

UNIT I MANAGEMENT OF SPORTING EVENTS

UNIT II CHILDREN AND WOMEN IN SPORTS

2.1 Exercise Guidelines of WHO for Different Age Groups

- Mortality (6% of deaths globally).

2.1.1 Recommendations for Children Under 5 Years of Age

Age	Physical Activity	Sleep
Less than 1 year	interactive floor-based play including 30 minutes of tummy time.	14-17 hours (0-3 months of age), 12-16h (4-11 months of age).
1-2 years	At least 180 minutes in a variety of types of physical activities including moderate to vigorous- intensity physical activity,	11-14 hours of good quality sleep, including naps, with regular sleep and wakeup time
3-4 years	At least 180 minutes in a variety of types of physical activities at any intensity, of which at least 60 minutes is moderate to vigorous intensity physical activity.	10-13h of good quality sleep, which may include a nap, with regular sleep and wake-up times.

Infants (Less than 1 year)

Giving the baby 30 minutes in prone position (tummy time).

Activities like crawling and rolling should be performed on mat or sheet that is at least 7 feet by 4 feet in size.

Children and Youth 5-17 Years

Volume/ Duration	At least one hour in a day; more than 60 minutes will provide additional health benefits.
Frequency	One session of 1 hour or two sessions of 30 minutes each.

Adults 18-64 Years

Aerobic activities	150 to 300 minutes per week with moderate intensity or 75 to 150 minutes per week with vigorous intensity; One aerobic activity bout should be at least 10 minutes
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Older Adults 65 Years and Above

Aerobic activities	150 to 300 minutes per week with moderate intensity or 75 to 150 minutes per week with vigorous intensity; One aerobic activity bout should be at least 10 minutes.
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2.2 Common Postural Deformities

Knock Knees

- Knock Knees, also known as Genu valgum,
- there is a gap of 3-4 inches between the ankles.

Corrective Measures

- Exercises like horse-riding
- Performing Padmasana and Gomukhasana

Flat Foot

- Flat foot is also known as pes planus or fallen arches.

Corrective Measures

- Adhomukhsavasana performed in Surya Namaskar, Vajrasana

Round Shoulders

- It leads to postural deviations such as hyper kyphosis, or hunch back and anterior head carriage, or forward head posture.

Corrective Measures

- Chakrasana, Dhanurasana,

Kyphosis

- Kyphosis is also known as Hunch Back or round upper back. The word Kyphosis comes from the Greek term kyph and means bent or bowed. It is an exaggerated, forward rounding of the back.

Corrective Measures

- Dhanurasana, Chakrasana and Bhujangasana

Lordosis

- The term Lordosis comes from the Greek lordos which means bent backward.
- The spine curves a little in the neck, upper back, and lower back.
- These curves, which create the spine's S shape, are called the kyphotic (upper back) and lordotic (neck and lower back).

- Lordosis is a spinal deformity in which the angle of arc of the lower back is reduced. This leads to an increase and exaggeration of normal concavity of the lumbar region of the spine.
- It is also known as sway back.

Corrective Measures

- Dhanurasana and Halasana

Scoliosis

- The word Scoliosis comes from the Greek skolios which means bent.
- It is a position of exaggerated lateral curvature or sideways curvature of the spine.

Corrective Measures

- Trikonasana and Adhomukhasana

Bowlegs

- Bowlegs, also known as Genu varum

2.3 Women participation in Sports – Physical, Psychological and Social benefits

- Karnam Malleswari was the first women who won a medal in Olympic Games in Sydney in 2000. In 2012, London Olympics, five times world champion Mary Kom won a medal in boxing and Saina Nehwal in Badminton. In 2016 Rio Olympics Sakshi Malik won medal in wrestling and P.V. Sindhu won the first ever women's silver medal in badminton.
- I. Saina Nehwal has won 24 international titles, which includes ten Super series titles. In 2015 that she was able to attain the world no. 1 ranking, thereby becoming the only female player from India to achieve this feat. Saikhom Mirabai Chanu, an Indian weightlifter, lifted a total of 201 kg to win the Gold Medal at the CWG 2022. Lovlina Borgohain is an Indian boxer who won a bronze medal at the 2020 Olympic Games in the women's welterweight event and the silver medal at the 2020 Tokyo Olympics in Women's 49 kg category.
- In a recent announcement by IOC, 49% women will take part in next Olympic games.

2.4 Special Consideration (Menarche & Menstrual Dysfunction)

2.4.1 Menarche

- The time when sexual maturity is reached is called puberty. Menarche (first menstruation) is usually considered the point of sexual maturity for girls.
- The average age for a girl to get her first period ranges from 8 to 15 years old.
- Discharging process lasts about 3-5 days. Women usually have periods until about ages 45 to 55 and have menopause usually around age of 50.
- Menopause means that a woman is no longer ovulating and can no longer get pregnant.

2.4.2 Menstrual Dysfunction

- Normal range of the menstruation cycle is 21 to 35 days.

There are different types of menstrual disorders which are given below:

1. **Pre-menstrual Syndrome**
2. **Amenorrhea:** Amenorrhea is known as missed periods or absence of a normal monthly period or menstrual cycle. (a) Primary amenorrhea: Menstruation cycle does not begin at puberty. (b) Secondary amenorrhea: It happens when menstruation is missed for three months or more. This is the most common type of amenorrhea.
3. **Dysmenorrhea:** When menstruation happens with severe pain or frequent menstrual cramps, the condition is called Dysmenorrhea.
4. **Menorrhagia:** Menorrhagia is characterized by heavy and long term or continuous menstrual bleeding.

5. **Polymenorrhea:** Polymenorrhea is a term used to describe a menstrual cycle that is shorter than 21 days.
6. **Oligomenorrhea:** Oligomenorrhea is infrequent menstruation. More strictly, it is menstrual periods occurring at intervals of greater than 35 days.
7. **Metrorrhagia:** Metrorrhagia refers to missed, delayed or erratic periods or abnormal bleeding patterns.
8. **Postmenopausal bleeding:** Postmenopausal bleeding is bleeding that occurs after one year of menopause or after a woman has stopped having menstrual cycles due to menopause.

2.5 Female Athlete Triad

- The term ‘triad’ was first described by American college of sports medicine in 1992, and the three
- Anorexia nervosa is an eating disorder where an individual tries to reduce body weight abnormally, having an intense fear of gaining weight or misconception over his/her weight.
- Bulimia nervosa is an eating disorder in which an individual eats large amount of food with loss of control overeating and then adopts unhealthy ways to cut down calories like vomiting, taking laxatives, weight loss supplements, diuretics, excessive exercises etc.

I. Tick the correct options

1. Minimum duration of activity should be ----- per week at vigorous intensity in adults above 65 years of age.
 - a. **75 minutes**
 - b. 150 minutes
 - c. 300 minutes
 - d. 450 minutes
2. Rate at which the activity is being performed is known as _
 - a. Volume
 - b. Intensity**
 - c. Type of Activity
 - d. Frequency
3. Deformity of the legs is known as
 - a. Scoliosis
 - c. Knock knees**
 - b. Lordosis
 - d. Kyphosis
4. Lordosis is a problem of the
 - a. Lower Back**
 - b. Middle Back
 - c. Upper Back
 - d. Shoulders
5. Scoliosis is a postural deformity related to
 - a. Muscles
 - c. Legs**
 - b. Shoulders
 - d. Spine**
6. Kyphosis is a deformity found in
 - a. Shoulders
 - c. Hips**
 - b. Lumber region
 - d. Thoracic region**
7. Sports is an important tool for social empowerment for women as it develops the following:
 - a. Aggression
 - c. Stress**
 - b. Isolation
 - d. Leadership**
8. Psychological benefits of women participation in sports includes:
 - a. Cooperation
 - c. Physical Fitness**
 - b. Emotion Control**
 - d. Communication
9. Frequent menstruation is known as:
 - a. Metrorrhagia**
 - c. Polymenorrhea**
 - b. Oligomenorrhea
 - d. Menorrhagia

10. If the menstruation cycle does not begin at puberty, the condition is called
 - a. Primary amenorrhea
 - b. Secondary amenorrhea
 - c. Oligomenorrhea
 - d. Dysmenorrhea
11. Weakening of bones due to loss of bone density and improper bone formation is
 - a. Amenorrhea
 - b. Anorexia Nervosa
 - c. Osteoporosis
 - d. Lordosis
12. What is the cause of Osteoporosis in women?
 - a. High blood pressure
 - b. Menarche
 - c. Excessive exercise
 - d. Lack of calcium and vitamin D
13. Female athlete triad is a syndrome characterized by a.
 - a. Osteoporosis
 - b. Amenorrhea
 - c. Eating disorder
 - d. All of the above
14. In which type of Anorexia does an individual lose weight by taking laxatives or diuretics
 - a. Bulimia Nervosa
 - b. Purgating type
 - c. Restricting type
 - d. Anorexia Nervosa

UNIT III YOGA AS PREVENTIVE MEASRUE FOR LIFESTYLE DISEASE

TADASANA: This is a traditional posture. The final position of this asana resembles the palm tree.

KATICHKRASANA: The name of this yoga asana comes from Kati meaning waist and chakra meaning circle.

PAVANMUKTASANA: The name comes from the Sanskrit word pawan meaning wind and mukta meaning “free”. Thus, Pawanmuktasana is also known as the wind removing asana.

MATSYASANA: The Sanskrit word Matsya means fish. Hence, Matsyasana refers to the fish pose. Begin Matsyasana by lying down in Savasana (Corpse Pose).

HALASANA: Hala means plough. This posture is known as Halasana because in its final position the shape of the body resembles the Indian plough.

PASCHIMOTTANASANA: The word paschimottanasana comes from the Sanskrit words paschima meaning west or back of the body and uttana meaning intense stretch or extended

ARDHA MATSYENDRASANA: The name comes from the Sanskrit words ardha meaning half, matsya meaning fish, and eendra meaning king. The final position of this asana is just like Half Lord of the Fish that is why it is called “ardhamatsyendrasana”. This asana is also known as “Half Spinal Twist Pose”.

DHANURASANA: The name Dhanurasana comes from the Sanskrit words Dhanura meaning bow. The final position of this asana is like a bow that is why this asana is called dhanurasana.

USHTRASANA: Ustra means Camel. So Ushtrasana refers to the camel pose. Ushtrasana is an intermediate level back-bending yoga posture known to open Anahata (Heart chakra). Primary position: Sit in Vajrasana

SURYA BHEDHANA PRANAYAMA: Surya is the sun and bhedhana means to get through.

BHUJANGASANA: In Sanskrit the word Bhujanga means Cobra. Since the final position of this asana resembles the ‘Hooded Snake’

SHALBHASANA: The name Shalabhasana comes from the Sanskrit shalabh which means grasshopper or locust.

SUPTA – VAJRASANA: In Sanskrit, supta means reclined, and Vajra means thunderbolt. Primary position: Sit in Vajrasana.

MANDUKASANA; Mandukasana comes from the Sanskrit manduk which means frog. Primary position: Sit in Vajrasana

GOMUKHASANA; The name Gomukhasana comes from the Sanskrit words Go, meaning cow and Mukha, meaning face or mouth.

