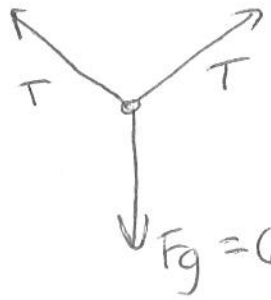
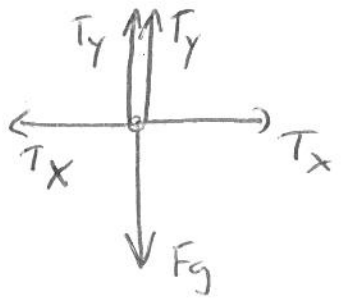
Practice Hanging Masses (Static Equilibrium)
ANSWERS

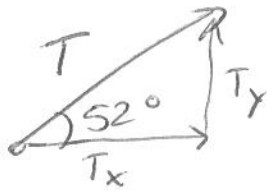
1) ① 



② $F_g = T_x + T_y$

$637N = 2T_y$

$T_y = 318.5N$



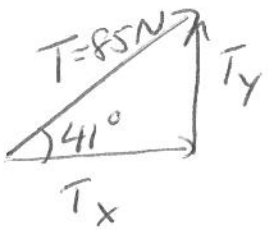
③ $T_y = T \sin 52°$

$T = \frac{T_y}{\sin 52°}$

$= \frac{318.5N}{\sin 52°}$

$\boxed{T = 404N}$

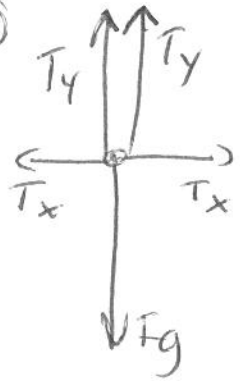
2) ①



$T_y = T \sin$

$= 55.8\,N$

②



$F_g = T_y + T_y$

$= 55.8\,N + 55.8\,N$

$= 111.6\,N$

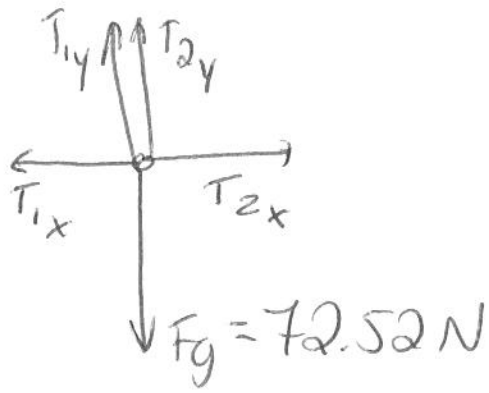
③ $F_g = mg$

$m = \frac{F_g}{g}$

$= \frac{111.6\,N}{9.8\,m/s^2}$

$\boxed{m = 11\,kg}$

3)



$T_{1x} = T_1 \cos 50°$

$T_{1y} = T_1 \sin 50°$

$T_{2x} = T_2 \cos 38°$

$T_{2y} = T_2 \sin 38°$

① $T_{1x} = T_{2x}$

$T_1 \cos 50° = T_2 \cos 38°$

$T_1 = T_2 \dfrac{\cos 38°}{\cos 50°}$

$T_1 = 1.226 T_2$

② $F_y = T_{1y} + T_{2y}$

$72.52\,N = T_1 \sin 50° + T_2 \sin 38°$

$72.52\,N = (1.226 T_2) \sin 50° + T_2 \sin 38°$

$72.52\,N = 0.939 T_2 + 0.616 T_2$

$72.52\,N = 1.555 T_2$

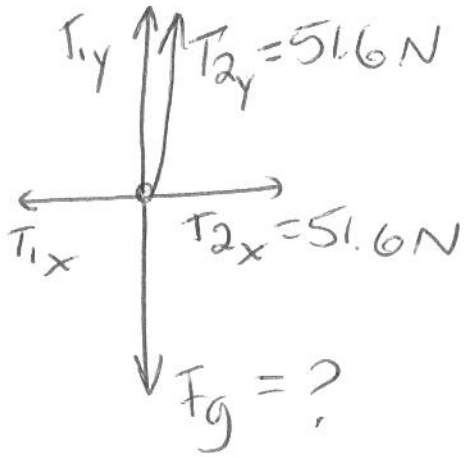
$T_2 = \dfrac{72.52\,N}{1.555}$

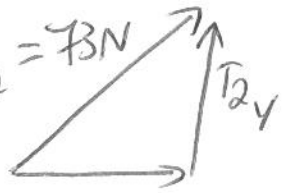
$\boxed{T_2 = 46.6\,N}$

③ $T_1 = 1.226 T_2$

$\boxed{T_1 = 57.1\,N}$

4)



