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P.D.:7

The Broken Eggs

POW # 1

1. Problem Statement: The problem in this POW is that there are eggs, that only fit in groups [boxes] of 7. When places in groups of 2, 3, 4, 5, 6, there is **1** egg left over. You need to find out how many eggs there are.

2. Process: This problem took me about an hour, 15 minutes to solve, not including the writing of this page. This was hard to solve because of there was 1 egg let over, not just a remainder, any remainder. I also started having numbers only going up to the 50's, where the real solution was 6 times that. I made a lot of mistakes, and wasted a lot of time on this problem. Here goes:

At first, I started with a multiplication chart with numbers 2-7. [Fig 1.] I then made a chart where I took the chart in Fig. 1 and added 1 to every number. [Fig 2] As you can see I skipped 7 because you don't add 1 to those. [Continued on the next page]

*	2	3	4	5	6	7
2	4	6	8	10	12	14
3	6	9	12	15	18	21
4	8	12	16	20	24	28
5	10	15	20	25	30	35
6	12	18	24	30	36	42
7	14	21	28	35	42	49
8	16	24	32	40	48	56
9	18	27	36	45	54	63
10	20	30	40	50	60	70

[Fig. 1] Multiplication Chart

* +1	2	3	4	5	6
2	5	7	9	11	13
3	7	10	13	16	19
4	9	13	17	21	25
5	11	16	21	26	31
6	13	19	25	31	37
7	15	22	29	36	43
8	17	25	33	41	49
9	19	28	37	46	55
10	21	31	41	51	61

[Fig. 2] Multiplication Chart +1

Next I made a number chart for the numbers 1 – 50.[Fig. 3]

#1-50

	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50									

[Fig. 3] Number Chart 1 - 50

I then copied that chart down, and I made a few changes. [Fig. 4] I first tried to delete all of the numbers found on chart 2 for numbers 1 – 50., (which were all that existed on that chart at that time.) I then stopped because I realized that those were numbers which the solution was one of those numbers, not a number which the solution was not. I then did the chart and copied all the numbers over. I realized the answer had to be a multiple of 7. I than made all of multiples of 7 green. I then underlined all of the numbers that were in chart 2 on chart 4. I then looked to see which were both underlined and green. I then boxed in those numbers. I also deleted all of the number before 7, because they couldn't be correct.

#1-50

							7	8	9
10	11	12	13	**14**	15	16	17	18	19
20	**21**	22	23	24	25	26	27	**28**	29
30	31	32	33	34	**35**	36	37	38	39
40	41	**42**	43	44	45	46	47	48	**49**

[Fig. 4] Number Chart 1 – 50 with underlines and boxes

Thinking the number was less that 50, I then made new chart to test if those boxed numbers were correct. [Fig 5] I put a 1 if you could subtract 1 from the number, and have it divide in the number above in bold. This also meant that when you divide the number, you get 1 left over. If that condition was not met I put a 0. I also employed the conditional formatting in Microsoft® Excel. This feature made every 0 I wrote red, and strikethrough. I also made the multiple of 7 red, some of the times. I found that none of those answers were correct. This chart is the key to my way of solving this problem, but I then made some more changes, which didn't bring me anyware.

Try	2	3	4	5	6	7
7	1	1	0	0	1	1
21	1	0				
28	0					
35	1	0				
49	1	0				

[Fig 5] 7's Trial Beginning

I then extended chart 2 to include more number, [Fig. 6] so I could make chart 4 longer. [Fig. 7] I did this to find more boxed numbers, to put on chart 7. After I did extended chart 4, I made the multiple's of 7 green. I was going to underline the numbers on chart 6, but then I realized something….

