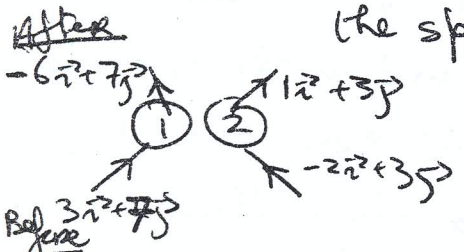
Collisions.

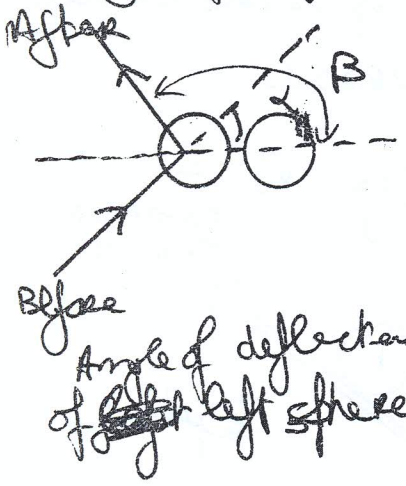
Impulse: Is the change in the momentum of one [either] of the two objects which collide.
We talk about the impulse imparted to one of the spheres.



Impulse imparted to first sphere.

$$\vec{I} = m_1\vec{v}_1 - m_1\vec{u}_2$$
$$= m_1[(-6\vec{i}+7\vec{j}) - (3\vec{i}+7\vec{j})]$$
$$= m_1[-9\vec{i}]$$
$$= -9m_1\vec{i}. \quad (\text{Say } m_1 = 10)$$
$$= -90\vec{i}.$$

Angle of Deflection: Again take impulse the angle of deflection is to do solely with one of the two spheres. The angle of deflection is the angle between the path the sphere in question had coming into the collision and the path the same sphere has leaving that collision.



To calculate $\beta - \alpha$, remember that if you know the velocity before the collision.

$$\tan\alpha = \frac{|\vec{u}_j|}{|\vec{u}_i|} \quad (\text{So we know } \alpha)$$

and if you know the velocity after the collision of that same sphere. Then

$$\tan\beta = \frac{(\vec{v}_j)}{(\vec{v}_i)} \quad (\text{So we know } \beta.)$$

ASK! →

For the example above (see the impulse section)

$$\tan\alpha = \frac{7}{3} \Rightarrow \alpha = 66.8^\circ$$

$$\tan\beta = \frac{7}{-6} \Rightarrow \beta = 130.6^\circ$$

$\Rightarrow$ Angle of deflection $= \beta - \alpha$.

$130.6 - 66.8$