**1.** Say whether the following is true or false and support your answer by a proof.

$$(\exists \boldsymbol{m} \in \mathbb{N})(\exists \boldsymbol{n} \in \mathbb{N})(\boldsymbol{3m + 5n = 12})$$

Opening: We will prove that this proposition is false by a **direct proof**.

$$3m + 5n = 12$$

$$5n = 12 - 3m$$

$$5n = 3(4 - m)$$

Then it is clear that $0 < \boldsymbol{m} < 4$ as both ***m*** and ***n*** should be natural numbers.

Pick *m* starting from 1 to 3.

If $m = 1$ then $5n = 3(4 - 1), \text{then } n = 9/5$ but this can not be true as $9/5$ is not a natural number.

Else if $m = 2$ then $5n = 3(4 - 2),\ n = 6/5$ this also can not be true as $6/5$ is not a natural number also.

Lastly if $m = 3$ then $5n = 3(4 - 3), n = 3/5$ like above $3/5$ is not a natural number.

So it is clear that there is no $m \in \mathbb{N}$ and $n \in \mathbb{N}$ such that $3m + 5n = 12$

**Then this statement is false**