



NAME:

CLASS:

CHAPTER 3: MOMENTUM AND IMPULSE

1. Select the correct equation of momentum

$$\vec{p} = m\vec{v}$$

$$\vec{J} = \Delta\vec{p}$$

$$\vec{J} = \vec{F}\Delta t$$

2. Select the equations for that can be used to calculate Impulse

$$\vec{p} = m\vec{v}$$

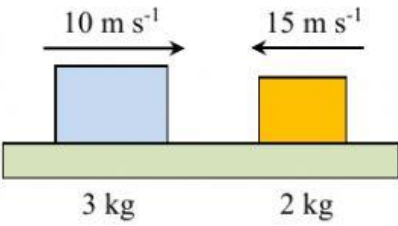
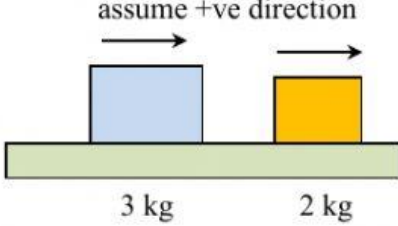
$$\vec{J} = \Delta\vec{p}$$

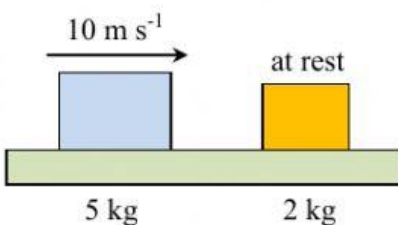
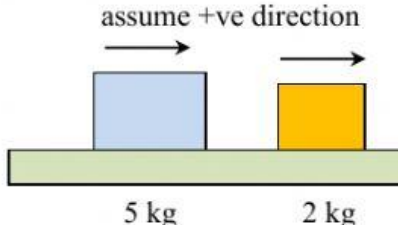
$$\vec{J} = \vec{F}\Delta t$$

3. Complete the following table by ticking YES or NO.

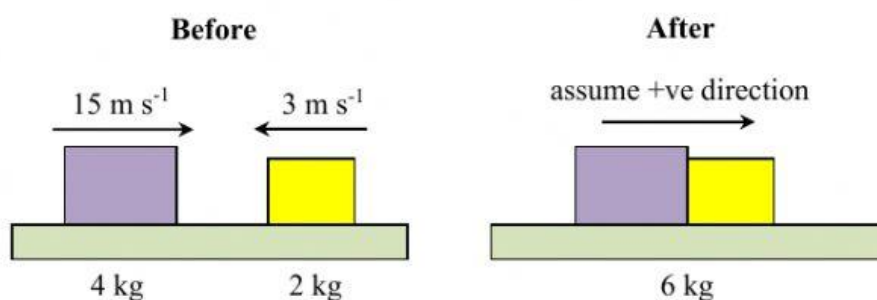
Type of collision	Total of momentum is conserved.	Total of kinetic energy is conserved.	Total of energy is conserved.
Elastic	☐ YES	☐ YES	☐ YES
	☐ NO	☐ NO	☐ NO
Inelastic	☐ YES	☐ YES	☐ YES
	☐ NO	☐ NO	☐ NO

4. Fill in the table below.

(a)	Before  After 		
	Information	Mass	Initial Velocity
	1 st block	$m_1 = \underline{\hspace{2cm}}$ kg	$u_1 = \underline{\hspace{2cm}}$ m s ⁻¹
	2 nd block	$m_2 = \underline{\hspace{2cm}}$ kg	$u_2 = \underline{\hspace{2cm}}$ m s ⁻¹

(b)	Before  After 		
	Information	Mass	Initial Velocity
	1 st block	$m_1 = \underline{\hspace{2cm}}$ kg	$u_1 = \underline{\hspace{2cm}}$ m s ⁻¹
	2 nd block	$m_2 = \underline{\hspace{2cm}}$ kg	$u_2 = \underline{\hspace{2cm}}$ m s ⁻¹

(c)



Information	Mass	Velocity
1 st block	$m_1 = \underline{\hspace{2cm}}$ kg	$u_1 = \underline{\hspace{2cm}}$ m s ⁻¹
2 nd block	$m_2 = \underline{\hspace{2cm}}$ kg	$u_2 = \underline{\hspace{2cm}}$ m s ⁻¹

Find the common velocity of both blocks.

Calculation:

Apply principle of conservation of momentum.

$$\sum \vec{p}_i = \sum \vec{p}_f$$

+

=

v

$v = \underline{\hspace{2cm}} \text{ m s}^{-1}$

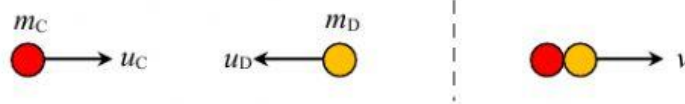
direction of v is to the

(d)

Ball **C** of mass 400 g and velocity 4 m s⁻¹ collides with ball **D** of mass 600 g and velocity 10 m s⁻¹. After collision, **C** and **D** move together. Determine the final velocity of both balls if **C** and **D** move in opposite direction before the collision.

