

Momentum Formative Assessment

Name _____

Date _____ Block _____

Answer completely in the space provided. You may do any work on the back.

1. Which has more momentum: a parked car or a squirrel running across the hood of the car?

Squirrel – squirrel is moving, car has no motion and no momentum

2. Momentum is simply _____ in motion.

Inertia or mass

3. How fast is a 1000 kg car traveling if it has a momentum of 20,000 kg·m/s?

20 m/s – $v = p/m$

4. A 2-kg ball is thrown at 3 m/s. What is the ball's momentum?

6 kg·m/s – $v = p/m$

5. When you jump off a step, you usually bend your knees as you reach the ground. By doing this, the time of the impact is about 10 times more what it would be in a stiff-legged landing. What happens to the average force on your body due to bending your legs?

force decreases 10 times due to the 10 time increase in time. The impulse is the same..you stop in either case, but more time to stop reduces your force of impact.

6. What impulse is provided to a 5 kg cannonball if 10 N of force pushes it for 2 seconds?

20 kg·m/s – $\Delta p = F \cdot \Delta t$

7. If two objects bounce off each other they have had a(n) _____ collision

elastic

8. A 5 kg box is traveling at 10 m/s just before it hits the ground and it takes 2 s for the box to stop. What is the force of impact on the ground?

25 N – $F = m \cdot \Delta v / \Delta t$

9. Yet another unfortunate bug hits the windshield of a moving car. Which had a greater impulse: car, bug, or were they the same?

same impulse – same force and same time of impact

10. A 3 kg cart is rolling down a track at a speed of 2 m/s and strikes another 3 kg cart at rest. After the collision, the two carts stick together and roll away together. What is their speed after the collision?

1 m/s – p of initial cart is 6 kg·m/s, must be conserved so p of both carts together is 6 kg·m/s. Divided by total mass 6 kg is 1 m/s

11. In a game of pool, the cue ball rolls across the table and strikes the 8-ball that is at rest. After the collision, the cue ball is at rest and the 8-ball is rolling towards the corner pocket. What happened to the cue ball's momentum?

transferred to the 8-ball...conservation of momentum

12. Superman is at rest in space and holding an extremely massive asteroid. Superman then throws the asteroid to save Earth again. Does Superman or the asteroid move faster as a result of the throw?

superman moves much faster – the total momentum of the pair is zero to start and must stay zero, so when superman throws he is pushed back with the same momentum as the asteroid, but the asteroid has much more mass