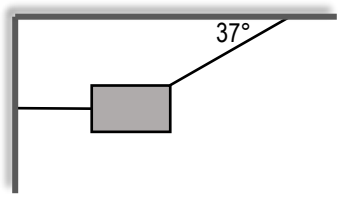
CONCEPT: EQUILIBRIUM IN 2D

● 2D Equilibrium: all forces cancel out to ZERO in the ____ AND ____ axes. $F_{net,x} = \Sigma F_x =$ ___ $F_{net,y} = \Sigma F_y =$ ___

- Remember to decompose all 2D forces!

EXAMPLE: A 5kg box is suspended in place by 2 cables. Calculate the tension forces of both cables.



2D FORCES
1) Draw FBD: **W,F_A,T,N,f**
2) Decompose 2D Forces
3) Write $\Sigma F = ma$ in x & y
4) Solve

● If you get stuck when solving X & Y axis equations, go to the other axis.

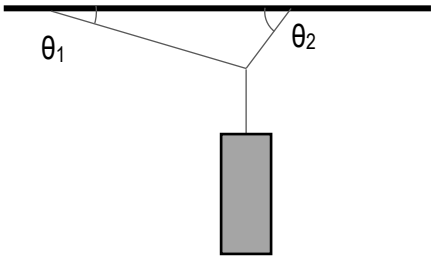
PROBLEM: A chandelier is supported from the ceiling by 2 chains. Both chains make a 30° angle with the **vertical.** The tension in each chain is the same because of symmetry: $T_1=T_2=50$ N. What is the mass of the chandelier?

A) 2.6 kg
B) 8.8 kg
C) 5.1 kg
D) 4.4 kg

2D FORCES
1) Draw FBD
2) Write $\boldsymbol{\Sigma F = ma}$ in x & y
3) Solve

PROBLEM: A traffic signal is suspended from 3 cables as shown. The angles of the upper cables are $\theta_1=22°$ and $\theta_2=60°$. If the mass of the traffic signal is 8kg, what is the tension in cable 1?

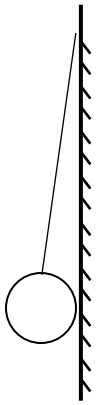
E) 4.0 N
F) 39.6 N
G) 73.4 N
H) 210 N



2D FORCES
1) Draw FBD
2) Write $\boldsymbol{\Sigma F = ma}$ **in** x & y
3) Solve

PROBLEM**:** A sphere hangs suspended by a light string, resting against a vertical wall. The sphere has a mass of 2 kg and the string makes an 80° angle with the horizontal. What is the force from the wall against the ball?

A) 2.2 N
B) 176 N
C) 3.5 N
D) 111 N



2D FORCES
1) Draw FBD **2)** Write $\boldsymbol{\Sigma F = ma}$ **in** x & y **3)** Solve