

2d motion extra practice problems with answers

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Understanding Two-Dimensional Motion

Definition of 2D Motion

Two-dimensional motion (2D motion) is any motion that occurs in a two-dimensional space, meaning it has only two dimensions, typically designated as x and y.

Vectors in Kinematics

In 2D kinematics, vectors are used to represent displacement, velocity, and acceleration. These vectors have both magnitude (length) and direction.

Examples of 2D Motion

2D motion can be observed in various scenarios, including:

- Projectile motion, such as a ball thrown through the air
- Movement of a car along a straight road
- Motion of an object on a table

Resultant of Kinematics

The resultant of kinematics is a displacement vector that represents the net displacement of an object over a specified time interval.

Formulas for 2D Motion

1. Displacement:

$$\text{Displacement} = \sqrt{(\Delta x^2 + \Delta y^2)}$$

2. Velocity:

$$\text{Velocity} = \text{Displacement} / \text{Time}$$

3. Acceleration:

$$\text{Acceleration} = (\text{Final Velocity} - \text{Initial Velocity}) / \text{Time}$$

5 Formulas of Kinematics

1. Constant Acceleration:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

2. Motion Under Gravity:

$$v = u + gt$$

$$s = ut + \frac{1}{2}gt^2$$

$$v^2 = u^2 + 2gs$$

Big 4 Equations in Physics

1. Newton's Second Law:

$$F = ma$$

2. Conservation of Energy:

$$E = \text{constant}$$

3. Conservation of Momentum:

$$p = \text{constant}$$

4. Coulomb's Law:

$$F = k * q_1 * q_2 / r^2$$

Formula for 2D Vectors

Vector Addition:

$$A + B = (A_x + B_x, A_y + B_y)$$

Vector Subtraction:

$$A - B = (A_x - B_x, A_y - B_y)$$

Scalar Multiplication:

$$kA = (kA_x, kA_y)$$

Basics of 2D Vectors

- 1. Magnitude:** Length of the vector **2. Direction:** Angle made with the positive x-axis
3. Components: x and y coordinates of the vector

2D Kinematics in Real Life

Examples of 2D kinematics in real life include:

- Motion of a person walking in a straight line
- Trajectory of a ball thrown from a height
- Movement of a car along a curve

Additional Information

- Two-dimensional motion is also known as motion in a plane.
- The term "R" in 2D motion refers to the vector representing the displacement of the object.
- To find velocity in 2D motion, calculate the displacement vector and divide it by the time interval.

- 2D animations are cartoons or digital images that move on a two-dimensional plane.
- The Big 5 in physics are the five fundamental principles that govern the behavior of matter and energy.

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