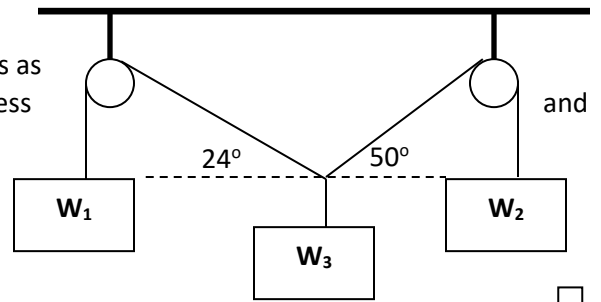


Name: \_\_\_\_\_

**Worksheet 3.4 Static Equilibrium**

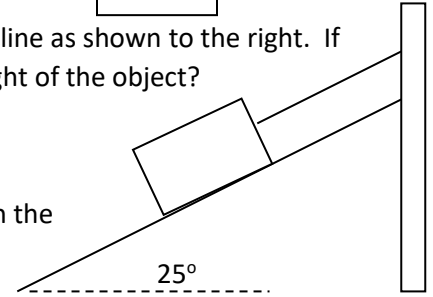
1)  $W_1$ ,  $W_2$  and  $W_3$  are the weights of three objects suspended by pulleys as shown. Assuming the pulleys in this system are frictionless and weightless that  $W_3 = 12$  N, what are the values of  $W_1$  and  $W_2$ ?

( $W_1 = 8.0$  N,  $W_2 = 11$  N)



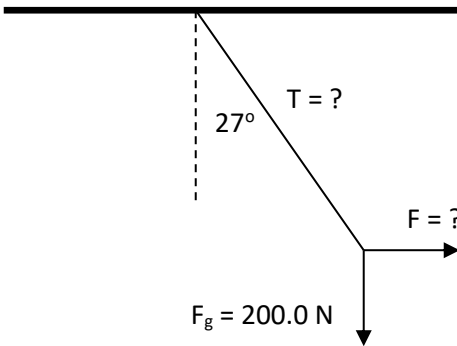
2) An object is suspended on a frictionless inclined plane by a rope parallel to the incline as shown to the right. If the angle of the incline is  $25^\circ$  and the tension in the rope is  $5000$  N, what is the weight of the object?

( $1.2 \times 10^4$  N)

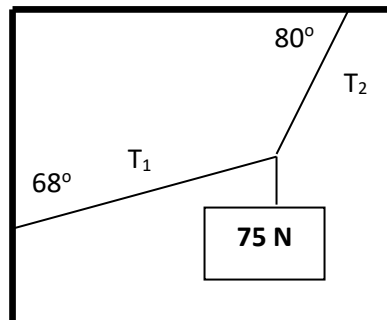


3) A  $200.0$  N child sitting on a playground swing is being pushed by her father. When the rope makes an angle of  $27^\circ$  to the vertical what is the force exerted by her father? What is the tension in the rope,  $T$  below?

( $F = 1.0 \times 10^2$  N,  $T = 220$  N)

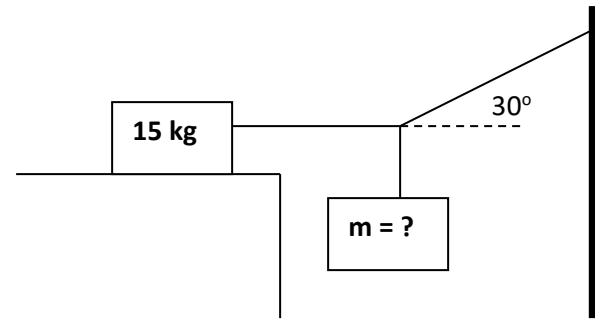


4) Find the tensions  $T_1$  and  $T_2$  in the ropes shown in the diagram below.

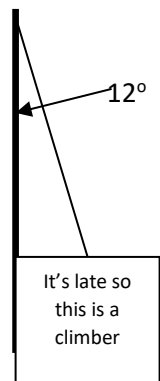
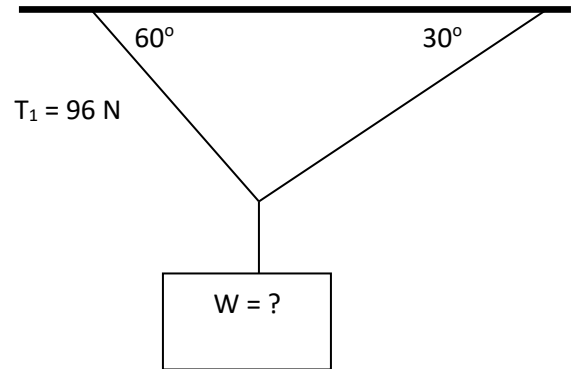


( $T_2 = 82$  N,  $T_1 = 15$  N)

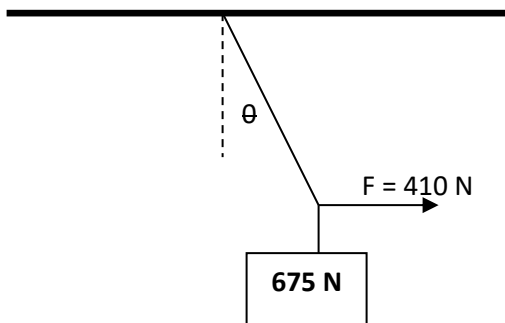
5) A  $15$  kg object rests on a table on the right. A cord is attached to this object and to a wall. Another object is hung from this cord as shown. If the coefficient of friction between the  $15$  kg object and the table is  $0.27$ , what is the maximum mass that can be hung, without movement? ( $2.3$  kg)



6) A  $735$  N mountain climber is rappelling down the face of a vertical cliff as shown in the diagram below. If the rope makes an angle of  $12^\circ$  with the cliff face, what is the tension in the rope? Assume that the climber pushes horizontally off the cliff. ( $750$  N)



7) Given the diagram to the right, find  $W$  and  $T_2$  ( $110$  N,  $55$  N respectively)



8) A  $675$  N object is pulled horizontally by a force of  $410$  N as shown on the left. What is the angle,  $\theta$ , between the rope and the vertical? ( $31^\circ$ )