YOGAMUDRA: Yogamudra is not asana rather it is a mudra, but it can be performed as a remedy for Diabetes. Primary position: Sit in padmasana

KAPALABHATI: This involves forceful and fast diaphragmatic breathing.

Urdhvahastottansana: The name for this asana comes from the Sanskrit urdhva, meaning upward, and hasta, meaning hands. Urdhvahastasana is called upward salute or upward hands pose in English.

UTTANMANDUKASANA: When in Mandukasaana, hold the head in the elbows. This is Uttanaamandukasana which resembles an upright frog. Primary position: Sit in Vajrasana

VAKRASANA: Vakra means twist in Sanskrit. Thus the Sanskrit name of Vakrasana means Twisted Pose Vakrasana comes under the category of seated asanas. Primary position: Seated in Dandasana,

ANULOM-VILOM: This is one of the fundamental types of Pranayams. This practice is also known as Anuloma-viloma as Viloma means ‘produced in the reverse order’.

UTTANPADASAN: The asana gets its name from the Sanskrit terms Uttana meaning raise-upward, and pada meaning feet or legs. It is also known as The Raised Leg Pose

Technique

1. Raise both the legs together slowly upto 30 degree angle.
2. Another few seconds, raise further upto 45 degree angle.
3. After few second, raise upto 60 degree angle and maintain it there for few seconds.
4. While returning, stop at 45 degree or 30 degree angle.

ARDHA -HALASANA: Ardha means half and Hala means plough so this asana is called Ardha-halasana because in its final position, the body resembles half the shape of an Indian plough.

SARALA MATYASANA: The word Saral means easy and Matsya means fish.

MAKARASANA: Makar means crocodile. While doing this asana the body resembles the shape of a crocodile. It is also considered a relaxing asana like Shavasana.

SHAVASANA: Lying supine on the ground like a corpse is Shavasana.

NADI- SHODHANA PRANAYAM: Nadi means “channel” and Shodhana means “purification”, therefore it is known as channel for purification. Nadi Shodhana, also known as Anulom Vilom or Alternate Nostril Breathing.

SHEETALI PRANAYAMA: This Pranayama cools the system. It helps to keep the body’s temperature down. Primary position: Sit in Padmasana

ARDHA-CHAKRASANA: In Sanskrit, Ardha means half, Chakra means wheel and Asana means a pose. Therefore, Ardha-chakrasana means half-wheel postures. It is a simpler version of chakrasana.

BHADRASANA: Bhadrasana means Gracious Yoga, it consists of two words –Bhadra and Asana. Bhadra is a Sanskrit word, which means Auspicious or Gracious, while asana indicates Yoga pose.

Makarasana: In Sanskrit “Makar” means “Crocodile, and “Asana” means “posture”. The English name is “Crocodile pose”.

I. Tick the correct option

1. What causes Obesity?
 - a. Non-Activity
 - b. Smoking
 - c. Over indulgence in food
 - d. All of the above
2. Ushtrasana pose refers to :
 - a. Camel pose
 - b. Cow pose
 - c. Fish pose
 - d. Cobra pose
3. Which asana is of side twist pose ?
 - a. Shavasana
 - b. Chakrasana
 - c. Ardha Mastendrasana
 - d. Parvatasana
4. Which gland secretes the hormone insulin, the lack of which is associated with Diabetes?
 - a. Endocrine glands
 - b. Pituitary
 - c. Pancreas
 - d. Hypothalamus
5. Katicakrasana is a
 - a. standing asana
 - b. Sitting asana
 - c. Lying asana
 - d. Balancing asana
6. Bhujangasana is also known as
 - a. Dog posture
 - b. Child posture
 - c. Cobra posture
 - d. Reverse Boat posture
7. Which asana can be suggested as preparatory asana for Pawanmuktasana?
 - a. Vajarasana
 - b. Bhujangasana
 - c. Matsyendrasana
 - d. Naukasana
8. What causes an Asthma Attack?
 - a. Allergy
 - b. Smoke
 - c. Exercise
 - d. All of the above
9. Poor exchange of oxygen and carbon dioxide in an individual is the result of
 - a. exercise induced Asthma
 - b. allergy induced Asthma
 - c. Pulmonary Hypertension
 - d. Respiratory Failure
10. Which asana is base asana for curing Asthma?
 - a. Sukhasana
 - b. Chakrasana
 - c. Matsyasana
 - d. Parvatasana
11. What causes Hypertension?
 - a. Excessive insulin secretion
 - b. Smoke
 - c. Food
 - d. All of the above
12. In Uttanpadasana which is the correct pose:
 - a. Legs raised in supine position
 - b. Legs raised in prone position
 - c. Head raised in supine position
 - d. Head and led raised in prone position
13. Which asana is base asana for relaxation and mental repose?
 - a. Shavasana
 - b. Chakrasana
 - c. Halasan
 - d. Parvatasana
14. Which of the asana is for relaxation?
 - a. Makarasana
 - b. Bhadrasana
 - c. Ardh-Chakrasana
 - d. All of the above
15. In Ardh Chakrasana which is the correct pose:
 - a. Back bend in standing position
 - b. Forward bend in standing position
 - c. Leg raised in sitting position
 - d. Head and led raised in lying position
16. Which asana is base asana is not having back bend?
 - a. Tadasasana
 - b. Chakrasana
 - c. Bhujangasana
 - d. Ushtrasana

UNIT IV PHYSICAL EDUCATION AND SPORTS FOR CHILDREN WITH SPECIAL NEEDS

4.1 Organizations promoting Disability Sports

- The first sport clubs for the deaf were already in existence in 1888 in Berlin.
- In 1948, on the opening ceremony of London Olympic Games, Guttmann conducted wheelchair competitions for the first time in history. He named these Games “Stoke Mandeville Games”. These Games later became Paralympic Games which took place in 1960 at Rome.
- In July 1968, the world witnessed the first International Special Olympics Games at Soldier Field in Chicago.
- The Deaflympic Winter Games were started in 1949.

4.1.1 PARALYMPICS

- The word Paralympics is derived from the Greek word para which means beside or alongside and Olympic. Combined, Paralympics means an international Games competition that is parallel to the Olympics.



- International Paralympic Committee (IPC) was formed on 22 September 1989 and is situated in Germany.
- The vision of IPC is ‘To enable Para athletes to achieve sporting excellence and inspire and excite the world.’
- In 1952, Dutch ex-servicemen also joined the Movement and the International Stoke Mandeville Games Federation (ISMGF) was founded which conducted its first Paralympic Games at Italy 1960 featuring athletes from 23 nations. These have now come to be recognised as the first Paralympic Games.
- International Sport Organisation for the Disabled (ISOD), which had been formed in 1964
- Formation of International Paralympics Committee (IPC) on 22nd September 1989 at Dusseldorf, Germany as a global governing body of Paralympic movement.
- The vision of the IPC is, “To enable Paralympic athletes to achieve sporting excellence and to inspire and excite the world.” The Paralympic anthem is “Hymne de l’Avenir” or “Anthem of the Future”. It was composed by Thierry Darnis and adopted as the official anthem of the IPC in March 1996.

1. Physical Impairment – There are eight different types of physical impairment:

- **Impaired muscle power** – With impairments in this category, the force generated by muscles, such as the muscles of one limb, one side of the body or the lower half of the body is reduced. e.g., spinal cord injury, spina bifida, post-polio syndrome.
- **Impaired passive range of movement** – The range of movement in one or more joints is reduced in a systematic way. Acute conditions such as arthritis are not included in this category.
- **Loss of limb or limb deficiency** – A total or partial absence of bones or joints from partial or total loss due to illness, trauma, or congenital limb deficiency. e.g., amputation, dysmelia.
- **Leg-length difference** – Significant bone shortening occurs in one leg due to congenital deficiency or trauma.
- **Short stature** – Standing height is reduced due to shortened legs, arms and trunk, which are due to a Musculo-skeletal deficit of bone or cartilage structures. e.g., achondroplasia, growth hormone deficiency, osteogenesis imperfecta.
- **Hypertonia** – Hypertonia is marked by an abnormal increase in muscle tension and reduced ability of a muscle to stretch. Hypertonia may result from injury, disease, or conditions which involve damage to the central nervous system. e.g., cerebral palsy.

- **Ataxia** – Ataxia means without coordination, is an impairment that consists of a lack of coordination of muscle movements. e.g., cerebral palsy, Friedreich's ataxia, multiple sclerosis.
 - **Athetosis** – Athetosis is generally characterized by unbalanced, involuntary movements and a difficulty maintaining a symmetrical posture (e.g., cerebral palsy, choreoathetosis).
- ** Cerebral palsy is a group of conditions that affect movement and posture.

4.1.2 SPECIAL OLYMPICS



- The Logo of Special Olympics is based on the sculpture “Joy and Happiness to All the Children of the World” by Zurab Tsereteli and was adopted in 1979. It reflects joy, happiness, confidence among children and adults with special needs who are learning coordination, mastering skills, participating in competitions and preparing themselves for richer, more productive lives.
- The mission of Special Olympics is to provide year-round sports training and athletic competition in a variety of Olympic-type sports for children and adults with intellectual disabilities,
- Special Olympics is World Games, which was first held in July 1968 at Chicago with around 1000 participants from U.S. and Canada. Special Olympic Winter Games were initiated in 1977 at Colorado, US.
- The Special Olympics was officially recognized by the International Olympic Committee (IOC) in 1988.

History of Special Olympics

- The first games were held on July 20, 1968 in Chicago,
- In 2003, the first Special Olympics Summer Games to be held outside the United States, were held in Dublin, Ireland
- The first World Winter Games were held in 1977 in Steamboat Springs, Colorado.
- The Special Olympics logo is based on the sculpture “Joy and Happiness to All the Children of the World” by Zurab Tsereteli. The logo is a symbol of growth, confidence and joy among children and adults with disabilities
- The Special Olympics athlete’s oath, which was first introduced by Eunice Kennedy Shriver at the inaugural Special Olympics international games in Chicago in 1968, is “Let me win. But if I cannot win, let me be brave in the attempt.”
- To participate in Special Olympics, a person must be at least 8 years old

4.1.3 Deaflympics

- The first games, known as the International Silent Games, were held in 1924 in Paris with 148 athletes from nine (9) European nations participating.
- Winter Games were instituted in 1949 at Seefeld, Austria.
- The most recent name, the “Deaflympics,” was formally adopted in 2001.
- Deaflympics are held every four years starting from 1924,

4.1.3.1 Logo



- The logo of Deaflympics designed in 2003 is a positive and powerful symbol of the international deaf sports community. It ties together strong elements: Sign language, deaf and international cultures, unity, and continuity.
- The hand shapes, “ok”, “good”, and “great” that overlap each other in a circle, represent the original sign for “deaflympics”. Together, the hand shapes represent the sign for “united”.
- The centre of the logo represents the iris of the eye, which defines deaf people as visual people; they must use their eyes to communicate.
- The logo incorporates the four colours of the national flags of the world. The red, blue, yellow and green represent the four regional confederations – the Asia Pacific Deaf Sports Confederation, the European Deaf Sports Organization, the Pan American Deaf Sports Organization and the Confederation of African Deaf Sports.

