Quiz A4

Linear momentum

1. When is the total momentum of a system conserved?

A Always.

B When the total mechanical energy of the system is constant.

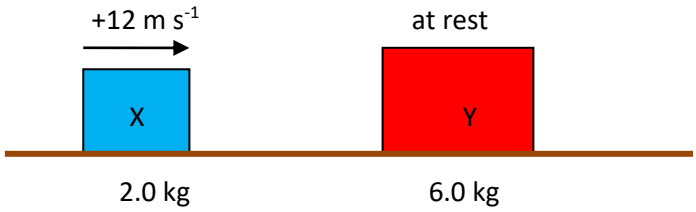
C When there are no forces acting on the system.

D When the net external force on the system is zero.

2. A ball of mass 0.25 kg travelling with speed 8.0 m s^{-1} collides with a vertical wall and bounces in the opposite direction with the same speed. What is the magnitude of the change of the momentum of the ball?

A 0 **B** 2.0 N s **C** 4.0 N s **D** 8.0 N s

3. Two bodies, X and Y, collide as shown and stick together.



What is the impulse delivered to X and what is the net impulse delivered to the system of the two blocks?

	Impulse delivered to X	**Impulse delivered to system**
A	– 18 N s	0
B	– 18 N s	+ 18 N s
C	+ 18 N s	0
D	+ 18 N s	– 18 N s

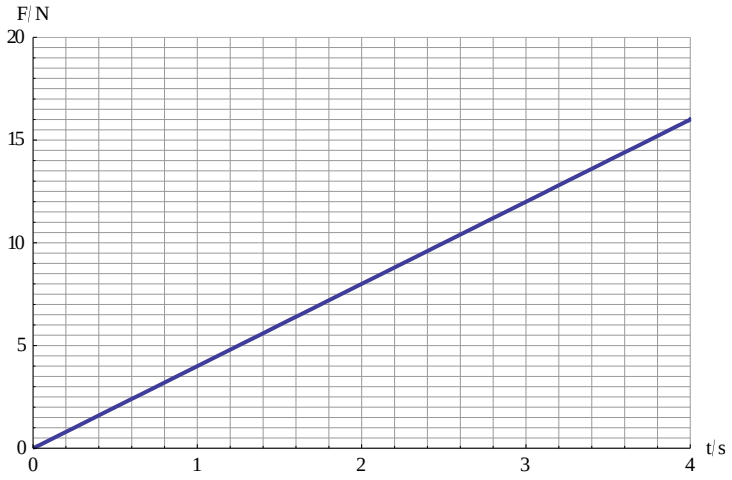
4. A body at rest of mass 5*M* explodes into two pieces of mass 2*M* and 3*M*. What is the ratio of kinetic energies of the lighter body to the heavier body?

A $\frac{2}{5}$ **B** $\frac{3}{2}$ **C** $\frac{3}{5}$ **D** $\frac{5}{3}$

5. A body of mass *m* initially at rest receives an impulse *J* in time Δt. What is the increase in the body's kinetic energy?

A $\frac{J}{\Delta t}$ **B** $\frac{J}{m}$ **C** $\frac{J^2}{2m}$ **D** $J\Delta t$

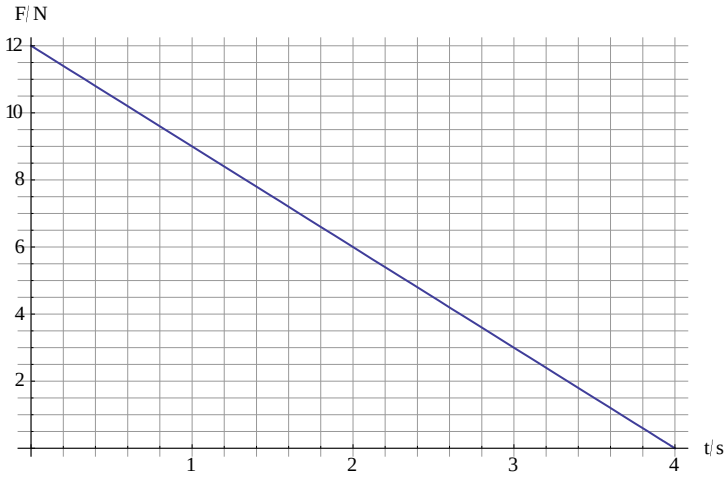
6. The graph shows how the net force on a body of mass 8.0 kg varies with time. The body is initially at rest.



