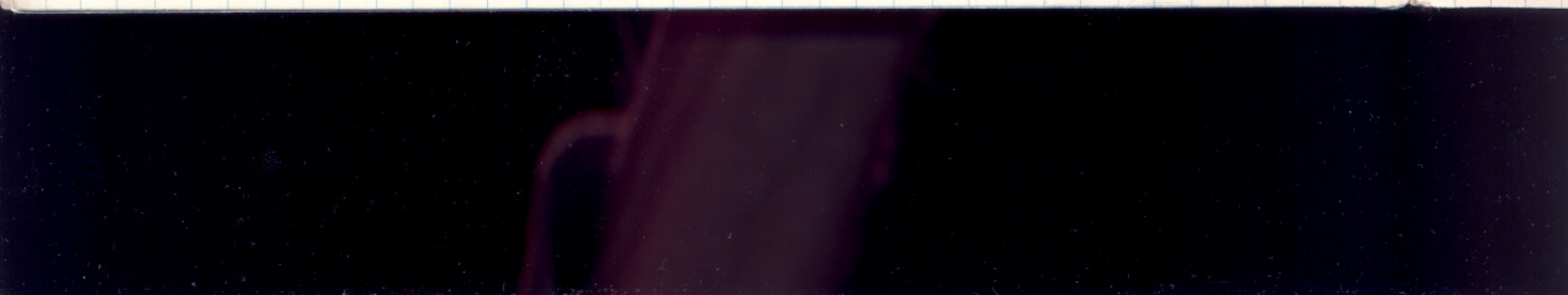
Jan 1 1975 42413 Planets 1-4



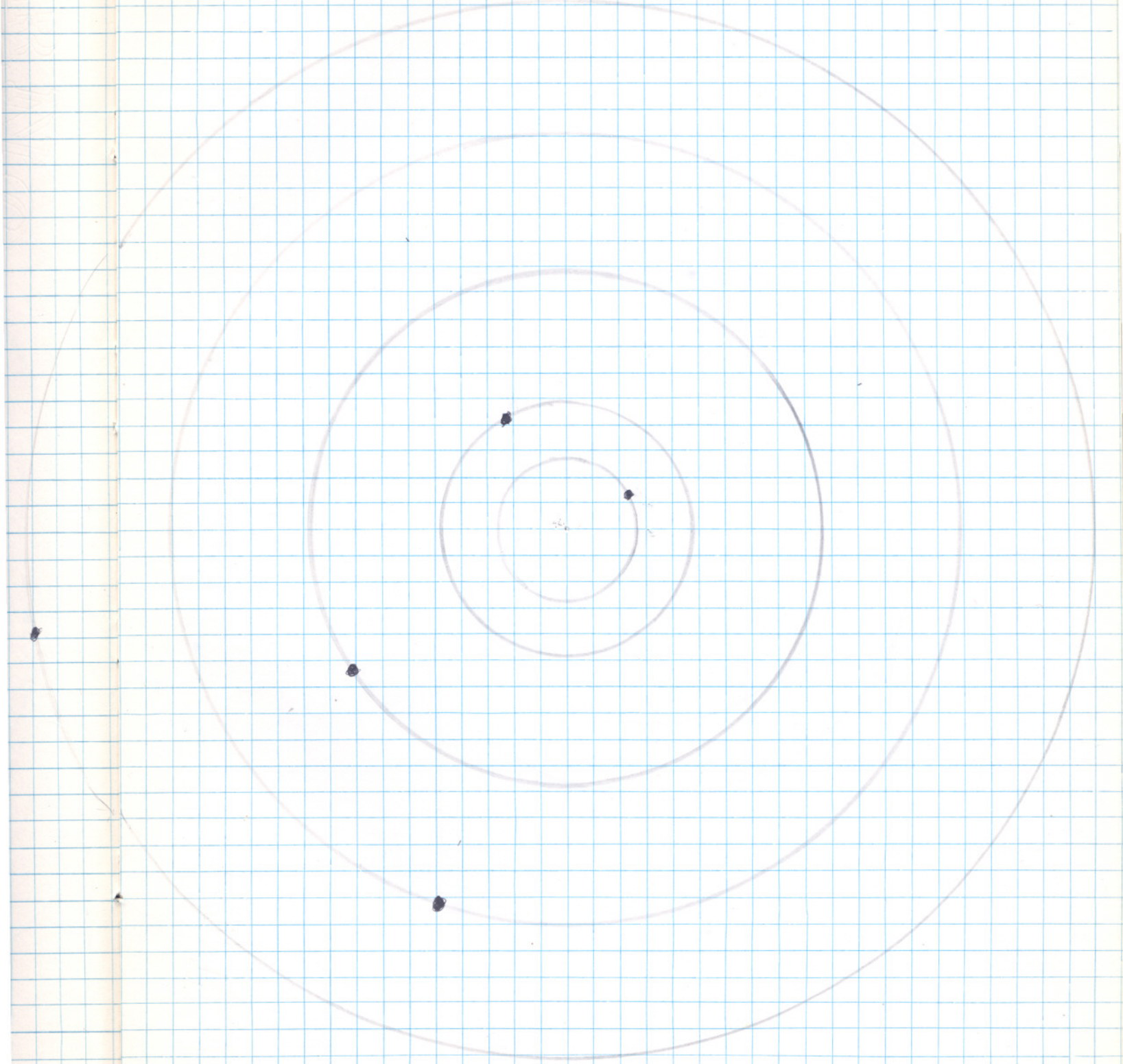
Jan 1 1775 planets 5–9



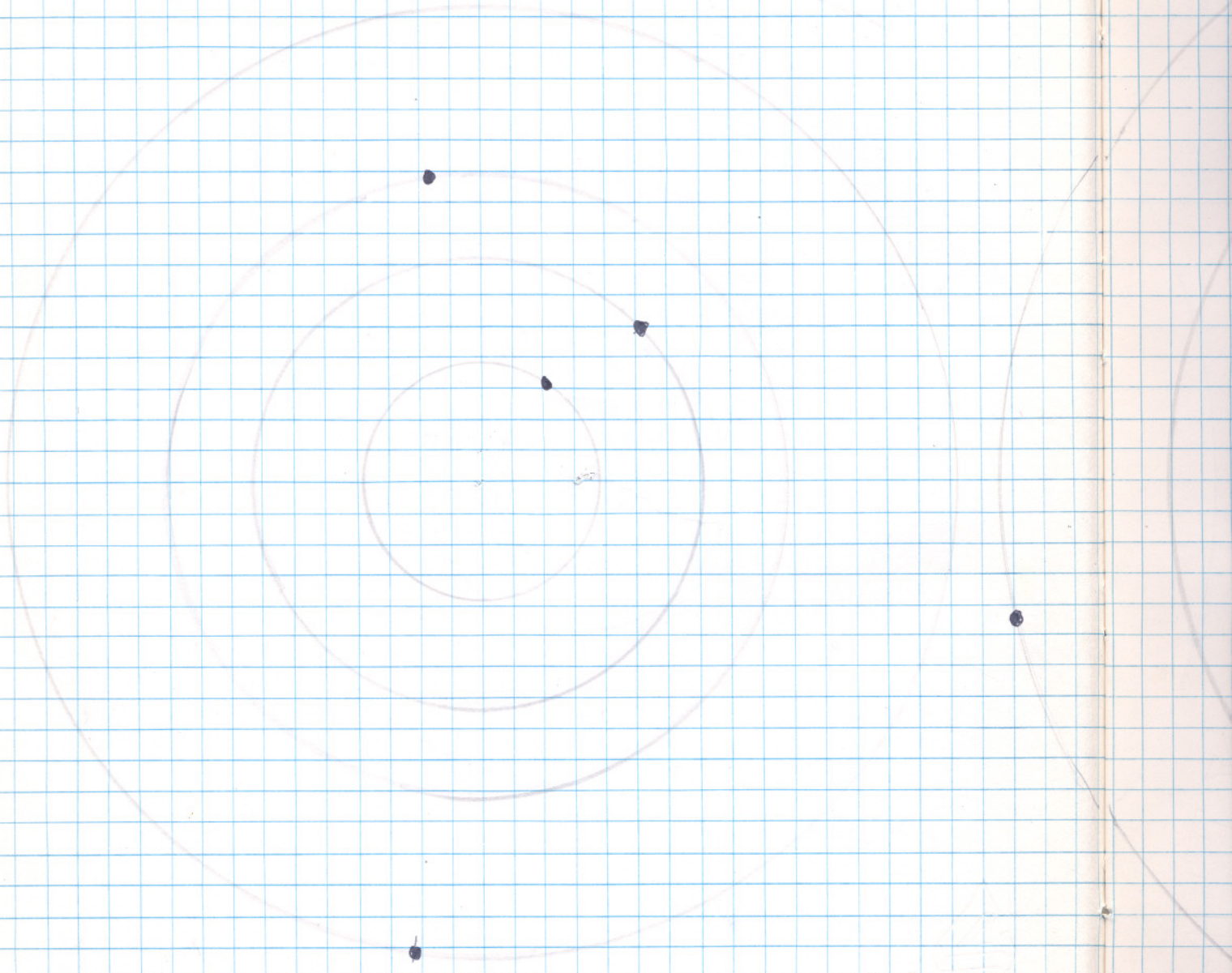
Jan 1 1976 42778 Planets 1-4



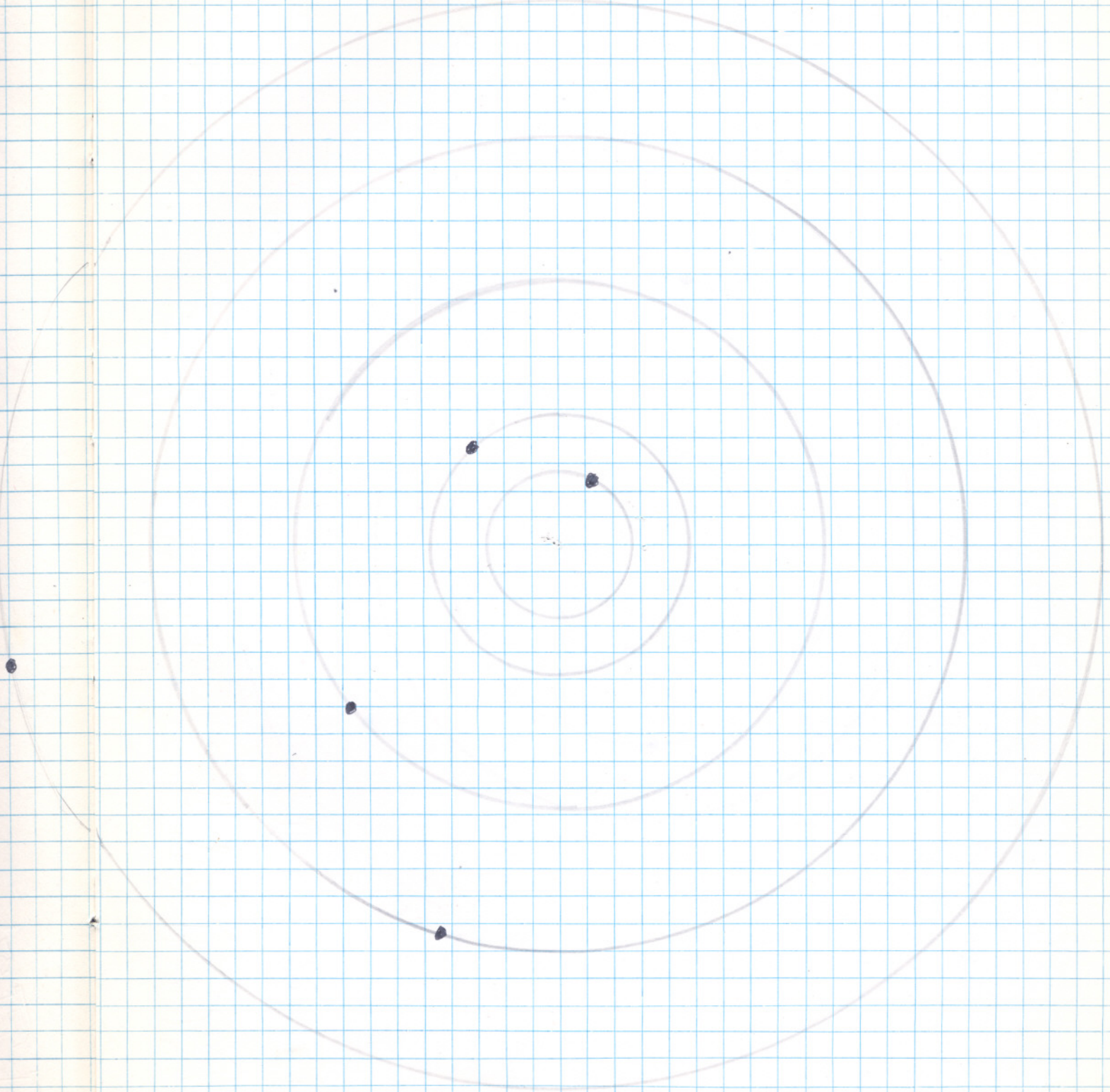
Jan 1 1976 Planets 5 - 9



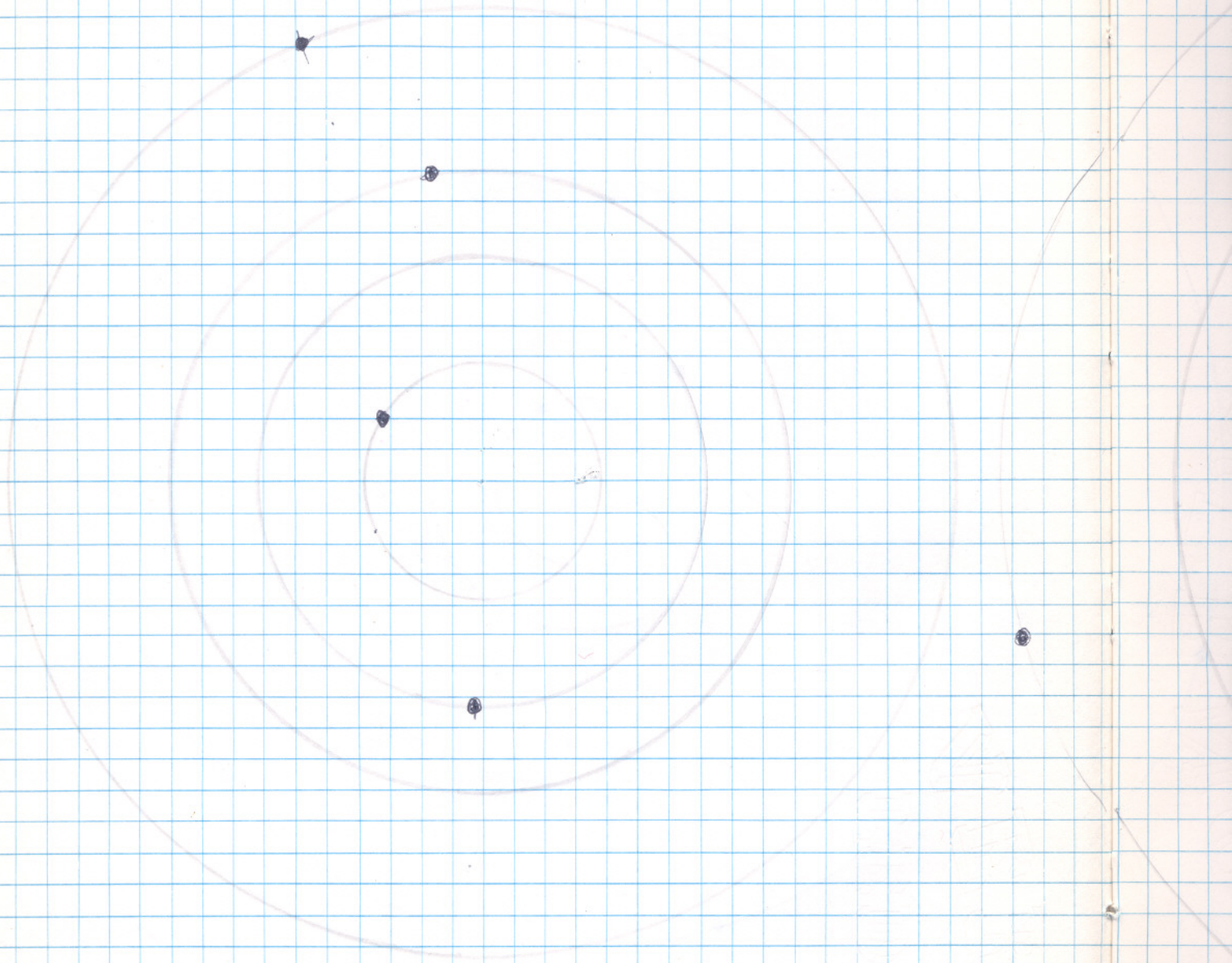
Jan 1 1977 43144 Planets 1-4



Jan 1 1977 Planets 5-9



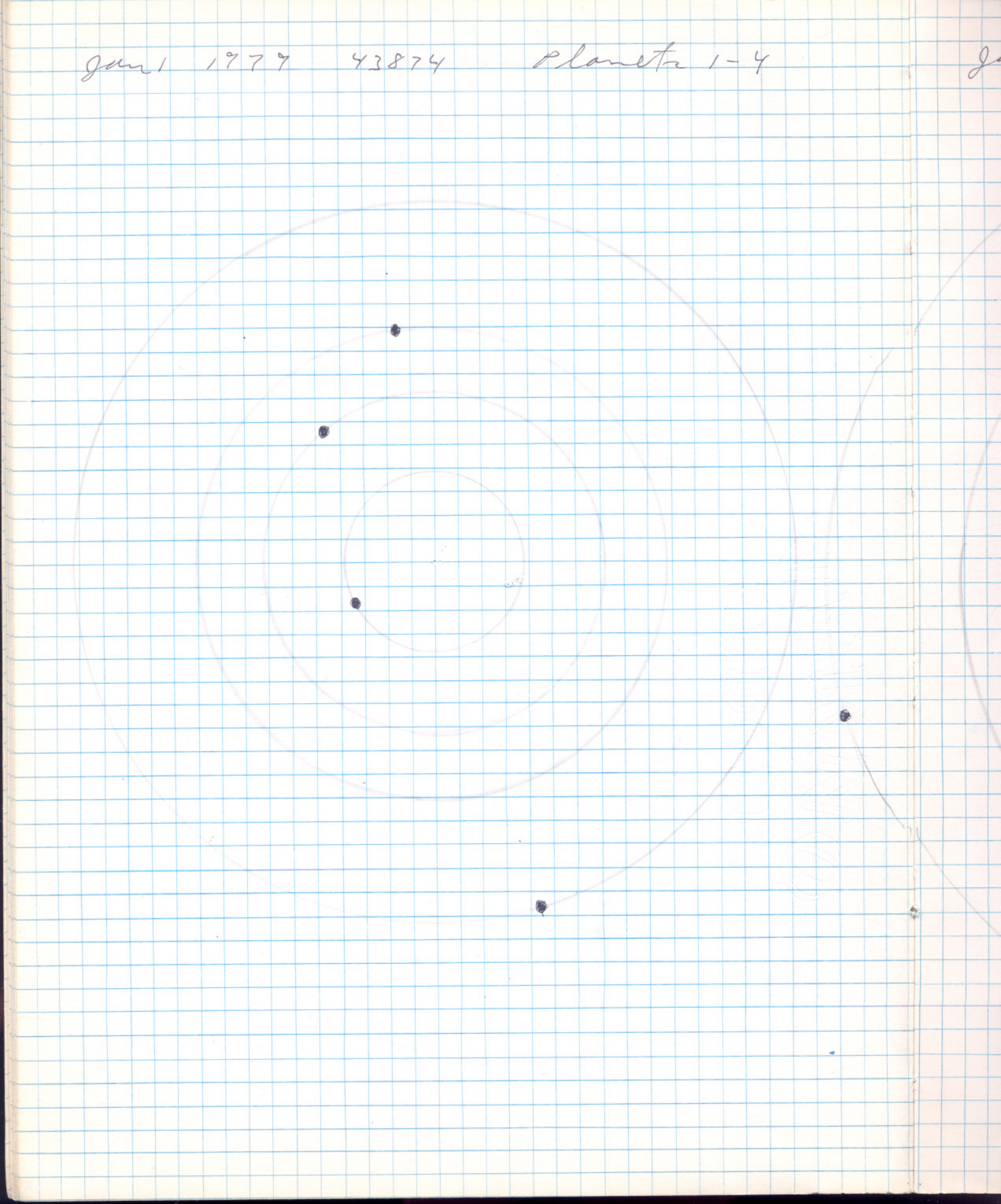
Jan 1 1978 ~~43874~~ 43509 Planets 1-4



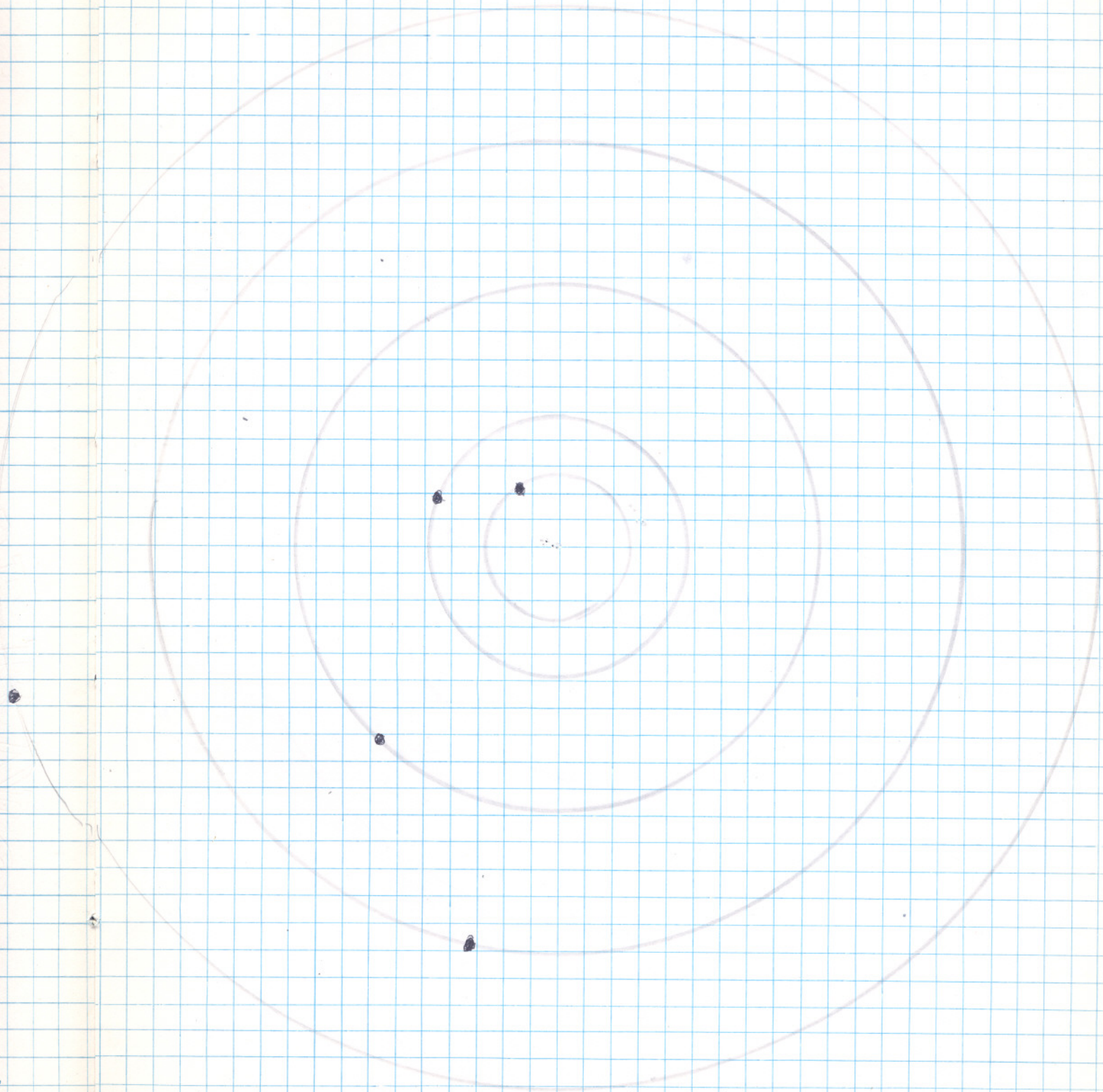
June 1 1978 Planets 5-9



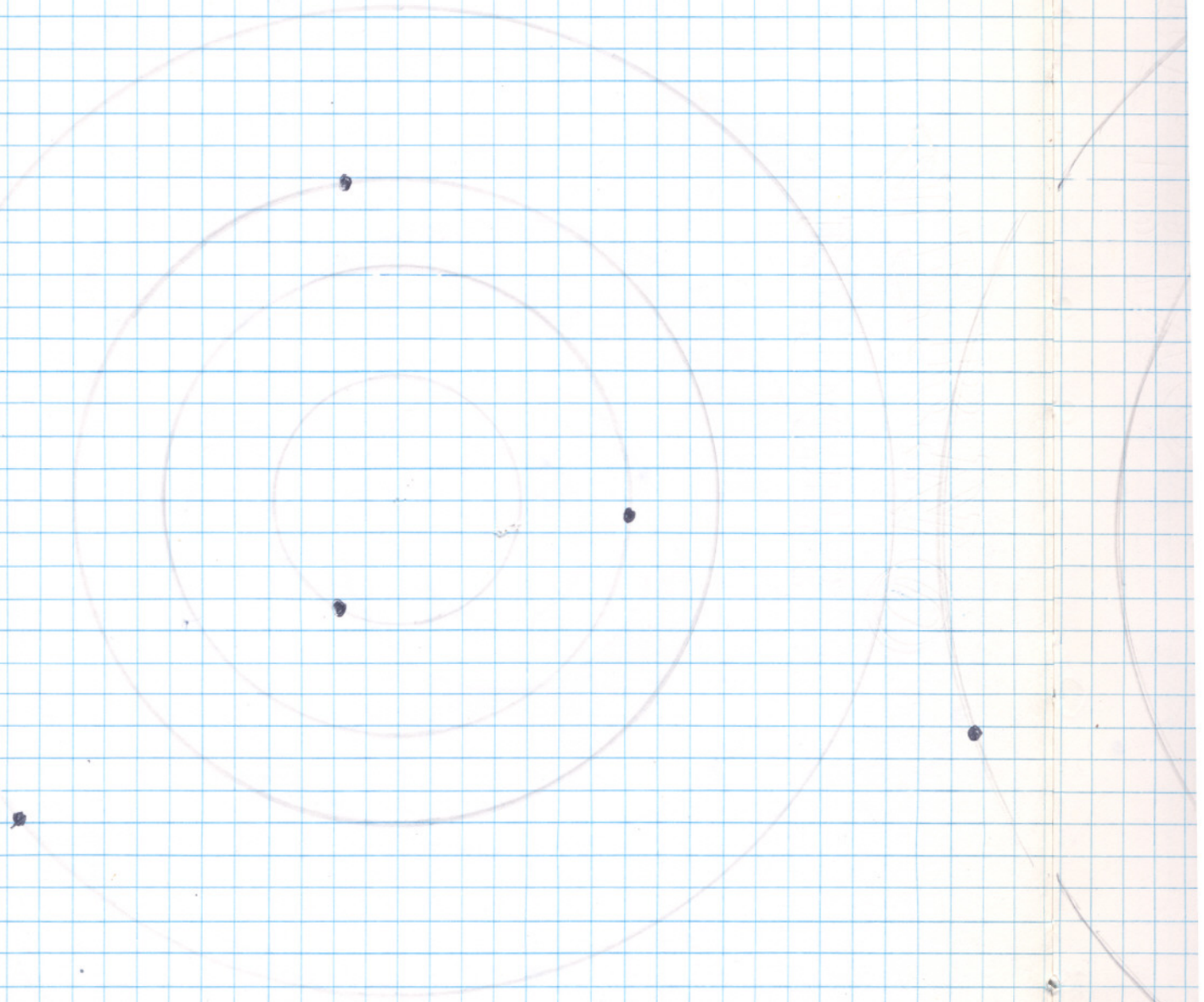
