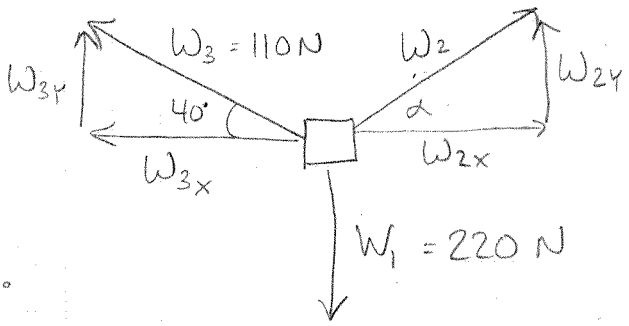
P #18

$W_1 = 220\ N$
$W_2 = ?$
$W_3 = 110\ N$

$\theta = 40°$
$\alpha = ?$



$W_{3x} = W_3 \cdot \cos\theta$
$= (110\ N) \cdot \cos 40°$
$W_{3x} = 84.3\ N$

$W_{3y} = W_3 \cdot \sin\theta$
$= (110\ N) \cdot \sin 40°$
$W_{3y} = 70.7\ N$

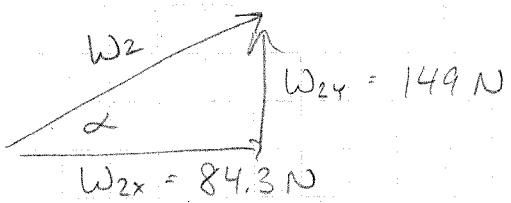
For Vertical Forces: $W_{3y} + W_{2y} = W_1$

$70.7\ N + W_{2y} = 220\ N$

$W_{2y} = 149\ N$

For Horizontal Forces: $W_{3x} = W_{2x} = 84.3\ N$

For W_2:



$W_2^2 = W_{2y}^2 + W_{2x}^2$
$= (149\ N)^2 + (84.3\ N)^2$

$\boxed{W_2 = 171\ N}$

$\tan\alpha = \dfrac{W_{2y}}{W_{2x}} = \dfrac{149\ N}{84.3\ N}$

$\boxed{\alpha = 60.5°}$