Edinburgh Napier UNIVERSITY

Physics-Based Animation (SET09119)

Tutorial 08 - Coefficient of Restitution

1 Question

A body of mass 2 kg moving with speed 5 ms^{-1} collides directly with another of mass 3 kg moving in the same direction with velocity 4 ms^{-1}. The coefficient of restitution is $\frac{2}{3}$. Find the velocities after collision.

2 Question

Two smooth spheres A and B of equal radii and masses $3m$ and m, respectively, are travelling towards each other along the line of centres. Given that each sphere has a speed u and that the collision is perfectly elastic:
(a) show that A is brought to rest by the impact
(b) find the speed of B after the impact

3 Question

A sphere of mass m is dropped from a height h on to a horizontal floor. Find the height to which the sphere rebounds, if the coefficient of restitution between the sphere and the floor is 0.5.

4 Question

A coin of mass 5 grammes is shoved across a board. It receives an initial impulse of 0.01Ns and stops after sliding 0.5m.

Find the coefficient of friction.

5 Question

A bullet of mass m is fired with a horizontal speed $2u$ into a stationary block of wood of mass $50m$ which is free to move horizontally.
Find the velocity of the block if:

5.1 (a)

the bullet goes right through it and emerges with speed u

5.2 (b)

the bullet becomes embedded in the block