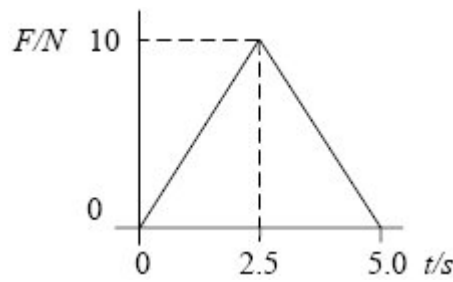# Momentum Questions 1   Name ....

1.

A force, F, varies with time, t, as shown by the graph and is applied to a body initially at rest on a smooth surface. What is the momentum of the body after 5.0 s?

A   zero.

B   12.5 N s.

C   25 N s.

D   50 N s.

2. Fill in the gaps with one or more words:

a) In a collision momentum is _____ conserved

b) In a collision kinetic energy is _____ conserved

c) In a collision energy is _____ conserved

3. Trolley A (mass 0.5kg) is moving at 1.0m/s and collides with Trolley B (mass 1.0kg) which is at rest. Trolley A rebounds at 0.28m/s and Trolley B moves off at 0.64m/s.

    a) Draw labelled diagrams

        i. Before the collision

        ii. After the collision

    b) Demonstrate whether momentum is conserved

    c) Demonstrate whether kinetic energy is conserved

    d) Is this collision elastic or inelastic?

4. A girl kicks a ball along the ground at a wall 2.0 m away. The ball strikes the wall normally at a velocity of 8.0 m s^{-1} and rebounds in the opposite direction with an initial velocity of 6.0 m s^{-1}. The girl, who has not moved, stops the ball a short time later.

(a) The ball has a mass of 0.45 kg and is in contact with the wall for 0.10 s. For the period of time the ball is in contact with the wall,

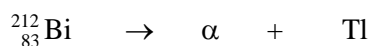(i) calculate the average acceleration of the ball.

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(ii) calculate the average force acting on the ball.

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(iii) state the direction of the average force acting on the ball.

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5. (a) When an α particle is emitted from a nucleus of the isotope $^{212}_{83}\text{Bi}$, a nucleus of thallium, Tl, is formed. Complete the equation below.

$$^{212}_{83}\text{Bi} \quad \rightarrow \quad \alpha \quad + \quad \text{Tl}$$

(b) The α particle in part (a) is emitted with 6.1 MeV of kinetic energy.

(i) The mass of the α particle is 4.0 u. Show that the speed of the α particle immediately after it has been emitted is 1.7×10^7 m s^{-1}. Ignore relativistic effects.

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(ii) Calculate the speed of recoil of the daughter nucleus immediately after the α particle has been emitted. Assume the parent nucleus is initially at rest.

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