

SOLUTION TO CROSS-NUMBERS
(APPEARED IN VOL. 17/NO. 2, PAGE 22)

Andrew Jenkins, who devised the Cross-Numbers sent us not only the solution, but the detailed reasoning leading to it. We print it here in full.

Thank you Andrew!

		a 2		b 4	c 6
d 9	e 9	6	6	3	3
	f 3	1		g 2	3
h 6		i 1	9		
j 2	1	6			k 4
6		l 2	1	1	6

There are five possibilities for j) across

$9^3 = 729$
 $8^3 = 512$
} not possible as b) down would have to have four digits.

$7^3 = 343$ if so b) down = 686
 $6^3 = 216$ if so b) down = 432
 } see below

$5^3 = 125$ if so b) down = 250 not so because of the zero digit b) across is twice g) across, and b) across starts with the first digit of b) down, whilst g) across starts with the last digit of b) down. If b) down was 686, then both b) and g) across would start with a six, and therefore b) across could not be twice g) across.

j) across is therefore 216, and b) down is 432, possibilities for b) across and g) across are therefore

b)	g)
42	21
44	22

(continued over)

46 23

48 24

As c) down requires that the sum of the last digits of b) and g) across have a rational square root. Only 46 and 23 fit these conditions. Therefore b) across is 46, g) across is 23, and c) down is 633.

As a) down is a palindromic number, consider for the moment only the last three digits. The digital sum of these digits must be the same as the digital sum of j) across which is 9. As the centre digit of the last three digits is 6, and there are no zero digits, the other digits must be one and two.

The possibilities for h) down are

121 for which l) across is 96 with only two digits

525 for which l) across is 1712 with no rational answer for k) down

626 for which l) across is 2116

therefore h) down is 626

therefore l) across is 2116

therefore k) down is 46

therefore a) down is 261162

therefore i) across is 19

The possibilities for d) across are then

966333 then e) down begins with 6

976433 then e) down begins with 7

986533 then e) down begins with 8

996633 then e) down begins with 9

Of these only 9 is acceptable to give e) down as 93 which is then a multiple of f) across i.e. 31.

