1	Let v_A and v_B be the speeds of A and B respectively after the collision. $4mv_A + mv_B = 4mu$
	$-v_A + v_B = eu$
	$v_A = \frac{3}{4}u, \quad v_B = u$
	$e = \frac{1}{4}$
	Alternative method for question 1
	Let v_A and v_B be the speeds of A and B respectively after the collision. $4mv_A + mv_B = 4mu$
	$-v_A + v_B = eu$
	$v_A = \frac{1}{5}u(4-e), \; v_B = \frac{4}{5}u(1+e)$
	$\dfrac{4m\left(\frac{1}{5}u(4-e)\right)}{m\left(\frac{4}{5}u(1+e)\right)} = 3, \qquad e = \frac{1}{4}$

5(a)	$u\sin\alpha = v\sin(2\alpha)$
	$v = \frac{5}{8}u$
5(b)	$mu\cos\alpha = mv\cos(2\alpha) + kmw$
	$eu\cos\alpha = w - v\cos(2\alpha)$
	$\frac{5}{8k} = \frac{4}{5}e + \frac{5}{8} \times \frac{7}{25}$
	$e = \frac{25}{32k} - \frac{7}{32}$
5(c)	$0 \leqslant \frac{25}{32k} - \frac{7}{32} \leqslant 1$
	$7k \leqslant 25 \leqslant 39k$
	$\frac{25}{39} \leqslant k \leqslant \frac{25}{7}$

7	Perpendicular to the wall: $eu\sin\alpha = v\sin\theta$
	$P_1P_2 = uT$ $P_2P_3 = vkT$
	$\sin\alpha = \dfrac{d}{P_1P_2}$ $\sin\theta = \dfrac{d}{P_2P_3}$
	$\sin\alpha = \dfrac{d}{uT}$ $\sin\theta = \dfrac{d}{vkT}$
	$\dfrac{eud}{uT} = \dfrac{vd}{vkT}$
	$e = \dfrac{1}{k}$

6(a)	$\frac{9}{2}\times\frac{1}{2}\times 2mv_A^2=\frac{1}{2}mv_B^2$ $\quad\left[3v_A=v_B\right]$
	$2mu=2mv_A+mv_B$
	$\left[v_A=\frac{2}{5}u\right]$ $\quad v_B=\frac{6}{5}u$
6(b)	Let w denote the speed after the second collision. Perpendicular to wall: $v_B\cos\alpha=w\cos\beta$
	Parallel to wall: $ev_B\sin\alpha=w\sin\beta$
	$e^2v_B^2\sin^2\alpha=w^2\sin^2\beta$ $\quad\left[\frac{576}{625}\sin^2\alpha=\frac{144}{125}\sin^2\beta\right]$ $v_B^2\cos^2\alpha=w^2cos^2\beta$ $\quad\left[\frac{36}{25}\cos^2\alpha=\frac{144}{125}\cos^2\beta\right]$
	$\frac{576}{625}\sin^2\alpha+\frac{36}{25}\left(1-\sin^2\alpha\right)=\frac{144}{125}$
	$\left[\sin^2\alpha=\frac{5}{9}\right]$ $\quad\sin\alpha=\frac{1}{3}\sqrt{5}$
	$\sin\left(\alpha+\beta\right)=1$

6(a)	Let v and w denote the horizontal components of the velocities for A and B respectively after the collision. $2mu\cos\theta - mu\cos\theta = mw + mv$
	$w - v = e(3u\cos\theta)$
	$w = \frac{1}{2}\left(3eu\cos\theta + u\cos\theta\right)\ \left[= \frac{1}{2}(3e+1)u\cos\theta\right]$
	$\dfrac{\frac{1}{2}\left(3e+1\right)u\cos\theta}{u\sin\theta} = \tan\theta$
	$\tan^2\theta = \frac{1}{2}(3e+1)$
	$\tan\theta = \sqrt{\frac{1}{2}(3e+1)}$
6(b)	$w = 3eu\cos\theta = u\cos\theta$ $e = \frac{1}{3}$
	$\tan\theta = 1,\ \theta = 45°$
	Alternative method for question 6(b)
	$v = 0,\ w = u\cos\theta$ and $\dfrac{w}{u\sin\theta} = \tan\theta$
	$u\cos\theta = u\sin\theta\tan\theta,\ \tan^2\theta = 1,\ \theta = 45°$