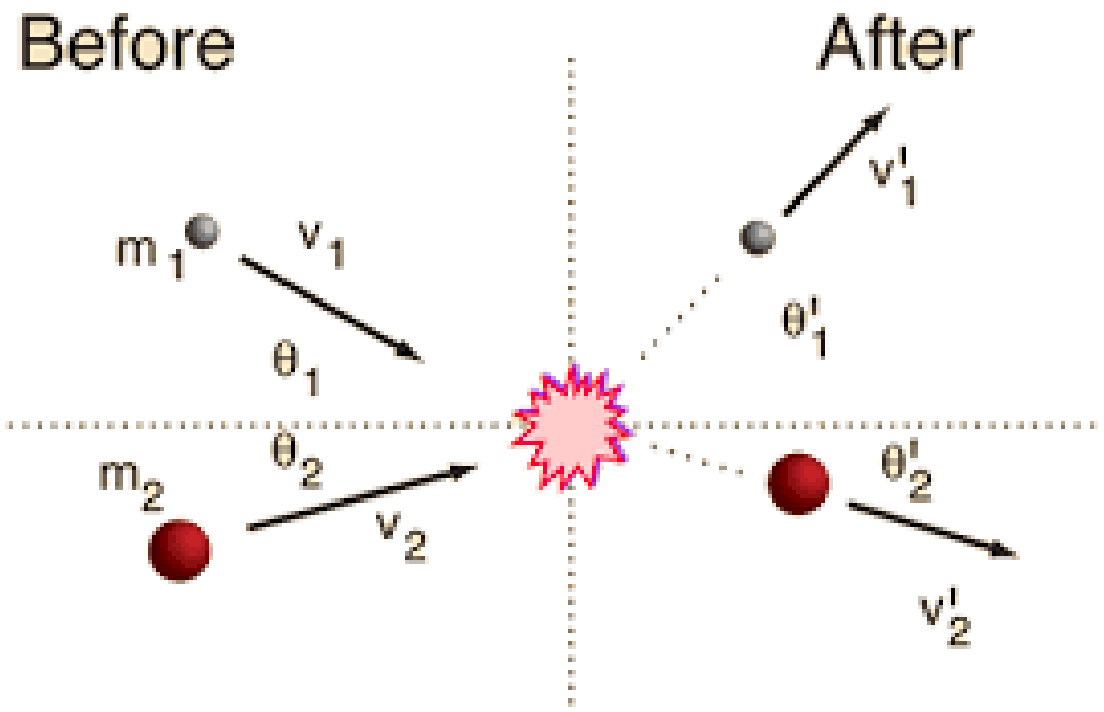
