Test Flight Q1

Say whether the following is true or false and support your answer by a proof.
$(\exists m \in \mathbb{N})(\exists n \in \mathbb{N})(3m + 5n = 12)$

Proof by contradiction:
$3m + 5n = 12$ Given in statement of problem.
$3m = 12 - 5n$

$m = 4 - \frac{5}{3}n.$

$4 - \frac{5}{3}n \geq 1$ Since m is a natural number.

n must be a multiple of 3 in order for $\frac{5}{3}n$ to be a natural number. But if $n = 3$,
$4 - \frac{5}{3}3 = -1 < 1$ Which is a contradiction of $n \in \mathbb{N}$ All n that are greater multiples of 3 also results in a negative integer for m which is a contradiction of $n \in \mathbb{N}$.

This proves by contradiction that $(\exists m \in \mathbb{N})(\exists n \in \mathbb{N})(3m + 5n = 12)$ is false.