EASY Question

EASY QUESTION: Let $a, b, d \in \mathbb{Z}$, and suppose that

$$\gcd(a, b) = d.$$

Prove that

$$\gcd\left(\frac{a}{d}, \frac{b}{d}\right) = 1.$$

Given, $\gcd(a, b) = d\ , where\ a, b, d\ \in\ \mathbb{Z}$

Let $a = kd\ , b = ld\ , where\ k, l \in \mathbb{Z}\ and\ k \neq l$

$$k = \frac{a}{d}\ \ , l = \frac{b}{d}$$

Assuming that $\gcd\left(\frac{a}{d}, \frac{b}{d}\right) > 1$,

$\gcd(k, l) = m > 1$

Hence, $k = \lambda_1 m\ , l =, \lambda_2\, m, where\ \ \lambda_1\ , \lambda_2\ \in\ \mathbb{Z}$

$a = \lambda_1 md\ , b = \lambda_2 md$

$\gcd(a, b) = md > d$

Contradicting the initial statement, $\gcd(a, b) = d$.

$\therefore \gcd\left(\frac{a}{d}, \frac{b}{d}\right) = 1,$