$\Rightarrow$ Velocity of 1st sphere after impact

$= u\vec{i} + \frac{6u}{5}\vec{j}$

$\Rightarrow$ Speed of 1st sphere after impact

$= \sqrt{u^2 + \left(\frac{6u}{5}\right)^2}$

$= \sqrt{u^2 + \frac{36u^2}{25}}$

$= \sqrt{\frac{25u^2 + 36u^2}{25}}$

$= \sqrt{\frac{61u^2}{25}}$

$= \frac{u}{5}\sqrt{61}$

$= \frac{\sqrt{61}}{5}u$

$q = \frac{1}{5}(5p + 2u)$ … from **Equation 2**

$\Rightarrow q = \frac{1}{5}(5u + 2u)$

$\Rightarrow q = \frac{7u}{5}$

$\Rightarrow$ Velocity of 2nd sphere after impact

$\frac{7u}{5}\vec{i} + \frac{3u}{5}\vec{j}$

$\Rightarrow$ Speed of 2nd sphere after impact

$\sqrt{\left(\frac{7u}{5}\right)^2 + \left(\frac{3u}{5}\right)^2} = \sqrt{\frac{49u^2 + 9u^2}{25}}$

$= \sqrt{\frac{58u^2}{25}} = \frac{u}{5}\sqrt{58} = \frac{\sqrt{58}}{5}u$

(ii) Velocities after impact

are $\overrightarrow{v_1} = u\vec{i} + \frac{6u}{5}\vec{j}$ and $\overrightarrow{v_2} = \frac{7u}{5}\vec{i} + \frac{3u}{5}\vec{j}$

The slope of $\overrightarrow{v_1}$ is given by $m_1 = \frac{\frac{6u}{5}}{u}$

$= \frac{6}{5}$

The slope of $\overrightarrow{v_2}$ is given by $m_2 = \frac{\frac{3u}{5}}{\frac{7u}{5}} = \frac{3}{7}$

$\tan\theta = \pm\frac{m_1 - m_2}{1 + m_1 m_2}$

$\Rightarrow \tan\theta = \pm\frac{\frac{6}{5} - \frac{3}{7}}{1 + \frac{18}{35}}$

$= \pm\frac{42 - 15}{35 + 18}$

$= \pm\frac{27}{53}$

Take the plus case to find the acute angle

$\Rightarrow \theta = \tan^{-1}\frac{27}{53} = 27°$