

# *Vidya Bhawan Balika Vidyapith*

## *Lakhisarai*

### *Sub. Physical edu. , Class 12th*

## **BASED ON NCERT**

#### UNIT 10

#### KINESIOLOGY, BIOMECHANICS & SPORTS

##### **Key Points:**

- Projectile & factors affecting projectile trajectory
- Newton's laws of motion and their application in sports
- Aerodynamics principles
- Friction & Sports
- Introduction to Axes And Plane
- Types of movements( Flexion, Extension, Abduction, Adduction)
- Major muscle involved in Running , Jumping And Throwing

##### **Projectile**

Projectile: an object thrown into the space either horizontally or at acute angle under the action of gravity is called a projectile. In the field of games and sport there are many examples of projectiles such as putting the shot, throwing a hammer, discus and javelin in athletics.

##### **Factors affecting projectile trajectory**

Propelling Force : The propelling force produces certain effects depending upon its point and direction of application. If the application is directly through the projectile's centre of gravity, only linear motion results from the force. As the projecting force is moved further from the centre of gravity, rotator motion of the object increases at the expense of linear motion. If the force is below the object's centre of gravity, back spin is results. Forward spin results when the force is above the centre of gravity. When the force is off centre to the left, clockwise spin results and when it is off centre to right, counter clockwise spin occurs.

Force of Gravity: As soon as contact is broken with a projected object, the force of gravity begins to diminish the upward velocity of the object. Finally, gravity overcomes the

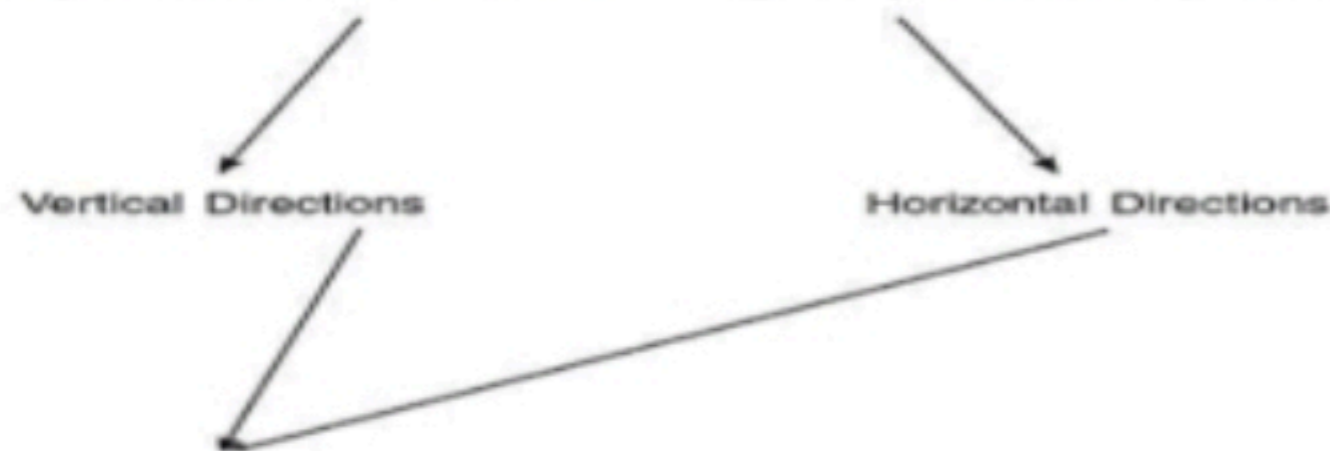


effects of the upward component of the projectile's motion and the object begins to descend. The factors that determine how soon gravity will cause the object to descend are -

- (a) Weight (mass) of the object
- (b) amount of force driving it upward
- (c) the effect of air resistance on the object.

(iii) Effect of Air Resistance As the speed of an object increases, air resistance has a greater retarding effect. The more surface area an object presents in the direction of movement, the greater will be the effect of air resistance.

### **Projectile & factors affecting Projectile Trajectory**



- Speed of Release
- Angle of Release(Trajectory of Relax)
- Height of Release

### **Newton's laws of motion and their application in the field of sports.**

The three laws of motion formulated by Newton are described below

1.Law of inertia: According to this law a body at rest will remain at rest and a body in motion will remain in motion at the same speed and in the same direction unless acted upon by an external force. There are great examples of this law in sports such as starting in rowing, starting in sprinting, starting in throwing the hammer. Basically if an object is in motion, it remains in motion unless something or some external force stops it. The external force may be gravitational force, the surface of playing field or a defensive player etc.For Ex: Starting in sprinting, starting in rowing, starting in hammer throw.

2.Law of acceleration: According to this law, A change in motion is directly proportional to the force producing it and inversely proportional to its mass. If two unequal forces are