* +1	2	3	4	5	6
2	5	7	9	11	13
3	7	10	13	16	19
4	9	13	17	21	25
5	11	16	21	26	31
6	13	19	25	31	37
7	15	22	29	36	43
8	17	25	33	41	49
9	19	28	37	46	55
10	21	31	41	51	61
11	23	34	45	56	67
12	25	37	49	61	73
13	27	40	53	66	79
14	29	43	57	71	85
15	31	46	61	76	91
16	33	49	65	81	97
17	35	52	69	86	103
18	37	55	73	91	109
19	39	58	77	96	115
20	41	61	81	101	121
21	43	64	85	106	127
22	45	67	89	111	133
23	47	70	93	116	139
24	49	73	97	121	145
25	51	76	101	126	151
26	53	79	105	131	157
27	55	82	109	136	163
28	57	85	113	141	169

[Fig. 6] Multiplication Chart +1 - Extended

50	51	52	53	54	55	**56**	57	58	59
60	61	62	**63**	64	65	66	67	68	69
70	71	72	73	74	75	76	**77**	78	79
80	81	82	83	**84**	85	86	87	88	89
90	**91**	92	93	94	95	96	97	**98**	99
100	101	102	103	104	**105**	106	107	108	109
110	111	**112**	113	114	115	116	117	118	**119**
120	121	122	123	124	125	**126**	127	128	129
130	131	132	**133**	134	135	136	137	138	139
140									

[Fig. 7] Number Chart 50 - 140 with underlines and boxes

Finally staring on the right track, I put the green numbers on chart 5. I starting putting in more 0's and 1's. I realized a few things as I extended that chart passed the 140 from chart 5. [Fig 8] These are things I found:
- Even numbers are divisible by 2, so they don't work
- Dividing by 5 is what really matters because 6 is like 3, but 5 is what to look for
- When you divide by 5 you need to look for numbers that 1, or 6. 6 is an even number, so it won't work so…
- It needs to end in a 1.

I continued putting 0's and 1's till I found one that would satisfy all of the requirements. I did…

56	0				
63	1	0			
70	0				
77	1	0			
84	0				
91	1	1	0		
98	0				
105	1	0			
112	0				
119	1	0			
126	0				
133	1	1	1	0	
140	0				
147	1	0			
154	0				
161	1	0			
168	0				
175	1	1	0		
182	0				
189	1	0			
196	0				
203	1	0			
210	0				
217	1	1	1	0	
224	0			0	
231	1	0		1	
238	0			0	
245	1			0	
252	0			0	
259	1			0	
266	0			1	
273	1			0	
280	0			0	
287	1			0	
294	0			0	
301	1	1	1	1	1	1

[Fig 8] 7's Trial All

I did not receive any assistance on this problem.

3. Solution: 301 eggs were lost in the crash. I now this answer is correct because I tried to divide 301 by all the numbers and see that there was a remainder of 1. [Fig 9]

Test		2	3	4	5	6	7
	301 150 r1	100 r1	75 r1	60 r1	50 r1		43

[Fig 9] 7's Trial of 301

I was correct. I am now going to try to extend my problem to see if there are more solutions. I tried 601, (because that was almost double 301.) However, that does not go into 7. I am going to try to multiply the first 3 in the hundreds place by 7, to get 2101. Let me try that. That number also does not go into 7. I will now try extending Chart 8, following the rules on p.4. Eventually I found the number 1141. I don't see a pattern between this and 301. I will extend the chart further, to 1561, which is another possible combo. I think I missed 1. Let me set up a chart analyzing these results. [Fig. 10]

Test number's	
301	Difference
1141	840
1561	420

[Fig 10] Answer's Relations

I see that the difference between each answer decreases by ½ each time this must mean that the next answer is 210 more then 1561 to be 1171. Let me test that. 1771 does not divide correctly into 4. Therefore that pattern is not correct. I will now sum this up with the answer to the 2nd question; yes there can be more then 1 solution. However, I think 301 is correct, because you can't spend a lot of time repacking 1561 eggs over and over again. 301 is also a lot of eggs to repack.

4. Extension: Not necessary to do.

5. Evaluation: Not necessary to do.