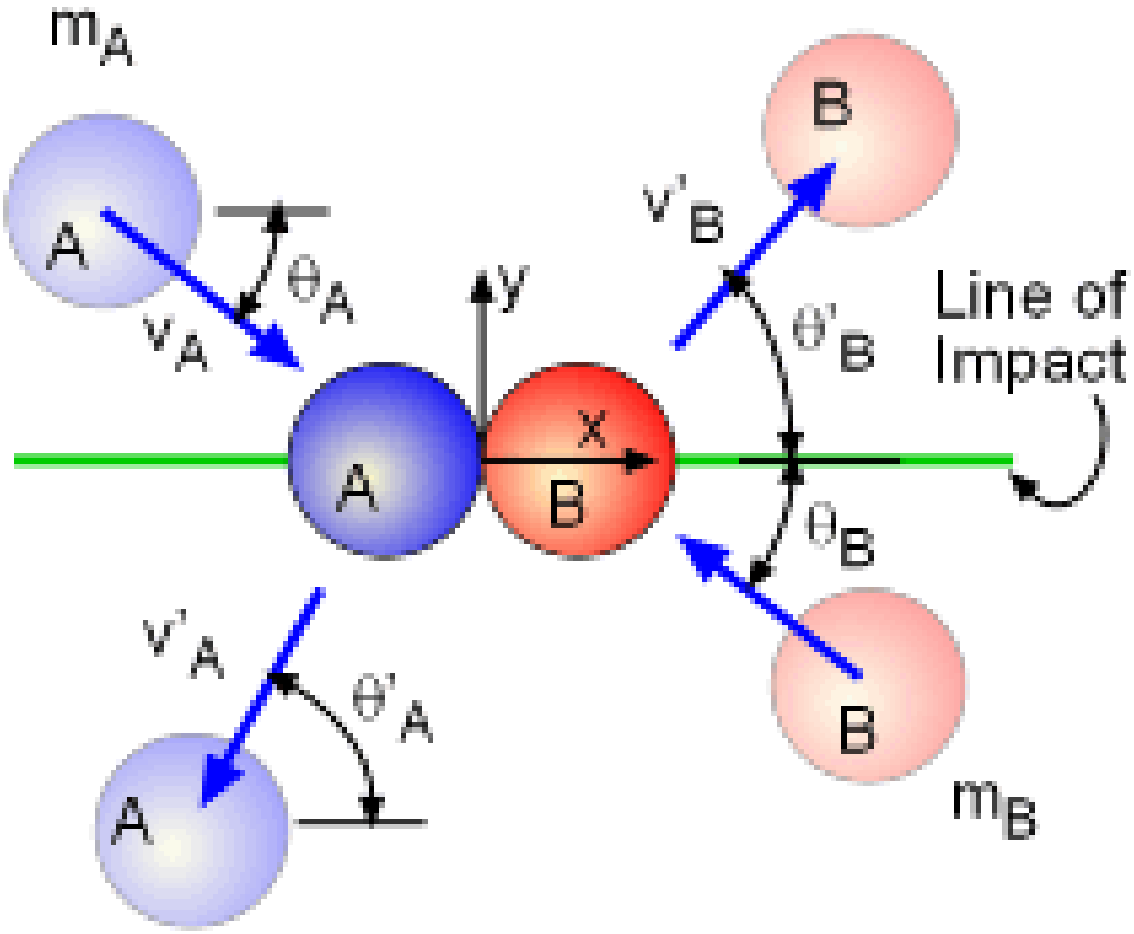
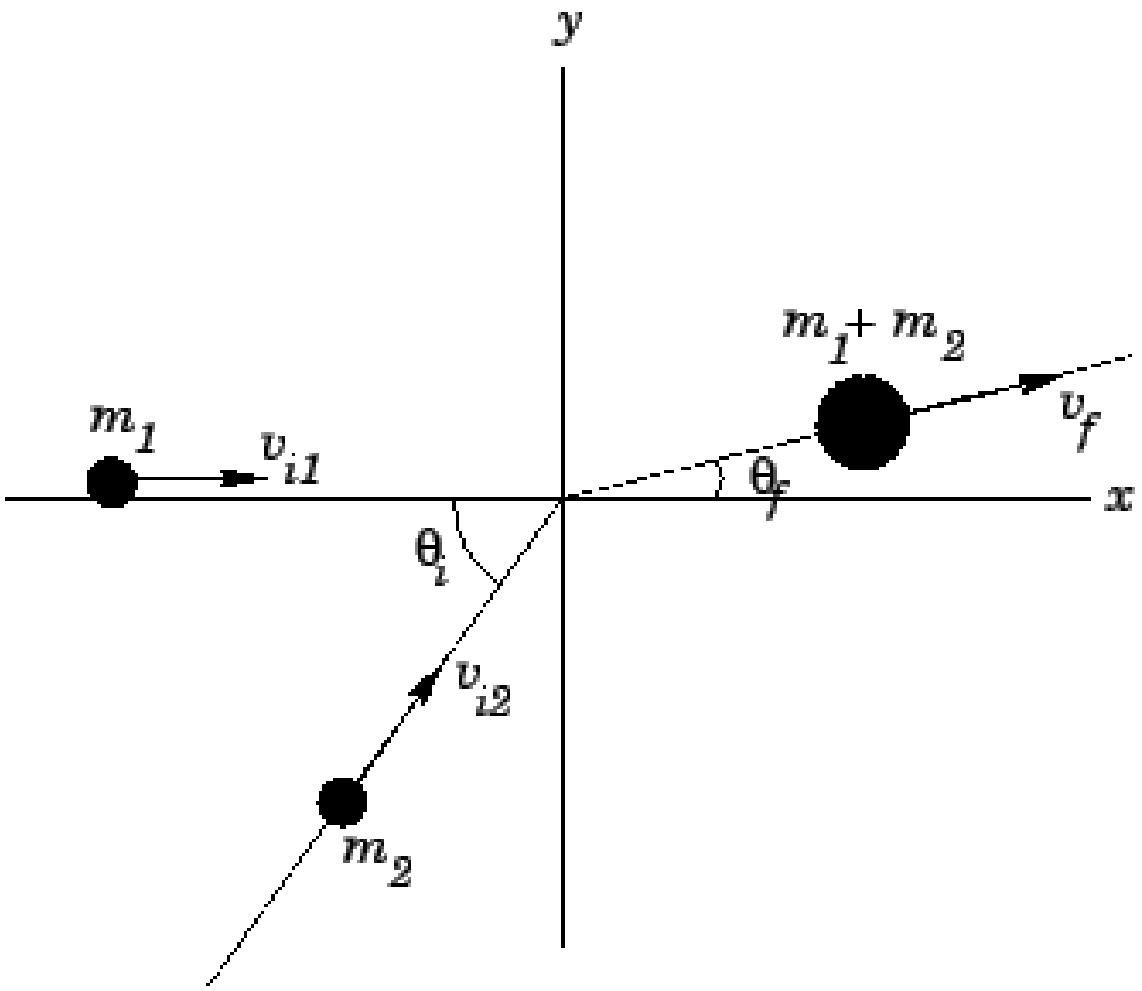
