Edinburgh Napier UNIVERSITY

Physics-Based Animation (SET09119)

Tutorial 07 - Momentum & Impulses

1 Question

A 3kg mass has a velocity of $5ms^{-1}$. What is its momentum?

2 Question

A hockey ball of mass 0.2kg received an impulse of 1.2N at a free hit. With what speed does it begin to travel?

3 Question

In what time will a force of 8N reduce the speed of a particle of mass 3kg from $21ms^{-1}$ to $6ms^{-1}$

4 Question

A dart of mass 0.12kg, flying at a speed of $20ms^{-1}$ hits the dartboard and comes to a rest in 0.1 seconds. What is the average force exerted by the dartboard on the dart?

5 Question

A cup of 90 grammes is dropped from a height of 1.25m. What impulse does it receive on striking the floor if it does not rebound?

6 Question

A bullet is fired with a speed of $550ms^{-1}$ into a block of weed of mass 0.49kg, and becomes embedded in it. If it gives the block a speed of $11ms^{-1}$, find the mass of the bullet.

7 Question

A body of mass 8kg increases its speed from $4ms^{-1}$ to $6ms^{-1}$. What is the gain in kinetic energy?

8 Question

A body of mass 225kg with a velocity of $4ms^{-1}$ strikes a body of mass 75 kg initially at rest. If the bodies move away together find:
(a) their common velocity,

(b) the total loss of kinetic energy during the impact.

9 Question

A 4kg mass has a velocity vector (in ms^{-1}) of $3i + 4j$.
(a) What is the kinetic energy?
(b) What is the momentum?

10 Question

An impulse has a magnitude of 20 Ns with direction vector 3i-4j. Express this impulse as a vector.

11 Question

A 2kg mass with velocity vector (1.5i + 8j) ms^{-1} hits a 5kg mass with velocity vector (-2i+8j) ms^{-1}.
They coalesce and move off 'together'.
Find:
(a) their common velocity after the impact

(b) the total loss of kinetic energy

12 Question

A force has a magnitude 12.5N and acts in the 'direction' (7i+24j). Express this as a vector.