Crossnumbers

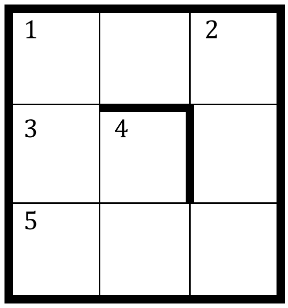
Quarterly

Open Up Special 2020

Petit Neuf by Zag

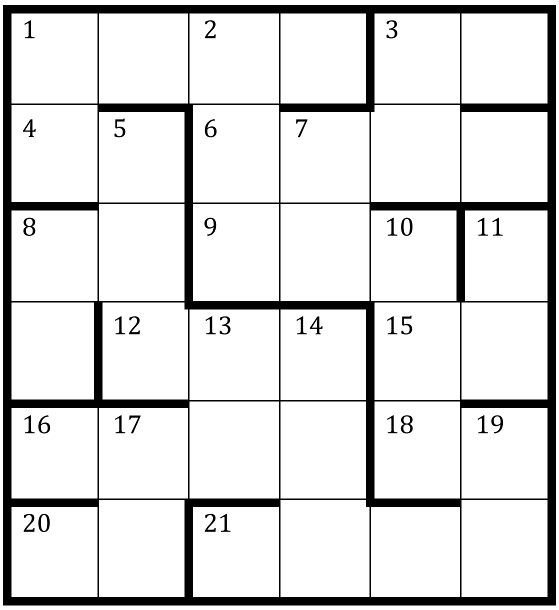
This puzzle uses all of the digits from 1 to 9 inclusive. Entries include precisely

- One square
- One cube
- Two primes
- Two Fibonacci numbers



Recycling by Oyler

No entry starts with zero and all are distinct. Factors and multiples are non-trivial.



Across

1 (3ac + 17dn) x (19dn – 3dn)
3 product of 3 distinct primes
4 square – 14dn
6 product of 5 distinct primes
8 multiple of 11dn
9 5 x prime
12 5dn – (21ac/(17dn – 3ac))
15 triangular
16 3ac + 6ac – 15ac – 10dn
18 8ac + 15ac
20 2 x 3ac
21 3ac x 4ac – (15ac – 11dn)

Down

1 square
2 multiple of (8ac – 3ac)
3 prime
5 prime
7 triangular
8 multiple of 3dn
10 square
11 prime
13 3 x square
14 square
17 factor of 19dn
19 4ac + 11dn

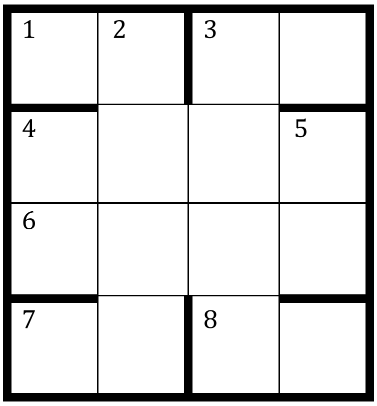
Sequence by Czecker

A and B are the first two terms in a sequence, where each term is the sum of the two previous terms, like the Fibonacci sequence. For example if A and B were 5 and 2 then the sequence would start 5, 2, 7, 9, 16, 25, 41 ….. No entry starts with zero and all entries are distinct.

Eight terms of the sequence, including A and B, are entries in the grid. The exceptions are

2dn : power of a prime

3dn : square

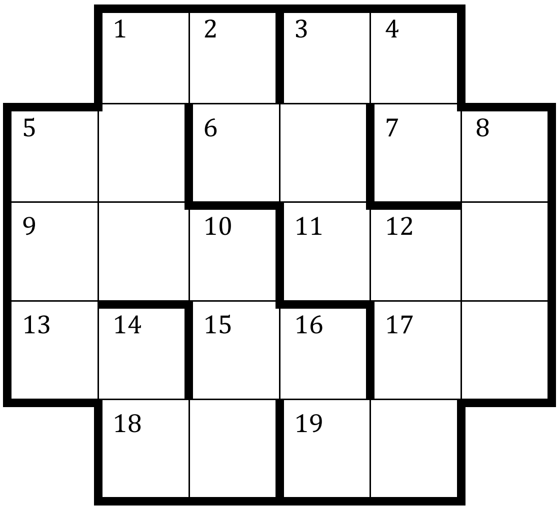


Major Suits by Nod

The major suits (Hearts & Spades) of a standard pack of cards have been laid out in the grid, one to each cell.

