Correspondence

DEAR EDITOR,

'Piecing it together'

In an earlier article I argued that the results from a theory associated with Felix Baumgartner's fall from a great height over Roswell in New Mexico in October 2012 showed a good measure of agreement with practice [1], except perhaps in respect of total free fall time. Between acceptance and publication of that article an even greater fall in the same region was undertaken in October 2014 by Alan Eustace. I subsequently analyzed and compared results from both falls recently and proposed also a simple modification to the earlier theory that resulted in an improved agreement with known facts of free fall time. Readers who wish to know more can find the details in the letters column of [2].

References

1. John D Mahony, Piecing it together, *Math. Gaz.*, **99** (March 2015), pp. 40-44.
2. John D Mahony, A Difference in Autumn Falls, *Mathematics Today*, **51** (February 2015), pp. 40-42.

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Feedback

On Note 93.36: Paul Dale writes: A succinct solution of the difference equation

$$f(k, n + 1) = 2f(k, n) - \binom{n}{k}, n \geqslant 1 \tag{1}$$

and the initial condition $f(k, 1) = 2$ (equation (5) of Martin Griffiths' note) is here derived by a rather less cumbersome method.

For $k = 2$ we find

$$\{f(2, n) : n \geqslant 1\} = \{2, 4, 7, 11, 16, 22, \dots\}$$

$$\therefore \{\Delta f(2, n)\} = \{2, 3, 4, 5, 6, \dots\}$$

or

$$\Delta f(2, n) = 1 + n = 1 + n^{\underline{1}}$$

where $n^{\underline{r}}$ denotes the falling factorial power

$$n(n - 1)(n - 2)\dots(n - r + 1).$$

On summing we get

$$f(2, n) = C + n^{\underline{1}} + \frac{n^{\underline{2}}}{2!}.$$