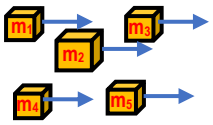
CONCEPT: CENTER OF MASS

● Sometimes it's useful to *simplify* a group/system of objects by replacing ALL objects with a single, equivalent object.

- This system 

can be simplified/replaced with a ***single*** object 

. When combining objects:

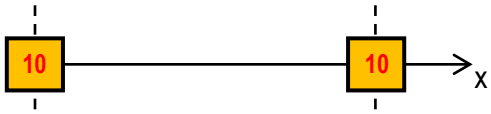
- **MASS** of the combined object is the _____ of the masses of all objects: **M =** _____.

- **CENTER OF MASS (C.O.M)** of the combined object is the _____ of all objects in the system.

Single object: Two Obj's (equal mass): Two Obj's (unequal mass):

$$X_{com} = \text{———} = \text{———————}$$

EXAMPLE: Two objects (**m_1=10kg, m_2=10kg**) are placed on the x-axis. **m_1** is placed at x=0 and **m_2 is** placed at x=4. Calculate the center of mass for the system of objects.



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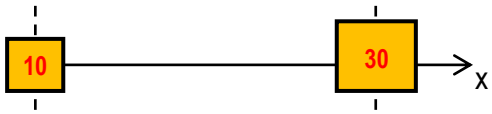


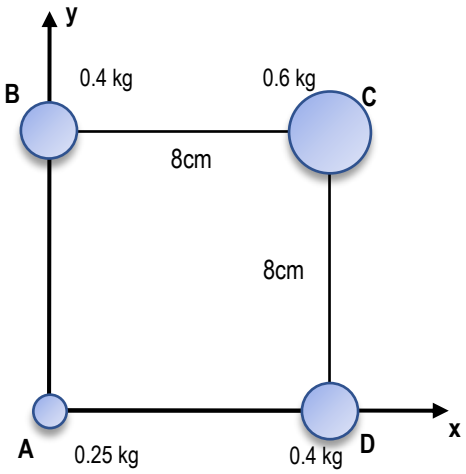
● The **C.O.M** is *NOT* necessarily in the middle of objs. When given different masses, it is often closer to _____ objects.

PROBLEM**:** Three weights are placed along the y axis**:** a 1.0-kg at +2.00 m, a 1.50-kg at the origin, and a 7.5-kg at –1.5 m**.** Where is the center of mass of these weights?

CENTER OF MASS

$$X_{com} = \frac{m_1 x_1 + m_2 x_2 + \ldots}{m_1 + m_2 + \ldots}$$

PROBLEM: Calculate the (x,y) coordinates of the center of mass (in cm) for the system of objects shown below.



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