V: line in $\mathbb{R}^2$ given by $y = 1$

Q: Is V a subspace?

Ans: No!

The set V does not satisfy any of the 3 properties of a subspace.

1) The zero vector is not in V: $(0, 0)$ does not have $y = 1$

2) $(0, 1) = v$ is on V, $(1) = w$ is also on V however $(0, 1) + (1) = v + w$ is not on V

(1) does not have $y = 1$

3) $(1)$ is on V but $5(1) = (5)$ is not in V
Points on V are shown in blue $V = (0,1)$  
$w = (1,1)$

$V + w = (1,2)$  
$5w = (5,5)$  
$0 = (0,0)$  

The red arrow shows vectors of the form $cw$ for various $c$. None of these except $w = (1,1)$ lies in $V$. 

$5w = (5,5)$ not on $V$