YOUR LETTERS

Dear Sir,

With regard to the case in "Research Corner" concerning numbers which can be written as the sum of three squares and four squares, all numbers of the form $m^{2n}(8k+6)$ can only be written as the sum of at least three squares since the residue 6 (mod 8) cannot be obtained with less than 3 squares ($6 \equiv 4 + 1 + 1 \pmod 8$). All numbers of the form $m^{2n}(8k+7)$ can likewise only be written as the sum of 4 squares since $4 + 1 + 1 + 1 \equiv 7 \pmod 8$.

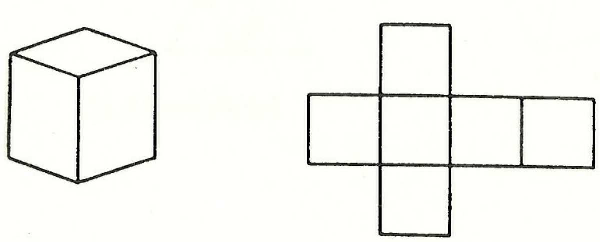
Numbers of the form $m^{2n}(8k+1)$ are either squares or the sum of two squares except in certain cases for which I can't work out a formula. I also can't work out numbers of the form $m^{2n}(8k+2)$ although I can see that if they are to be expressed as the sums of two squares, those squares must be odd numbers. Numbers of the form $m^{2n}(8k+5)$ have the same problem: they may exist as the sum of two squares and they may not.

Numbers of the form $m^{2n}(8k+3)$ cannot be expressed as the sum of less than three squares since the only combination is $3 \equiv 1 + 1 + 1 \pmod 8$. Numbers of the form $m^{2n}(8k+4) = (2m^n)^2(2k+1)$ are really only an application of $m^{2n}(8k+1)$, $m^{2n}(8k+3)$, $m^{2n}(8k+5)$ or $m^{2n}(8k+7)$.

Numbers of the form $m^{2n} \times 8k = (2m^n)^2 \times 2k$ depend on the value of k (i.e. $k = 4r$, $4r + 1$, $4r + 2$ or $4r + 3$) and we may find out the way it may be represented by the above means. But this case should not occur since all the squared numbers should be taken out of the brackets beforehand (e.g. $768 = 256 \times 3 = 16^2 \times 3 = 16^2 + 16^2 + 16^2$).

Barry Quinn,
St. Joseph's College, Hunters Hill

What happened to all the others? — Editor.



Cube {4, 3}