4.2 Concept of Classification and Divisioning in Sports

‘Classification’ and ‘Divisioning’: ‘Classification’ is a grouping process associated with Paralympics and para-athletes, and ‘Divisioning’ is a process of grouping associated with Special Olympics. Classification process adopted by Paralympics assigns categories to athletes based on different types of disabilities, on the other hand divisioning process of Special Olympics is a performance-based system of grouping athletes bases on their skill level.

Age

Team Sports	Individual Sports
15 & under	8 – 11 years
16 – 21 years	12 – 15 years
22 and above	16 – 21 years 22 – 29 years 30 and above

Maximum Effort Rule: To achieve the intentions of fairness, there is a ‘maximum efforts rule’, wherein athletes are expected to give their maximum effort during divisioning process and coaches are expected to motivate all athletes towards giving their best. Special Olympics Athletes who do not participate honestly and do not adhere to the maximum effort rule in all preliminary trials or final rounds violate the true spirit of competition and may even be disqualified from competition.

4.3 Concept of Inclusion in Sports, its need and implementation

Education a fundamental right of every child between the ages of 6 and 14 all children

1. The International Paralympics Committee was founded in the year
 - a. 1960
 - b. 1948
 - c. 1900
 - d. 1989**
2. The reason Paralympic Games got their name was because
 - a. they were meant for athletes suffering from paraplegia.
 - b. they run alongside or parallel to the Olympic Games.**
 - c. the athletes are paragons of their sports.
 - d. they are attended by a large number of paramedics.
3. Paralympic Games was a 1948 sporting competition held at Stoke Mandeville hospital in
 - a. England**
 - b. United States of America
 - c. Germany
 - d. Greece
4. The founder of Special Olympics was
 - a. Eunice Kennedy Shriver**
 - b. John F. Kennedy
 - c. Lyndon B. Johnson
 - d. Donald Trump

UNIT V SPORTS AND NUTRITION

1. **Cereals and Millets:** Cereals and millets include foods like wheat, rice, jowar, bajra, ragi etc. Majorly provide carbohydrates. Cereals also provide protein (protein quality can be improved by consuming it with pulses), B-vitamins, iron (bajra) and calcium (ragi).
2. **Pulses:** Pulses include all whole and washed dhals like red gram (lobia), Bengal gram (chana), lentils, green gram (moong) etc. Pulses provide protein (protein quality is improved by combining it with cereals). They are also a fair source of carbohydrates and B-vitamins especially thiamine and niacin. Whole pulses also provide iron and fibre; sprouts provide vitamin C.
3. **Milk and Milk Products:** This group includes foods like milk, curd, cheese, paneer, khoa etc. The major nutrient it gives is good quality protein, besides providing other nutrients like carbohydrates, fat (whole milk), calcium and riboflavin. Milk and milk products are generally sources of all nutrients except iron and vitamin C.
4. **Meat and Meat Products:** These include foods like meat, fish, chicken, egg and products made with these. This group is a major source of good quality protein. Other nutrients supplied by this group are B-vitamins, retinol (liver) and calcium (fish). Eggs particularly are good sources of most nutrients.
5. **Nuts and Oil Seeds:** Nuts and oil seeds eg., groundnuts, almonds, cashew nuts, til seeds, pistachio etc. are a good source of fat. They also provide protein, B-vitamins, calcium and other minerals.
6. **Green Leafy Vegetables (GLVs):** These include vegetables like mustard (sarson), bathua, fenugreek leaves (methi), spinach (palak). Green leafy vegetables are a good source of carotene (vitamin A, B-vitamins (especially riboflavin and folic acid), iron (especially sarson and bathua) and fibre. They are also a source of calcium, but presence of oxalates in GLVs bind calcium and make most of it unavailable for absorption and utilisation. Fresh GLVs provide vitamin C.
7. **Root Vegetables:** These include potato, colocasia, sweet potato, yam etc. Major nutrient supplied by root vegetables is carbohydrate. Carotene is provided only by yellow yam.
8. **Other Vegetables:** All other vegetables like brinjal, ladyfinger (okra), beans, cauliflower etc. provide fibre, vitamins, some amount of minerals.
9. **Fruits:** Wide variety of fruits is available in the market. Different fruits are sources of different nutrients; hence a combination of various fruits should be included in the balanced diet. Fruits like mangoes, apricots, oranges, papaya are rich in carotene, citrus fruits like orange, mausambi, amla and guavas are good sources of vitamin C, dried fruits like dates and raisins are rich in iron. Fibre is provided by most fruits.
10. **Sugar and Jaggery:** These are simply carbohydrates. Jaggery also has iron.
11. **Fats and Oils:** Include ghee, oil, butter etc. are a rich source of fat. Vitamin D also is provided by butter/fortified oils.

Food groups can also be classified according to their functions:

Group 1. Energy giving foods- This category includes foods rich in carbohydrate and fat

- a. Cereals and roots and tubers
- b. Sugar and jaggery
- c. Fats and oils

Group 2. Body building group – this category includes foods rich in protein

- a. Milk and milk products
- b. Meat and meat products, fish, egg, or poultry
- c. Pulses
- d. Nuts and oilseeds

Group 3. Protective or regulatory foods – This group include foods providing vitamins and minerals

I. Fruits-

- a. Yellow and orange fruits (mango, papaya)
- b. Citrus fruits (lemon, orange, mausambi)
- c. Others (apple, banana etc.)

II. Vegetables

- a. Green leafy vegetables (spinach, mustard, fenugreek etc.)
- b. Yellow and orange vegetables (carrot, pumpkin)
- c. Others (beans, okra, cauliflower etc.)
- d. Root vegetables- potatoes and yam (arvi) are rich in carbohydrates
- Total energy intake in the following proportion: carbohydrates: 55-60%; protein: 10- 15% and fats: 20-30%. Water does not provide energy but is a vital nutrient required in large quantity for functioning of metabolic processes in the body and various regulatory functions. Therefore, it is also considered a macronutrient.
- **Proteins:** provide energy (4 Kcal/g)
- **Fats** provide energy (9kcal/g)
- Carbohydrates are organic compounds made up of Carbon, Hydrogen and Oxygen.
- Carbohydrates are a major source of energy and provide 4kcal per gram.
- Carbohydrates are found in abundance in plant foods.
- There are three types of carbohydrates monosaccharides, disaccharides and polysaccharides. Monosaccharides are simple single units of sugars like glucose, fructose and galactose.
- Disaccharides are when two monosaccharides are combined together; these are maltose (glucose + glucose), lactose (glucose + galactose) and sucrose (glucose + fructose). Simple sugars (mono and disaccharides) are found in fruits (in the form of sucrose, glucose and fructose), milk (in the form of lactose) and sweets that are produced commercially and added to foods to sweeten, prevent spoilage, or improve structure and texture.
- Polysaccharides are more than two units of monosaccharides joined together. These are starches and fibre (cellulose). These are also called complex sugars and are found in whole grain cereals, rice, oats, potatoes, bread, legumes, corn and flour.

I. Tick the correct option.

1. In which of the following food groups “Sugar and jaggery” come under?
 - a. Protective or regulatory foods
 - b. Energy giving foods**
 - c. Body building foods
 - d. Immunity boosters foods
2. Nutrition is ----- Substance.
 - a. Biological
 - b. Chemical**
 - c. Energy
 - d. Mechanical
3. Which is NOT a Micronutrient?
 - a. Macro Minerals
 - b. Trace Minerals**
 - c. Vitamins
 - d. Protein**
4. Which of the following is a water-soluble vitamin?
 - a. Vitamin A
 - b. Vitamin B**
 - c. Vitamin D
 - d. Vitamin K
5. Iron is a part of
 - a. trace minerals**
 - b. macro minerals
 - c. vitamins
 - d. carbohydrate
6. Fats and oils come under:
 - a. protective or regulatory foods
 - b. energy giving foods**
 - c. bodybuilding group
 - d. routine foods
7. 1 gram of fat provides
 - a. 3 kcal
 - b. 4 Kcal**
 - c. 5 Kcal
 - d. 9 Kcal**

UNIT VI TEST AND MEASUREMENT IN SPORTS

6.1 Fitness Test – SAI Khelo India Fitness Test in School

BATTERY OF TESTS AGE GROUP 5-8 YEARS | CLASS 1 to 3,

6.1.1 BODY MASS INDEX (BMI)

Purpose: Body Composition refers primarily to the distribution of muscle and fat in the body. Body size such as height, lengths and girths are also grouped under this component.

Infrastructure/Equipment Required: Flat and Clean surface, Weighing Machine, Stadiometer/Measuring Tape pasted on a wall

Scoring: The test performed is Body Mass Index (BMI), which is calculated from body Weight (W) and height(H).

6.1.2 PLATE TAPPING TEST

Purpose: Tests speed and coordination of limb movement

Infrastructure/Equipment Required: Table (adjustable height), 2 yellow discs (20cm diameter), rectangle (30 x 20 cm), stopwatch

Procedure: The two yellow discs are placed with their centers 60 cm apart on the table. This action is repeated for 25 full cycles (50 taps).

Scoring: The time taken to complete 25 cycles is recorded.

6.1.3 FLAMINGO BALANCE TEST

Purpose: Ability to balance successfully on a single leg. This single leg balance test assesses the strength of the leg, pelvic, and trunk muscles as well as Static balance.

Infrastructure/Equipment Required: Non-slippery even surface, Stopwatch, can be done while standing on beam

Procedure:

Count the number of falls in 60 seconds of balancing. If there are more than 15 falls in the first 30 seconds, the test is terminated.

Scoring: The total number of falls or loss of balance in 60 seconds of balancing is recorded. If there are more than 15 falls in the first 30 seconds, the test is terminated.

6.1.4 AGE GROUP: 9-18+ YEARS | CLASS 4 TO 12

6.1.6 ABDOMINAL (PARTIAL CURL-UP)

Purpose: The curl up test measures abdominal muscular strength and endurance of the abdominals and hip flexors, important in back support and core stability.

Infrastructure/Equipment Required: two parallel strips (6 inches apart),

Scoring: Record the maximum number of Curl ups in a certain time (30 seconds).

6.1.7 PUSH UPS (BOYS)/MODIFIED PUSH UPS (GIRLS)

Purpose: Upper body strength endurance, and trunk stability.

6.1.8 SIT AND REACH

Purpose: flexibility of the lower back and hamstring muscles.

Infrastructure/Equipment Required: Sit and Reach box with the following dimensions: 12" x 12" (sides) 12" x 10" (front and back) 12" x 21" (top).

6.1.9 600 MTR RUN/WALK

Purpose: Cardiovascular Fitness/Cardiovascular Endurance

Infrastructure/Equipment Required: 200 or 400 mts. with 1.22 mts. (minimum 1 mts.)

6.1.10 50 MTR DASH (STANDING START)

Purpose: Determines acceleration and speed

6.2 Measurement of Cardio-Vascular Fitness



Developed by Brouha in 1943. Brouha tested 2200 males.