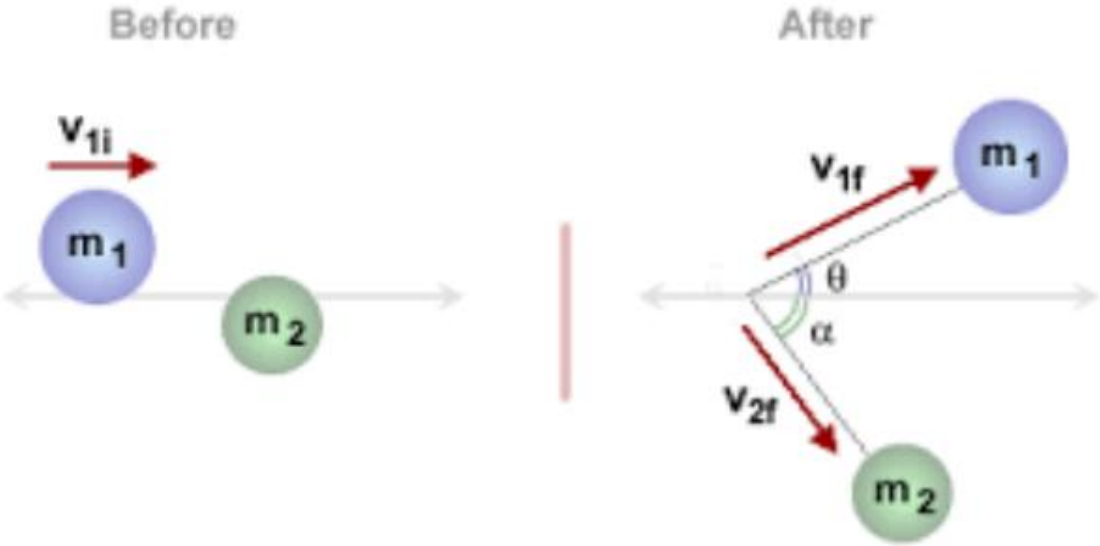
