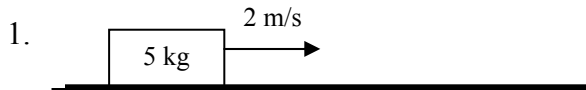


W7.01**MOMENTUM -- KEY**

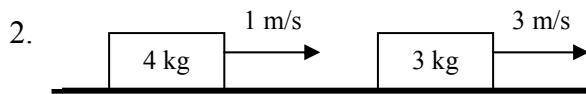
Inelastic Collisions

→ +

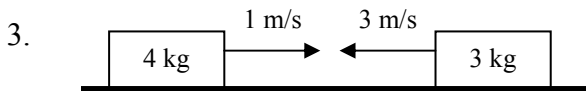
For all problems, assume all surfaces are frictionless.

I. For #'s 1-4, calculate the momentum, $p = mv$, of each system and each individual object.

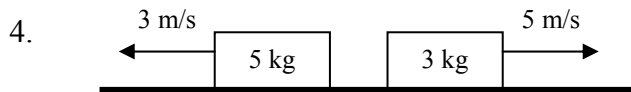
$$p_{\text{total}} = 10 \text{ kg m/s}$$



$$p_1 = 4 \text{ kg m/s} \quad p_2 = 9 \text{ kg m/s} \quad p_{\text{total}} = 13 \text{ kg m/s}$$




$$p_1 = 4 \text{ kg m/s} \quad p_2 = -9 \text{ kg m/s} \quad p_{\text{total}} = -5 \text{ kg m/s}$$




$$p_1 = -15 \text{ kg m/s} \quad p_2 = 15 \text{ kg m/s} \quad p_{\text{total}} = 0 \text{ kg m/s}$$

II. For the problems below, two boxes collide and stick together (an inelastic collision). The boxes before the collision are shown on the left; the boxes after the collision are shown on the right. Solve for the indicated unknown quantities.

5. 


$p_{\text{total initial}} = 18 \text{ kg m/s}$
 $KE_{\text{total initial}} = 27 \text{ J}$

$p_{\text{total final}} = 18 \text{ kg m/s}$ $v_{\text{total}} = 2 \text{ m/s}$
 $KE_{\text{total final}} = 18 \text{ J}$

6. 


$p_{\text{total initial}} = 34 \text{ kg m/s}$
 $KE_{\text{total initial}} = 76 \text{ J}$

$p_{\text{total final}} = 34 \text{ kg m/s}$ $v_{\text{total}} = 4.25 \text{ m/s}$
 $KE_{\text{total final}} = 72.25 \text{ J}$

7. 

$p_{\text{total initial}} = 16 \text{ kg m/s}$
 $KE_{\text{total initial}} = 56 \text{ J}$

$p_{\text{total final}} = 16 \text{ kg m/s}$ $v_{\text{total}} = 1.6 \text{ m/s}$
 $KE_{\text{total final}} = 12.8 \text{ J}$

8. 

$p_{\text{total initial}} = -22 \text{ kg m/s}$
 $KE_{\text{total initial}} = 154 \text{ J}$

$p_{\text{total final}} = -22 \text{ kg m/s}$ $v_{\text{total}} = -2 \text{ m/s}$
 $KE_{\text{total final}} = 22 \text{ J}$