Help needed

As readers may know, the *Gazette* is produced by individuals in their 'spare time'. As may sometimes be apparent, there are no full-time employees. To maintain the present quality, the editorial team need some help.

Firstly, after a number of years of service, Tony Crilly is retiring as a Reviews Editor. He has co-ordinated book reviews in the post-school category (with Rosalie McCrossan dealing with other areas). Could *you* take over from Tony?

Secondly, the burden of editing is increasing as the *Gazette* seems to becoming more and more popular with authors. This, as well as his day job, is giving Steve some real headaches. We would like an Assistant Editor to oversee features such as letters, gleanings, problems and reviews. This would be particularly helpful in the final stages of production when we process corrections from proof-readers and authors to ensure that everything is in *Gazette* style. We would be delighted to hear from anyone who is prepared to help. It would be quite possible to have a rota to handle this on an issue by issue basis.

For each of these categories, incidental expenses would be paid and also a (small) honorarium. **We need this help to maintain the quality of the journal.**

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Correspondence

DEAR EDITOR,

I would like to make two comments on the July 1998 issue as follows:–

1. John Sharp's 'Have you seen this number', equation (3) (p. 203) appears wrong as the roots 0.618033 and −1.618033 do not satisfy equation (3) unless $-x$ is changed to $+x$ in the given equation. I suspect he is confusing roots with factors: $x^2 - x - 1 = (x + 0.618033\ldots)(x - 1.618033\ldots)$ has roots $-0.618033\ldots$ and $1.618033\ldots$.

2. Frank Gerrish, in the Correspondence, refers to some interesting points on Pythagorean Triplets, which has also been mentioned previously and is always a popular issue.

I discovered a very simple relationship (about 40 years ago) which gives any number of triplets that one wants for say the equation:

$$a^2 = b^2 + c^2 \qquad (1)$$

The trick is to solve the equation,

$$z^2 = 2xy \tag{2}$$

for integral values of x, y, z and put $a = (x + y + z)$, $b = (x + z)$ and $c = (y + z)$ in equation (1) to yield the triplets. Note z perforce needs to be even and an infinite number of values for x, y, z are possible. To find primitive triplets one needs to choose x and y as co-primes.

Example 1. For $z = 2$, $x = 2$ and $y = 1$, then we have the primitive triplet (5,4,3).

Example 2. For $z = 4$, $x = 8$, $y = 1$, we get the primitive triplet (13, 12, 5) and with $x = 4$, $y = 2$ we get the triplet (10, 8, 6) a multiple of (5, 4, 3) above.

Example 3. For $z = 6$, $x = 18$, $y = 1$ we get a primitive triplet (25, 24, 7) which is different to the triplet (25, 20, 15) built up from the primitive (5, 4, 3) of example 1. Factoring 18 for other values of x and y e.g. (9, 2) and (3, 6) will yield the primitive (17, 15, 8) and ordinary triplet (15, 12, 9).

(Note: I have a proof for the above relationship but it is too elaborate for the correspondence section. The relationship certainly is an exciting and useful tool.)

Yours sincerely,

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Editor's note: Frank Gerrish has confirmed that Shafi Ahmed's construction will yield *all* the primitive Pythagorean triples.

Given such a triple (a, b, c) with $a^2 = b^2 + c^2$, write

$$z = b + c - a, \qquad x = a - c, \qquad y = a - b.$$

Then the integers x, y, z are positive because $a > c$, $a > b$ and $a < b + c$. Also

$$x + y + z = a, \qquad x + z = b, \qquad y + z = c \tag{1}$$

and
$$\begin{aligned} 2xy &= 2(a - c)(a - b) \\ &= 2a^2 - 2(b + c)a + 2bc \\ &= a^2 + b^2 + c^2 - 2(b + c)a + 2bc, \text{ since } a^2 = b^2 + c^2, \\ &= (b + c - a)^2 \\ &= z^2, \end{aligned}$$

so z is even. Finally, x and y are coprime: a common prime divisor of them would divide $2xy = z^2$, and hence also z, and consequently by (1) also a, b, c—contradicting primitivity.

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