CBSE Test Paper 05

CH- 10 Biomechanics and Sports

1. Elucidate projectile motion.
2. Which type of deformity is **Kyphosis**?
3. What do you mean by axis? Enlist various types of axes.
4. What is Sagittal plane?
5. What are hamstring muscles?
6. Enumerate the laws of motion.
7. What is axis? What are its types?
8. Difference between sagittal plane and horizontal plane.
9. Which muscles do we use in throwing?
10. Describe the factors affecting the trajectory of a projectile.

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Answer

1. When a body is thrown at a certain angle with a certain amount of force into the air, it travels in the air and covers some distance following a curved path called a parabola. This is called projectile motion.

2. Kyphosis implies an increase of a backward posterior curve or a decrease of a forward curve. It is also called round upper back. Depression of chest is common in Kyphosis.

3. An axis is a straight line around which an object rotates. Movements at the joints of human musco skeletal system are mainly rotational and take place about a line perpendicular to the plane in which they occur. This line is known as axis of rotation. There are following types of axes of rotation: a) Sagittal axis b) Frontal axis c) Vertical axis
4. Sagittal or Medial plane: The sagittal plane is a vertical plane passing from the rear to the fronty, dividing the body into left and right halves. It is also known as anteroposterior plane. Most of the sports and exercise movements that are two dimensional, such as running, long jumping and somersault take place in this plane.
5. Hamstrings: As you move forward, the action switches to your hamstrings, the muscles at the back of your thigh muscles. These muscles helps you in pulling the leg back behind and give you strength to propel your body forward.

6. 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.
    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.eg. In hammer throw, a thrower who is stronger will throw the hammer farther than a thrower who is less strong.

3. **Law of reaction:** According to this law 'For every action there is an equal and opposite reaction.'

7. An axis is a straight line around which an object rotates. Movements at the joints of human muscoskeletal system are mainly rotational and take place about a line perpendicular to the plane in which they occur. This line is known as axis of rotation.

   There are following types of axes of rotation:

   1. 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.
   2. Frontal axis: The frontal axis passes horizontally from left to right. It is formed by the intersection of frontal and horizontal plane. Frontal axis passes from side to side.
   3. Vertical axis: The vertical axis passes vertically from inferior to superior. It passes straight through the top of the head down between feet. It is formed by the intersection of sagittal and frontal it is also known as longitudinal axis. It is the longest axis.

8. Sagittal or Medial plane: The sagittal plane is a vertical plane passing from the rear to the fronty, dividing the body into left and right halves. It is also known as anteroposterior plane. Most of the sports and exercise movements that are two dimensional, such as running, long jumping and somersault take place in this plane. 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.

9. Following are the muscles which are used while are used while throwing anything like the ball, football etc

   i. **Shoulder Muscles** The deltoids are the muscles of your shoulder, which play a

crucial role in rotating your arm. Always warm up adequately by performing arm circle to avoid injuring your rotator cuff while performing shoulder exercises.

ii. **Triceps** Your triceps are located on the back of your upper aim and aid in the process of extending your arm at the elbow. This action helps your release the ball with force and push it in the desired direction. To strengthen your triceps efficiently, perform exercises such as triceps sufficiently, perform exercises such as triceps pushdowns with a rope or pulley and close-grip bench presses.

iii. **Latissimus Dorsi** Your latissimus dorsi often referred to as your lats are located on either side of your spine. These large muscles help produce force for throwing and help transfer energy from your legs to upper body. Among the best exercises for strengthening your lats are pull-ups, seated cable rows, and bent-over barbell rows.

iv. **Abdominals** While many people exercise their abdominal muscles in hopes of attaining a six-pack, this muscle group is highly functional as well. A strong core facilitates the transfer of power from your lower body to your upper body, enabling your throws to benefit from the strength of your legs. among the best exercises for your abs are hanging leg raises and Swiss ball crunches.

v. **Quadriceps** The quadriceps is the major muscle group located on the front of your thigh. This large group of muscle tissue helps you power the ball toward your intended target as you step init your throw. Among the most effective exercises for the quadriceps are the barbell step-up, barbell lunge and barbell squats, which also work your abdominal muscles.

10. 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, 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.

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 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.