Purpose: To determine aerobic fitness.

Objective: To perform step test continuously without break for 5 minutes or until exhausted.

Equipment: Bench or wooden block 20 inches in height; stopwatch; metronome.

Pulse Count

Takes the heart beats between 1 to 1½ minutes.

Scoring

$$\text{Fitness Index Score} = \frac{\text{Duration of the exercise in seconds} \times 100}{5.5 \times \text{Pulse count of 1-1.5min. after Exercise}}$$

Norms for Harvard Step Test

Up to 49	Poor
50-80	Average
81 or Above	Good

6.3 Computing Basal Metabolic Rate (BMR)

The Basal Metabolic Rate (BMR) is the number of calories needed to maintain body function and resting condition. Unit of BMR is calculated in Kcal.

Purpose: determine Basal Metabolic Rate

Equipment: Stadiometer, Weight machine, Pen and paper

Formula used: The Mifflin - St Jeor BMR Equation

Male calculation = $(10 \times \text{weight in kg.}) + (6.25 \times \text{height in cm}) - (5 \times \text{age}) + 5$

Female calculation = $(10 \times \text{weight in kg.}) + (6.25 \times \text{height in cm}) - (5 \times \text{age}) - 161$

6.4 Rikli and Jones Senior Citizen Fitness Test

Aged between 60 to 94 years. The purpose of the test was to evaluate functional ability and monitor the physical fitness status of older people and to identify problems and work on the weakness.

6.4.1 30 SECOND CHAIR STAND TEST

Purpose: To determine lower body strength.

Objective: To complete maximum stands in 30 seconds.

Equipment: Straight back chair without arms; stopwatch.

Scoring: Maximum number of complete stands will be counted as score. If the individual is in halfway of the stand and time is over, then it will be counted as a full stand.

6.4.2 ARM CURL TEST

Purpose: To determine upper body strength.

Objective: To complete maximum arm curls in 30 seconds.

Equipment: Dumbbell for men- 8 pounds (3.6kgs) and women- 5 pounds (2.3kgs);.

Scoring: Maximum number of correct arm curls in 30 second will be counted.

6.4.3 CHAIR SIT AND REACH TEST

Purpose: To determine lower body flexibility.

Objective: To stretch the lower body as far as possible.

Equipment: Straight back chair without arms; 18 inches ruler.

6.4.4 BACK STRETCH

Purpose: To determine upper body flexibility

Objective: To touch or overlap the finger of the both hands behind the back.

Equipment: 18 inches ruler

6.4.5 FOOT UP AND GO

Purpose: To determine physical mobility (power, speed, agility, and balance).

Objective: To stand and walk 16 feet and sit back as fast as possible (without running).

Equipment: Straight back chair without arms; cone; stopwatch,

Scoring: Two attempts will be made, and the best score will be taken for record.

6.4.6 MINUTE WALK TEST

Purpose: To determine aerobic endurance

Objective: To walk maximum distance in 6 minutes.

Equipment: Walking area of 20 yards each between parallel lines connected with 5 yards lines making rectangles; stopwatch; cone.

6.5 Johnson – Metheny Test of Motor Education

Objective: Johnson- Metheny Test battery is revised version of Johnson Educability Test which was designed in 1932. The purpose of the Johnson battery was to measure neuromuscular skill capacity which have ten items. In 1938 Methney studied the test and eliminated six items.

Four stunts are to be performed by the boys and first three stunts for girls.

Test Area: Mat area length is 15 feet and it is 2 feet wide. The 15 feet length divided in to ten sections for 18" each. The width of transverse line is $\frac{3}{4}$ " and 3" alternatively. Centre of lines remains 18" apart. Another $\frac{3}{4}$ " wide line is marked lengthwise in the middle of the mat area.

Procedure:

1. **Front Roll:** Perform two front rolls, one up to 7.5' i.e. 3" wide centre line and the second in the other half of 7.5'.

Scoring: Each correct roll gets 5 points, hence maximum of 10 points. Two points are deducted for over-reaching side line, right or left for each roll; one point is deducted for over reaching the end limit on each roll and full five points are deducted when the subject fails to perform a true front roll

2. **Back Roll:** 'Perform two back rolls in the 2 feet lane area, one up to first half and the second back roll in the second half.

3. **Jumping Half Turns:** Perform in between two 3 inches wide line right or left alternatively.

Scoring: Perfect execution of four jumps is worth ten points. Only 2 points are deducted for each wrong jump

Jumping Full Turns: Perfect execution of five jumps is worth ten points. Two points are deducted, if the subject fails to keep balance on landing on both feet; turns too far or oversteps the squares.

1. 50 Mtr Dash is conducted to test:

- | | |
|----------------|-----------------|
| a. Strength | b. Acceleration |
| c. Flexibility | d. Endurance |

2. Which test can be applied to test Endurance?

- | | |
|---------------------|-----------------------|
| a. Sit and Reach | b. Push Ups |
| c. 600 Mtr Run/Walk | d. Plate Tapping Test |

3. Partial curl up is to test .

- | | |
|-------------------------------------|--------------------------------------|
| a. agility and speed | b. leg strength and endurance |
| c. abdominal strength and endurance | d. upper body strength and endurance |

4. Sit and reach test measures

- | | |
|--------------|----------------|
| a. endurance | b. flexibility |
| c. strength | d. speed |

5. The test duration for the Harvard fitness test is

- | | |
|--------------|--------------|
| a. 3 minutes | b. 4 minutes |
| c. 5 minutes | d. 6 minutes |

6. The Harvard step test is developed by

- | | |
|------------|-----------|
| a. Harvard | b. Brouha |
| c. Kansal | d. SAI |

7. What id BMR?

- | | |
|----------------------|-------------------------|
| a. Bodily Mass Index | b. Body Mass Index |
| c. Boldy Mass Index | d. Basal Metabolic Rate |

8. Which parameter is not required to assess the BMR

- | | |
|-----------|-----------|
| a. Weight | b. Height |
| c. Age | d. Name |

9. Which is not an item of Rikli and Jones Test?

- | | |
|-----------------------|-----------------------|
| a. 8 Foot Up and Go | b. Sit and Reach test |
| c. 6 Minute Walk Test | d. Arms Curl Test |

10. What is the weight of dumbbell for men in arm curl of Rikli and Jones Test?
- a. 5 pounds
 - b. 6 pounds
 - c. 8 pounds
 - d. 10 pounds
11. Johnson- Metheny Test battery has _____ Items.
- a. 6
 - b. 5
 - c. 4
 - d. 10
12. Johnson- Metheny Test battery does not consist of _____ motor stunts
- a. Front Roll
 - b. Back Roll
 - c. Side Roll
 - d. Jumping Full- Turns

UNIT VII PHYSIOLOGY AND INJURIES IN SPORTS

7.1 Physiological Factors Determining the Component of Physical Fitness

- Exercise physiology is a study of the body's response to exercise.

SKELETAL MUSCLES FACTOR

- Skeletal muscles are made up of muscles fibres which are divided into two categories Slow twitch fibres or Type I fibres and Fast twitch fibres or Type II fibres.
- Skeletal muscles have four properties contractility, excitability, extensibility, and elasticity.
- **Slow twitch fibres or Type I fibres** or slow oxidative fibres contain large numbers of oxidative enzymes, have more capillaries, higher concentration of myoglobin and mitochondrial enzyme than fast twitch fibres which promote aerobic activity and resistance against fatigue. Due to higher concentration of capillaries the colour of fibres becomes red and has greater supply of blood. Such types of fibres contract at low rate and keep contracting for longer duration without fatigue; thus, producing large amounts of energy slowly. Slow twitch fibres help in long distance running, swimming, cycling etc.
- **Fast twitch fibres or Type II fibres** or Fast glycolytic fibres contain a good volume of glycolytic enzymes which promote anaerobic activity but due to a smaller number of mitochondria they have limited aerobic capacity and low fatigue resistance. Fast twitch fibres do not require blood supply to produce energy, so their colour is lighter as compared to slow twitch fibre. Such fibres have fast contraction rate, tire rapidly and Type consume lots of energy, and can produce small amount of energy quickly. Fast twitch muscle fibre helps in anaerobic activities like jumps, throws, sprint etc.
- There are variations of types of fibres among athletes participating in the same sports also Sprinters generally have a higher percentage of Type II fibres and a lower percentage of Type I fibres, while endurance athletes have a higher percentage of Type I fibres and a lower percentage of Type II fibres.

ENERGY PRODUCTION FACTOR

- Cellular respiration is a process in which ATP (Adenosine triphosphate) is formed through food.
- Higher intensity aerobic activity requires carbohydrates in the form of glucose and glycogen as fuel.
- Carbohydrates work as a fuel for short duration exercise, fats are utilized for long duration exercises and proteins contribute a small but important proportion of nourishment.
- Three energy system works in our body ATP-CP (Creatine phosphate) system, anaerobic system, and aerobic system. ATP- CP system provides energy if the activity is less than 10 second. They include jumps, throws, sprints, weightlifting, powerlifting etc.

- Anaerobic system provides energy for less than two minutes, in activities like 200m, 400m races.
- Aerobic system provides energy for long duration activities like marathon, football, hockey etc.

7.1.3 CARDIORESPIRATORY FACTOR

- Maximal oxygen consumption (VO₂ Max),

7.2 Effect of Exercise on Muscular System

- **Micro-tears in Muscle Fibres:** During exercises muscle tissue is placed under stress which results in micro-tears in muscle fibres. The body responds by repairing the muscle fibres and making them larger. When a muscle gets bigger, this process is called **hypertrophy**.
- **Hypertrophy of Muscle:** Scientific and systematic exercise leads to increase in thickness of muscle fibres that results in increase in muscle size also known as muscle hypertrophy.
- **Increase in Myoglobin Storage:** Long term effect of aerobic exercise is to increase the storage of myoglobin which transports oxygen to mitochondria.
- **Increase in Glycogen Storage:** Glycogen is generally stored in muscles and liver. Regular exercise helps the body to increase the storage of glycogen which may give continuous energy for 90 to 120 minutes.

7.3 Effect of Exercise on Cardiorespiratory System

Cardiorespiratory system consists of two parts. They are

- **Cardiovascular system** - It consists of three parts: the heart, blood vessels and blood. Its major function is to deliver oxygen and nutrients, remove CO₂ and other metabolic waste products, to transport hormones and other molecules, to support thermoregulation and control of body fluid balance and lastly to regulate immune function.
- **Respiratory system** - The important parts of the respiratory system are the nose, nasal cavity, pharynx, larynx, trachea, bronchi, and lungs. Its major functions include, transporting air to the lungs, exchanging gases (O₂ and CO₂) between the air and blood, and regulating blood pH.
- **Stroke Volume:** The volume of blood pumped during one beat (contraction) is called stroke volume. During exercise, stroke volume increases as more oxygen is required. After an endurance training programme capacity of heart to pump blood in one contraction increased by 20 to 50 percent.
- **Cardiac Output:** Cardiac output is the amount of blood pumped out by each ventricle of the heart in 1 minute. Resting cardiac output is approximately 5.0 L/min. Maximal cardiac output varies between less than 20 L/min in sedentary individuals to 40 or more L/min in elite endurance athletes.
- **Decrease in Resting Heart Rate:** Due to improved efficiency of the heart, it is required to pump less blood to meet the needs of the body. As a result, the heart rate at rest decreases. It is also called as **Bradycardia**.
- **System Respiratory Rate Increases:** The normal respiration rate for an adult at rest is 12 to 20 breaths per minute, but during exercise it increases to 40 breaths per minutes.
- **Tidal Volume:** The amount of air inhaled and exhaled in one breath is known as tidal volume..
- **Residual Volume:** Residual volume is the volume of air that remains in the lungs after forceful expiration.