Information	Mass	Initial Velocity
Ball C	$m_C = \underline{\hspace{2cm}}$ kg	$u_C = \underline{\hspace{2cm}}$ m s ⁻¹
Ball D	$m_D = \underline{\hspace{2cm}}$ kg	$u_D = \underline{\hspace{2cm}}$ m s ⁻¹

Diagram:



$$\sum \vec{p}_i = \sum \vec{p}_f$$

$$\boxed{} \boxed{} + \boxed{} \boxed{} = \boxed{} v$$

$$v = \boxed{} \text{ m s}^{-1}$$

direction of v is to the

(e)

A 10 kg car **P** travelling at a speed of 250 m s^{-1} strikes an identical car **Q**, at rest. If the car **P** moves to the right with velocity of 200 m s^{-1} as a result of the collision, what is velocity of car **Q** after the collision?

Information	Mass	Initial Velocity	Final Velocity
Car P	$m_P = 10 \text{ kg}$	$u_P = 250 \text{ m s}^{-1}$	$v_P = 200 \text{ m s}^{-1}$
Car Q	$m_Q = 10 \text{ kg}$	$u_Q = 0$	$v_Q = ?$

Diagram:



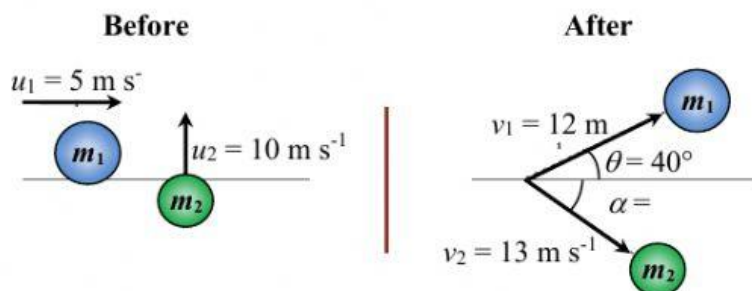
$$\sum \vec{p}_i = \sum \vec{p}_f$$

$$\boxed{} \boxed{} + \boxed{} \boxed{} = \boxed{} \boxed{} + \boxed{} v_q$$

$$v_q = \boxed{} \text{ m s}^{-1}$$

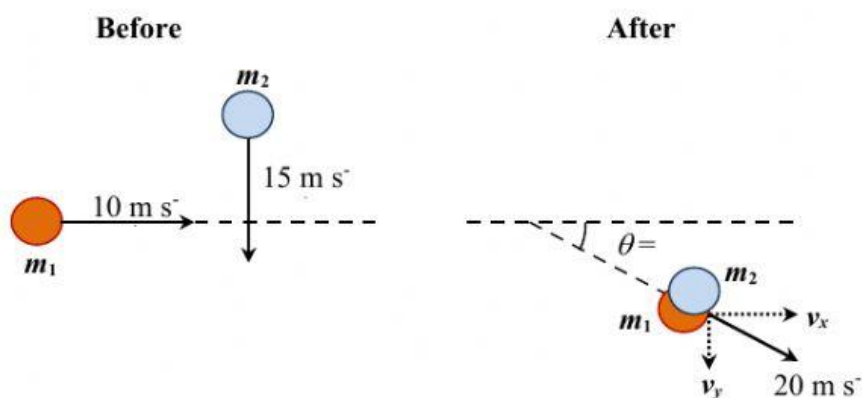
direction of v_q is to the

(f)



Velocity	x-component	y-component
$u_1 = 5 \text{ m s}^{-1}$	$u_{1x} = \text{_____ m s}^{-1}$	$u_{1y} = \text{_____ m s}^{-1}$
$u_2 = 10 \text{ m s}^{-1}$	$u_{2x} = \text{_____ m s}^{-1}$	$u_{2y} = \text{_____ m s}^{-1}$
$v_1 = 12 \text{ m s}^{-1}$	$v_{1x} = \text{_____}$ $v_{1x} = \text{_____ m s}^{-1}$	$v_{1y} = \text{_____}$ $v_{1y} = \text{_____ m s}^{-1}$
$v_2 = 13 \text{ m s}^{-1}$	$v_{2x} = \text{_____}$ $v_{2x} = \text{_____ m s}^{-1}$	$v_{2y} = \text{_____}$ $v_{2y} = \text{_____ m s}^{-1}$

(g)



Velocity	x-component	y-component
$u_1 = 10 \text{ m s}^{-1}$	$u_{1x} = \text{_____ m s}^{-1}$	$u_{1y} = \text{_____ m s}^{-1}$
$u_2 = 15 \text{ m s}^{-1}$	$u_{2x} = \text{_____ m s}^{-1}$	$u_{2y} = \text{_____ m s}^{-1}$
$v = 20 \text{ m s}^{-1}$	$v_x = \text{_____}$ $v_x = \text{_____ m s}^{-1}$	$v_y = \text{_____}$ $v_y = \text{_____ m s}^{-1}$