# Unit 1 – Our Dynamic Universe
## Section 3 - Collisions, Explosions & Impulse

**2009** **5.** A 2·0 kg trolley travels in a straight line towards a stationary 5·0 kg trolley as shown.


The trolleys collide. After the collision the trolleys move as shown below.


What is the speed $v$ of the 5·0 kg trolley after the collision?

A $0{\cdot}4\ \text{m s}^{-1}$

B $1{\cdot}2\ \text{m s}^{-1}$

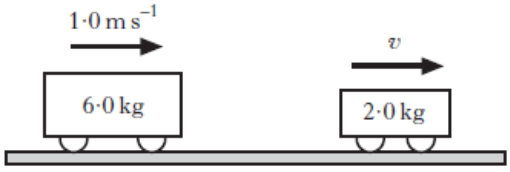
C $2{\cdot}0\ \text{m s}^{-1}$

D $2{\cdot}2\ \text{m s}^{-1}$

E $3{\cdot}0\ \text{m s}^{-1}$

**2011** **4.** Two trolleys travel towards each other in a straight line along a frictionless surface.

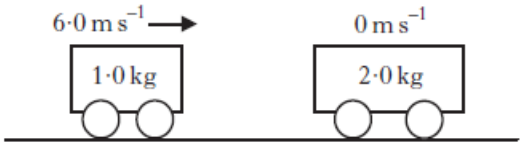

The trolleys collide. After the collision the trolleys move as shown below.




Which row in the table gives the total momentum and the total kinetic energy **after** the collision?

| | *Total momentum*/ kg m s$^{-1}$ | *Total kinetic energy*/ J |
|---|---|---|
| A | 10 | 7·0 |
| B | 10 | 13 |
| C | 10 | 20 |
| D | 14 | 13 |
| E | 14 | 7·0 |

**2012** **4.** The diagram shows the masses and velocities of two trolleys just before they collide on a level bench.




After the collision, the trolleys move along the bench joined together.

How much kinetic energy is lost in this collision?

A 0 J

B 6·0 J

C 12 J

D 18 J

E 24 J

**2013** **6.** A cannon of mass $2{\cdot}0 \times 10^3$ kg fires a cannonball of mass 5·00 kg.

The cannonball leaves the cannon with a speed of $50{\cdot}0\ \text{m s}^{-1}$.

The speed of the cannon immediately after firing is

A $0{\cdot}125\ \text{m s}^{-1}$

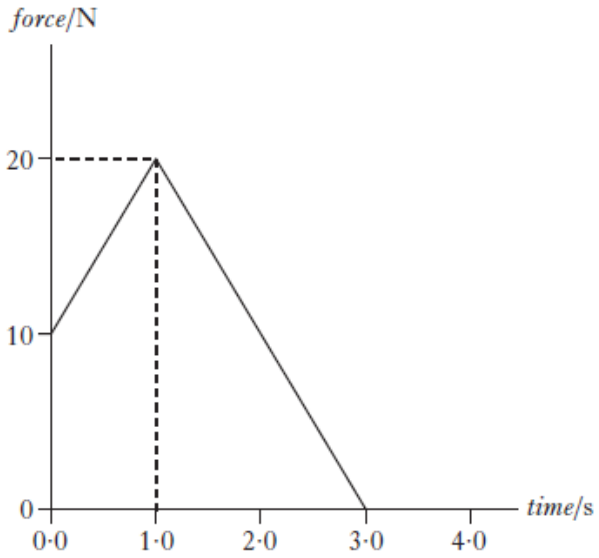
B $8{\cdot}00\ \text{m s}^{-1}$

C $39{\cdot}9\ \text{m s}^{-1}$

D $40{\cdot}1\ \text{m s}^{-1}$

E $200\ \text{m s}^{-1}$.

**2014** **4.** The graph shows how the force acting on an object of mass 5·0 kg varies with time.




The change in momentum of the object is

A $7{\cdot}0\,\text{kg m s}^{-1}$

B $30\,\text{kg m s}^{-1}$

C $35\,\text{kg m s}^{-1}$

D $60\,\text{kg m s}^{-1}$

E $175\,\text{kg m s}^{-1}$.

**2015** **4.** A student makes the following statements about elastic and inelastic collisions.

I In an elastic collision kinetic energy is conserved but momentum is not conserved.

II In an inelastic collision both kinetic energy and momentum are conserved.

III In an inelastic collision momentum is conserved but kinetic energy is not conserved.

Which of the statements is/are correct?

A I only

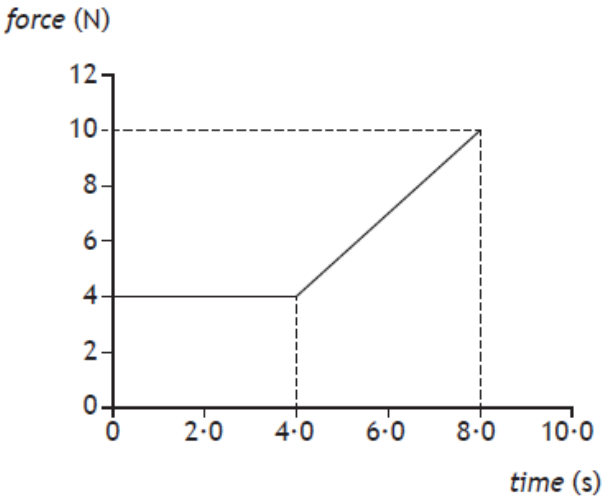
B II only

C III only

D I and II only

E I and III only

**2016** **4.** The graph shows the force which acts on an object over a time interval of 8·0 seconds.




The momentum gained by the object during this 8·0 seconds is

A $12\,kg\,m\,s^{-1}$

B $32\,kg\,m\,s^{-1}$

C $44\,kg\,m\,s^{-1}$

D $52\,kg\,m\,s^{-1}$

E $72\,kg\,m\,s^{-1}$.

**2019** **6.** A student makes the following statements about an elastic collision.

I Total momentum is conserved.

II Total kinetic energy is conserved.

III Total energy is conserved.

Which of these statements is/are correct?

A I only

B II only

C I and II only

D I and III only

E I, II and III