7.5 Sports Injuries

1. **Direct Injuries:** They are sustained from an external force causing injury at a point of contact.

2. **Indirect Injuries:** It usually involves the athlete damaging the soft tissues such as ligaments tendons or muscles of the body through internal or external force.
3. **Soft Tissue Injuries:** Any injuries to skin muscles or ligaments are soft tissue injuries.
4. **Hard Tissue Injuries:** Injuries that occur in bones and cartilages.
5. **Overuse Injuries:** They are sustained from continuous or repetitive stress, incorrect technique, or equipment or too much training.

7.5.3 SOFT TISSUE INJURIES

A soft tissue injury is the damage of muscles, ligaments and tendons throughout the body.

- **Abrasion:** Occur due to moving contact with a rough surface, causing a grinding, or rubbing away of the upper superficial layers of the epidermis.
- **Contusion:** It is the type of hematoma, which refers to any collection of blood outside of a vessel.
- **Laceration:** The irregular tear-like wounds caused by some blunt trauma.
- **Strain:** Strain is an injury to the muscles which are attached to a bone, that is a twist, pull or tear of a muscle or the tendon.
- (RICE: rest, ice, compression, and elevation).
- **Sprain:** Sprain is the stretching or tearing of ligaments, the fibrous tissue that connects bones in the joints.
- **Incision:** An incision is a cut made into the tissues of the body to expose the underlying tissue, bone or organ.
- **Dislocation:** Dislocations are joint injuries that force the ends of bones out of position.
- **Greenstick:** A fracture in a young, soft bone, in which the bone bends.
- **Comminuted:** A fracture in which a bone is broken, splintered, or crushed into number of pieces.
- **Transverse:** Transverse fracture is when there is a straight break right across a bone.
- **Oblique:** Oblique fracture is one in which the bone breaks diagonally.
- **Impacted:** This type of fracture occurs when the broken ends of the bones are jammed together by the force of the injury.

1. ----- system provide energy during 5000m race.
 - a. ATP CP system
 - b. Anaerobic System
 - c. **Aerobic System**
 - d. Endurance System
2. Slow twist fibres are of----- colour.
 - a. Red
 - b. White
 - c. Black
 - d. Blue
3. Vo₂ max is related to -----.
 - a. Muscular system
 - b. **Respiratory system**
 - c. Cardiovascular system
 - d. Energy production system
4. Which is NOT a property of muscles?
 - a. Contractility
 - b. Excitability
 - c. Extensibility
 - d. **Durability**
5. Which is not a long term effects of exercise on muscular system?
 - a. Hypertrophy of muscle
 - b. Increased metabolism
 - c. Increased Myoglobin
 - d. **Increased blood supply**
6. Which is not a short term effects of exercise on muscular system?
 - a. Accumulation of Lactate
 - b. Micro-tears in muscle fibers
 - c. Increase muscle temperature
 - d. **Increase in lactate acid tolerance**
7. Physical activity helps to increase -----.
 - a. **size of muscle**
 - b. size of bone
 - c. size of brain
 - d. size of liver

UNIT VIII BIOMECHANICS & SPORTS

8.1 Newton's Laws of Motion and their Application in Sports (Sir Isaac Newton (1642-1727))

8.1.1 NEWTON'S FIRST LAW OF MOTION (LAW OF INERTIA)

Application in Sports

- If you slide a hockey puck on ice, eventually, it will stop because of friction on the ice. It will also stop if it meets something like a player's stick or a goalpost.
- A skater gliding on ice will continue gliding with the same speed and in the same direction unless an external force acts upon the skater.
- That unbalanced force is the player's foot, head, friction, gravity, and the net during a soccer game. A soccer player uses the body's muscles to create a force to move the leg and kick the ball from rest to motion until another player or the net stops or changes the ball's motion.
- When a ball is thrown and is in mid-air, the only force acting upon it is the force of gravity. If the force of gravity did not exist, the ball would keep traveling at a constant speed until it was affected by an object or another person touched it. If this ball were thrown upwards, it would end up traveling into space!

8.1.2 NEWTON'S SECOND LAW OF MOTION (LAW OF MOMENTUM)

Application in Sports

- As in Shot-put, a player who applies more force and tosses the shot-put at the correct angle has a greater displacement of shot-put, whereas a player who exerts less force has a lesser displacement of shot put.
- When a ball is thrown, kicked, or struck with an implement, it tends to travel in the direction of the line of action of the applied force. The greater the amount of force applied, the greater the speed the ball has. If a player improves leg strength through training while maintaining the same body mass, they will have an increased ability to accelerate the body using the legs, resulting in better agility and speed.
- In soccer, a team will require more force to kick the ball high and faster. This law of motion is fundamental in soccer, so you can calculate the force needed to give a pass or kick the ball to the net without missing.

8.1.3 NEWTON'S THIRD LAW OF MOTION (LAW OF REACTION)

Application in Sports

- In Swimming, a diver needs to push down on the springboard when he/she dives off a diving board. The springboard pushes back the force on you for proper projecting into the air during the performance.
- When you jump off a small rowing boat into the water, you will push yourself forward towards the water. The same force used to go ahead will make the boat move backward.
- During a soccer match, we need to kick the ball for passing, shooting, or clearing the ball. While kicking the soccer ball, we will feel the force of the kickback on our leg. We won't feel the force as much because our legs have more mass than the soccer ball.
- During any type of motion, if we need to jump, our legs apply force to the ground, and the ground applies equal and opposite reaction force (ground reaction force) that propels us into the air.

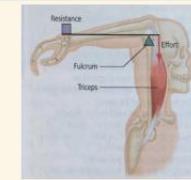
8.2 Levers

- A lever is "a rigid bar used to overcome resistance when a force is applied."
- **Fulcrum:** It is the point at which the lever rotates or turns
- **The Force/Effort Arm:** It is the point at which the force is applied.
- **The Load/Resistance Arm:** It is the point where the load or resistance is located.

8.2.1 TYPES OF LEVERS

First-Class Lever: A first lever has the fulcrum between the force and the resistance.

Examples of 1st class lever

	
<p>Triceps causing Extension at the elbow</p> <p>Example: When throwing a ball:</p> <ul style="list-style-type: none">◆ Fulcrum = Elbow◆ Effort = Triceps◆ Load = Arm/ball	<p>V- sit-up position.</p> <p>Example: When doing V-sit-up -</p> <ul style="list-style-type: none">Fulcrum = Hip jointEffort = AbdomenLoad = Leg/Lower body

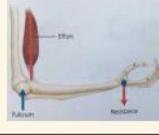
Second Class Lever: A second class lever has the load resistance between the fulcrum and the force.

Examples of 2nd class lever

	
<p>The foot acting as a whole is a second-class lever when the fulcrum is the ball of the foot, and the body weight is lifted to the toes by force at the heel.</p> <p>Example: When throwing a ball:</p> <ul style="list-style-type: none">Fulcrum = Ankle jointEffort = GastrocnemiusLoad = Ankle joint	<p>Straight Push-ups.</p> <p>Example: When doing V-sit-up -</p> <ul style="list-style-type: none">Fulcrum = Ball of the footEffort = Arm Muscle contraction.Load = Body weight

Third Class Lever: A third-class lever has the force between the fulcrum and the resistance.

Examples of 3rd class lever

	
<p>Bicep causing flexion at the elbow</p> <p>Example: When throwing a ball:</p> <ul style="list-style-type: none">Fulcrum = Elbow jointEffort = BicepsLoad = Arm/Weight	<p>Sit-ups</p> <p>Example: When doing Sit-ups</p> <ul style="list-style-type: none">Fulcrum = Hip jointEffort = AbdomenLoad = Upper body

Application in Sports

1. **Cricket bat (2nd class)** - The fulcrum is the top of the handle, the load is the bat's body, and the force is closer to the neck of the handle.
2. **Kicking - Lower limb (3rd class)** – The fulcrum at the knee joint, force at tibial tuberosity, (attachment of the quadriceps) load is the foot.
3. **Jumping** - Plantar flexion of the foot (2nd class) – The load is at the toes, the fulcrum is at the heel, and force is your weight which is anterior to your heel.
4. **Looking up/down or side-to-side (1st class)** - Your head is balanced on your atlantooccipital joint, which pivots, similarly to a seesaw.
5. A tennis player can hit a tennis ball harder with a straight-arm drive than with a bent elbow because the lever is longer & moves at a faster speed.
6. Long levers produce more linear force and thus better performance in some sports such as baseball, hockey, golf, field hockey, etc.

Static Equilibrium

Static equilibrium is the balance of the body during rest or stationary position.

For an object or body to be in a static or static equilibrium, where it is completely motionless it must meet 3 conditions:

1. The sum of all the vertical forces acting on the body must be zero
2. The sum of all the horizontal forces acting on the body must be zero.
3. The sum of all torques must be zero.

8.3.2 FACTORS INCREASING EQUILIBRIUM

- The centre of gravity falls within the base of support
 - Decrease instability when the centre of gravity becomes near the edge of the base
- Larger base
- Greater weight
- Lower centre of gravity
- When anticipating an oncoming force
 - Place centre of gravity near the side of the base of support expected to receive force
 - Extending the base of support in direction of expected force
- Greater friction between body and surfaces it contacts
- Rotation about an axis
 - Moving cycle is easier to balance than a stationary cycle
- Kinaesthetic physiological functions
 - Vestibular system, vision, touch, and kinaesthetic awareness

Examples: Stance maintained by the batsmen in cricket, on the starting block by the sprinter, wide stance maintained by the wrestler, etc.

Dynamic equilibrium

Dynamic equilibrium or dynamic stability is a balance of the body during movement.

Example: Body position maintained by a sprinter while running on the track, Cyclist while cycling, dribbling of the football by a soccer player etc.

