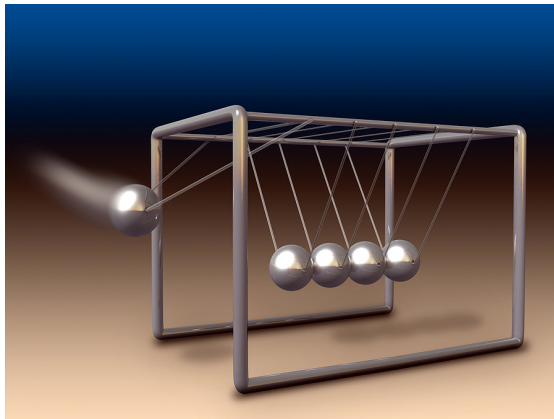




Name: \_\_\_\_\_ Date: \_\_\_\_\_

# READING SCIENCE!

## History of Momentum



- 1** The modern definition of momentum is mass times velocity. Momentum is a vector quantity, having both magnitude and direction. The history of momentum goes back to the 16<sup>th</sup> century. René Descartes, Christiaan Huygens, and Sir Isaac Newton contributed to momentum and the law of conservation of momentum.
- 2** René Descartes was a French scientist, mathematician, and philosopher. He was active in the 1600s. He is most famous as the ‘Father of Modern Philosophy.’ His writings on philosophy are still studied by philosophers today. However, Descartes is also the first person to draw a graph of a mathematical function. The Cartesian coordinate system is named after him. Descartes published a definition of momentum in 1644. Importantly, he stated that a ‘quality of motion’ of an object was its mass multiplied by its velocity. His ‘quality of motion’ was a scalar quantity. Descartes was also the first to examine collisions between bodies. He analyzed the change of motion of bodies produced as a result of collisions. He stated that the motion lost by one body is gained by another. The overall amount of motion in the system remains the same. But, Descartes explained only very few types of collisions in the natural world.
- 3** Christiaan Huygens was a Dutch mathematician, astronomer, physicist, and horologist. A horologist is concerned with clocks and time measurement. He accepted Descartes’ statements for bodies approaching each other with equal velocities. However, Huygens generalized the principles to all collisions between bodies of equal mass. When a moving body strikes a stationary body of equal mass, the moving body comes to a stop. The stationary body begins moving with the same velocity as the

# READING SCIENCE!

moving body had before the collision. Think about billiard or pool. If a ball strikes another ball, the first ball will stop, and the second ball will travel at the velocity of the first ball.

- 4 Huygens also addressed conservation of momentum during a collision of bodies of unequal mass. He stated that the total ‘quantity of motion’ should be the same before and after collision. This is the first statement of the law of conservation of momentum. Bodies can move either in the same direction or in opposite directions. When both bodies are moving in the same direction, the total ‘quantity of motion’ is the addition of the two quantities. When the bodies move in opposite directions, the total ‘quantity of motion’ is calculated by subtracting one body’s motion from the other body’s motion.
- 5 Sir Isaac Newton was influenced by both Descartes and Huygens. Newton stated the law of conservation of momentum in even more general terms. In 1687, he published his three laws of motion. The third law states that the forces of action and reaction between two bodies are equal, opposite, and collinear. Within less than 50 years, momentum received a mathematical definition and a law of conservation. Analyzing collisions between bodies that are not traveling collinear requires geometry, in addition to the law of conservation of momentum.

- 1 The modern definition of momentum is —
  - A Mass x velocity squared
  - B Mass x velocity
  - C Mass divided by velocity
  - D Mass cubed
  
- 2 How does Descartes' 'quality of motion' differ from the modern momentum?
  - A 'Quality of motion' is a scalar quantity, momentum is a vector quantity.
  - B Momentum is always smaller than 'quality of motion.'
  - C 'Quality of motion' does not apply to collisions.
  - D They don't differ, they are the same.
  
- 3 One of Christiaan Huygens' contributions to society of his time was —
  - A description of planetary motions.
  - B development of the Cartesian coordinate system.
  - C measurement of time.
  - D description of the particulate nature of light.

- 4 If two bodies of equal mass collide with each other with equal velocity in an elastic collision, their velocities after the collision will be —
- A zero.
  - B equal in magnitude and opposite in direction.
  - C half of what they were before the collision.
  - D Twice what they were before the collision.
- 5 Who was the first to state the law of conservation of momentum?
- A Aristotle
  - B Descartes
  - C Huygens
  - D Newton
- 6 Which of Newton's Laws of Motion is a statement of the conservation of momentum?
- A The First Law
  - B The Second Law
  - C The Third Law
  - D The Seventh Law