Each card's value equals its face value (with A = Ace = 1, … , T = Ten = 10, J = Jack = 11, Q = Queen = 12 and K = King = 13) plus its suit value. Suit values are H = Hearts = 10 and S = Spades = 23. This gives each card a unique value between 11 and 36 inclusive which is entered into its cell. Clues either refer to the value of the entry or the cards in the cells. Picture cards are J, Q and K.

The numbers in the completed grid should be converted back to show the cards.



Across

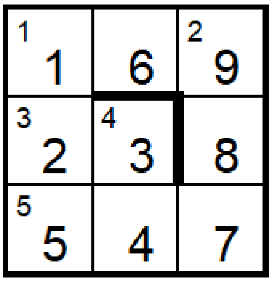
1 Square
3 Same suit
5 Sum of face values = 5
6 Cube
7 Triangular
9 Same suit
11 Same suit
13 Triangular
15 Cube
17 Sum of face values = 12
18 Same suit
19 Square

Down

1 Sum of face values = 11
2 *Unclued*
3 Square
4 Both picture cards
5 *Unclued*
8 Sum of face values = 19
10 Square
12 Same suit
14 Sum of face values = 9
16 Different suits

Solutions to Open Up Special

Petit Neuf by Zag



There are 6 clue types so no number can do double duty such as 13 (prime & Fibonacci) and no answer can have duplicate digits. The possible Fibonacci numbers are 21,34,987. 21&34 cannot appear together so the two Fibonacci numbers are either 21&987 or 34&987. Possible cubes are 27 (no way it can fit with 7 in 987), 64 (cannot link with 21 or 34 in 3a/4d), 125, 216, 512. Since each of the valid cubes involve 1&2 this rules out 21 being present and confirms the two Fibonacci as 34&987.

If 1dn=987, 3ac=83, 4dn=34 and there is no category for 5ac starting 74 and ending 1,2,5,6. If 5ac=987, 3ac=34, 4dn=48 with no valid category. 987 cannot intersect the cube so must appear opposite it. If 1ac=987, 5ac is one of 125, 216, 512 and 4dn cannot be 34 hence 3ac=34. 1dn is not a square, cube, Fibonacci and the only prime is 937 requiring a duplicate 7. This confirms 2dn=987.

1dn is one of 125, 216, 512 so 3ac cannot be 34, therefore 4dn=34. 1ac must be the square with candidates 169, 289 (duplicate 8), 529 or 729 (duplicate 2). 1dn=125 with 3ac=23 and 5ac=547 the required primes.

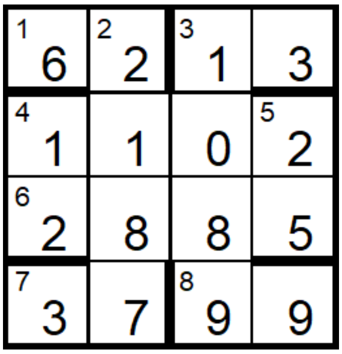
Recycling by Oyler

(1) 3	0	(2) 1	0	(3) 3	0
(4) 6	(5) 9	(6) 8	(7) 9	7	0
(8) 7	7	(9) 8	1	(10) 5	(11) 1
4	(12) 7	(13) 7	(14) 1	(15) 2	1
(16) 8	(17) 4	5	0	(18) 9	(19) 8
(20) 6	0	(21) 2	0	6	0

