**UNIT 4 PRACTICE EXAM**
Momentum, Impulse, & Collisions

1. _____ Vehicle #1 has a mass of 500 kg and moves with a velocity of 10 m/s.
Vehicle #2 has a mass of 1000 kg and moves with a velocity of 10 m/s.
   A. Vehicle 1's momentum is 2-times greater than Vehicle 2's momentum.
   B. Vehicle 1's momentum is 4-times greater than Vehicle 2's momentum.
   C. Vehicle 1's momentum is ½ the momentum of Vehicle 2.
   D. Vehicle 1's momentum is ¼ the momentum of Vehicle 2.

2. _____ According to the law of conservation of momentum…
   A. The total momentum of stationary objects must equal the momentum of the same objects when moving.
   B. Moving objects have momentum, stationary objects have zero momentum.
   C. The sum of momentums before interactions must equal the sum of momentums after interactions.
   D. The total momentum before objects accelerate must equal the total momentum after objects accelerate.

3. _____ See the colliding objects. Two objects are about to have an elastic collision. What will be outcome of velocities after the collision?
   A. Object 1 moves at 0 m/s. Object 2 moves at 15.0 m/s.
   B. Object 1 moves at -10.0 m/s. Object 2 moves at 5.0 m/s.
   C. Object 1 moves at -5 m/s. Object 2 is at 10 m/s.
   D. Object 1 moves at 5 m/s. Object 2 moves at 10 m/s.

Object 1
10 kg
10 m/s

Object 2
10 kg
5 m/s
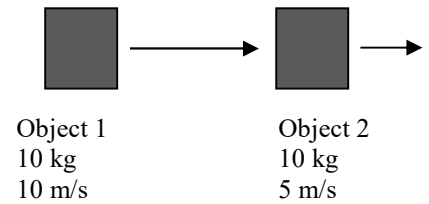
List five important facts about momentum	
What is kinetic energy?	
What is impulse?	
What is the relationship between contact time and force when impulse happens?	

What is the equation to solve for kinetic energy?		What is the equation to solve for momentum?	
What is the equation for the impulse-momentum theorem?			
What is an elastic collision?			
What is an inelastic collision?			
What are the four "rules" for elastic collisions?			
What are the three "rules" for inelastic collisions?			
What is the law of conservation of momentum?			

Calculations Practice

A man rides his bicycle with a velocity of 8.4 m/s. The mass of the man and his bike together is 104 kg. Calculate momentum. Calculate kinetic energy.	
A man rides his bicycle with a velocity of 7.5 m/s. His momentum is 575 kgm/s. Calculate his mass.	

A tennis ball moves with an initial velocity of -40 m/s. It is hit by the tennis racket, it changes direction, and it moves with a final velocity of 32 m/s. The mass of the tennis ball was 0.120 kg. The force of impact was 1.92 N.

Calculate initial momentum.	
Calculate final momentum.	
Calculate the impulse	
Calculate the contact time between the tennis racket and the tennis ball.	
Calculate the acceleration of the ball.	

A car collided with utility pole. The car came to a stop in 0.68 seconds. The mass of the car was 500 kg. The velocity of the car just before impact was 12 m/s.

Calculate initial momentum.	
Calculate final momentum.	
Calculate the impulse	
Calculate the acceleration of the car when it impacted the pole.	
Calculate the force of impact.	