jan 1 1977 43874 planets 1-4



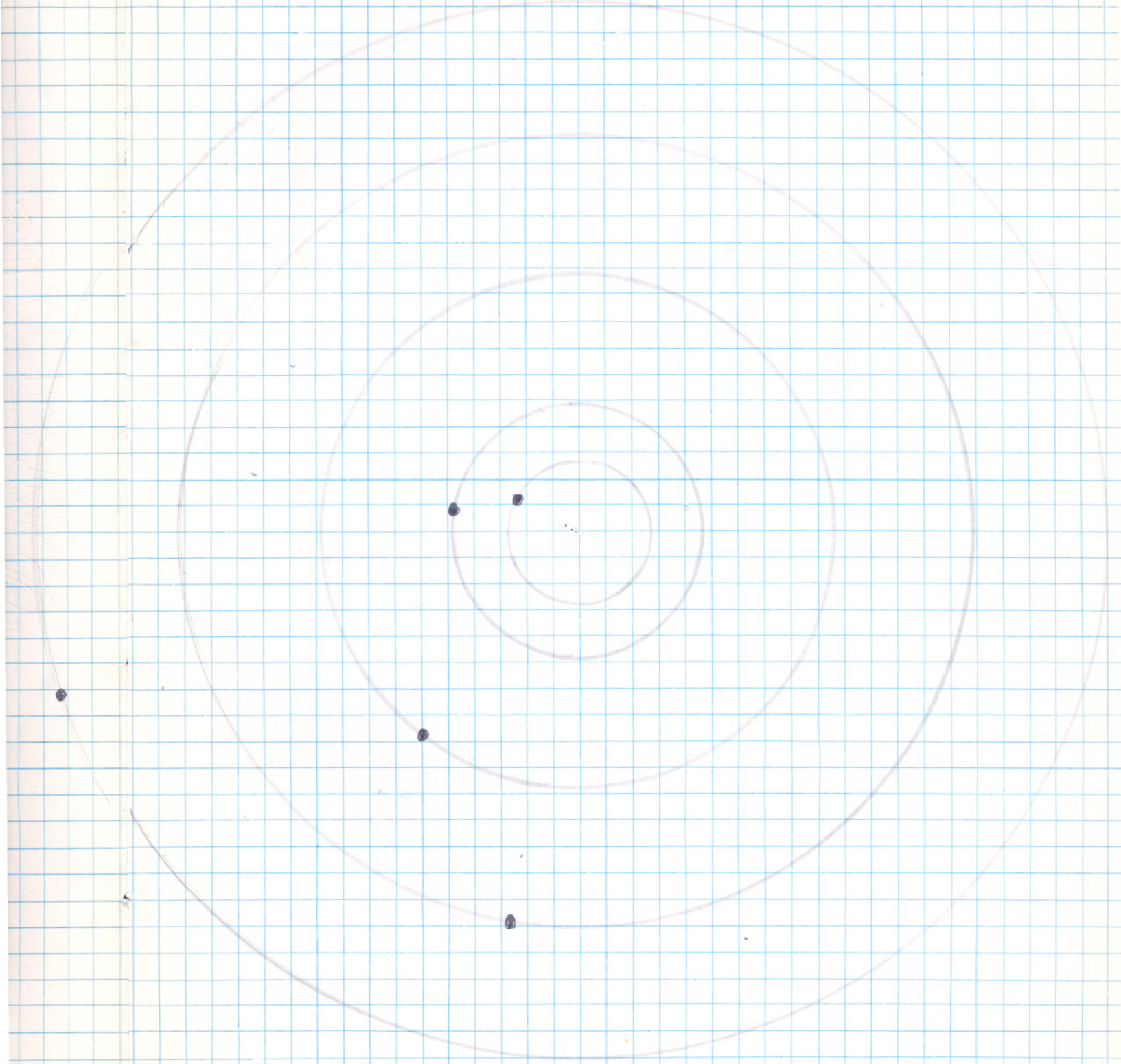
Jan 1 1777 Planets 5 - 9



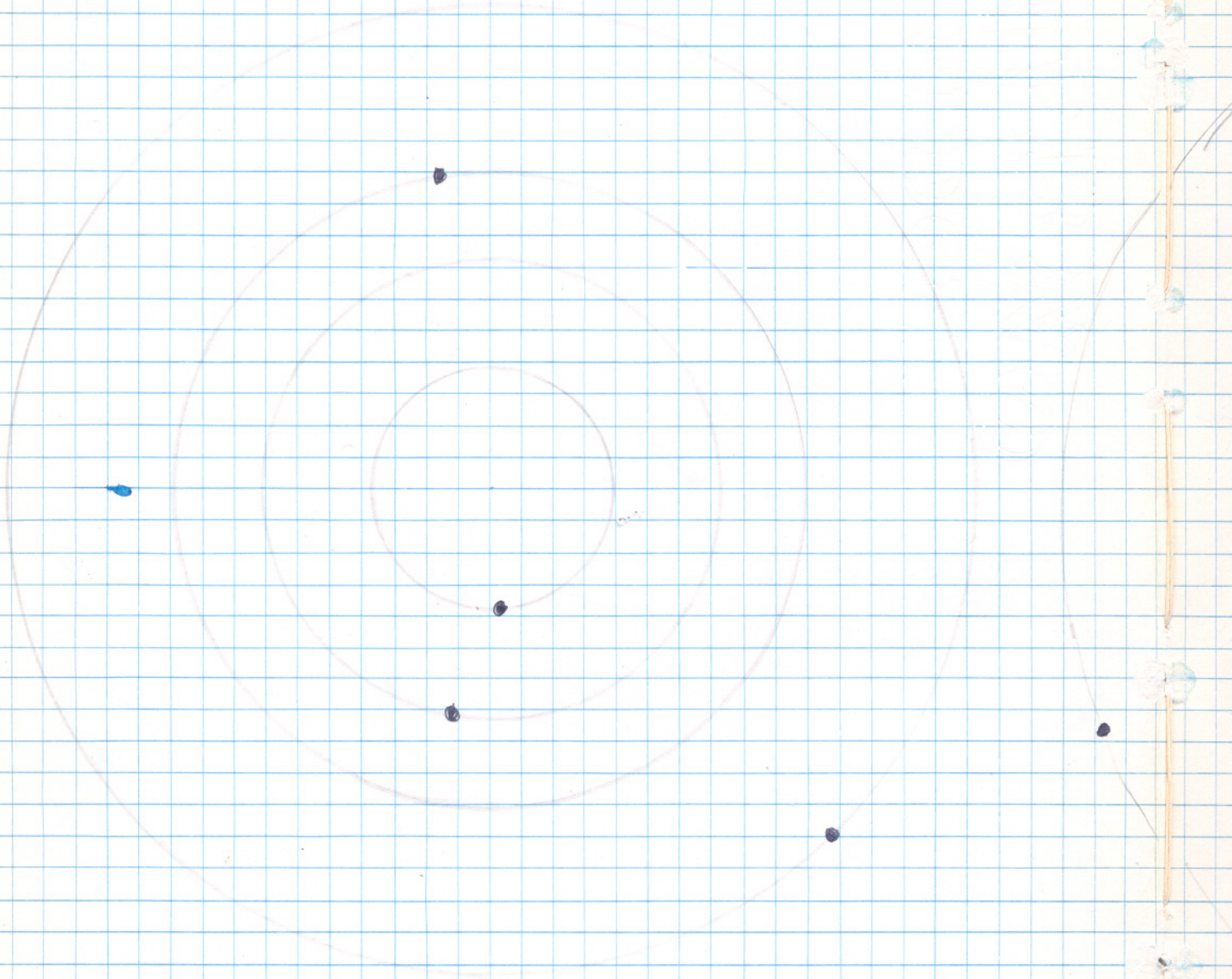
Jan 1 1980 44239 Planets 1-4



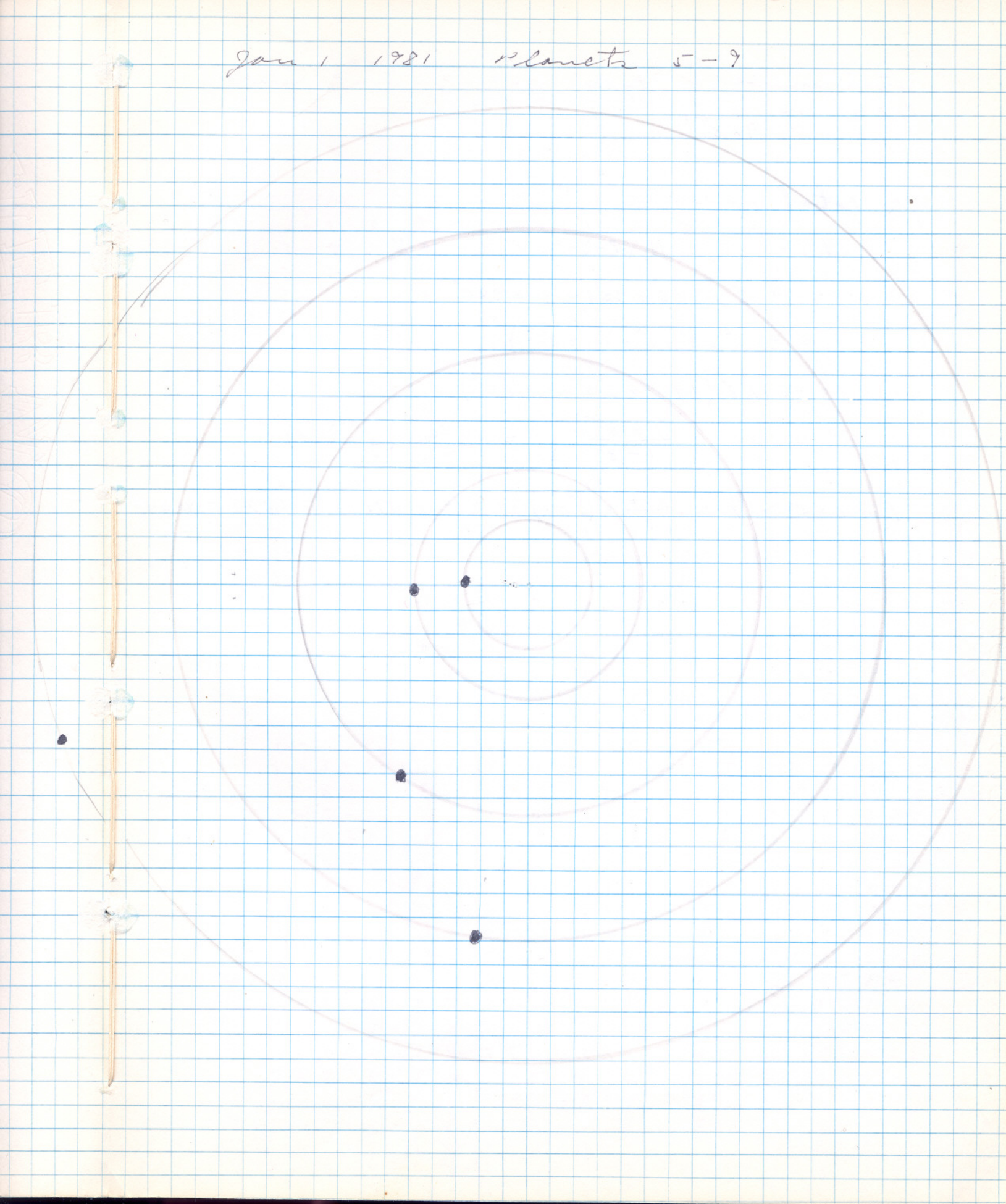
Jan 1 1980 Planets V - 9



Jan 1 1981 44605 Planets 1-4



Jan 1 1981 Planets 5 – 9



Total number of types $P_1 - P_2 - P_3 - \cdots - P_n$ where $P_i \neq P_{i+1}$ is

$$9 \times 8^{n-1}$$

$\therefore$ total number is

$$N_3(P_1 - P_2 - P_3) + N_4(P_1 - P_2 - P_3 - P_4) + \cdots + N_n$$

$$= 9 \times 8^2 + 9 \times 8^3 + 9 * 8^4 + \cdots + 9 \times 8^{n-1}$$