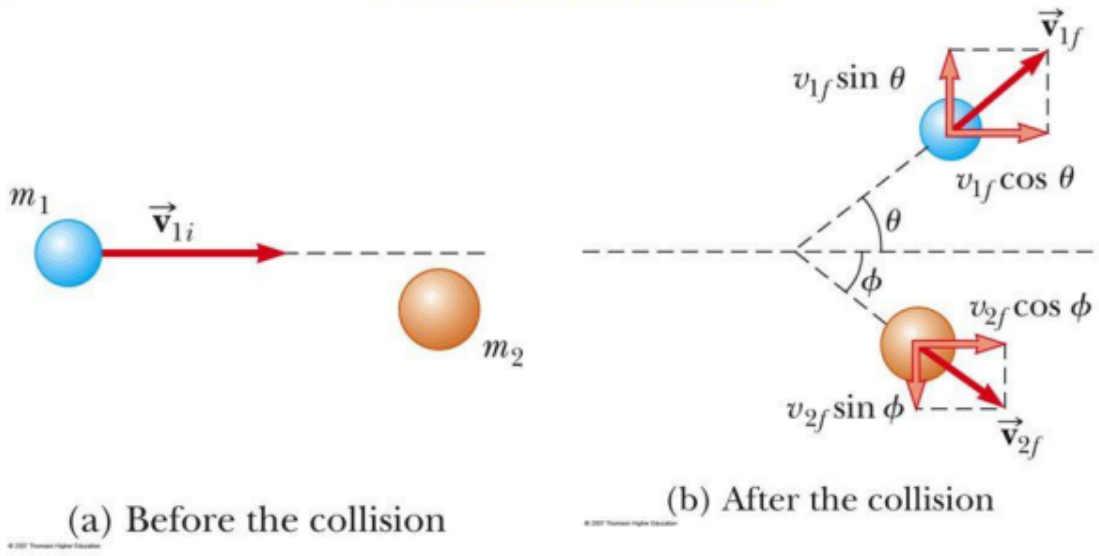

