

Momentum Worksheet With Answers

Chapter 10: Forces and Motion

Lesson 4: Momentum

Momentum Answers

1. Josephine is riding her bike at 10m/s. The combined mass of Josephine and her bike is 90kg. What is their momentum?

$$10\text{m/s} \times 90\text{kg} = 900\text{kg m/s}$$

2. Jacques is sky diving and has a mass of 80kg:

- a. He has reached his terminal velocity of 53m/s. What is his momentum?

$$4240\text{kgm/s}$$

- b. Jacques then opens his parachute, drastically reducing his terminal velocity to 8m/s. What is his new momentum?

$$8\text{m/s} \times 80\text{kg} = 640\text{kg m/s}$$

3. A 2000kg ship is sailing at a velocity of 30m/s:

- a. What is the ship's momentum?

$$30\text{m/s} \times 2000\text{kg} = 60000\text{kg m/s}$$

- b. What two actions could the ship take to reduce its momentum?

a; Reducing its velocity by turning down the engines

b; Reducing its mass by throwing objects overboard

4. The plane from last lesson's worksheet is still travelling with a velocity of 280m/s and still has a mass of 380000kg. What is its momentum?

$$280\text{m/s} \times 380000 = 106400000\text{kg m/s} = 1.1 \times 10^8 \text{kgm/s}$$

Extension Questions

1. A toy car has a mass of 80g and races along with a speed of 2m/s. What is its momentum?

$$0.08\text{kg} \times 2\text{m/s} = 0.16\text{kg m/s}$$

2. Usain Bolt has a mass of 94kg and has a maximum momentum of 987kg m/s. What is his maximum velocity?

$$V = p \div m \rightarrow 987\text{kg m/s} \div 94\text{kg} = 10.5 \text{m/s}$$

3. A Range Rover Classic has a mass of 2011kg whilst a Smart Car has a mass of 820kg:

Momentum Worksheet with Answers: Mastering Physics Concepts

Are you struggling to grasp the concept of momentum in physics? Do those pesky momentum problems leave you feeling lost and frustrated? You're not alone! Many students find momentum challenging, but with the right resources and practice, it can become clear and even enjoyable. This comprehensive blog post provides you with a momentum worksheet containing a range of problems, complete with detailed answers and explanations. We'll cover the fundamental principles of momentum, delve into different types of problems, and help you build your confidence in tackling any momentum-related question. Get ready to master momentum!

Understanding Momentum: The Basics

Before diving into the worksheet, let's solidify our understanding of the core concept. Momentum (p) is a vector quantity representing the mass in motion. It's calculated as the product of an object's mass (m) and its velocity (v):

$$p = mv$$

Where:

p represents momentum (measured in kg·m/s)

m represents mass (measured in kg)

v represents velocity (measured in m/s)

Understanding this simple formula is crucial for solving momentum problems. Remember that velocity is a vector, meaning it has both magnitude (speed) and direction. Therefore, momentum also has direction.

The Law of Conservation of Momentum

A cornerstone of momentum physics is the Law of Conservation of Momentum. This law states that in a closed system (where no external forces act), the total momentum before a collision or interaction is equal to the total momentum after the collision or interaction. This principle is incredibly useful for solving many momentum problems, particularly those involving collisions.

Momentum Worksheet: Practice Problems

Now, let's get to the core of this post - the momentum worksheet! The following problems range in difficulty, allowing you to gradually build your understanding. Remember to show your work! Detailed answers are provided below the worksheet.

Problem 1: A 2 kg ball is rolling at 5 m/s. What is its momentum?

Problem 2: A 1000 kg car is traveling at 20 m/s. What is its momentum?

Problem 3: A 0.5 kg ball is thrown with a momentum of 10 kg·m/s. What is its velocity?

Problem 4: Two billiard balls, each with a mass of 0.17 kg, collide head-on. One ball is initially moving at 2 m/s, and the other is at rest. After the collision, the first ball stops, and the second ball moves. What is the velocity of the second ball after the collision? (Assume an elastic collision)

Problem 5 (Challenge): A 5 kg object moving at 3 m/s collides with a stationary 2 kg object. After the collision, they stick together. What is their combined velocity after the collision?

Momentum Worksheet: Answers and Explanations

Problem 1: $p = mv = (2 \text{ kg})(5 \text{ m/s}) = 10 \text{ kg}\cdot\text{m/s}$

Problem 2: $p = mv = (1000 \text{ kg})(20 \text{ m/s}) = 20,000 \text{ kg}\cdot\text{m/s}$

Problem 3: $v = p/m = (10 \text{ kg}\cdot\text{m/s}) / (0.5 \text{ kg}) = 20 \text{ m/s}$

Problem 4: Using the Law of Conservation of Momentum: $(0.17 \text{ kg})(2 \text{ m/s}) + (0.17 \text{ kg})(0 \text{ m/s}) = (0.17 \text{ kg})(0 \text{ m/s}) + (0.17 \text{ kg})(v)$ Solving for v , we get $v = 2 \text{ m/s}$.