$$= 9\left(8^2 + 8^3 + 8^4 + \cdots + 8^{n-1}\right)$$

$$= 9 \times 8^2 \left(1 + 8 + 8^2 + \cdots + 8^{n-3}\right)$$

$$= 9 \times 8^2 \left[\frac{1 - 8^{n-2}}{1 - 8}\right] = \frac{576}{7} \times \left(8^{n-2} - 1\right)$$

For $n = 5$ $\quad N = \frac{576}{7} \times \left(8^3 - 1\right) = \frac{576}{7} \times 511 = 576 \times 73 = 42048$

Possible Trajectory Types

$P_1 - P_2 - P_3 - \ldots - P_N$

P_1 = Earth = 3

N	Type
2	3 – 2 – 1
	3 – 2 – 3
	3 – 2 – 4
	3 – 2 – 5
	3 – 2 – 6
	3 – 2 – 7
	3 – 2 – 8
	3 – 2 – 9
	3 – 4 – 1
	3 – 4 – 2
	3 – 4 – 3
	3 – 4 – 5
148	3 – 4 – 6
	3 – 4 – 7
	3 – 4 – 8
	3 – 4 – 9
	3 – 5 – 1
	3 – 5 – 2
	3 – 5 – 3
	3 – 5 – 4
	3 – 5 – 6
	3 – 5 – 7
	3 – 5 – 8
	3 – 5 – 9
	2 – 6 – 1
	3 – 6 – 2
	3 – 6 – 3
	3 – 6 – 4
	3 – 6 – 5
	3 – 6 – 7
	3 – 6 – 8
	3 – 6 – 9
4	3 – 2 – 4 – 1
	3 – 2 – 4 – 2
	3 – 2 – 4 – 3
	3 – 2 – 4 – 5
	3 – 2 – 4 – 6
	3 – 2 – 3 – 1
	3 – 2 – 3 – 2
	3 – 2 – 3 – 4

N	Type
4	3 – 2 – 3 – 5
	3 – 2 – 3 – 6
	3 – 2 – 3 – 7
	3 – 2 – 1 – 2
	3 – 4 – 3 – 1
	3 – 4 – 3 – 2
	3 – 4 – 3 – 4
	3 – 4 – 3 – 5
	3 – 4 – 3 – 6
	3 – 4 – 3 – 7
	3 – 4 – 3 – 8
	3 – 4 – 3 – 9
