CBSE Test Paper 02

CH- 10 Biomechanics and Sports

1. What is horizontal plane?
2. What do you mean by Kinesiology?
3. What do you mean by Flexion?
4. What do you mean by sagittal axis?
5. State law of acceleration and its use in field of sports.
6. What do you mean by Aerodynamics? Discuss the basic forces of aerodynamics?
7. Define Projectile and enlist the factors which affect the projectile trajectory.
8. Explain any three objectives of Intramurals.
9. Elucidate Newton’s laws of motion and their application in the field of sports.
10. Define trajectory. Describe the factors affecting the trajectory of a projectile.

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Answer

1. Transverse or Horizontal plane: The transverse plane divides the body into top and bottom halves. In fact, it divides the body into upper and lower sections. This plane lies horizontally that why it is also called horizontal plane. Movements along this plane can include an ice-skating spin or rotation to play a tennis shot.

2. Kinesiology is defined primarily as the use of muscle testing to identify imbalances in the body's structural, chemical and emotional energy.

3. Bending parts at a joint so that the angle between them decreases and parts come closer together (bending the lower limb at the knee).

4. Sagittal axis: The sagittal axis passes horizontally from posterior to anterior. It is formed by the intersection of the sagittal and transverse plane. Sagittal axis passes from front to back.
5. 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 applied to objects of equal mass, the object that has greater force applied will move faster. Conversely, if two equal forces are applied to objects of different masses, the lighter mass will travel at a faster speed.

6. Aerodynamics is the study of properties of moving air and the interaction between the air and solid bodies moving between it.
   The basic forces of aerodynamics are stated below:
   Lift: lift is the force that pushes the object to move upward. It is the force that is the opposite of weight.
   Weight: Weight is the force generated by the gravitational force of the earth. The weight of an object controls how strong the push has to be. A shot of 16 pounds requires more force (push) than a javelin.
   Drag: Drag is a force that tries to slow the object down. It makes hard for an object to move. It is harder to walk through the water than through the air. It is because water

causes more drag than air.
Thrust: Thrust is a force that is the opposite of drag. Thrust is the push that moves some objects forward.

7. 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. Three factors affecting projectile trajectory or parabola are follows:
   1. Angle of Projection
   2. Projection height relevant to the landing surface
   3. Spin

8. The three main objectives of Intramurals are as follows:

   a. **Providing opportunity:** These tournaments provide ample opportunities to every student to participate in games and sports of his/her choice. As in Extra murals mass participation is not possible but in Intramurals everyone has a chance to participate in some or the activity.
   b. **Developing sportsmanship:** Intramurals develop sportsmanship qualities among the students. They show respect to the opponents and officials and remain humble in victory and gracious in defeat.
   c. **Providing recreation:** By participating in Intramurals students get a lot of joy, pleasure, fun as they participate in the activities according their interests.

9. 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.
   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 applied to objects of equal mass, the object that has greater force applied will move faster. Conversely, if two equal forces are applied to objects of different masses, the lighter mass will travel at a faster speed.

3. Law of reaction: According to this law ‘ For every action there is an equal and opposite reaction.’ There are so many examples in sports where this law is applied. e.g., In swimming a swimmer pushes the water backwards (action) and the water pushes the swimmer forward (reaction) with the same force.

10. Trajectory is the path described by a moving object or the path followed by a projectile. Examples are kicking a soccer ball, a throw-in cricket, throwing a hammer etc.

    Factors affecting projectile trajectory are

    i. **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, rotatory motion of the object increases at the expense of linear motion. If the force is below the object's centre of gravity, backspin 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.
    ii. **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 effects of aIT 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.