Problem 5: Using the Law of Conservation of Momentum: $(5 \text{ kg})(3 \text{ m/s}) + (2 \text{ kg})(0 \text{ m/s}) = (5 \text{ kg} + 2 \text{ kg})(v)$ Solving for v , we get $v = 2.14 \text{ m/s}$ (approximately).

Conclusion

This momentum worksheet and its detailed solutions provide a solid foundation for understanding momentum in physics. Remember to practice regularly, and don't hesitate to revisit the fundamental concepts if you encounter difficulties. Consistent practice is key to mastering this important area of physics. By working through these problems and understanding the principles behind them, you'll be well-equipped to tackle more complex momentum problems in the future.

Frequently Asked Questions (FAQs)

Q1: What is the difference between momentum and kinetic energy? Momentum is a vector quantity related to mass and velocity, while kinetic energy is a scalar quantity related to mass and the square of velocity. They represent different physical properties.

Q2: Does momentum always remain constant? No, momentum only remains constant in a closed system where no external forces are acting. External forces can change an object's momentum.

Q3: How does friction affect momentum? Friction acts as an external force, opposing motion and causing a decrease in momentum.

Q4: Can momentum be negative? Yes, momentum is a vector quantity, so it can be positive or

negative depending on the direction of the velocity.

Q5: Where can I find more practice problems on momentum? Many physics textbooks and online resources offer additional practice problems and worked examples on momentum. Search online for "momentum practice problems" or consult your physics textbook.

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physics concepts interesting and accessible to students while maintaining the mathematical rigor inherent in the subject. Frequent, strong examples focus on how to approach a problem, how to work with the equations, and how to check and generalize the result.

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exercise that asks students to make comparative judgments about variations on a particular physical situation. It includes 200 exercises covering classical physics and optics.

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the American dream, Reyna and her siblings are forced into the already overburdened household of their stern grandmother. When their mother at last returns, Reyna prepares for her own journey to "El Otro Lado" to live with the man who has haunted her imagination for years, her long-absent father. Funny, heartbreaking, and lyrical, *The Distance Between Us* poignantly captures the confusion and contradictions of childhood, reminding us that the joys and sorrows we experience are imprinted on the heart forever, calling out to us of those places we first called home. Also available in Spanish as *La distancia entre nosotros*.

momentum worksheet with answers: Get Better Faster Paul Bambrick-Santoyo, 2016-07-25
Effective and practical coaching strategies for new educators plus valuable online coaching tools
Many teachers are only observed one or two times per year on average—and, even among those who are observed, scarcely any are given feedback as to how they could improve. The bottom line is clear: teachers do not need to be evaluated so much as they need to be developed and coached. In *Get Better Faster: A 90-Day Plan for Coaching New Teachers*, Paul Bambrick-Santoyo shares instructive tools of how school leaders can effectively guide new teachers to success. Over the course of the book, he breaks down the most critical actions leaders and teachers must take to achieve exemplary results. Designed for coaches as well as beginning teachers, *Get Better Faster* is an integral coaching tool for any school leader eager to help their teachers succeed. *Get Better Faster* focuses on what's practical and actionable which makes the book's approach to coaching so effective. By practicing the concrete actions and micro-skills listed in *Get Better Faster*, teachers will markedly improve their ability to lead a class, producing a steady chain reaction of future teaching success. Though focused heavily on the first 90 days of teacher development, it's possible to implement this work at any time. Junior and experienced teachers alike can benefit from the guidance of *Get Better Faster* while at the same time closing existing instructional gaps. Featuring valuable and practical online training tools available at <http://www.wiley.com/go/getbetterfaster>, *Get Better Faster* provides agendas, presentation slides, a coach's guide, handouts, planning templates, and 35 video clips of real teachers at work to help other educators apply the lessons learned in their own classrooms. *Get Better Faster* will teach you: The core principles of coaching: Go Granular; Plan, Practice, Follow Up, Repeat; Make Feedback More Frequent Top action steps to launch a teacher's development in an easy-to-read scope and sequence guide It also walks you through the four phases of skill building: Phase 1 (Pre-Teaching): Dress Rehearsal Phase 2: Instant Immersion Phase 3: Getting into Gear Phase 4: The Power of Discourse Perfect for new educators and those who supervise them, *Get Better Faster* will also earn a place in the libraries of veteran teachers and school administrators seeking a one-stop coaching resource.

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presented in considerable detail, to enable students to follow each step. The emphasis is on stressing the principles and methods used, allowing students to master new ways of thinking and problem-solving techniques. The problems themselves are longer than those usually encountered in textbooks and consist of a number of questions based around a central theme, highlighting properties and concepts of interest. For undergraduate and graduate students, as well as those involved in teaching Quantum Mechanics, the book can be used as a supplementary text or as an independent self-study tool.

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applications of the included concepts to assist in retention and learning. The text includes Check Your Understanding questions, Math Skills boxes, multi-concept problems, and worked examples. The first volume of a two-volume set, Volume 1 explores ideas and concepts like Newton's Laws of Motion, the Ideal Gas Law, and kinetic theory. Throughout, students' knowledge is tested with concept and calculation problems and team exercises that focus on cooperation and learning.

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