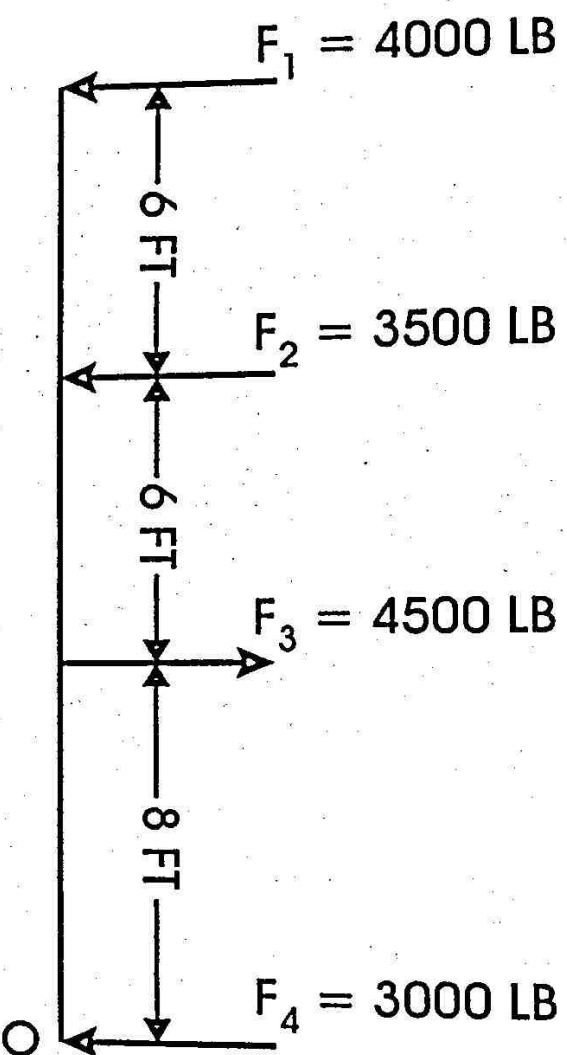
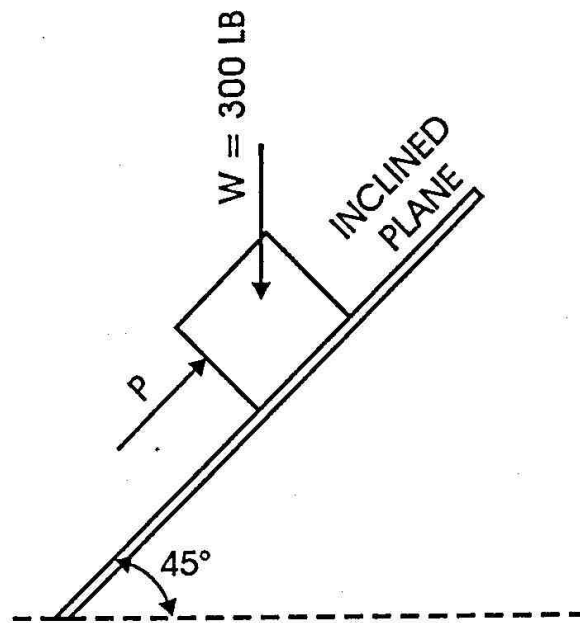




Examination Figure 1

The horizontal bar represented in Examination Figure 1 is acted upon by the four vertical forces F_1 , F_2 , F_3 , and F_4 , whose locations and characteristics are shown. Calculate the horizontal distance from point **O** to the line of action of the resultant of the given forces.



Examination Figure 2

2. As indicated in Examination Figure 2, a body that weighs 300 lb is to be supported on a plane surface which is inclined so that the angle between a horizontal reference plane and the surface is 45° . The coefficient of friction for the materials used for the body and the surface is 0.3. The body is prevented from sliding down the surface by a force **P** whose line of action is parallel to the surface. Calculate the least magnitude of the force **P** (rounded off to the nearest pound).
3. An airplane was moving with a velocity equal to 300 mph when the velocity was increased with uniform acceleration to 600 mph in 5 min. Calculate the number of miles the airplane traveled during that interval of time.
4. A railroad car that weighs 20,000 lb is traveling eastward with a velocity whose magnitude is 5 fps. A second car, on the same track, that weighs 40,000 lb is also traveling in an easterly direction with a velocity of 7.81 fps. When the cars collided, they became coupled together and then both cars moved with the same velocity. If friction between the cars and the rails is neglected, what were the magnitude and the direction of the velocity of the cars after the collision?