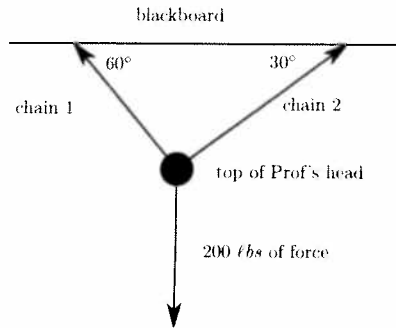


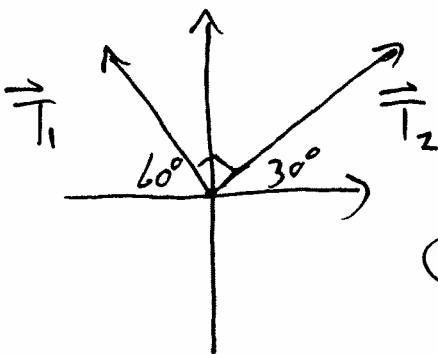
Write your name on this quiz



Once upon a time there was a Calculus class that got so angry with its professor that the students carried out a mutiny and chained the professor to the blackboard at the end of class in protest (don't worry, the prof was just fine).

The view from above the professor's head is pictured. He pulls directly away from the blackboard with all of his strength, but does not move. You may assume that all the forces acting in the picture occur in a plane, and that the professor is standing at the origin and pulling in the direction of negative  $y$ -values in this plane. Answer the following:

1. What is the total tension (in pounds) being exerted by the two chains?
2. If the tensions being exerted by chains 1 and 2 are denoted by  $C_1$  and  $C_2$ , then write down three two-dimensional vectors for the forces being applied by the two chains and the professor.
3. Calculate the dot product of the vectors that represent the chains.



① The total force of the chains is 200 lbs (to counteract the prof)

$$\textcircled{2} \vec{T}_1 = [C_1 \cos 60^\circ] \vec{i} + [C_1 \sin 60^\circ] \vec{j}$$

$$\vec{T}_2 = [C_2 \cos 30^\circ] \vec{i} + [C_2 \sin 30^\circ] \vec{j}$$

$$\vec{P}_{\text{Prof}} = -200 \vec{j}$$

③  $\vec{T}_1 \perp \vec{T}_2$  so dot product is zero.