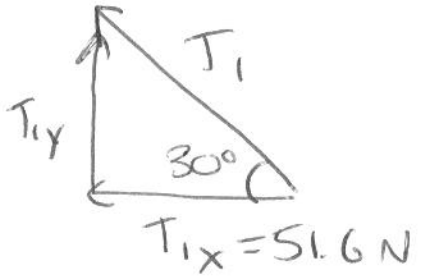


$T_{2x} = 73N\cos 45°$
$= 51.6\,N$

$T_{2y} = 73N\sin 45°$
$= 51.6\,N$

① $T_{1x} = T_{2x}$

$T_{1x} = 51.6\,N$



$\tan 30° = \dfrac{T_{1y}}{T_{1x}}$

$T_{1y} = T_{1x} \tan 30°$

$= (51.6N)\tan 30°)$

$= 29.8\,N$

② $F_g = T_{1y} + T_{2y}$

$= 29.8\,N + 51.6N$

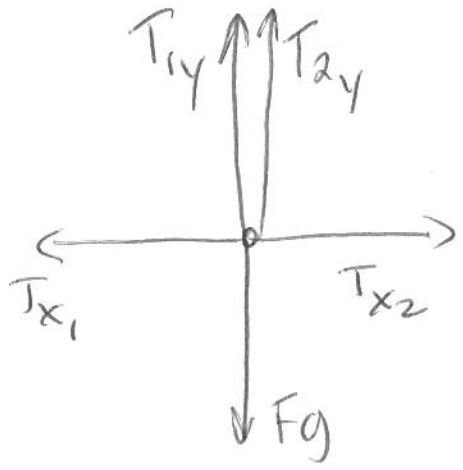
$= 81.4\,N$

③ $F_g = mg$

$m = \dfrac{F_g}{g} = \dfrac{81.4\,N}{9.8\,m/s^2}$

$\boxed{m = 8.3\,kg}$

5)



$T_{1y} = 51.3N \sin 65°$

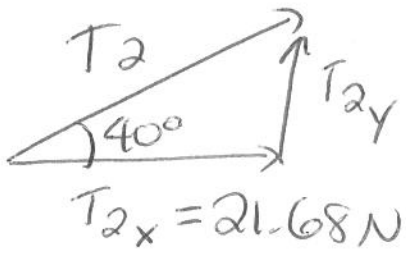
$= 46.49 N$

$T_{1x} = 51.3N \cos 65°$

$= 21.68N$

① $T_{1x} = T_{2x}$

$T_{2x} = 21.68N$



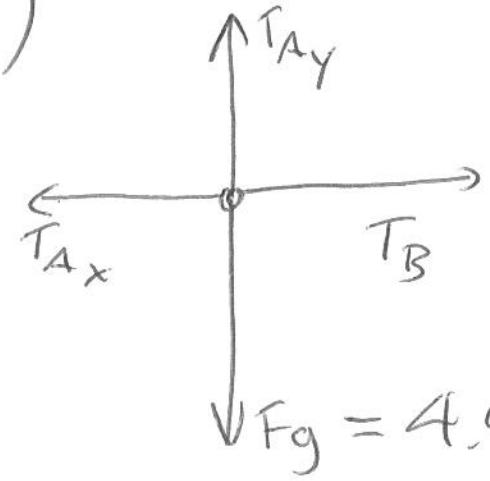
$\cos 40° = \frac{T_{2x}}{T_2}$

$T_2 = \frac{T_{2x}}{\cos 40°}$

$= \frac{21.68N}{\cos 40°}$

$\boxed{T_2 = 28.3N}$

6)



① $T_{Ay} = F_g$

$T_{Ay} = 4.9N$

$$\tan 60° = \frac{T_{Ax}}{T_{Ay}}$$

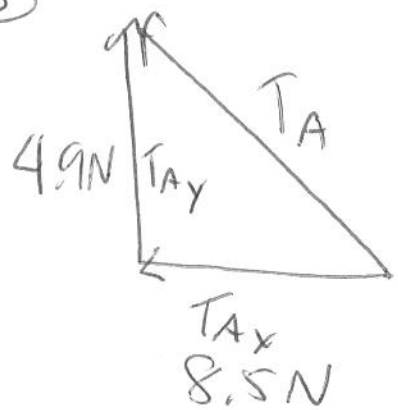
$T_{Ax} = T_{Ay} \tan 60°$

$= 4.9N \tan 60°$

$= 8.5N$

② $T_B = T_{Ax} \longrightarrow \boxed{T_B = 8.5N}$

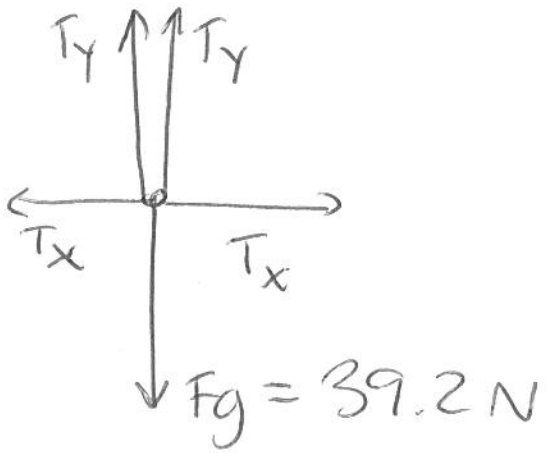
③



$T_A = \sqrt{(4.9N)^2 + (8.5N)^2}$

$\boxed{T_A = 9.8N}$

7)



① $F_g = T_Y + T_Y$

$F_g = 2T_Y$

$T_Y = \frac{F_g}{2}$

$= \frac{39.2\,N}{2}$

$T_Y = 19.6\,N$

②

$\theta = \sin^{-1}\left(\frac{19.6\,N}{25\,N}\right)$

$= \boxed{52°}$