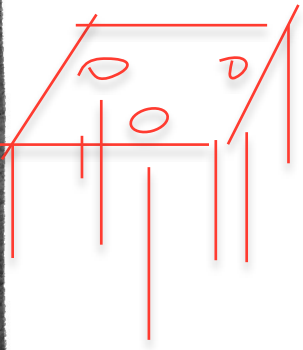
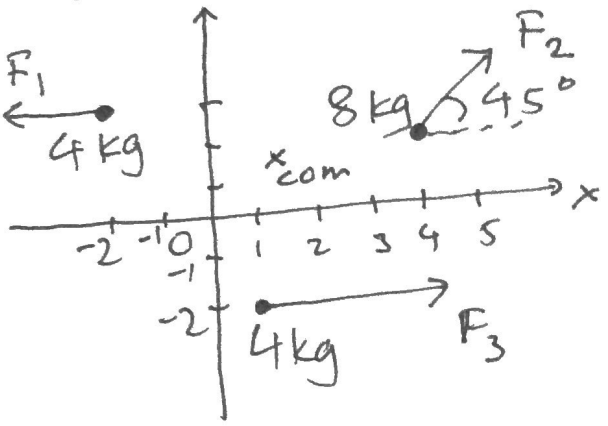
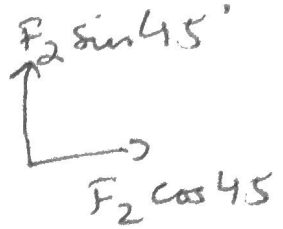
Ex: MOTION of COM of the three particles.

The three particles are initially at rest. Each experiences an external force due to bodies outside the three-particle system. The directions are indicated, and the magnitudes are $F_1 = 6\,N$, $F_2 = 12\,N$ and $F_3 = 14\,N$. What is the acceleration of the center of mass of the system?





$\simeq$



$M = 4+8+4 = 16\,kg$

soln:

$$\vec{a}_{com} = a_{com,x}\,\hat{i} + a_{com,y}\,\hat{j}$$

Applying $F=ma$ Law:

x: $F_{net,x} = M\,a_{com,x}$

$$F_2\cos 45^\circ + F_3 - F_1 = M\,a_{com,x}$$

$$a_{com,x} = \boxed{\quad}$$

y: $F_{net,y} = M\,a_{com,y}$

$$F_2 \sin 45^\circ = M\,a_{com,y}$$

$$a_{com,y} = \boxed{\quad}\ .\ //$$