Задание

$xy = 38(x + y)$ нужно найти все решения в натуральных числах!

Решение:

$\boldsymbol{xy = 38(x + y)}$

$\boldsymbol{xy - 38x = 38y; x(y - 38) = 38y;}$

$$\boldsymbol{x = \frac{38y}{y - 38} = \frac{38y - 38 * 38 + 38 * 38}{y - 38} =}$$
$$\boldsymbol{= \frac{38(y - 38)}{y - 38} + \frac{1444}{y - 38} = 38 + \frac{1444}{y - 38}}$$

$\boldsymbol{38}$ целое число, $\boldsymbol{\frac{1444}{y - 38}}$ тоже целое число

$\boldsymbol{(y - 38)}$ должен быть делителем числа $\boldsymbol{1444}$

$\boldsymbol{1; 2; 4; 19; 38; 76; 361; 722; 1444}$

$\boldsymbol{-1; -2; -4; -19; -38; -76; -361; -722; -1444}$

$\boldsymbol{x}$ и $\boldsymbol{y}$ должны быть натуральными, $\boldsymbol{x > 0; y > 0}$

$$\boldsymbol{1)y - 38 = 1; y = 39; x = 38 + \frac{1444}{1} = 1482}$$
$$\boldsymbol{2)\ y - 38 = -1; y = 37; x = 38 + \frac{1444}{-1} = -1406 < 0}$$
$$\boldsymbol{3)y - 38 = 2; y = 40; x = 38 + \frac{1444}{2} = 760}$$
$$\boldsymbol{4)\ y - 38 = -2; y = 36; x = 38 + \frac{1444}{-2} = -684 < 0}$$
$$\boldsymbol{5)y - 38 = 4; y = 42; x = 38 + \frac{1444}{4} = 399}$$
$$\boldsymbol{6)\ y - 38 = -4; y = 34; x = 38 + \frac{1444}{-4} = -323 < 0}$$

$$7) y-38=19; y=57; x=38+\frac{1444}{19}=114$$

$$8)\ y-38=-19; y=19; x=38+\frac{1444}{-19}=-38<0$$

$$9) y-38=38; y=76; x=38+\frac{1444}{38}=76$$

$$10)\ y-38=-38; y=0; x=38+\frac{1444}{-38}=0$$ не натур.

$$11) y-38=76; y=38; x=38+\frac{1444}{76}=57$$

$$12)\ y-38=-76; y=-38<0;$$

$$13) y-38=361; y=399; x=38+\frac{1444}{361}=42$$

$$14)\ y-38=-361; y=-323<0;$$

$$15) y-38=722; y=760; x=38+\frac{1444}{722}=40$$

$$16)\ y-38=-722; y=-684<0;$$

$$17) y-38=1444; y=1482; x=38+\frac{1444}{1444}=39$$

$$18)\ y-38=-1444; y=-1406<0$$

Ответ: $(39;1482)(40;760)(42;399)(57;38)$
$(76;76)\ (114;57)\ (399;42)(760;40)(1482;39)$