Guiding Principles to Determine the Degree of Stability

1. **Broader the base, the greater the stability:** Broadening the base of support helps an athlete to achieve greater stability. E.g., while standing spreading the feet in the direction of movement provide stability. Where a stance is required, using both hands and feet creates the widest base.
2. **Body weight is directly proportional to stability:** The athlete or an object which weighs more will have greater stability. E.g., it is difficult to move a heavier person than a lighter one. Combative sports like, judo, wrestling, taekwondo, and boxing are played according to the bodyweight principle.
3. **Lower the Centre of gravity, higher the stability:** When a player does an activity that needs stability, the player usually lowers their centre of gravity by bending. E.g., when a player bends his knees while running, he can stop sooner and more efficiently. Similarly, a wrestler half sits to maintain his stability. Even a shot-put thrower bends his knees in the end so that he may avoid a foul.
4. **The nearer the centre of gravity to the centre of the base of support the more will be the stability:** If the centre of gravity extends beyond the base of support, balance is lost. Keeping the body's weight centred over the base will support and help maintain stability. E.g., when a gymnast walks on a balance beam one requires a small base of support. During the performance, if the balance is lost the gymnast raises the arm or legs on the opposite sides to shift the centre of gravity back towards the base of support.
5. **Direction of acting force:** During a competition, if the direction of an acting/ applied force is known, stability can be increased by moving the line of gravity as close as possible to the edge of the base where the force is expected. E.g., when in a judo match the judoka shifts his foot in the line of direction of the force applied by the opponent to use the force of the opponent as a counterforce to throw him down.

8.3.3 CENTRE OF GRAVITY

The Centre of gravity is the point at which all the weight or mass of a body may be considered to be concentrated.

- (a) For wrestlers in snatch and jerk, the widening of legs and lowering of body to maintain the stability, makes COG come down.
- (b) During running, the runner's centre of gravity is in the lower region of the pelvis and in front of his body, because his upper body is leaning forwards. Having the centre of gravity lower and in front of his lower body is advantageous for acceleration.

Importance and Application of centre of gravity in Sports

- (a) Helps the athlete to move
- (b) Stops the moving object
- (c) Helps the athlete to accelerate
- (d) Helps the athlete in throwing objects.
- (e) Helps the athlete to lift the object.
- (f) Helps the athlete to pull the object

Example of Centre of Gravity

- In the game of basketball and volleyball, high defence players spread their legs to lower the centre of gravity towards the base to occupy a better position against the offensive player.
- Starting in short sprints in track events is another example of the use of centre of gravity. As we need to take an instant start in sprints, we take our body weight on our hands in the “Set” position. So, that we can start immediately while balancing our weight. (Initially, the centre of gravity of the body falls on the edge of the baseline of hands. If the centre of gravity falls behind the line, then there will be delay in starting because it will require a greater force to go ahead).
- In combative sports like wrestling, a wrestler falls on the mat with arms, knees, and legs spread on the mat to get a proper balanced position, (This position, makes it difficult for the opposite player to move him.

8.4 Friction & Sports

Friction is a force that opposes the motion between two surfaces that are in touch. For example, if you roll a ball on a surface, it will come to rest after a short while.

8.4.1 TYPES OF FRICTION

Static friction: It occurs when the force applied to an object does not cause the thing to move. Because of static friction, you must use extra force to start the motion of stationary objects. E.g., if you try to push a heavy object with less force than the force of static friction between the object and the floor, the object will not move. To make the object move, you need to exert more force than the force of static friction. Once the object is moving, there is no longer any static friction.

Kinetic friction: It occurs when force is applied to an object and the object moves. It includes three different types of friction:

- (a) **Sliding friction:** Pushing an object across a surface. This is when two bodies are in contact and one body moves on the surface of the other body by sliding on it or rubbing over the surface. Example – skating on ice, planting a pole in the pole vault event and skiing or sliding weight.
- (b) **Rolling friction:** It occurs between wheels and a surface. When two bodies are in contact and one body rolls over the other, it is referred to as rolling friction. E.g., when a hockey or cricket ball is hit it begins to move ahead and roll on the ground. After sometimes it stops rolling due to the friction force, this type of friction is often seen in sports. E.g., Roller skates and skateboards
- (c) **Fluid friction:** It opposes the motion of objects traveling through the fluid (gas, air, and water).

For example:

- When you ride a bike, fluid friction occurs between you and the air.
- Cyclist often wears streamlined helmets and specially designed clothing to reduce fluid friction.
- Paragliding vs hang gliding when an athlete glides on air.

Things that affect friction

- Applying a lubricant between two surfaces. (Motor oil, grease, and wax)
- Friction can be reduced by rolling rather than pushing an object
- Friction increases as surfaces are made rougher.
- Friction increases when the force between two objects is increased
- In general, smooth surfaces produce less friction than uneven surfaces.

8.4.2 METHODS OF REDUCING FRICTION

- **Polishing:** If we polish and rub the surface to reduce its unevenness and make it smooth, the force of friction can be reduced. e.g., shining a cricket ball increase the swing of the ball.
- **Lubricating:** A common way to reduce the force of friction is by applying a lubricant such as Motor oil, grease, wax etc. e.g., the most widely used lubricants in practical mechanical systems like bearings or gears.
- **Wheels and Ball bearing use:** It is easier to roll an object than to slide it by using wheels and ball bearings as we convert sliding friction into rolling friction. This reduces friction between the two contact surfaces and helps us to save energy and time. e.g., in roller skates, both wheels and balls contribute to reducing friction.
- **Streamlining:** Friction due to air is reduced by streamlining the shape of the body. e.g., the Javelin, boats, ships, and vehicles, are made with a sharp point to reduce friction.

8.4.3 ADVANTAGES AND DISADVANTAGES OF FRICTION IN THE FIELD OF SPORTS

Advantages

Friction is essential in the field of sports. Without appropriate friction, we will not be able to grip any sports equipment effectively. The advantages of friction in various sports can be explained as follows:

- **Athletics:** In Athletics, the shoes (spikes) are designed to increase friction so that better speed can be generated. The shoes used for short-distance running events have spikes in the front portion only. Whereas the longdistance runner uses completely different shoes.
- **Badminton:** The grip in badminton plays a major role in performing a shot perfectly during a match. That is why a good grip in rackets, will increase the friction with the hand, helping the shot to count and preventing the racket from slipping.
- **Basketball:** Friction between the shoes and the court helps players to maintain control of movement. They wipe their shoes often to get more friction for better movement control.
- **Cricket:** The cricket players, essentially the fielders wear shoes that have spikes. The helps them increase the friction with the ground and hence, helps the cricketer during the run-up for balling, running between the wickets, and preventing from slipping
- **Cycling:** The friction between the tires and the surface prevents cyclists from slipping and skidding. The friction between the brakes and the wheel help cyclists slow down their bikes.
- **Football:** In Football, a footballer kicks and catches the ball. Friction helps him/her to run, change and maintain his/her position on the ground. Better friction helps him/her to tackle the opponent correctly.
- **Gymnastics:** It is due to friction that a gymnast is able to perform actions on the Horizontal bar. In fact, he uses lime powder on his hands to increase the friction between his palm and the bar
- **Javelin:** Friction between the hand and javelin allows the thrower to grip the javelin and friction between shoes and track helps them to generate a perfect ground reaction force for throwing the javelin in the right direction. Without friction, the javelin would just fall out of their hands.
- **Running:** Friction between the shoes and the track enables an athlete to run fast, deaccelerate, stop and change direction. If friction is low, the athlete would slip and even fall.
- **Soccer:** In soccer also number and size of spikes between a striker to a defensive player are different, this technical difference is based on the type of friction required by the players.
- **Weightlifting:** In weightlifting, the weightlifters needs more friction between their feet and the floor to prevent slipping while lifting heavy weights, for which they use specially designed shoes.

The friction force is also required for pulling and pushing which is common in all sports activities. Hence, we can say that friction is necessary to give the best performance all forms of games and sports.

Disadvantages

The disadvantages of friction are as follows:

- **Bicycling:** During cycle racing the tires get heated up due to friction. Due to more heat, tires may burst and it may lead to serious accidents.

- **Weightlifting and Gymnastics:** In weightlifting and gymnastics, the skin in the palm gets damaged due to friction and the athlete even may slip while performing the lift. Hence, gymnasts and weightlifters are advised to use powder on their palms and wear special shoes to maintain appropriate friction
- **Pole-Vault:** During Pole-Vault, a vaulter may lose grip on the pole if less friction is there between palms and pole. Hence, pole vaulters are advised to use adhesive on the palm to increase friction and perform correctly.
- **Friction makes movements difficult:** Any time you want to move an object, friction can make the job more difficult, as movement is directly affected by mass and force applied and also on the surface condition.
- **Excess friction means extra energy:** in other words, more friction means more force to overcome it and more force means more energy. Thus, energy is wasted due to friction.
- **Friction can cause injuries:** if a player slides/falls across the ground. In fact, friction can lead to critical injuries.
- **Wear and tear:** sporting equipment occurs with time because of friction. If, there were no friction, they would last forever.

Consequently, it can be said that it is friction can be is advantageous or disadvantageous depending on the use, time, and place of using it. To some extent, some force of friction is required in various sports. The requirement may differ or vary from sport to sport.

8.5 Projectile in Sports

Examples from sports involve projectile motion:

- Objects acting as projectiles: basketball, football, shot-put, hammer, discus, javelin, golf ball, volleyball, tennis ball, etc
- The body acts as a projectile in high jump, long jump, gymnastics, diving, figure skating, ski jumping etc.

The motion of a projectile is due to two separates simultaneously occurring components of motion

- (a) One along the horizontal direction
- (b) Other along the vertical direction

With constant acceleration due to force of gravity

8.5.2 APPLICATION OF PROJECTILE IN SPORTS

Baseball

Pitching analysis

Projectile motion is applicable in both throwing and hitting. A thrown ball undergoes projectile motion when it is mid-air since the only force that affects the ball is the acceleration due to gravity. A variety of factors will go into the trajectory of a pitch, including a pitcher's height, arm angle, and the spin being applied to the ball.

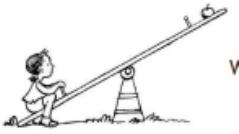
Hitting analysis

In terms of hitting, advanced analytics like to use “launch angle” as a good indicator of the optimal angle that a ball should be hit. Launch angle is the angle at which a ball exits the bat as soon as they connect with each other. The best launch angles, which allow for line drives and home runs, are calculated to be around 10–30 degrees North of East, relative to the bat. This allows for the most optimal ball flight, usually necessary to hit the ball over 325 to 400 feet over the fence.

Basketball

Another example of projectile motion in sports is basketball. For a basketball shot to enter the hoop, the basketball must be shot at a certain angle with a certain amount of force. The optimal angle of a shot will vary depending on the height from which the ball is shot and the player’s distance from the hoop. According to Professor John Fontanella, the ideal angles from the free-throw line will vary from 48.7 degrees to 52.2 degrees, with shorter players.

I. Tick the correct options.

1. According to Newton's Second Law of Motion, the greater the movement of an object, the
 - a. The longer distance will it travel
 - b. Stronger will it resist the external forces
 - c. Speedier it will cover the given distance
 - d. More stable will it remain in its motion.
2. Newton's First Law of Motion is known as the
 - a. Law of Reaction
 - b. Law of Inertia
 - c. Law of Effect
 - d. Law of Momentum
3. Newton's Second Law of Motion is also known as
 - a. Law of Reaction
 - b. Law of Inertia
 - c. Resultant Force
 - d. Law of Effect
4. Acceleration due to an external force acting on a moving object is technically defined as the change in that object's
 - a. Location
 - b. Direction
 - c. Velocity
 - d. Movement
5. The three basic components of a lever are
 - a. Mass, weight & velocity.
 - b. Force, Fulcrum & Load
 - c. Fulcrum, Resistance & Effort
 - d. Both b and c.
6. What type of lever is depicted in the picture?

7. Push up is an example of which lever?
 - a. 1st Class lever
 - b. 2nd Class lever
 - c. 3rd Class lever
 - d. None of the above
8. In the human body, the most common class of lever.....
 - a. 1st Class lever
 - b. 2nd Class lever
 - c. 3rd Class lever
 - d. None of the above
9. When the sum of force acting upon the object and sum of the movement acting upon the body is both equal to zero then the body is said to be in
 - a. Equilibrium
 - b. Static equilibrium
 - c. Dynamic equilibrium
 - d. Zero force
10. The position of the centre of gravity changes depending upon the
 - a. position of force
 - b. position of the body
 - c. position of the intersection of force
 - d. position of stability
11. Centre of gravity is the average location of an object's
 - a. weight
 - b. force
 - c. balance
 - d. velocity
12. The Friction force acts in a/an ----- direction to the direction of motion of an object.
 - a. opposite
 - b. same
 - c. downwards
 - d. diagonal
13. Among the following sports, in which does friction plays the least important role?
 - a. Car Race
 - b. Football
 - c. Hockey
 - d. Ice Skating
14. Friction is a –
 - a. Magnetic Force
 - b. Non-contact Force
 - c. Contact Force
 - d. Couple Force

15. Cyclist often wears streamlined helmets and specially designed clothing to reduce Calibration
- Fluid Friction
 - Rolling Friction
 - Sliding Friction**
 - None of the above
16. Factors that bring air resistance into play
- Larger the surface area
 - Rough surface
 - Smaller the mass
 - All of the above**
17. The motion of a projectile is due to two separates simultaneously occurring components of motion and they are
- One along the vertical
 - One along the horizontal
 - both a and b**
 - none of above
18. According to Professor John Fontanella, the ideal angles from the freethrow line will vary from ----- to ----- with shorter players.
- 48.7 degrees to 52.2 degrees,**
 - 45.6 degrees and 50.2 degrees,
 - No specific degree
 - Any degree

UNIT IX PSYCHOLOGY AND SPORTS

9.1 Personality

- The word personality is derived from the Latin word persona, the mask used by actors in the Roman theatre for changing their appearance for performing in front of their audience according to the given role.

Characteristics of Introverts & Extroverts	
Introvert	Extrovert
Interested in their own self Reserved Self-aware and introspective Take pleasure in reading, writing Tend to shy away from public Think before acting	Highly socialized Broad-minded Expressive and enjoy centre of attention Meet unknown people easily Bold, outgoing, and optimistic person Action oriented

- Thinking and sensations are rational, according to Jung, while intuition and feeling are irrational.
- Big Five Factor personality model offered by Paul Costa and Robert McCrae.
- The five personality traits also known as the Five Factor Model of Personality and sometimes referred as OCEAN. The five domains or traits represented by the acronym OCEAN, are Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism.
- The term 'Motivation' is derived from Latin word Movere meaning 'to move'.

BIG 5 Traits	Behaviour for High Score	Behaviour for low score
Openness	Curious, Imaginative, Intellectual, Creative, Open to trying new things, focused on tackling new challenges, Thinks about abstract concepts	Dislikes change, Does not enjoy new things, Resists new ideas Not very imaginative, Dislikes abstract or theoretical concepts
Conscientiousness	Well-Organised, careful, responsible, self-disciplined	Disorganised, careless, relaxed, easy going
Extraversion	Active, optimistic, sociable, interactive, affectionate	Sober; reserved , cautious
Agreeableness	Good Natured, friendly, helpful, trusting, cooperative	Irritable, suspicious, rude, uncooperative
Neuroticism	Insecure, nervous, anxious, excitable	Calm, composed, poised, Hardy, Secure

	Intrinsic Motivation	Extrinsic Motivation
Definition	Driving force to pursue an action for fun, joy or any other inner satisfaction	Driving force to pursue an action due to reward, trophy, money, promotions or praise
Factors	Internal factors like joy, enjoyment	External factors like reward, promotion, praise
Method	Method: Goal Setting strategies, Family and Community support	Method: Associating success with future benefits, awards, promotions and avenues.
Benefits	Long term benefit of maintaining a behaviour	Helpful to initiate or create a drive towards a desired behaviour when

1. **Hostile Aggression:** The term 'hostile' refers to being 'opposed', therefore hostile aggression refers to violent and angry behaviour where the intent and primary goal is to harm the other. A boxer who punches the opponent below the belt with the primary aim of injuring him because he is losing or an athlete who uses abusive words to mentally harm another player who has angered him with better skills are examples of hostile aggression. Hostile aggression is a type of aggression that is committed in response to a perceived threat or insult. It is unplanned, reactionary, impulsive, and fueled by intense emotion as opposed to desire to achieve a goal. Aggressors typically have a sense of a loss of control during outbursts, and characteristically experience physiological hyperarousal. Thus, **it is also sometimes known as reactive aggression**. In the examples given above, the intent of action is to physically or mentally harm the other person due to dislike, enmity or due to the person being on the opposing team or side. Along with the intent, the goal is also to harm the other, therefore non-legitimate measures or illegal methods to physically or mentally harm the other person are employed.
2. **Instrumental Aggression:** The term 'instrumental' refers to 'serve as a means' ie., aggression is being used just as an instrument to gain advantage or win and not because of anger or enmity. Therefore, instrumental aggression refers to aggressive behaviour meant or used to attain some non-aggressive goals like winning, getting money, prestige or gaining any other advantage. Instrumental aggression is harmful behaviour engaged in without provocation to obtain an outcome or coerce others. An instrumental aggression does consist of an aggressive intent to harm an opponent physically or psychologically without necessarily being angry. Instrumental aggression is a behaviour directed at the target as a means to an end. **For example, elbowing and injuring a player to gain a competitive advantage, or late tackling to stop an opponent from scoring a goal. An important distinction between hostile and instrumental aggression is that instrumental aggression is learned behaviour, where hostile aggression is impulsive.**
3. Assertive behaviour is generally seen as a positive form of expression, whereas aggression is a negative form of expression. Assertive behaviour has its roots in respect for the other individual, while aggression does not; for example, if you voice your opinion through aggressive acts, you are conveying that your feelings are more important. Aggression also is often counter-productive, while assertive behaviour leads to a more positive resolution. Finally, assertive behaviour is all about standing up for yourself and your values in an unthreatening manner, while aggression puts others down.

	Hostile	Instrumental	Assertive
Intent	Harm or Suffering	Harm or Suffering	No harm
Primary Goal	Harm or injure	Win or advantage	Win or Advantage
Process	Non-Legitimate	Non-Legitimate	Legitimate
Emotion	Anger	No Anger	Unusual effort and energy expenditure
Explanation	Self-justification instead of apology	Offer apologies	

I. Tick the correct answers

1. Personality is derived from a latin word ‘persona’ meaning
 - a. Shape
 - b. Mask
 - c. Stage
 - d. Philosophy
2. Which can be a suitable concept related to personality in sports?
 - a. Stable but not unique characteristics
 - b. **Stable and Unique characteristics**
 - c. Unstable characteristics
 - d. Dynamic behaviour pattern
3. A person who is bold and outgoing is an
 - a. Introvert
 - b. **Extrovert**
 - c. Ambivert
 - d. Somatotype
4. Motivation that drives individuals to naturally pursue actions that provide fun, joy, pleasure or challenge is called
 - a. Extrinsic Motivation
 - b. Amotivation
 - c. **Intrinsic Motivation**
 - d. Cognitive Motivation
5. Motivation through reward or praise is known as
 - a. Intrinsic Motivation
 - b. **Extrinsic Motivation**
 - c. Pedagogical Motivation
 - d. Facilitation Motivation
6. Which of the following is NOT a feature of Intrinsic Motivation?
 - a. goals
 - b. feedback
 - c. needs
 - d. attitudes
7. Which of the following is effective for prevention of Coronary Heart Disease?
 - a. Regular exercise
 - b. Sedentary lifestyle
 - c. Medicine
 - d. Dieting
8. Which one of the following is NOT a result of regular exercise?
 - a. Increased bone density
 - b. **Increased cholesterol level.**
 - c. Strong immune system.
 - d. Increased longevity.
9. Normally people do not adhere to a regular exercising programme due to
 - a. lack of proper goals
 - b. adding a variety of exercises
 - c. social support enhancement
 - d. feedback from instructor
10. Aggression is displayed in sports through
 - a. assertion of views
 - b. **use of abusive words**
 - c. walking away from the opponent
 - d. strictly following the rules
11. Which of the following is a legitimate behaviour?
 - a. Hostile Aggression
 - b. Instrumental Aggression
 - c. **Assertiveness**
 - d. Proactive Aggression
12. In instrumental aggression, the main aim is to using aggression.
 - a. cause harm to the opponent
 - b. achieve a positive goal
 - c. **expresses your feeling of jealousy**
 - d. show your hostility to an opponent
13. Which one of the goals focus on technique for executing a task?
 - i. Process Goal
 - ii. Product Goal
 - iii. Outcome Goal
14. Which type of goal focus on final result of an event?
 - i. **Outcome Goal**
 - ii. Process Goal
 - iii. Product Goal
15. Process of recreating images in mind to improve performance in sports is referred as?
 - i. **Mental imagery**
 - ii. Self-talk
 - iii. Self-esteem
 - iv. Goal setting

Concept of Talent Identification and Talent Development in Sports

- ❖ Talent can be defined as adequate aptitude or ability in one direction, above the normal average.
- ❖ Talent identification can also be defined as “the process by which children are encouraged to participate in the sport they are most likely to succeed, based on selected parameters.

Introduction to Sports Training Cycle – Micro, Meso, Macro Cycle

- (a) **Micro Cycle:** The duration of this cycle is 3 to 10 days
(b) **Meso Cycle:** The duration of this training cycle is 3 to 6 weeks
(c) **Macro Cycle:** The duration of this cycle is 3 to 12 months

Types & Methods to Develop – Strength, Endurance, and Speed

Strength

The amount of force muscles can produce to complete a task is known as strength. In simple words, strength is the ability of a group of muscles to overcome resistance.

Definition

According to H. Singh, “strength is the ability to overcome resistance or to act against resistance.”

Static Strength: Static strength is also called isometric strength. It is the ability of the muscles to act against resistance. Static strength can be measured with a dynamometer. Some static strength is not usually applied in sports, but it is used in phases in weightlifting. Example: plank or yoga asanas.

Dynamic Strength: Dynamic strength is also known as isotonic strength.

Example: push up and full squats.

Dynamic strength can be divided into three parts.

- a. **Maximum Strength:** Maximum strength means exerting force against resistance in the maximal effort.
Required in sports like long jump, shot put, javelin throw, weightlifting, discus throw, etc.
- b. **Explosive Strength:** The muscles can overcome resistance as fast as possible. In other words, it can be said that it is a combination of strength and speed.
This strength is mainly used in volleyball spiking, jumps in basketball, sprint events, etc.
- c. **Strength Endurance:** The muscle can overcome resistance under fatigue or for as long as possible.
This strength is mainly used in long-distance races of athletics, swimming, distance cycling, etc.

