

# Leonard's Analysis of the Satisfaction Challenge

I looked at the Satisfaction puzzle and am now down a rabbit hole (depth TBD). Here is a sampling of what I have found.

Start with these 11 sets:

**Even Number:** 2, 4, 6, 8, 10, 12, 14, 16

**Square Number:** 1, 4, 9, 16

**Multiple of Four:** 4, 8, 12, 16

**Prime Number:** 2, 3, 5, 7, 11, 13

**Greater than 10:** 11, 12, 13, 14, 15, 16

**Triangular  
Number:** 1, 3, 6, 10, 15

**Odd Number:** 1, 3, 5, 7, 9, 11, 13, 15

**Factor of 42:** 1, 2, 3, 6, 7, 14

**Multiple of Three:** 3, 6, 9, 12, 15

**Greater than 6:** 7, 8, 9, 10, 11, 12, 13, 14, 15, 16

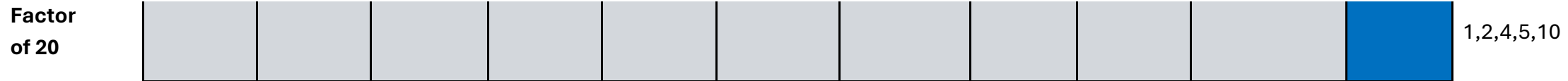
**Factor of 20:** 1, 2, 4, 5, 10

Construct a spreadsheet to count the numbers in each set and to track the prevalence of each number:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Count
Even Number		1		1		1		1		1		1		1		1	8
Square Number	1			1					1							1	4
Multiple of Four				1				1				1				1	4
Prime Number		1	1		1		1				1		1				6
Greater than 10										1	1	1	1	1	1	1	6
Triangular Number	1		1			1				1					1		5
Odd Number	1		1		1		1		1		1		1		1		8
Factor of 42	1	1	1			1	1							1			6
Multiple of Three			1			1			1			1			1		5
Greater than 6							1	1	1	1	1	1	1	1	1	1	10
Factor of 20	1	1		1	1					1							5
<b>Count:</b>	5	4	5	4	3	4	4	3	4	4	4	5	4	4	5	5	67

Make a second spreadsheet to consider the intersection of each pair of sets:

	<b>Even Number</b>	<b>Square Number</b>	<b>Multiple of Four</b>	<b>Prime Number</b>	<b>Greater than 10</b>	<b>Triangular Number</b>	<b>Odd Number</b>	<b>Factor of 42</b>	<b>Multiple of Three</b>	<b>Greater than 6</b>	<b>Factor of 20</b>	
<b>Even Number</b>		4,16	4,8,12,16		12,14,16	6,10		2,6,14	6,12	8,10,12,14,16	4,10	2,4,6,8,10,12,14,16
<b>Square Number</b>			4,16		16	1	1	1	9	9,16	1,4	1,4,9,16
<b>Multiple of Four</b>					12,16				12	8,12,16	4	4,8,12,16
<b>Prime Number</b>					11,13	3	3,5,7,11,13	2,3,7	3	7,11,13	2	2,3,5,7,11,13
<b>Greater than 10</b>						15	11,13,15	14	12,15	11,12,13,14,15,16	10	11,12,13,14,15,16
<b>Triangular Number</b>							1,3,15	1,3,6	3,6,15	10,15	1,10	1,3,6,10,15
<b>Odd Number</b>								1,3,7	3,9,15	7,9,11,13,15	1,5	1,3,5,7,9,11,13,15
<b>Factor of 42</b>									3,6	7,14	1,2	1,2,3,6,7,14
<b>Multiple of Three</b>										9,12,15		3,6,9,12,15
<b>Greater than 6</b>											10	7,8,9,10,11,12,13,14,15,16



Note that eight intersections (pairs of sets) have no common members (shown in red), and that fourteen intersections have a single common member (shown in orange). When I first opened the Satisfaction puzzle, and after spending a couple of minutes attempting to solve an impossible configuration, I finally noticed the “category assignment” aspect of the problem. More to come on my solution process.

Shifting gears, of the 74 solutions found at the link you provided:

52 use the category sets (or their reverse).