	3 – 4 – 2 – 1
	3 – 4 – 2 – 3
	3 – 4 – 2 – 4
	3 – 4 – 2 – 5
	3 – 4 – 2 – 6
	3 – 4 – 2 – 7
	3 – 4 – 2 – 8
	3 – 4 – 2 – 9
	3 – 5 – 1 – 2
	3 – 5 – 1 – 3
	3 – 5 – 1 – 4
	3 – 5 – 1 – 6
	3 – 5 – 1 – 7
	3 – 5 – 1 – 8
	3 – 5 – 1 – 9
	3 – 5 – 2 – 1
	3 – 5 – 2 – 3
	3 – 5 – 2 – 4
	3 – 5 – 2 – 5
	3 – 5 – 2 – 6
	3 – 5 – 2 – 7
	3 – 5 – 2 – 8
	3 – 5 – 2 – 9
	3 – 5 – 3 – 1
	3 – 5 – 3 – 2
	3 – 5 – 3 – 4
	3 – 5 – 3 – 5
	3 – 5 – 3 – 6
	3 – 5 – 3 – 7
	3 – 5 – 3 – 8

N	Type
4	3 – 5 – 3 – 9
	3 – 5 – 4 – 1
	3 – 5 – 4 – 2
	3 – 5 – 4 – 3
	3 – 5 – 4 – 5
	3 – 5 – 4 – 6
	3 – 5 – 4 – 7
