Impulse-Momentum Change

Activity 1: Apprentice Difficulty Level

Question 1:

An object is at rest. It then experiences a **force** for a given duration of **time**, resulting in an **impulse** that causes a **change in momentum (p)**. The **final momentum (p_{final})** is different than the initial momentum.

Complete the following table. Tap on a table cell to enter or edit an answer.

	Force (N)	Time (s)	Impulse (N·s)	Δp (kg·m/s)	p_{final} (kg·m/s)
A	25.0	2.00			
B	40.0	0.500			
C		0.0100	20.0		
D	80.0				16.0
E		0.800		32.0	

Question 2:

An object is at rest. It then experiences a **force** for a given duration of **time**, resulting in an **impulse** that causes a **change in momentum (p)**. The **final momentum (p_{final})** is different than the initial momentum.

Complete the following table. Tap on a table cell to enter or edit an answer.

	Force (N)	Time (s)	Impulse (N·s)	Δp (kg·m/s)	p_{final} (kg·m/s)
A	18.0	3.00			
B	24.0	0.200			
C		0.0200	12.0		
D	60.0				20.0
E		0.400		24.0	

Question 3:
An object is at rest. It then experiences a **force** for a given duration of **time**, resulting in an **impulse** that causes a **change in momentum (p)**. The **final momentum (p_{final})** is different than the initial momentum.

Complete the following table. Tap on a table cell to enter or edit an answer.

	Force (N)	Time (s)	Impulse (N·s)	Δp (kg·m/s)	p_{final} (kg·m/s)
A	15.0	3.00			
B	60.0	0.200			
C		0.0100	28.0		
D	40.0				10.0
E		0.500		30.0	

Question 4:
An object is at rest. It then experiences a **force** for a given duration of **time**, resulting in an **impulse** that causes a **change in momentum (p)**. The **final momentum (p_{final})** is different than the initial momentum.

Complete the following table. Tap on a table cell to enter or edit an answer.

	Force (N)	Time (s)	Impulse (N·s)	Δp (kg·m/s)	p_{final} (kg·m/s)
A	12.0	4.00			
B	50.0	0.100			
C		0.0500	16.0		
D	48.0				24.0
E		0.200		14.0	

Activity 2: Master Difficulty Level
Question 5:

An object is in motion with an **initial momentum ($p_{initial}$)**. It then experiences a **force** for a given duration of **time**, resulting in an **impulse.** This causes a **change in momentum (p)**, and a **final momentum (p_{final})** that is different than the initial value.

Complete the following table. Tap on a table cell to enter or edit an answer.

	$p_{initial}$ (kg·m/s)	Force (N)	Time (s)	Impulse (N·s)	Δp (kg·m/s)	p_{final} (kg·m/s)
A	14.0	3.00	4.00			
B	12.0	8.00		28.0		
C	42.0		2.00		12.0	
D	18.0		0.500			34.0
E		28.0	0.500			26.0

Question 6:

An object is in motion with an **initial momentum ($p_{initial}$)**. It then experiences a **force** for a given duration of **time**, resulting in an **impulse.** This causes a **change in momentum (p)**, and a **final momentum (p_{final})** that is different than the initial value.

Complete the following table. Tap on a table cell to enter or edit an answer.

	$p_{initial}$ (kg·m/s)	Force (N)	Time (s)	Impulse (N·s)	Δp (kg·m/s)	p_{final} (kg·m/s)
A	14.0	3.00	4.00			
B	12.0	8.00		28.0		
C	42.0		2.00		12.0	
D	18.0		0.500			34.0
E		28.0	0.500			26.0

Question 7:

An object is in motion with an **initial momentum ($p_{initial}$)**. It then experiences a **force** for a given duration of **time**, resulting in an **impulse.** This causes a **change in momentum (p)**, and a **final**

momentum (p_{final}) that is different than the initial value.

Complete the following table. Tap on a table cell to enter or edit an answer.

	$p_{initial}$ (kg·m/s)	Force (N)	Time (s)	Impulse (N·s)	Δp (kg·m/s)	p_{final} (kg·m/s)
A	32.0	4.00	2.00			
B	44.0	12.0		30.0		
C	50.0		1.00		25.0	
D	64.0		0.500			80.0
E		64.0	0.250			74.0

Question 8:
An object is in motion with an **initial momentum ($p_{initial}$)**. It then experiences a **force** for a given duration of **time**, resulting in an **impulse.** This causes a **change in momentum (p)**, and a **final momentum (p_{final})** that is different than the initial value.

Complete the following table. Tap on a table cell to enter or edit an answer.

	$p_{initial}$ (kg·m/s)	Force (N)	Time (s)	Impulse (N·s)	Δp (kg·m/s)	p_{final} (kg·m/s)
A	32.0	3.00	6.00			
B	36.0	28.0		14.0		
C	72.0		0.500		28.0	
D	80.0		1.00			98.0
E		44.0	0.250			32.0

Activity 3: Wizard Difficulty Level
Question 9:
An object with **mass (m)** is in motion with an **initial velocity ($v_{initial}$)**. It then experiences an **impulse** resulting in a **final velocity (v_{final})** and a **final momentum (p_{final})** that are different than the initial values.

Complete the following table. Tap on a table cell to enter or edit an answer.

	m (kg)	$v_{initial}$ (m/s)	$p_{initial}$ (kg·m/s)	Impulse (N·s)	p_{final} (kg·m/s)	v_{final} (m/s)
A	2.00	4.00		12.0		
B	3.00	5.00		27.0		
C	5.00		15.0		45.0	
D	2.00		12.0			8.00
E		3.00	24.0			12.0

Question 10:
An object with **mass (m)** is in motion with an **initial velocity ($v_{initial}$)**. It then experiences an **impulse** resulting in a **final velocity (v_{final})** and a **final momentum (p_{final})** that are different than the initial values.

Complete the following table. Tap on a table cell to enter or edit an answer.

	m (kg)	$v_{initial}$ (m/s)	$p_{initial}$ (kg·m/s)	Impulse (N·s)	p_{final} (kg·m/s)	v_{final} (m/s)
A	4.00	12.0		12.0		
B	5.00	3.00		35.0		
C	6.00		24.0		72.0	
D	3.00		18.0			12.0
E		6.00	24.0			16.0

Question 11:
An object with **mass (m)** is in motion with an **initial velocity ($v_{initial}$)**. It then experiences an **impulse** resulting in a **final velocity (v_{final})** and a **final momentum (p_{final})** that are different than the initial values.

Complete the following table. Tap on a table cell to enter or edit an answer.

	m (kg)	$v_{initial}$ (m/s)	$p_{initial}$ (kg·m/s)	Impulse (N·s)	p_{final} (kg·m/s)	v_{final} (m/s)
A	5.00	4.00		30.0		
B	8.00	2.00		24.0		
C	6.00		48.0		60.0	
D	4.00		32.0			20.0
E		7.00	35.0			12.0

Question 12:

An object with **mass (m)** is in motion with an **initial velocity ($v_{initial}$)**. It then experiences an **impulse** resulting in a **final velocity (v_{final})** and a **final momentum (p_{final})** that are different than the initial values.

Complete the following table. Tap on a table cell to enter or edit an answer.

	m (kg)	$v_{initial}$ (m/s)	$p_{initial}$ (kg·m/s)	Impulse (N·s)	p_{final} (kg·m/s)	v_{final} (m/s)
A	8.00	6.00		32.0		
B	10.0	3.00		50.0		
C	8.00		24.0		72.0	
D	6.00		18.0			12.00
E		2.00	24.0			8.0