CONCEPT: TOTAL MOMENTUM OF A SYSTEM OF OBJECTS

● A KEY idea of momentum is that when 2+ objects interact (e.g collide), the momentum of the **SYSTEM** is _____.

    - Recall: System = collection of objects. The total momentum of a system is the _____ of each objects' momenta.
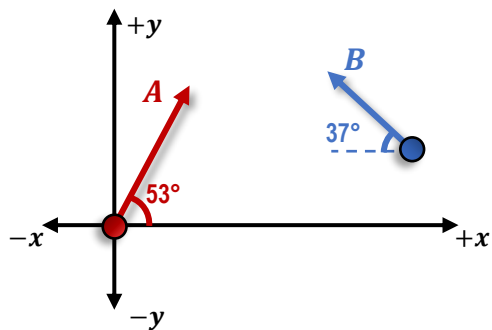
$$\vec{p}_{sys} = \underline{\hspace{1cm}} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$
(2 Objects)

EXAMPLE: Objects A (4 kg) and B (5kg) move towards each other. Object A moves to the right with 12 m/s, and B moves to the left with 9m/s. Calculate the total momentum of the system.
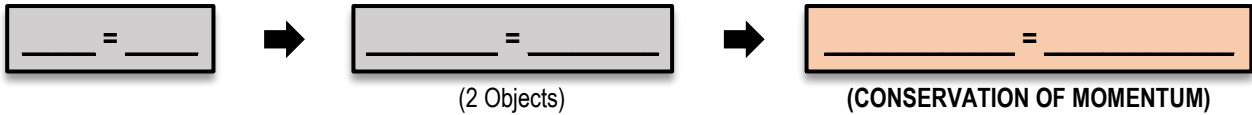
PROBLEM: Object A moves at 10 m/s at 53° and Object B moves at 5 m/s at −37° as shown below. Calculate the magnitude of the system's total momentum if both objects have a mass of 2kg.

CONCEPT: CONSERVATION OF MOMENTUM

● Remember! When objects interact, the total momentum of the SYSTEM $\vec{p}_{sys}$ is **CONSERVED**.

_____ = _____	➡	_____ = _____	➡	_____ = _____
		(2 Objects)		**(CONSERVATION OF MOMENTUM)**

EXAMPLE: Two balls roll towards each other. Ball **A** (3kg) moves at 7m/s to the right, and Ball **B** (4kg) moves at 5m/s to the left. After colliding, **B** moves at 2m/s to the right. Find the magnitude and direction of Ball **A's** velocity after the collision.

CONSERVATION OF MOMENTUM
1) Draw Diagrams for Before & After
2) Write **Conservation of Momentum** EQ
3) Plug in values & solve

PROBLEM: On a frictionless air hockey table, puck **A** of mass 0.250 kg moves to the right and collides with puck **B** of mass 0.38kg, which is initially at rest. After the collision, puck **A** is moving the left at 0.12 m/s and puck **B** moves to the right at 0.65 m/s. What was the initial velocity of puck **A** *before* the collision?

CONSERVATION OF MOMENTUM
1) Draw Diagrams for Before & After **2)** Write **Conservation of Momentum** EQ **3)** Plug in values & solve