

CONSERVATION OF MOMENTUM MODEL

CONDITION: NO NET EXTERNAL FORCE ACTS ON SYSTEM

STEP 1: WRITE STATEMENT OF COM

$$P_i = P_f$$

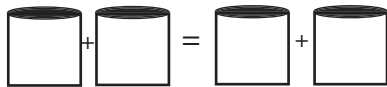
STEP 2: DEFINE POSITIVE X DIRECTION



STEP 3: DRAW MOMENTUM BUCKETS

CASE 1:
BOTH OBJECTS MOVE IN SAME DIRECTION
BEFORE AND AFTER COLLISION

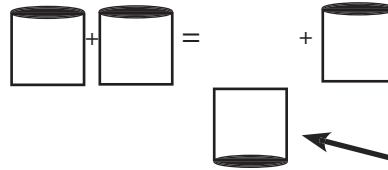
ELASTIC OR INELASTIC COLLISION



IF COLLISION IS ELASTIC,
THEN $K_i = K_f$

CASE 2:
ONE (OR MORE) OBJECT(S) MOVES BACKWARD
AFTER COLLISION

ELASTIC OR INELASTIC COLLISION



IF COLLISION IS ELASTIC,
THEN $K_i = K_f$

CASE 3:
OBJECTS "STICK TOGETHER" AFTER COLLISION

COMPLETELY INELASTIC COLLISION



UPSIDE BUCKET REPRESENTS
NEGATIVE VELOCITY
(MOVING BACKWARD)

STEP 4: WRITE RESULTING MOMENTUM EQUATION

$$m_1 v_{1i} + m_2 v_{2i} = m_1 v_{1f} + m_2 v_{2f}$$

$$m_1 v_{1i} + m_2 v_{2i} = -m_1 v_{1f} + m_2 v_{2f}$$

$$m_1 v_{1i} + m_2 v_{2i} = (m_1 + m_2) v_f$$

STEP 5: SOLVE EQUATION (MATHEMATICAL PART)