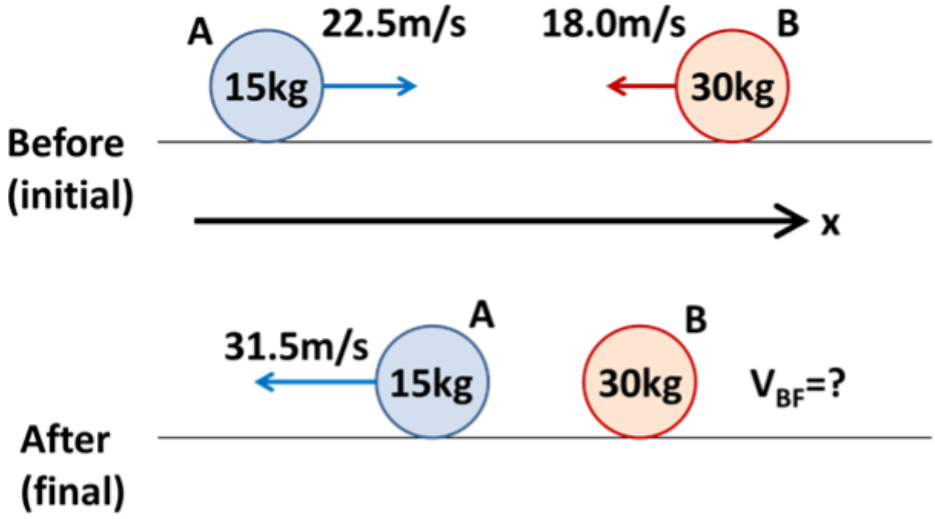
Ex.1 - **Elastic collisions.**



A) What was the velocity of marble B after the collision?

B) Was this collision elastic?

Feb 4-7:42 AM

SYSTEM: A + B

A)

$$P_{Si} = P_{SF}$$

$$P_{Ai} + P_{Bi} = P_{AF} + P_{BF}$$

$$m_A v_{Ai} + m_B v_{Bi} = m_A v_{AF} + m_B v_{BF}$$

$$(15)(22.5) + (30)(-18) = (15)(-31.5) + (30) v_{BF}$$

$$\boxed{v_{BF} = 9.0 \frac{m}{s}}$$

Feb 4-11:41 AM

B) $KE_{Si} = KE_{Ai} + KE_{Bi}$

$\boxed{KE_{Si} = 8{,}657\ J}$

$KE_{SF} = KE_{AF} + KE_{BF}$ $\left(KE = \frac{1}{2}mv^2\right)$

$\boxed{KE_{SF} = 8{,}657\ J}$

$KE_{Si} = KE_{SF}$, SO IT WAS AN ELASTIC COLLISION!

Feb 4-1:03 PM

SYSTEM: A & B.

