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

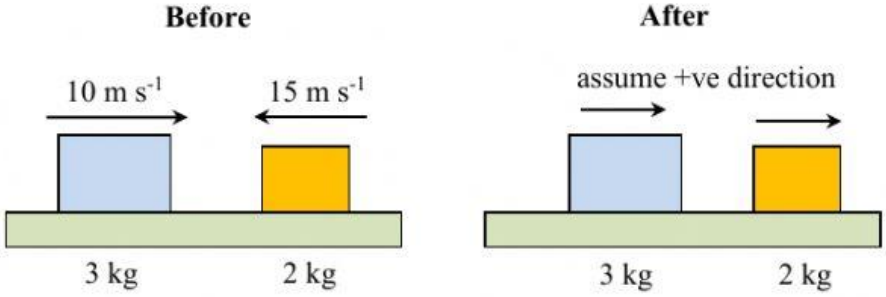
$\vec{p} = m\vec{v}$ $\vec{J} = \Delta\vec{p}$ $\vec{J} = \vec{F}\Delta t$

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 ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO
Inelastic	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO

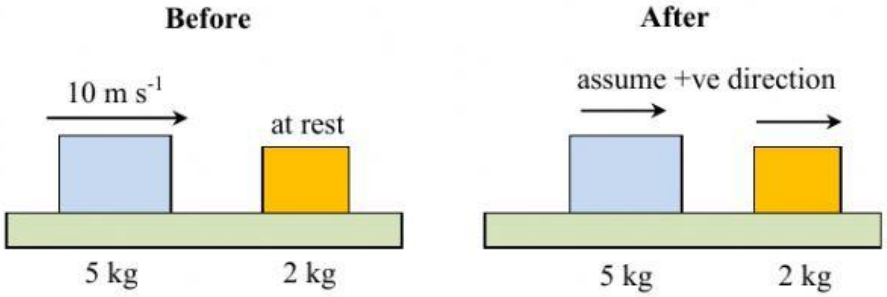
4. Fill in the table below.

(a)



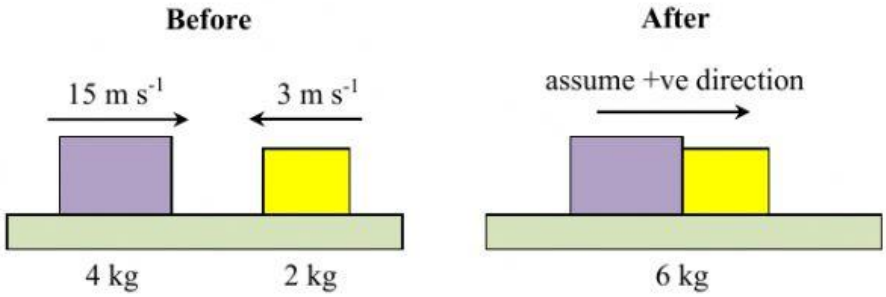
Information	Mass	Initial Velocity
1st block	m_1 = _____ kg	u_1 = _____ m s^{-1}
2nd block	m_2 = _____ kg	u_2 = _____ m s^{-1}

(b)



Information	Mass	Initial Velocity
1st block	m_1 = _____ kg	u_1 = _____ m s^{-1}
2nd block	m_2 = _____ kg	u_2 = _____ m s^{-1}

(c)



Information	Mass	Velocity
1st block	m_1 = _____ kg	u_1 = _____ m s^{-1}
2nd block	m_2 = _____ kg	u_2 = _____ m s^{-1}

Find the common velocity of both blocks.

Calculation:

Apply principle of conservation of momentum.

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

$$\square\,\square + \square\,\square = \square\; v$$

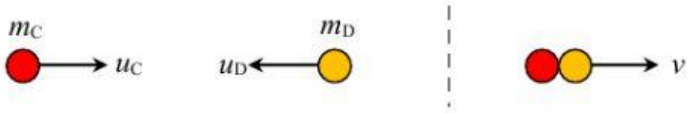
$$v = \square \; m\,s^{-1}$$

$$direction\ of\ v\ is\ to\ the\ \square$$

(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 = _____ kg	u_C = _____ m s^{-1}
Ball D	m_D = _____ kg	u_D = _____ m s^{-1}

Diagram:



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

$$\square\ \square + \square\ \square = \square\ v$$

$$v = \square\ m\ s^{-1}$$

$$direction\ of\ v\ is\ to\ the\ \square$$

(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 kg	u_P = 250 m s^{-1}	v_P = 200 m s^{-1}
Car Q	m_Q = 10 kg	u_Q = 0	v_Q = ?

Diagram:

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

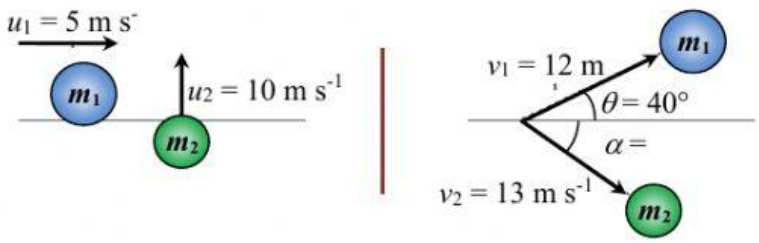
$$\square\ \square + \square\ \square = \square\ \square + \square\ v_q$$

$$v_q = \square\ m\ s^{-1}$$

$$direction\ of\ v_q\ is\ to\ the\ \square$$

(f)

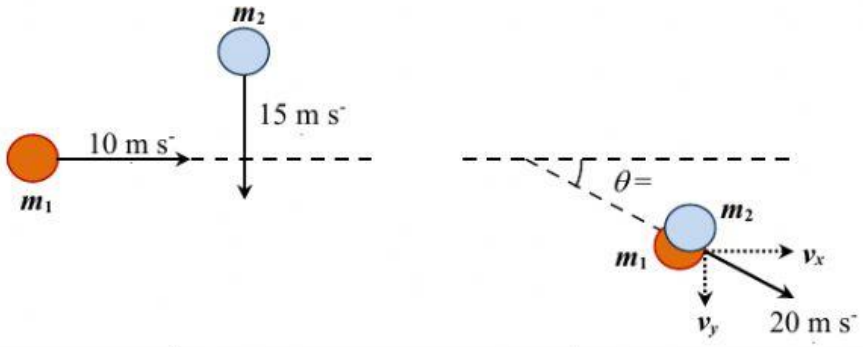
Before **After**



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

(g)

Before **After**



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