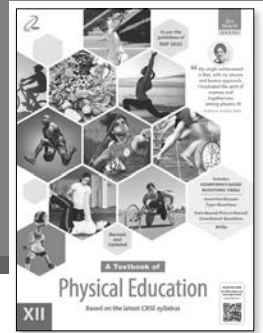


As per the  
guidelines of  
NEP 2020

# — SUPPLEMENT —

## A Textbook of Physical Education Class XII

Based on 2023–24 CBSE syllabus



1

## Management of Sporting Events

### INTRAMURAL AND EXTRAMURAL TOURNAMENTS – MEANING, OBJECTIVES AND ITS SIGNIFICANCE

#### Meaning of Intramurals

The word ‘intramural’ is derived from Greek: ‘*intra*’ for ‘within’, and ‘*mural*’ for ‘walls’. That is, intramural competitions are organised within the school itself, with the participants being the students of the school. No outsiders are allowed to compete in such events. Intramural competitions are popular throughout the world for several reasons: they comparatively cost less, consume little time, and can be organised at the discretion of the school. Additionally, intramural competitions create opportunities for a greater number of students to enjoy sporting activities as the school committee is not under pressure to select only the top players.

When it comes to selection of intramural activities, two important considerations should be kept in mind: the facilities available at the school and the interests of the students. For instance, it would be impractical to include a gymnastics event if there is no gymnasium or equipment related to the game in the school. Even if the school is prepared to build one, it would be a bad investment if the students are more interested in court and field

games. Common activities included in intramural competitions are:

- ❖ Major games like football, hockey, cricket, basketball, wrestling, kabaddi, swimming, track and field, tennis, badminton, etc.
- ❖ Minor games like kho-kho, circle games, tag, obstacle race, potato race, sack race, three legged runs, judo, karate, taekwondo, boxing, etc.
- ❖ Marching, dancing, mass PT and rhythmic gymnastics.
- ❖ Creative activities like painting, poster making, clay modelling, etc.

#### Objectives of Intramurals

- 1. Establishing Physical Education:** In India, where physical education does not enjoy the kind of importance it has in western schools, intramurals should be encouraged and made an annual event in the school calendar. Parents should get involved in the organisation and the competitions should be properly planned and carried out.
- 2. Accommodating Greater Number of Participants:** In inter-school competitions, only the best players are handpicked and

allowed to compete to bring honour to the school. Obviously, a lot of students who may be less talented but have as much enthusiasm for sports are left out. Intramurals close this gap. The competition is for the school students only. Participation is thus amplified in terms of number. A single student can even compete in more than one event if she/he wishes so.

3. **Promoting Positive Values in Students:** Sports have a positive effect on students. These are about cooperation, leadership, grit, mental alertness and determination. Regular organisation of intramurals instils these values in the students since their involvement in sports increases.
4. **Providing Healthy Recreation:** Intramurals are a healthy means of recreation which the students, teachers, school officials and even family members can enjoy and share.
5. **Introducing New Games:** Intramurals introduce new games to the students which they might not have been aware of previously. In India especially, most children are exposed to only a few variety of games like cricket, football, boxing and badminton. There are many other sports that should be encouraged so that Indians can excel in a greater number of sports.
6. **Development of Sportsmanship:** Intramurals develop the spirit of sportsmanship in young students. Students learn how to respect their opponents and the officials overseeing the games, understand the importance to show courage in the face of defeat and accept victories with humility; these are the qualities that lend fortitude to their character.
7. **Development of Organisational Skills:** Some students, instead of competing in the sporting events, volunteer for the organisational process. This makes them adept at management skills. They learn how to organise events, how to delegate tasks and carry out their own duties in a time-bound manner, how to work within budgets, where to get essential items needed for the events, etc.
8. **Development of Personality:** Intramurals are fun yet stressful events for those who take active part in it, whether as organising volunteers or

competitors. They become smarter, resilient and hardworking, and their personality becomes more attractive and worthy of admiration.

9. **Scouting for Talent:** Intramurals also provide a platform for students to showcase their talents. Exceptional players get noticed during these competitions and may get a chance to play in more advanced competitions if spotted by the right people.

## Significance of Intramurals

- ❖ Intramurals help mould the physical, mental, emotional, moral and social development of the students.
- ❖ They channel the energy of the students and provide a healthy outlet.
- ❖ They make students more agile and fit.
- ❖ Intramurals are also useful in bringing out hidden talents.
- ❖ Intramurals contribute to personality growth of the students and make them leaders who are not afraid to face challenges.

## Meaning of Extramurals

The word 'extra' in this context means 'outside', i.e. extramural activities are those that take place outside the walls of the school. As opposed to intramurals, extramurals are organised by more than one school or institution as a type of inter-school competition. Students of the member schools compete in the events to bring honour to their own school. Unlike intramurals, extramurals cannot be carried out at the discretion of just one school; they are fixed according to the convenience of all the schools involved in the competition, with proper advanced planning and funding.

## Objectives of Extramurals

1. **Enforcing Sports Culture:** Extramurals enforce sports culture as every competitor aims to win, bring honour to herself/himself, family, school, and gains recognition.
2. **Giving Students Experience in Competitive Sports:** Extramurals offer high-stakes competitive sports, rigorous training, discipline, pressure management, health and physique care and mental/physical preparation.

3. **Developing Sportsmanship and Fraternity:** Students who take part in extramural competitions imbibe the qualities of respect, humility, curiosity, courage and become true sports players in terms of character too.
4. **Making Students Acquainted with Knowledge Related to Sports:** Extramurals take rules and regulations of the game more seriously. The participants of extramurals also learn in detail about the rules, techniques, skills and the latest news associated with their chosen game.
5. **Increasing Harmony and Unity:** Extramurals expand the scope of intramurals and impact a larger community of people. Extramural competitions close the gap and allow participants of various schools to mingle with each other.

### Significance of Extramurals

- ❖ Extramurals provide exposure to schools and students who lack training and opportunities. While participating in extramurals, they are noticed by more people and even by officials who have the knowledge and connections to help them advance their career in sports.
- ❖ Extramurals increase interest in physical education of students, their parents and the school authorities. This leads to sufficient funding and standardising the curriculum to fit regular physical education classes in the students academic life.
- ❖ Extramurals are a healthy excuse for participating in a fun recreational indulgence like sports, which students might not be otherwise able to in their schools and homes.
- ❖ Extramurals improve the knowledge of sports due to student's keener interest in the games. Training with full awareness of rules and regulations, proper equipment and gears, and training under experts prepares aspiring sports stars for their career in sports.
- ❖ Since extramurals are competitions between different schools and institutions, the standards are higher than those of intramurals. Participants have to train harder and perform better than they are expected to in their own domains. Thus extramurals increase the standards of their performance.

### COMMUNITY SPORTS PROGRAM (SPORTS DAY, HEALTH RUN, RUN FOR FUN, RUN FOR SPECIFIC CAUSE AND RUN FOR UNITY)

Community sports play a vital role in society by connecting individuals with opportunities to participate in sports, exercise and fitness activities. These activities promote health and well-being among people of all ages, including school children, adults, elders and vulnerable populations. Community sports can serve as a foundation for health promotion initiatives within a community. They are organised for various purposes, involving citizens and public residing in a society.

Engaging in community sports provides an excellent opportunity to meet like-minded people. By participating in group activities, individuals can connect with others who share their interests, leading to conversations and social interactions. Regular community sports activities such as cricket, volleyball, football, basketball and mass activity programs like yoga, aerobics, morning walks and jogging, can help individuals get to know their neighbours and community members better. They can also bond with them over training sessions, practices, victories and defeats. Some of these programmes are as follows:

#### Sports Day

A sports day is a special day dedicated to sports. It is usually observed in schools and is an annual feature. The instructional structure in Indian



Figure 1.1 Sports day activity

schools has the tendency to focus heavily on academics. Sports days offer a respite from the classroom, allowing the students to stretch their legs and meet the physical challenges of sports. The advantages of sports days are:

1. Establishing a sports culture in the school thereby perfecting the physical and motor skills of the students.
2. Acting as a medium for scouting talents who otherwise might lie undiscovered.
3. Strengthening the role and importance of physical education in the school.
4. Inculcating attractive qualities in the students, such as leadership, ambition, courage, team spirit, etc.
5. Unifying students from different classes and building friendship, tolerance and respect.
6. Providing a healthy and active source of recreation.

There are no specific rules for organising sports day. It is up to the school to devise their own plans. Normally, a day (or more) is set aside for the event. The schools may pick which events they want to include, how teams should be formed, how long the competition will last, etc. Schools may also present awards and prizes to their winners. In order to organise such events successfully, the schools should constitute a proper association and entrust it with the various tasks associated with the event. Decisions and preparations should be made in advance so that the sports day is a success.

## Health Run

Health runs are a variety of marathons organised to spread awareness of, and improve, the physical health of the members of a community. They are planned and executed by the health department, sports department, or social organisations focusing on health. The benefits of health runs are:

1. Easy to participate in, as they do not require strict training regimes or specialised equipment.
2. Promotion of health and physical fitness.
3. Unification of people from various social groups and communities.
4. Anyone can participate in health runs – from the young to the old. It is not about winning a competition but taking part in a social cause.



Figure 1.2 Health run

Although one can participate in health runs with simple and comfortable clothing and a pair of running shoes, there are still a few points to be kept in mind for the sake of safety and ease:

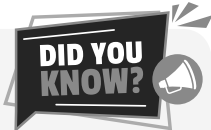
- ❖ Health runs are not for the physically weak. Someone who leads a sedentary lifestyle would find them a difficult and demanding task. It is better to exercise regularly in advance to avoid health risks.
- ❖ Staying hydrated is vital. Participants should drink plenty of fluids before the run and also keep a bottle of water handy in case they get dehydrated.
- ❖ There should be no muscular tension. The arms, shoulders, necks, hips, etc. should be relaxed. Hands should be free of clenching.
- ❖ The right breathing technique will help the participants complete their run smoothly. Breathing should be rhythmic and deep with carefully controlled exhalation.
- ❖ The torso should be erect and the arms should swing in synchronisation.
- ❖ Swift running should be avoided – the key idea is to complete the race, not be the first to cross the finish line.



### Extension Activity

As the Sports Secretary, organise a health check-up camp followed by a health run for the students, teachers, staff members and all of their family members of your school. Make necessary arrangements at all halt points.

The oldest person to complete a marathon was born in 1911, making him 100 years old at the time. He was an Indian man named Fauja Singh. He didn't even start running until he was 89 years of age. It's never too late!



## Run for Fun

Run for fun has the same purpose as health runs: to increase the spirit of physical fitness in the public. Its goal is to inspire the participants and onlookers to stay healthy and exercise regularly. Additionally, run for fun has the added element of being light-hearted; the runners take part in cross country running or road running for the sake of recreation and entertainment. In some examples, participants wear thematic costumes and may be divided according to their age. Though run for fun does not have to include an agenda, it is often used to raise funds for charity. There are schools that organise run for fun camps as recreational activities for their students.

## Run for Specific Causes

Unlike run for fun, run for specific causes are organised in honour of a cause: spreading awareness of AIDS, cancer, disabilities, etc. are examples of such causes. There are no limitations regarding the age or number of participants. The goal of the run for specific causes is to raise funds for chosen causes. They act as awareness campaigns in which various kinds of people can join without having to



Figure 1.3 Run for unity

worry about qualifying. Many non-profit bodies organise these runs. Examples include Mumbai Marathon and Chennai Marathon.

## Run for Unity

Run for unity events are held to bring people from different communities, castes and creeds together under a single event to promote peace, harmony and unity. The scope of these events may be national, or part of a larger international event. Run for unity can also be special for some countries where it is used to celebrate their independence. In these events, every participant must run for some distance, even if they don't complete the entire race. In these runs, a lot of celebrities and renowned personalities join the public to highlight the need for solidarity and respect for every religion in the country.

## EXERCISES



### A. Objective Type/Multiple-Choice Questions

#### I. Multiple-Choice Questions:

1. What is the meaning of the word 'intramural'?

(a) Competition between schools

(c) Competition between countries

(b) **Competition between students within a school**

(d) Competition between sports teams

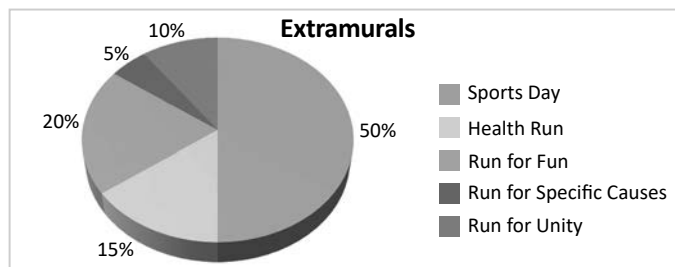
Note: Answers of all MCQs are highlighted in **bold**.

2. Why are intramural competitions popular throughout the world?
- (a) They are organised by the government.                      (b) **They consume little time and cost less.**  
(c) They include only the top players.                      (d) They are organised in a stadium.
3. What are the major objectives of intramurals?
- (a) To establish physical education                      (b) To accommodate greater number of participants  
(c) To promote positive values in students                      (d) **All of these**
4. The primary goal of Intramural competition is (CBSE 2020)
- (a) **To provide opportunity for mass participation of students**  
(b) To participate in inter-school competition  
(c) To provide intra-school competition  
(d) All of these
5. Which of the following is not a part of the intramurals?
- (a) Football, hockey, swimming and wrestling  
(b) Kho-kho, tag, obstacle race and judo  
(c) Marching, dancing, painting and clay modelling  
(d) **None of these**
6. Which of the following is not a common activity included in intramural competitions?
- (a) Kho-kho                      (b) Badminton  
(c) **Archery**                      (d) Tennis
7. Which of the following is not a category of run?
- (a) **Run for identity**                      (b) Run for fun  
(c) Run for specific cause                      (d) Run for unity
8. What is the purpose of a sports day in Indian schools?
- (a) To focus heavily on academics.  
(b) To spread awareness of physical health.  
(c) **To establish a sports culture and perfect physical skills of the students.**  
(d) To promote health and well-being among people of all ages.
9. What is the difference between a health run and a run for fun?
- (a) Health runs are planned by social organisations focusing on health, while run for fun is a recreational activity for schools.  
(b) Health runs require strict training regimes and specialised equipment, while run for fun is light-hearted and recreational.  
(c) Health runs raise funds for specific causes, while run for fun does not include any agenda.  
(d) **Health runs focus on promoting physical fitness and unification of people, while run for fun is organised to spread awareness of specific causes.**

## II. Data-Based Questions:

CBO

Given below is the data which depicts the percentage of population participating in different extramurals:



On the basis of the pie-chart given above, answer the following questions:

- Which of the following extramural sports programme is organised at school level to perfect the physical and motor skills of the students?  
(a) Sports Day                      (b) Run for Fun                      (c) Run for Unity                      (d) Health Run
- Which of the following extramural sports programme will be organised to make people aware of cancer?  
(a) Run for Unity                      (b) Health Run                      (c) Run for a Specific Cause                      (d) Run for Fun
- Which of the following is not a benefit of health run?  
(a) Ease of participation without strict training and specialised equipment  
(b) Promotion of healthiness and physical fitness  
(c) Unification of people from various social groups and communities  
(d) None of the above

### B. Very Short Answer Type Questions

- What is the meaning of the word 'intramural'?
- What are the two important considerations when selecting intramural activities?
- What are the advantages of sports days in schools?
- What is the purpose of a run for specific causes?

