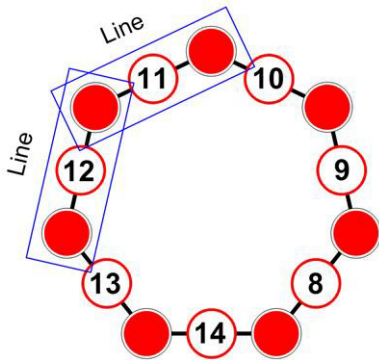


Fill in the Blanks

8 February 2025

Jim Stevenson

This is a fun puzzle¹ from John Bassey at Puzzle Sphere.



The diagram shows a heptagon with three circles on each side. Some circles already have the numbers 8 to 14 filled in, while the remaining circles need to be filled with the numbers 1 to 7. Each circle must contain one number, and the sum of the numbers in every set of three circles along a line must be the same. Arrange the numbers!!!

Solution

First, fill in the red empty circles with the unknown variables a, b, c, d, e, f, and g for the integers 1, 2, 3, 4, 5, 6, and 7 (Figure 1). Then the equal triplets yield

$$\begin{aligned}
 a + 8 + b &= b + 9 + c \\
 &= c + 10 + d \\
 &= d + 11 + e \\
 &= e + 12 + f \\
 &= f + 13 + g \\
 &= g + 14 + a
 \end{aligned}$$

These equations imply

$$\begin{aligned}
 a &= c + 1 \\
 b &= d + 1 \\
 c &= e + 1 \\
 d &= f + 1 \\
 e &= g + 1 \\
 f &= a + 1
 \end{aligned}$$

Therefore, $a > c > e > g$ and $b > d > f > a$. So

$$b > d > f > a > c > e > g,$$

which means (Figure 2)

g	e	c	a	f	d	b
1	2	3	4	5	6	7

and the sides each add to 19.

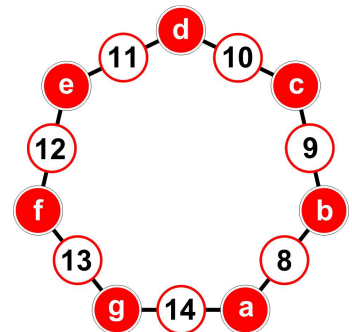


Figure 1

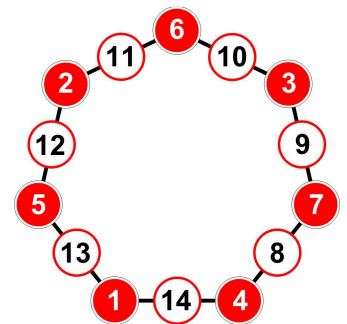


Figure 2

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¹ 30 January 2025 (<https://medium.com/puzzle-sphere/a-timeless-puzzle-to-challenge-your-reasoning-a10e7a930014>)