9ac ends in 5 so 10dn is 529 or 576. The latter is eliminated from 15ac/11dn thus 10dn is 529 with 15ac 21. The range for 8ac is 70 – 78 so 11dn is 11 with 8ac 77. Hence 18ac is 98. Consider 19dn/4ac/11dn/1dn forces 19dn = 80, 4ac = 69 and 14dn = 100. 3ac/3dn/8dn, as 8dn starts with a 7 3ac/dn starts with a 1, 2 or 3. The minimum for 3ac is 30, thus 3ac = 30, 3dn = 37, 8dn = 74, 20ac = 60. By calculation 21ac = 2060. From 16ac clue 13dn must end in 5 and is 75. 5dn is 971 or 977, so 17dn must be a factor of 80 that's greater than 30 so is 40. This yields 5dn 977 and 12ac 771. 1ac is 3010 by calculation so 1dn is 36. 2dn is 141 or 188. The 16ac clue is now ?450 = 6ac – 520 which gives 6ac as 4970 or 8970. Only the latter is the product of 5 distinct primes. 8ac is 8970 and 16ac is 8450. 7dn is 91 and 9ac is 815.

This puzzle used the same grid and grid fill as Tally Ho which appeared in CQ4 but with number definition as opposed to letter/number assignment clues, hence the title. Incredibly one solver spotted this.

Sequence by Czecker



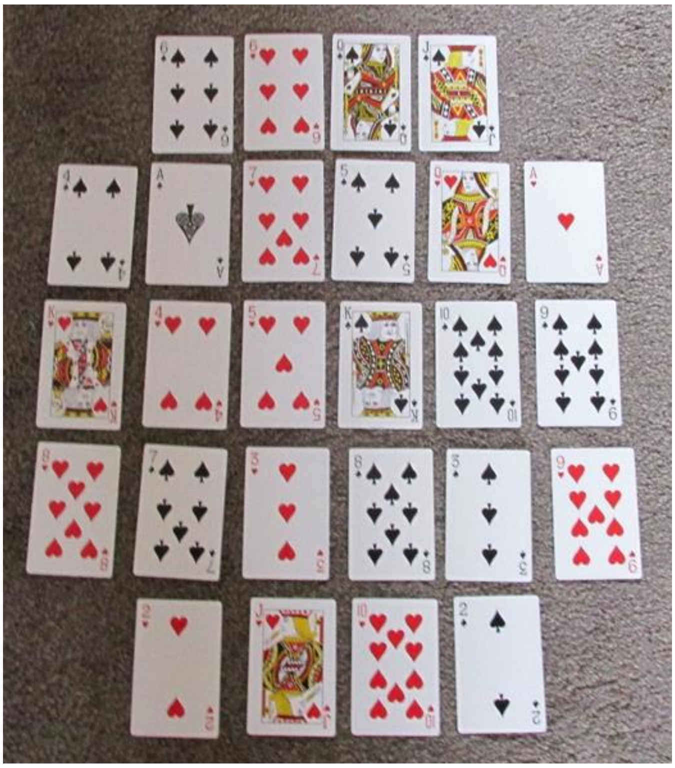
The sequence contains six two-digit terms. A and B are entries, so are both at least 10. If A=10+a and B=10+b, then the sixth term is 80+3a+5b<100, so there are 15 possibilities for A and B. Only the sequence that begins 11,13; and the one that begins 13,12; have four-digits numbers that fit at 4 across and 6 across together with 4 down and 5 down.

The one that begins 11,13 has 4 across=2851 and 6 across=4613. Then 3 down is *516, and no four-digit square ends *516.

The sequence begins 13,12. 2 down is $2187=3^7$ and 3 down is 1089.

Major Suits by Nod

	1 29	2 16	3 35	4 34	
5 27	24	6 17	28	7 22	8 11
9 23	14	10 15	11 36	12 33	32
13 18	14 30	15 13	16 31	17 26	19
	18 12	21	19 20	25	



A6 & A15 = Cubes ⇒ {A6, A15} = {1331, 1728}. D3 = Square ⇒ **A6 = 1728**, **A15 = 1331**, **D3 = 352836**
Consider D10 = Square. Consider A1, D2 ⇒ **A1 = 2916**, **D2 = 1617**
Consider A19, D16. Consider A7 = Triangular, D4 = Picture cards, A3 = Same suit
Consider A13 = Triangular. Consider A5 = Sum of face values = 5.
Consider D1 = Sum of face values = 11. Consider A17 = Sum of face values = 12
Consider D14 = Sum of face values = 9. Consider D8 = Sum of face values = 19
Consider A11 = Same suit & D12. Consider A9 = Same suit, D5