<b>Solution Author</b>	<b>Even Number</b>	<b>Square Number</b>	<b>Multiple of Four</b>	<b>Prime Number</b>	<b>Greater than 10</b>	<b>Triangular Number</b>	<b>Odd Number</b>	<b>Factor of 42</b>	<b>Multiple of Three</b>	<b>Greater than 6</b>	<b>Factor of 20</b>
11nicholsont	Orange	White	Orange	Orange	Red	White	Orange	White	Red	Red	Red

5 use the category sets (or their reverse).

<b>Solution Author</b>	<b>Even Number</b>	<b>Square Number</b>	<b>Multiple of Four</b>	<b>Prime Number</b>	<b>Greater than 10</b>	<b>Triangular Number</b>	<b>Odd Number</b>	<b>Factor of 42</b>	<b>Multiple of Three</b>	<b>Greater than 6</b>	<b>Factor of 20</b>
Transum	White	White	Red	White	Orange	Red	Red	Red	Orange	Orange	Orange

4 use the category sets (or their reverse).

<b>Solution Author</b>	<b>Even Number</b>	<b>Square Number</b>	<b>Multiple of Four</b>	<b>Prime Number</b>	<b>Greater than 10</b>	<b>Triangular Number</b>	<b>Odd Number</b>	<b>Factor of 42</b>	<b>Multiple of Three</b>	<b>Greater than 6</b>	<b>Factor of 20</b>
Lewei.gu1	Red	Orange	White	Orange	Red	White	Red	Red	Orange	Orange	White

4 use the category sets (or their reverse).

	Even Number	Square Number	Multiple of Four	Prime Number	Greater than 10	Triangular Number	Odd Number	Factor of 42	Multiple of Three	Greater than 6	Factor of 20
<b>Solution Author</b>											
Tudor.chivulescu	Teal	Teal	White	White	Pink	Pink	Teal	Teal	White	Pink	Pink

3 use the category sets (or their reverse).

	Even Number	Square Number	Multiple of Four	Prime Number	Greater than 10	Triangular Number	Odd Number	Factor of 42	Multiple of Three	Greater than 6	Factor of 20
<b>Solution Author</b>											
Daniel.kim30	Pink	Teal	White	Teal	Pink	Teal	Pink	Pink	White	Teal	White

2 use the category set (and its reverse).

	Even Number	Square Number	Multiple of Four	Prime Number	Greater than 10	Triangular Number	Odd Number	Factor of 42	Multiple of Three	Greater than 6	Factor of 20
<b>Solution Author</b>											
Charlie.zhang31	Pink	Pink	White	Pink	Pink	White	White	Teal	Teal	Teal	Teal

2 use the category sets (no column/row reversal).

	Even Number	Square Number	Multiple of Four	Prime Number	Greater than 10	Triangular Number	Odd Number	Factor of 42	Multiple of Three	Greater than 6	Factor of 20
<b>Solution Author</b>											
Steve.shaw	Teal	Teal	White	White	Pink	White	Teal	Teal	Pink	Pink	Pink

The remaining 2 solutions are:

<b>Solution Author</b>	<b>Even Number</b>	<b>Square Number</b>	<b>Multiple of Four</b>	<b>Prime Number</b>	<b>Greater than 10</b>	<b>Triangular Number</b>	<b>Odd Number</b>	<b>Factor of 42</b>	<b>Multiple of Three</b>	<b>Greater than 6</b>	<b>Factor of 20</b>
Jevans											
Lvincent1280											

Tallying up the category usages yields:

<b>Even Number</b>	<b>Square Number</b>	<b>Multiple of Four</b>	<b>Prime Number</b>	<b>Greater than 10</b>	<b>Triangular Number</b>	<b>Odd Number</b>	<b>Factor of 42</b>	<b>Multiple of Three</b>	<b>Greater than 6</b>	<b>Factor of 20</b>
69	16	57	62	73	14	72	22	67	74	66

A couple of (interesting?) things of note:

- All 74 solutions use the “> 6” category.
- All but one solution use the “>10” category.
- All but two solutions use the “odd number” category.

Well, that’s enough shenanigans for now. I hope this finds you well.

Leonard