What is the velocity of the body at t = 4 s?

A 2.0 m s^{-1} **B** 4.0 m s^{-1} **C** 8.0 m s^{-1} **D** 16 m s^{-1}

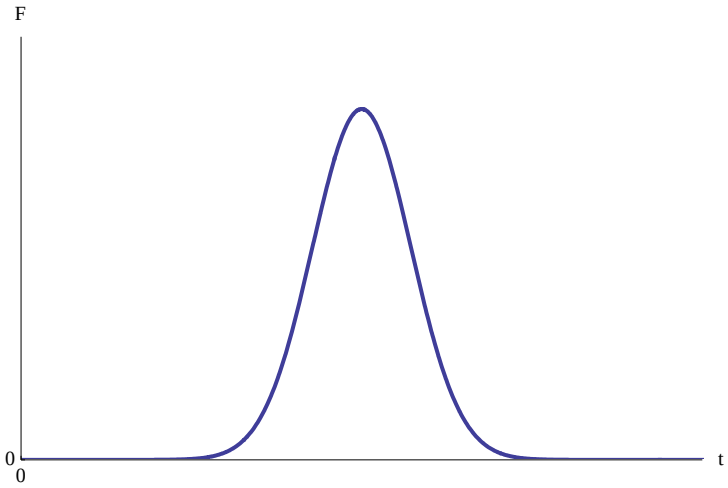
7. The graph shows how the net force on a body of mass 2.0 kg varies with time. The body is initially at rest.



What is the average power delivered to the body?

A 18 W **B** 36 W **C** 72 W **D** 144 W

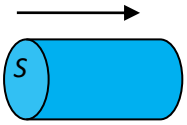
8. The graph shows the variation with time of the net force on a body of mass 3.0 kg.



The impulse delivered is 15 N s and the force acted for 2 ms. What is the average force that acted on the body?

A 7.5 kN **B** 7.5 N **C** 5.0 N **D** 5.0 kN

9. A cylindrical spacecraft of cross-sectional area *S* moves in the vacuum of space with velocity *v*. The spacecraft then enters a region of interstellar dust of density *ρ*. The dust encountered by the spacecraft sticks to the craft increasing its mass.

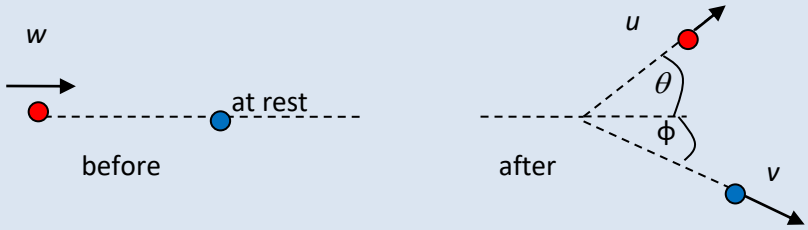


interstellar dust

What force must be exerted on the spacecraft so that it continues to move at the same constant velocity?

A Zero
B ρSv
C ρSv^2
D ρSv^3

10. HL The diagram shows a glancing collision of two bodies of equal mass.



Three equations are proposed to describe this collision:

I $w = u\cos\theta + v\cos\phi$

II $0 = u\sin\theta - v\sin\phi$

III $w^2 = u^2 + v^2$

Which equations always apply?

A I and II
B I and III
C II and III
D I, II and III

Quiz A4 Answers	
1	D
2	C
3	A
4	B
5	C
6	B
7	B
8	A
9	C
10	A