	3 – 5 – 4 – 8
	3 – 5 – 4 – 9
	3 – 5 – 6 – 1
	3 – 5 – 6 – 2
	3 – 5 – 6 – 3
	3 – 5 – 6 – 4
	3 – 5 – 6 – 5
	3 – 5 – 6 – 7
	3 – 5 – 6 – 8
	3 – 5 – 6 – 9
	3 – 5 – 7 – 1
	3 – 5 – 7 – 2
	3 – 5 – 7 – 3
	3 – 5 – 7 – 4
	3 – 5 – 7 – 5
	3 – 5 – 7 – 6
	3 – 5 – 7 – 8
	3 – 5 – 7 – 9
	3 – 5 – 8 – 1
	3 – 5 – 8 – 2
	3 – 5 – 8 – 3
	3 – 5 – 8 – 4
	3 – 5 – 8 – 5
	3 – 5 – 8 – 6
	3 – 5 – 8 – 7
	3 – 5 – 8 – 9
5	3 – 2 – 1 – 2 – 3
	3 – 2 – 1 – 2 – 4
	3 – 2 – 1 – 2 – 5
	3 – 2 – 1 – 2 – 6
	3 – 2 – 1 – 3 – 2 – 1
	3 – 2 – 3 – 2 – 1
	3 – 2 – 3 – 2 – 3
	3 – 2 – 3 – 2 – 4
	3 – 2 – 3 – 2 – 5

