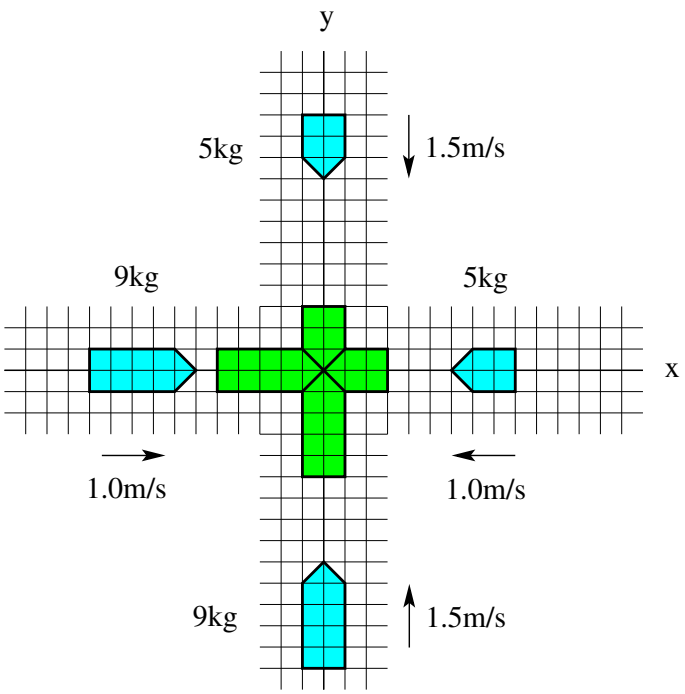
[mex268] Inelastic crossroad collision

Consider four flat objects moving toward the origin of the coordinate system with a 1m×1m grid size as shown. Each object has uniform density (1kg/m^2). They collide inelastically and stick together to form a single object as shown.
(a) Find the momentum (p_x, p_y) and the velocity (v_x, v_y) of the center of mass after the collision.
(b) Find the angular momentum l_z and the angular velocity ω_z of the rotational motion about the center of mass after the collision.
(c) Find the amount of energy E_{dis} dissipated during the collision.
Describe also in words the tools (principles, laws) you are using in each part.
Hint: For part (b) think of the cross-shaped object as a composite of seven 2m×2m square tiles.



Solution: