Fun with Prime Numbers
Invitation to the Mysterious World of Mathematics

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Fermat's theorem on sums of two squares

Theorem

Let P be an odd prime number. The remainder of P is 1 when we divide it by 4 if and only if P is of the form

$$P = X^2 + Y^2$$

for some integers X,Y.

Pierre de Fermat (1601?-1665)

Example

$5 = 1^2 + 2^2$ $13 = 2^2 + 3^2$ $17 = 1^2 + 4^2$