PROJECTILE MOTION

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MOST ESSENTIAL LEARNING COMPETENCIES

Have you ever wondered why a ball thrown into the air follows a curved path before falling back to the ground? Or how a cannonball is able to travel such great distances? The answer lies in the fascinating concept of projectile motion.

In this module, we will explore projectile motion, including its principles, mathematical equations, and the factors influencing range and height, equipping you with the tools to analyze and optimize the motion of objects in flight.

By the end of this module, you will be able to:

1. Define what a projectile and projectile motion is.
2. Illustrate the path travel by a projectile
3. Appreciate the application of projectile motion in relation to sports

Lesson 1: Projectile Motion

Let's Try This!

Direction: Read the jumbled letters carefully and focus on each individual letter.

1.TROYECJATR

2.OPRECJLITE ONMITO

3.LOBCIAAPR

4. RUCEV AHTP

5. TOMNIO

PROJECTILE MOTION

Projectile motion is a form of motion where an object given an initial velocity is thrown or projected and is allowed to be acted on by gravity in a curved-like path. These objects are called projectiles. The curved path followed by a projectile is called a trajectory.

In projectile motion, the physical principles and mathematical formulas that must be applied are those concepts that were recalled earlier. Combining the two allows us to make predictions concerning projectile motion. As such the principles and formulas are well understood in various types of projectile problems.

Type 1: Horizontally Launched Projectiles Horizontally launched projectiles are projectiles that are launched with an initial velocity from an elevated position and follow a curved-like path to the ground. Consider the figure below.

Figure 1.1: A man diving into the water

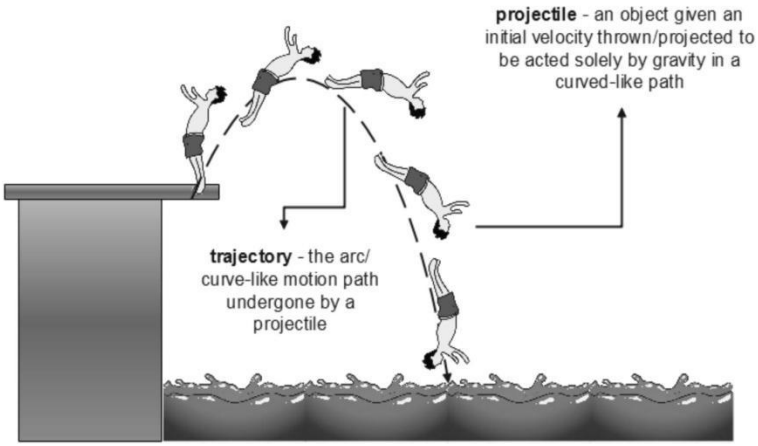

Figure 1.1 depicts the downward curved trajectory of a man diving into the water, which is a result of the gravitational force exerted by the Earth. Gravity, a natural force responsible for objects falling towards the Earth, causes this motion. Consequently, the acceleration due to gravity is consistently directed downwards with a magnitude of -9.8m/s². Therefore, the man's movement follows a projectile path, incorporating the effects of gravity.

Type 2: Angle-Launched Projectiles

Angle-launched projectiles are projectiles launched at an angle with respect to the horizontal and rises to a peak while moving horizontally. Upon reaching the peak, the projectile falls with a motion that is symmetrical to its path upwards to the peak. Consider the situation below

Figure 1.2: A sepak takraw player kicking a rattan ball over the net

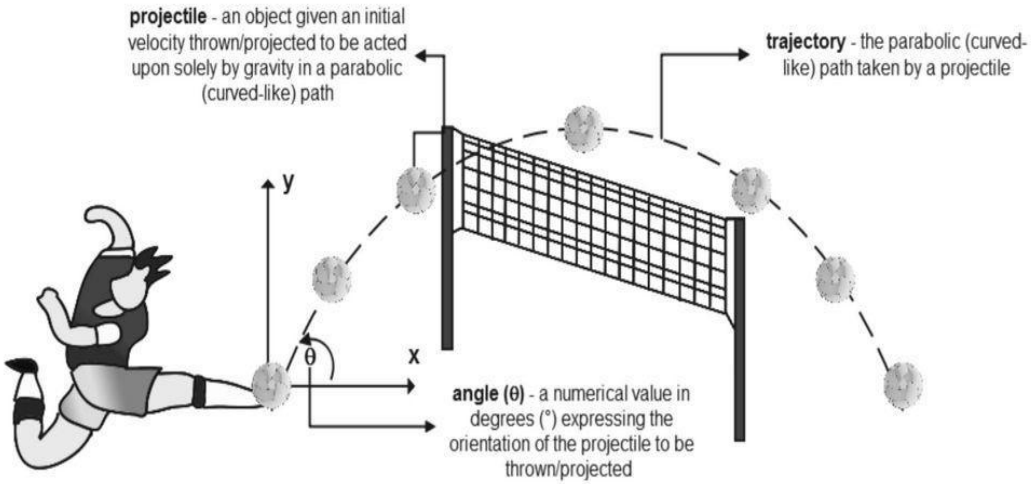

Figure 1.2 is the rattan ball. Its trajectory is described as a curved path. In mathematical terms, this pattern is called a parabola. When a projectile is launched at an angle, it undergoes a complete parabolic trajectory. This means that when a player kicks a rattan ball into the air, the ball will eventually come back down to the ground under the influence of gravity, while simultaneously moving horizontally. Therefore, projectile motion consists of two separate motions: horizontal motion and vertical motion, which act independently of each other.

ASSESSMENT

Instructions: Read each question carefully and choose the letter of the correct answer.

1. What is projectile motion?

A. The motion of an object launched horizontally.

B. The motion of an object moving in a straight line.

C. The motion of an object thrown vertically.

D. The motion of an object moving in a circular path.

2. Which of the following forces act on a projectile during its motion?

A. Air resistance B. Friction C. Gravity D. Both gravity and air resistance

3. Which of the following remains constant during projectile motion?

A. Velocity B. Acceleration C. Distance traveled D. Angle of projection

4. At the highest point of a projectile's trajectory, which of the following statements is true?

A. The horizontal component of velocity is zero.

B. The vertical component of velocity is zero.

C. The total velocity is zero.

D. The acceleration is zero.

5. What is the shape of a projectile's trajectory when there is no air resistance?

A. Ellipse B. Straight line C. Circle D. Parabola

ANSWER KEY:

Let's try

1. Trajectory

2. Projectile Motion

3. Parabola

4. Curve Path

5. Motion

Assessment

1. A

2. C

3. A

4. B

5. D