Methods to Develop Strength

1. **Isometric Exercise:** These are the exercises that are not visible as there are no direct movements. like pushing a wall.
2. **Isotonic Exercise:** These are exercises in which movements can be seen directly.
Examples of isotonic exercises include running and jumping on the spot, weight training exercises, and calisthenics exercises.
3. **Isokinetic Exercise:** This method was introduced by J.J. Perrine in 1968
used in sporting events like rowing and swimming.

Endurance

Endurance is the ability of a person to maintain a certain level of energy production for a more extended period.

Types of Endurance

I. Classification according to the nature of the activity:

- a. **Basic Endurance:** It is the ability to do movements that involve a large number of muscles at a slow pace for a prolonged period. For example, jogging, cycling, and swimming for more than 30 minutes.
- b. **General Endurance:** It is the ability to do such sporting movements for a prolonged duration that are general.

- c. **Specific Endurance:** This is the ability to perform movements of a particular sport to resist fatigue.

II. Classification according to the Duration of the Activity:

- a. **Speed Endurance:** The classic example of this endurance type is a 400m sprint in track and field.
- b. **Short Term Endurance:** The most appropriate example for shortterm endurance is an 800m run.
- c. **Medium Time Endurance:** The most common example of this type is 1500m and 3000m run and 100m rowing
- d. **Long Time Endurance:** This type of endurance is required in events like marathons, cross country, etc

Methods to Develop Endurance

1. Continuous Method:

- a. **Slow Continuous Method:** A trained athlete's heart rate should be between 140-160 beats per minute during activity. The duration of the training should not be less than 30 minutes. This method is used for walking, running, cycling, etc.
- b. **Fast Continuous Method:** Heart rate during the training should be between 160-180 beats per minute. The duration of the activity should be at least 20 minutes.
- c. **Variable Pace Method:** The heart rate usually ranges between 140-180 beats per minute during this method. The duration of this method may range from 15 minutes to 1 hour.
- d. **Fartlek Method:** Fartlek is a Swedish word that means 'speed play.'

2. Interval Method: The heart rate goes up to 180 beats per minute. After this, there should be a short interval, and when the heart rate drops down to 120-130 beats per minute, the work should start again."

3. Repetition Method

The repetition method is characterized by a high intensity that ranges from 90 to 100% of work with an interval of complete recovery. It is the best method to develop speed endurance.

Speed

The ability to execute motor movements as quickly as possible.

Types of Speed

- 1. **Reaction Ability:** Reaction ability is the ability to react quickly to a stimulus or signal.
- 2. **Acceleration Ability:** Acceleration ability is the ability to achieve a high locomotion speed from a stationary position.
- 3. **Movement Speed:** Movement speed can be defined as the ability to perform a single movement in the minimum possible time.
- 4. **Locomotor Ability:** Locomotor ability is the ability to maintain maximum speed when in motion for the maximum possible duration or distance.
- 5. **Speed Endurance:** It is the ability to do the movement with high speed for a longer duration, i.e., under fatigue.

Methods of Developing Speed

- 1. **Acceleration Runs:**
- 2. **Pace Runs:**

Flexibility

Flexibility is also known as the range of motion around a joint. It is the ability to execute a movement with greater amplitude or range.

Types of Flexibility

(A) Passive Flexibility: The ability to do movements with greater amplitude and with external help is known as passive flexibility. Example, stretching with the help of a partner.

(B) Active Flexibility: The ability to perform a movement with greater amplitude without external help is called active flexibility. For example, you are performing a stretching exercise by a sportsperson himself.

- a. **Static Flexibility:**
- b. **Dynamic Flexibility:**

Methods to Improve Flexibility

1. Static Stretching Method
2. Dynamic Stretching Method
3. Slow Stretch and Hold
4. Ballistic Method
5. Proprioceptive Neuro-Muscular Facilitation (PNF) Technique

Coordinative Abilities

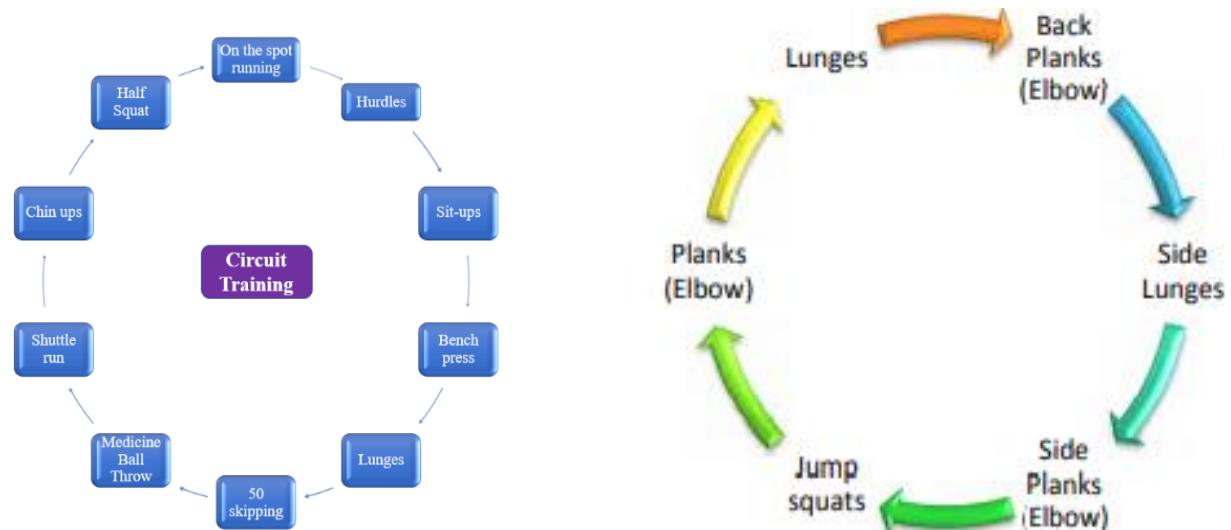
The coordinative abilities are those abilities of an individual that enable the individual to do various activities correctly and efficiently.

Types of Coordinative Ability:

1. **Orientation Ability:** It is the ability to determine and change the position and movements of the body in the required time and available space in a definite field of action (such as a volleyball court, skating rink, a football ground) and a moving object (like a ball, opponent, partner). Example: body movement and position in gymnastics are essential for orientation. In team games, vision, especially peripheral vision, is decisive for orientation.
2. **Differentiation Ability:** It is the ability to attain a high fine-tuning of movement phases. It is the ability to achieve a high level of accuracy. The high level of differentiation depends on movement experience and mastery over motor action.
3. **Coupling Ability:** It is the ability to coordinate body part movements with one another and about a definite goal-oriented body movement.
4. **Rhythm Ability:** Rhythm ability is the ability to perceive the rhythm of a movement and do the exercise with the required rhythm.
5. **Reaction Ability:** Reaction ability is the ability to react quickly and effectively to a stimulus. It can be further classified into simple and complex reaction abilities.
6. **Adaptation Ability:** Adaptation Ability is the ability to adjust or completely change the movement programme based on changes and anticipated changes.
7. **Balance Ability:** Balance Ability is the ability to maintain equilibrium or balance throughout the movement and regain balance quickly after disturbing balance movements.

10.6.1 Circuit Training

Circuit training method was designed by Adamson and Morgan of Leads University in the year 1957.



Tick the correct options

1. The performance enhancement in the future can be predicted based on
 - a. Physiological factor
 - b. Physical factor
 - c. Talent indicators
 - d. All of the above
 2. Psychological factors contributing to talent identification is
 - a. Cognitive
 - b. Emotional
 - c. Personality traits
 - d. All of the above
 3. Talent identification is a _____ process
 - a. General process
 - b. Scientific process
 - c. Specific process
 - d. None of the above
- Ans:** Future oriented process
4. Meso cycle is training of
 - a. one week
 - b. 4 to 10 days
 - c. 3 to 6 weeks
 - d. Three 3 months
 5. Transitional Phase is a
 - a. rest and recovery period
 - b. training period
 - c. competition period
 - d. fitness period
 6. Micro cycle is
 - a. 3 to 10 weeks
 - b. 3 to 10 hrs
 - c. 3 to 10 days
 - d. None from above
 7. The isokinetic method was developed by.
 - a. HC Buck
 - b. Joy Perrny
 - c. J.J. Perrine
 - d. JJ Coubertin
 8. An exercise in which movement is visible.
 - a. Isometric
 - b. Isotonic
 - c. Isokinetic
 - d. Ionomic
 9. Under which kind of strength would you put Shotput?
 - a. Strength Endurance
 - b. Explosive Strength
 - c. Maximum strength
 - d. Speed Strength
 10. Which is not a type of endurance according to the nature of activities
 - i. Basic Endurance
 - ii. General Endurance
 - iii. Specific Endurance
 - iv. Speed Endurance
 11. 400m sprint event comes under
 - i. Speed Endurance
 - ii. Short Endurance
 - iii. Medium Endurance
 - iv. Long Endurance
 12. There will be no variation in the pace of inactivity in
 - i. Fartlek Method
 - ii. Continuous Method
 - iii. Interval Method
 - iv. None of the Above
 13. The Swedish word meaning speed play is.....
 - i. Fartlek Method
 - ii. Continuous Method
 - iii. Pace Method
 - iv. None of the Above
 14. Which is not a type of Speed
 - i. Reaction
 - ii. Sprinting
 - iii. Acceleration
 - iv. Speed endurance
 15. What type of speed is defined as the ability to maintain maximal speed for maximal distance and maximum duration?
 - i. Acceleration ability
 - ii. Locomotor ability
 - iii. Movement ability
 - iv. Reaction ability
 16. Acceleration run and pace run can be two methods of improving
 - i. Flexibility
 - ii. Speed
 - iii. Endurance
 - iv. Strength
 17. Which is not a type of Flexibility?
 - i. Active
 - ii. Passive

- iii. Ballistic iv. Stretch
18. In which method is stretching done rhythmically?
i. Slow stretch ii. Slow stretch and hold
iii. Ballistic method iv. PNF
19. Which of the following factors does not influence flexibility?
i. Structure of joints ii. Proper warming-up
iii. Body temperature **iv. None of these**
20. What are the necessary steps in improving flexibility?
i. Proper warm-up ii. Proper stretching
iii. Repetition of exercise **iv. All of these**
21. The ability to coordinate body part movements with one another and about a definite goal-oriented body movement is known as:
a. Balance Ability b. Adaptation Ability
c. Rhythm Ability **d. Coupling Ability**
22. The ability to attain a high level of fine-tuning of movement phases is known as:
(a) Differentiation Ability b. Orientation Ability
c. Adaptation Ability d. Coupling Ability
23. What kind of coordinate abilities are defined as determining a body's position and its part in time and space concerning gravity and moving objects?
a. Differentiation Ability **b. Orientation Ability**
c. Adaptation Ability d. Coupling Ability
24. Circuit Training Method was designed by:
(a) Adamson and Morgan (b) Morgan and Morgan
(c) Adamson and Adamson **(c) None of Above**