

MATHEMATICS 5.
Problem

1. Let x and y be positive integers satisfying the equation $3x + 5y = 100$.
2. John has \$7. Each day he can buy a pizza for 2, or pineapple for 2. In how many ways can he spend his money?
3. Let x_1, x_2, \dots, x_n be positive integers such that $x_1 + x_2 + \dots + x_n = 100$.

Senior Questions

1. Let $x; y; k$ be integers. Fermat's theorem on sums of two squares states that: A prime number p is of the form $p = 4k + 1$ if and only if $p = x^2 + y^2$.

Use the above theorem or otherwise, show that for each prime p of the form $p = 4k + 1$, there is only one right-angled triangle with integer side lengths $a; b$ and p , such that $a^2 + b^2 = p^2$.

2. In every cell of a square table is a number. The sum of the largest two numbers in each row is a and the sum of the largest two numbers in each column is b . Prove that $a = b$.
3. A positive integer n is divided by d and the quotient and remainders are q and r