A) $P_{Si} = P_{SF}$

$P_{Ai} + P_{Bi} = P_{AF} + P_{BF}$

$m_A v_{Ai} + m_B v_{Bi} = m_A v_{AF} + m_B v_{BF}$

$(15)(22.5) + (30)(-18) = (15)(-31.5) + (30)v_{BF}$

$\boxed{v_{BF} = 9.0\ \frac{m}{s}}$

Feb 4-8:53 AM

B) $KE_{Si} = KE_{Ai} + KE_{Bi}$

$KE_{Si} = 8{,}657\ J$

$KE_{Sf} = KE_{Af} + KE_{Bf}$

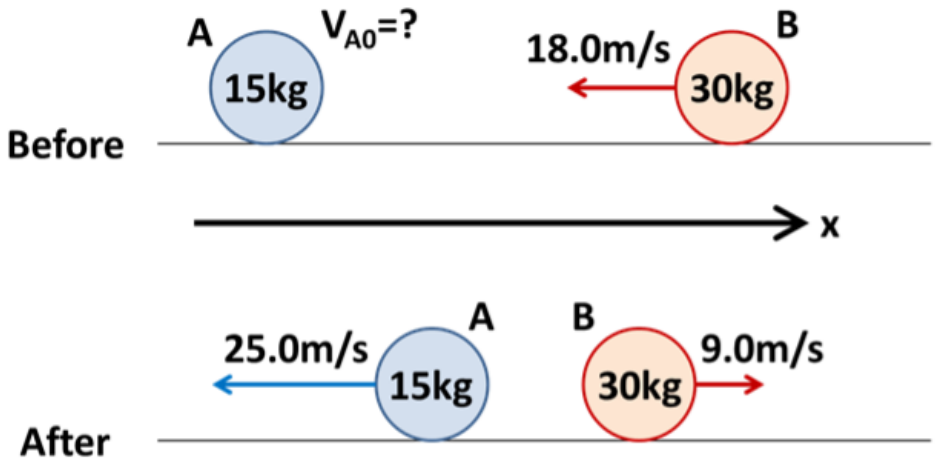
$KE_{Sf} = 8{,}657\ J$

$\left(KE = \frac{1}{2}mv^2\right)$

$KE_{Si} = KE_{Sf}$, SO IT WAS AN ELASTIC COLLISION.

Feb 4-9:50 AM

Ex.2 - **Inelastic collisions.**



A) What was the velocity of marble A before the collision?

B) Was this an inelastic collision?

Feb 4-7:59 AM

SYSTEM: A + B

$P_{Si} = P_{SF}$

A) $P_{Ai} + P_{Bi} = P_{AF} + P_{BF}$

$m_A v_{Ai} + m_B v_{Bi} = m_A v_{AF} + m_B v_{BF}$

$(15) v_{Ai} + (30)(-18) = (15)(-25) + (30)(9.0)$

$v_{Ai} = 29.0 \frac{m}{s}$

Feb 5-9:21 AM

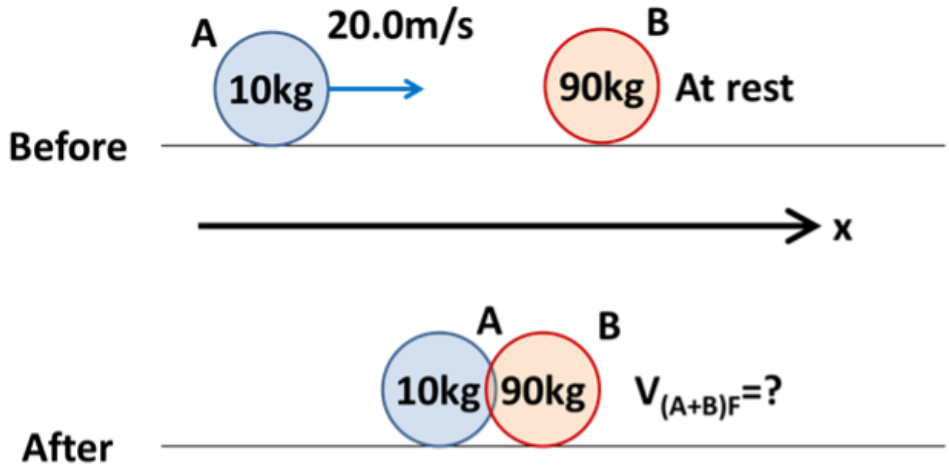
B) $K_{Si} = 11,168 \text{ J}$

$K_{SF} = 5,903 \text{ J}$

$K_{Si} \neq K_{SF}$, THEREFORE IT WAS AN INELASTIC COLLISION!

Feb 4-8:53 AM

Ex.3 – **Perfectly inelastic collisions.**



A) What was the velocity of the two marbles stuck together after the collision?

