Week 14 - Momentum

Read Page 88 (Defining Momentum)

TQ1. What is the energy of motion called?

TQ2. What collisions all about?

TQ3. Why can't you stop a car going 60 mph?

TQ4. What is the symbol for momentum?

TQ5. What are two types of objects that have a lot of momentum?

TQ6. What is the equation for momentum?

TQ7. What are the units of momentum?

CQ8. A train and a bird are both moving with the same velocity of 50 m/s. Compare their momenta.

CQ9. The magnitude of momentum of an object is 50 kg·m/s. If the velocity is halved, the magnitude of momentum of the object will be what?

QQ10. A tennis ball, with a mass of 0.060 kg, may leave the racket on a serve with a speed of 55 m/s. What is the tennis ball's momentum?

CQ11. Which color carts in the table below have the same inertia? Which have the same momentum?

Cart Color	Cart Mass (kg)	Cart Speed (m/s)
Red	4 kg	3 m/s
Yellow	5 kg	5 m/s
Green	5 kg	3 ms
Blue	6 kg	2 m/s

Read Page 90 (Impulse)

TQ12. What is the change in momentum called?

TQ13. What quantity is represented by the symbol J?

TQ14. What are the units of J?

QQ15. A ball initially at rest is now found to be moving with a momentum of 10 kg·m/s. What impulse was applied?

QQ16. A 2 kg cart was moving at 2 m/s forward and changed its velocity to 5 m/s in the same direction. What is the magnitude of the impulse of the cart?

QQ17. A 5 kg block is sliding to the right across a horizontal, frictionless surface with a velocity of 4 m/s. The block strikes an obstacle that exerts an impulse of 10 kg·m/s to the left on the block. What is the new momentum of the block (including direction) after the collision? What is the new speed of the block after the collision?

CQ18. What are two quantities that have units of kg·m/s?

CQ19. If a cart experiences an impulse of 100 kg·m/s, what was the change in momentum of the cart?

Read Page 91-92 (Impulse-Momentum Theorem)

TQ20. If impulse equals the change in momentum, what else does it equal to?

TQ21. What is the equation for the Impulse-Momentum Theorem?

TQ22. If an airbag in a car acts on a person's face over a period of time, what is this also known as?

QQ23. A person applies a force of 200 N on a 5 kg block for a period of 4 seconds. What is the magnitude of the change in the car's momentum?

QQ24. If the block in QQ23 starts from rest, what is the block's final speed?

QQ25. A 10 kg box is initially moving at 6 m/s to the right. If a constant force of 5 N in the same direction to the right is applied for 4 seconds, what is the final speed of the box?

QQ26. A baseball of mass 0.20 kg is traveling at 40 m/s. The catcher must exert an 800 N of force to bring the baseball to a rest. How much time did it take for the baseball to come to rest?

QQ27. A 2 kg cart is traveling 4 m/s to the right. It hits a wall and bounces the opposite direction (to the left) and is now traveling 2 m/s. If the wall and cart were in contact with 0.005 seconds, what was the average force the wall exerted on the cart?

QQ28. A 5 kg block was dropped on the ground. The instant before it hit the ground it was traveling 3 m/s. The force on the ground to bring the block to a stop was found to be 300 N. How much time did it take to bring the block to a stop?