Before
After
m 1
v 1
θ 1
v'1
θ'1
m 2
θ 2
v 2
θ'2
v'2


mA
A
θA
vA
y
x
A
B
B
v'B
θ'B
Line of
Impact
θB
v'A
θ'A
A
B
mB


y
$m_1 + m_2$
v_f
m_1
v_{i1}
θ_f
x
θ_i
v_{i2}
m_2


Before
After
v_{1i}
m_1
m_2
v_{1f}
m_1
θ
α
v_{2f}
m_2

Collisions in 2D



(a) Before the collision

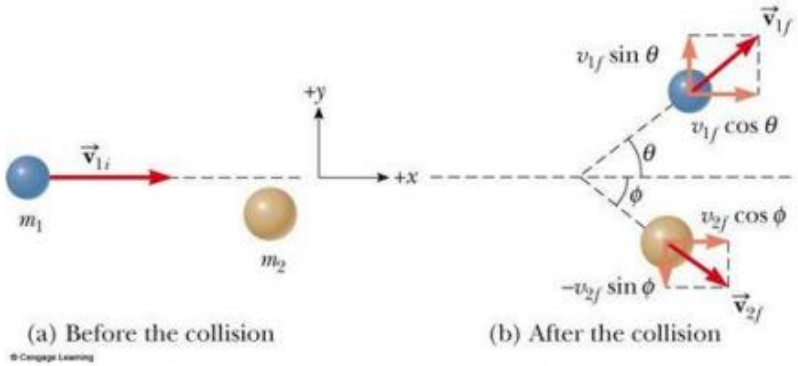
(b) After the collision

$$\vec{P} = const$$

$$P_x = const$$

$$P_y = const$$

Glancing Collisions



(a) Before the collision

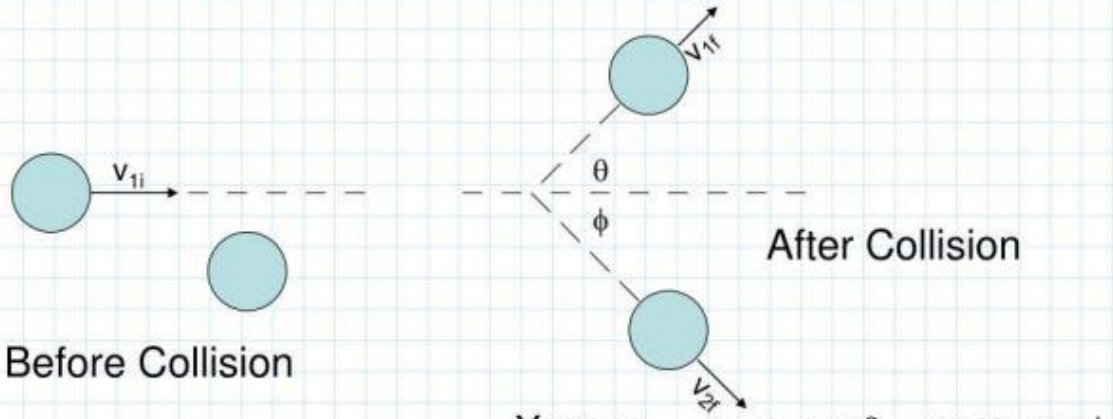
(b) After the collision

- The "after" velocities have x and y components
- Momentum is conserved in the x direction and in the y direction
- Apply conservation of momentum separately to each direction

Glancing Collisions

When objects do not collide on the same path line, they make glancing collisions.

To solve this type of problem, break it into components!!



X: $m_1v_{1i} = m_1v_{1f}\cos\theta + m_2v_{2f}\cos\phi$

Y: $0 = m_1v_{1f}\sin\theta - m_2v_{2f}\sin\phi$

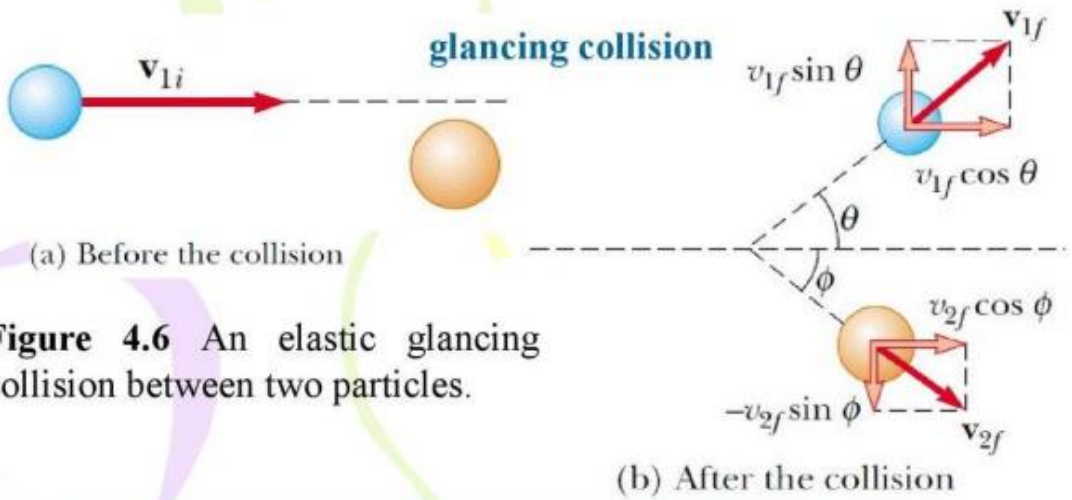


Figure 4.6 An elastic glancing collision between two particles.

$$m_1 v_{1i} = m_1 v_{1f} \cos\theta + m_2 v_{2f} \cos\phi \qquad \textbf{(4.24)}$$

$$0 = m_1 v_{1f} \sin\theta - m_2 v_{2f} \sin\phi \qquad \textbf{(4.25)}$$

THIS IS A MUCH MORE DIFFICULT PROBLEM