$T_1 \geq 76$

$T_1 \geq 76$

$T_1 \geq 77$

$T_1 \leq 66$

$T_1 \geq 78$

any T_1 period

$T_1 \geq 76$

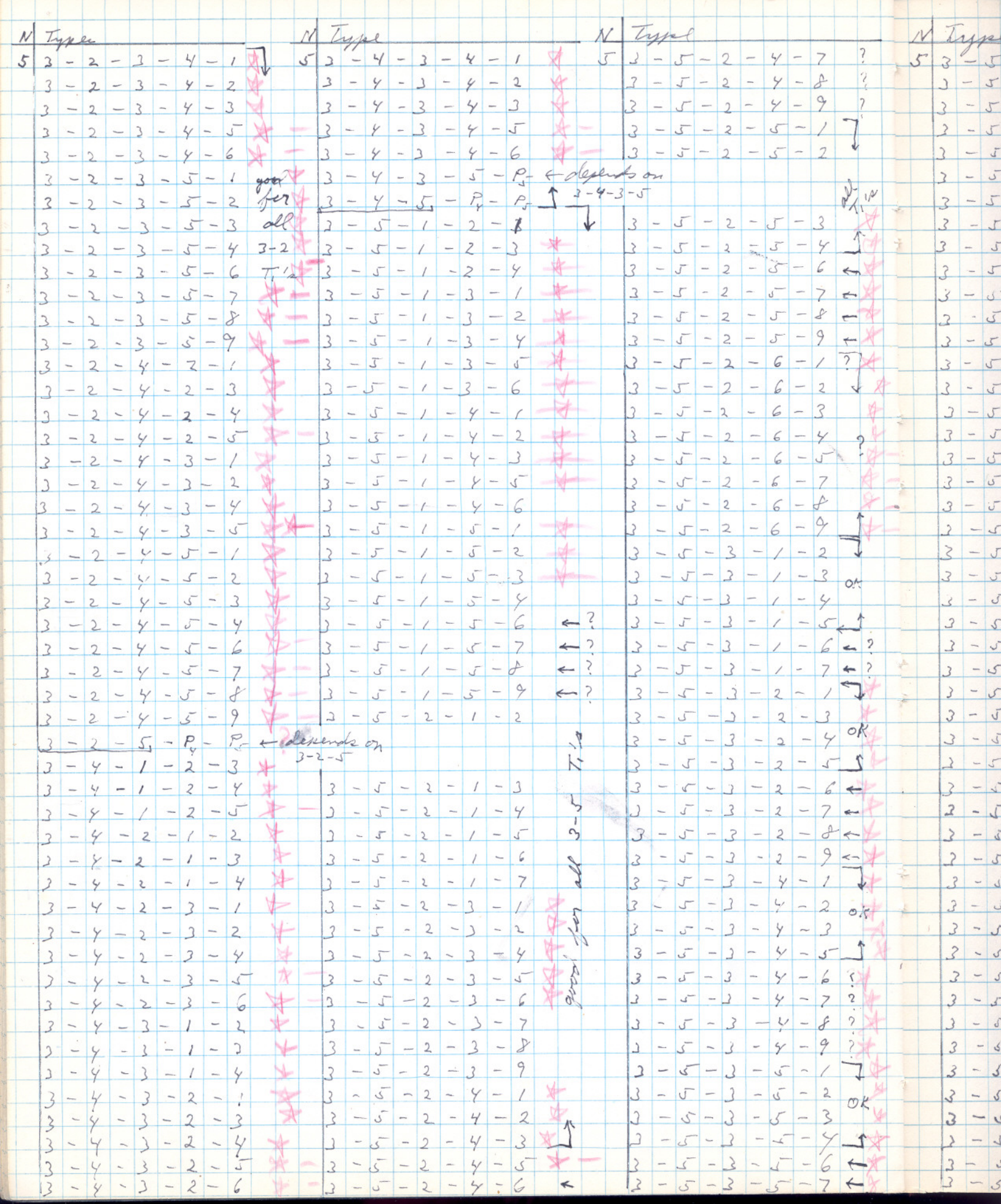
$T_1 \leq 78$

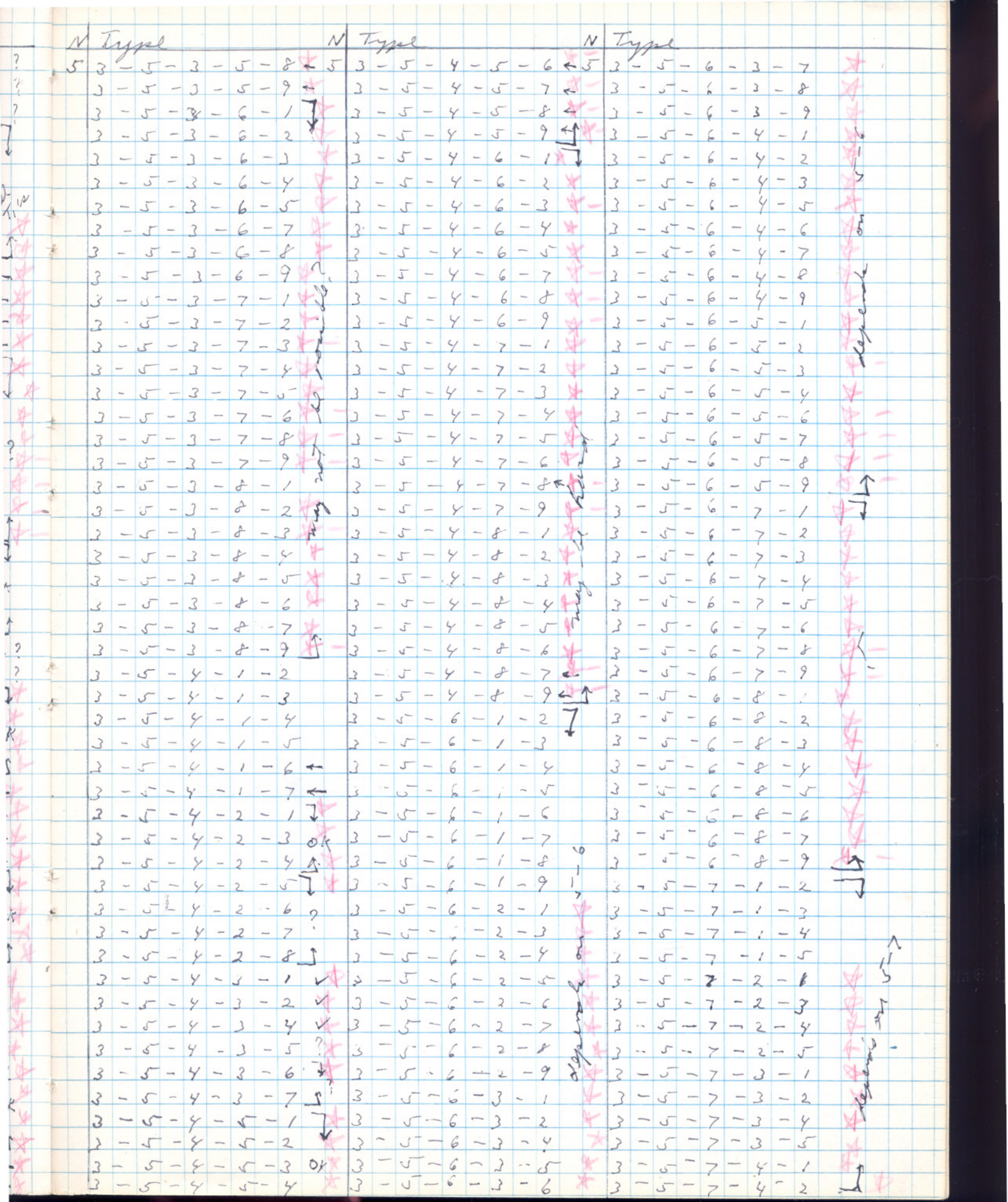
$T_1 \leq 15, \geq 78$

$T_1 \neq 77$

use $P_2 = 5$ intercept

do for all T_1


N Types
5
3-2-3-4-1
3-2-3-4-2
3-2-3-4-3
3-2-3-4-5
3-2-3-4-6
3-2-3-5-1
3-2-3-5-2
3-2-3-5-3
3-2-3-5-4
3-2-3-5-6
3-2-3-5-7
3-2-3-5-8
3-2-3-5-9
3-2-4-2-1
3-2-4-2-3
3-2-4-2-4
3-2-4-2-5
3-2-4-3-1
3-2-4-3-2
3-2-4-3-4
3-2-4-3-5
3-2-4-5-1
3-2-4-5-2
3-2-4-5-3
3-2-4-5-4
3-2-4-5-6
3-2-4-5-7
3-2-4-5-8
3-2-4-5-9
3-2-5-P4-P5
3-4-1-2-3
3-4-1-2-4
3-4-1-2-5
3-4-2-1-2
3-4-2-1-3
3-4-2-1-4
3-4-2-3-1
3-4-2-3-2
3-4-2-3-4
3-4-2-3-5
3-4-2-3-6
3-4-3-1-2
3-4-3-1-3
3-4-3-1-4
3-4-3-2-1
3-4-3-2-3
3-4-3-2-4
3-4-3-2-5
3-4-3-2-6
goes for all 3-2 T1/2
depends on 3-2-5
N Types
5
3-4-3-4-1
3-4-3-4-2
3-4-3-4-3
3-4-3-4-5
3-4-3-4-6
3-4-3-5-P4-P5
3-4-5-P4-P5
depends on 3-4-3-5
3-5-1-2-3
3-5-1-2-4
3-5-1-3-1
3-5-1-3-2
3-5-1-3-4
3-5-1-3-5
3-5-1-3-6
3-5-1-4-1
3-5-1-4-2
3-5-1-4-3
3-5-1-4-5
3-5-1-4-6
3-5-1-5-1
3-5-1-5-2
3-5-1-5-3
3-5-1-5-4
3-5-1-5-6
3-5-1-5-7
3-5-1-5-8
3-5-1-5-9
3-5-2-1-2
3-5-2-1-3
3-5-2-1-4
3-5-2-1-5
3-5-2-1-6
3-5-2-1-7
3-5-2-3-1
3-5-2-3-2
3-5-2-3-4
3-5-2-3-5
3-5-2-3-6
3-5-2-3-7
3-5-2-3-8
3-5-2-3-9
3-5-2-4-1
3-5-2-4-2
3-5-2-4-3
3-5-2-4-5
3-5-2-4-6
goes for all 3-5 T1/2
N Types
5
3-5-2-4-7
3-5-2-4-8
3-5-2-4-9
3-5-2-5-1
3-5-2-5-2
3-5-2-5-3
3-5-2-5-4
3-5-2-5-6
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3-5-2-6-2
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3-5-3-2-3
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3-5-3-4-1
3-5-3-4-2
3-5-3-4-3
3-5-3-4-5
3-5-3-4-6
3-5-3-4-7
3-5-3-4-8
3-5-3-4-9
3-5-3-5-1
3-5-3-5-2
3-5-3-5-3
3-5-3-5-4
3-5-3-5-6
3-5-3-5-7
N Types
5
3-5-3-6-1
3-5-3-6-2
3-5-3-6-4
3-5-3-6-5
3-5-3-6-7
3-5-4-1-2
3-5-4-1-3
3-5-4-1-5
3-5-4-2-1
3-5-4-2-3
3-5-4-2-5
3-5-4-2-6
3-5-4-3-1
3-5-4-3-2
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3-5-5-4-6
