# Sum Thing Special Problem

**Solution:** Let a be the first term of the set of consecutive n integers whose sum is $S = 296$. Then

$$S = \frac{n}{2}(2a + n - 1) = 296$$

$\Rightarrow \quad n(2a + n - 1) = 592 = 2^4 \times 37.$ \qquad\qquad …(1)

$\Rightarrow \quad 2a = \frac{592}{n} - n + 1.$ \qquad\qquad …(2)

Since $2a$ is even, $\frac{592}{n} - n + 1$ must be even. Therefore $\frac{592}{n} - n$ must be odd.

From (1), we see that 16, 37 and 592 are the factors of 592.

If $n = 16$ then $2a = \frac{592}{16} - 16 + 1 = 37 - 16 + 1 = 22 \Rightarrow a = 11.$

Therefore the required set is given by

$$A = \{11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26\}.$$

If $n = 37$ then $2a = \frac{592}{37} - 37 + 1 = 16 - 37 + 1 = -20 \Rightarrow a = -10.$

Therefore the required set is given by

$$B = \{-10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, … ,26\}.$$

If $n = 592$ then $2a = \frac{592}{592} - 592 + 1 = 1 - 592 + 1 = -590 \Rightarrow a = -295.$

Therefore the required set is given by

$$C = \{-295, -294, … 0, 1, … ,295, 296\ \}.$$

These are the three required sets. There may be some more sets.

From:

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