Feb 4-8:06 AM

SYSTEM: A + B

$P_{Si} = P_{SF}$

$P_{Ai} + P_{Bi} = P_{(AB)F}$

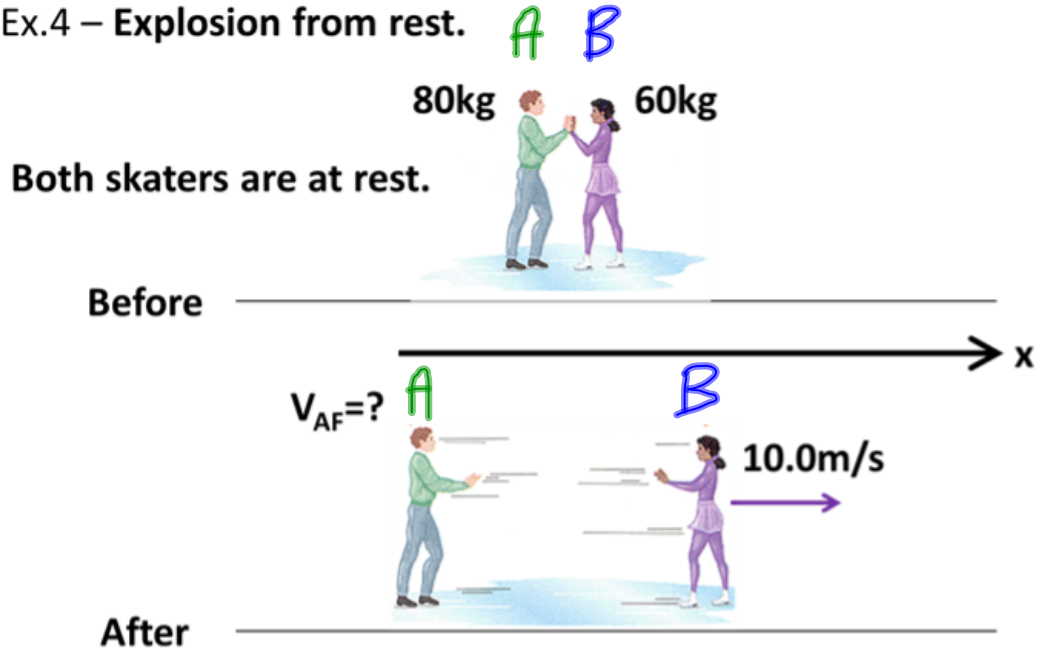
$m_A v_{Ai} + m_B v_{Bi} = (m_A + m_B) v_F$

$(10)(20) + (90)(0) = (10+90) v_F$

$v_F = 2.0 \frac{m}{s}$

Feb 4-8:53 AM

Ex.4 – **Explosion from rest.**



A) What was the velocity of the skater dude after the push-off?

Feb 4-8:11 AM

SYSTEM: A + B

$$P_{Si} = P_{SF}$$

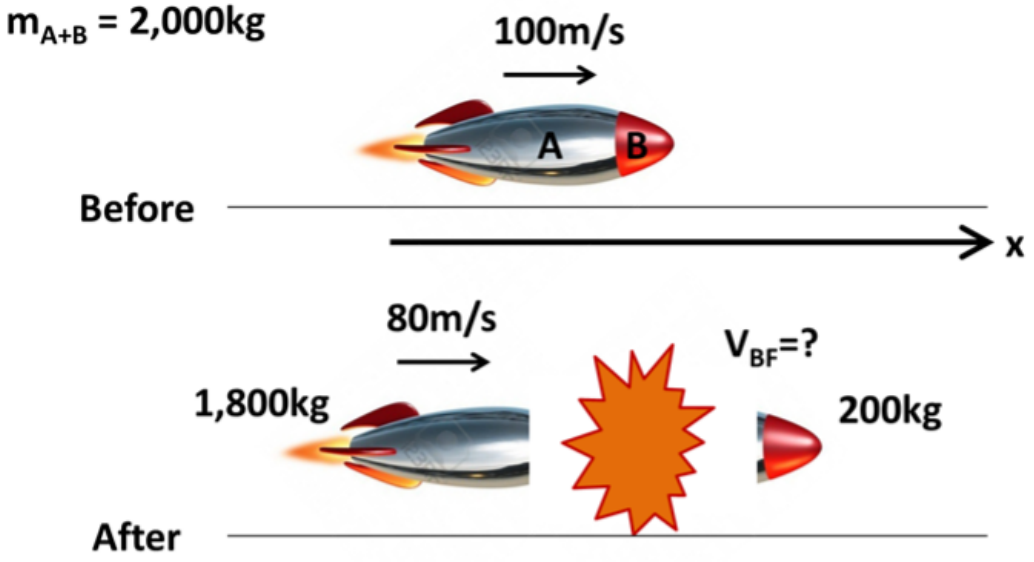
$$0 = m_A V_{AF} + m_B V_{BF}$$

$$0 = (80) V_{AF} + (60)(10)$$

$$V_{AF} = -7.5 \frac{m}{s}$$

Feb 4-8:53 AM

Ex.5 – **Explosion in motion.**



A) What was the velocity of the piece B after the explosion?

Feb 4-8:14 AM

SYSTEM: A & B

$P_{Si} = P_{SF}$

$P_{(AB)i} = P_{AF} + P_{BF}$

$(2{,}000)(100) = (1{,}800)(80) + (200)V_{BF}$

$V_{BF} = 280 \frac{m}{s}$

Feb 4-8:53 AM