Name: _____

Impulse

Impulse is the change in momentum.

Variable: **J**
Unit: **Ns** = **Kg m/s**

Formulas:

$$J = \Delta p$$
$$J = p_f - p_i$$
$$J = Ft$$
$$J = m(v_f - v_i)$$

Example 1:
A car changes momentum from 50Ns to 75 Ns. What is the Impulse on the car?
p_i = _____
p_f = _____

Example 2:
A worker applies 107 Newton force is to a crate to move it across a smooth floor (negligible friction).The force is applied for 3 seconds. What is the Impulse on the crate?
F = _____
t = _____

Example 2 (Continued):
If the 24 kilogram crate was initially at rest, How fast was it moving after the force was applied?
J = _____ (from #2)
m = _____
v_i = _____

Example 3:
A 0.003 kg ball is moving at 90 m/s when a batter hits it. After the impact, the ball's new velocity is – 175 m/s. What is the Impulse on the ball?
v_i = _____
v_f = _____
m = _____

Name: _____

Egg Landing Pad Analysis

Drop Height when the egg breaks:
d_y = _____

Determine the minimum time it takes to bring the egg to rest without breaking.

F_{min} = 63.63 N (Minimum force to break an egg)

1. Find the time in the air. $d_y = \frac{1}{2}gt^2$

2. Find the velocity when it hits the ground. $v_f = v_i + gt$

3. Find the egg's momentum when it reaches the ground. $p = mv$

4. Find the impulse on the egg. $J = \Delta p$

5. Find the time to stop the egg. $J = Ft$

Tool Box

Time to fall:
$d_y = \frac{1}{2}gt^2$
Velocity of falling object before impact:
$v_f = v_i + gt$
Momentum of falling object before impact:
$p = mv$
Impulse due to collision:
$J = \Delta p$
$J = p_f - p_i$
$J = Ft$