3-5-5-6-1
3-5-5-6-2
3-5-5-6-3
3-5-5-6-4



N	Type
5	3-5-7-4-3
	3-5-7-4-5
	3-5-7-4-6
	3-5-7-4-7
	3-5-7-4-8
	3-5-7-4-9
	3-5-7-5-1
	3-5-7-5-2
	3-5-7-5-3
	3-5-7-5-4
	3-5-7-5-6
	3-5-7-5-7
	3-5-7-5-8
	3-5-7-5-9
	3-5-7-6-1
	3-5-7-6-2
	3-5-7-6-3
	3-5-7-6-4
	3-5-7-6-5
	3-5-7-6-8
	3-5-7-6-8
	3-5-7-6-9
	3-5-7-8-1
	3-5-7-8-2
	3-5-7-8-3
	3-5-7-8-4
	3-5-7-8-5
	3-5-7-8-6
	3-5-7-8-7
	3-5-7-8-9
	3-5-7-9-1
	3-5-7-9-2
	3-5-7-9-3
	3-5-7-9-4
	3-5-7-9-5
	3-5-7-9-6
	3-5-7-9-7
	3-5-7-9-8
	3-5-8-1-2
	3-5-8-1-3
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	3-5-8-1-5
	3-5-8-1-6
	3-5-8-1-7
	3-5-8-1-8
	3-5-8-1-9
	3-5-8-2-1
	3-5-8-2-3
	3-5-8-2-4

N	Type
5	3-5-8-2-5
	3-5-8-2-6
	3-5-8-2-7
	3-5-8-2-8
	3-5-8-2-9
	3-5-8-3-1
	3-5-8-3-2
	3-5-8-3-4
	3-5-8-3-5
	3-5-8-3-6
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	3-5-8-3-9
	3-5-8-4-1
	3-5-8-4-2
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	3-5-8-4-6
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	3-5-8-6-7
	3-5-8-6-8
	3-5-8-6-9
	3-5-8-7-1
	3-5-8-7-2
	3-5-8-7-3
	3-5-8-7-4
	3-5-8-7-5
	3-5-8-7-6
	3-5-8-7-8
	3-5-8-7-9
	3-5-8-9-1
	3-5-8-9-2
	3-5-8-9-3
	3-5-8-9-4



april 6 1962

Full scale numerical study begin - general reconnaissance program completed. new job number in CF09

one-way: Earth - mercury

BLI(M) = 38761 TI3(M) = 4.
TIM(M) = 50. TI4(M) = 4.
NL(M) = 90 NNM(M) = 50

completed ✓

april 26 Earth - Jupiter

BLI(M) = 38761. TI3(M) = 20.
TIM(M) = 400. TI4(M) = 20.
NL(M) = 20 NNM(M) = 100

NM = ~~X~~ 5

BLI(M) =	38981.	38771.	38771.	37411.	38771.
TI3(M) =	10.	4.	4.	4.	4.
TI(M) =	~~400~~ 10.	~~60~~ 2.	~~60~~ 2.	4.	2.
TIO(M) =	10.	6.	4.	~~6~~ 10.	~~6~~ 10.
NNM(M) =	100	90	100	100	90
TI4(M) =	10.	4.	2.	~~10~~ 5	4.
TIM(M) =	400.	60.	60.	70.	60.
NPM(M) =	3	4	3	3	3
~~NA(M) =~~					
NL(M) =	5	50	50	50	50
ALTINJ(M) =	200.	200	200	200.	200

NP(IP, M) =
3 - 5 - 7
3 - 2 - 4 - 3
3 - 2 - 1
3 - 4 - 5
3 - 2 - 5

NA(IP, M) =
0 0 100
0 0 50 50
0 0 70
0 0 100
0 0 100