### C. Short Answer Type-I Questions

- What is the role of intramural competitions in promoting physical education in schools?
- How do intramural competitions promote positive values in students?
- What is the role of community sports in promoting health and well-being?
- What are the benefits of health runs?

### D. Short Answer Type-II Questions

- Why should intramurals be encouraged and made an annual event in the school calendar in India?
- Write three differences between intramurals and extramurals. (CBSE 2017)
- How do intramurals help in the development of sportsmanship and organisational skills?
- What are the points to keep in mind while participating in health runs?
- How is a run for fun different from a health run?

### E. Long Answer Type Questions

- Explain the major objectives of intramurals in detail.
- What is the significance of community sports, and how do they help in building social connections and promoting health?



## Children and Women in Sports



Figure 2.1 Physical activity in toddlers



Figure 2.2 Physical activity in early childhood



Figure 2.3 Physical activity in middle childhood

### EXERCISE GUIDELINES OF WHO FOR DIFFERENT AGE GROUPS

WHO defines physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure. Physical activity refers to all movements including during leisure time, for transport to get to and from places, or as part of a person's work. Both moderate- and vigorous-intensity physical activities improve health. The Organisation cites lack of physical activity these days as the fourth leading risk factor for global deaths, accounting for 6% deaths globally.

Regular physical activity helps prevent and manage non-communicable and lifestyle diseases such as heart disease, stroke, diabetes and several cancers. It also helps prevent hypertension, maintain healthy body weight and can improve mental health, quality of life and well-being.

WHO guidelines and recommendations provide details for different age groups and specific population groups on how much physical activity is needed for good health.

#### For Children Under 5 Years of Age

Infants (less than 1 year) should not be restrained for more than 1 hour at a time in prams/strollers or high chairs. Instead they should be given enough open space so that they move around freely and explore their environment. They should be allowed to be physically active several times a day through interactive floor-based activities. They can also be kept active by reaching and grasping, pulling and pushing and moving her/his head, body and limbs several times a day. When sedentary, they should be engaged in reading and storytelling with a caregiver.

Toddlers (1–2 years of age) should spend at least 180 minutes in a variety of types of physical activities at any intensity, including moderate-to vigorous-intensity physical activity, spread throughout the day. Physical activities include standing up, moving around, running, jumping, throwing, riding a bike, and so on. Sedentary screen time (such as watching TV or videos, playing computer games) is not recommended. Reading and storytelling with a caregiver should be encouraged when sedentary.



**Table 2.1** Exercise guidelines at different stage of growth and development.

Age Group	Exercise Guidelines
Children between 0–5 years (infants and toddlers)	<p><b>Infants (aged less than one year):</b> reaching and grasping, tummy time, crawling, pushing, pulling, floor-based interactive activities.</p> <p><b>Recommended sleep:</b> 14–17 hours for 0–3 months, 12–16 hours for 4–11 months infants.</p> <p><b>Toddlers (children who can walk on their own):</b> standing up, moving around, rolling and playing, skipping, hopping, running, jumping, riding a bike, ball games, etc.</p> <p><b>Recommended sleep:</b> 11–14 hours for 1–2 years toddlers.</p> <p><b>Children below 5 years:</b> climbing frame, riding a bike, running and chasing games, walking, skipping, etc. Watching TV and travelling by bus or car for longer times are not good for growth and development.</p> <p><b>Recommended sleep:</b> 10–13 hours for 3–4 years children.</p>
Children between 5–8 years	Catching a ball, short distance or light running, throwing jumping, coordinative activities, etc.
Children between 9–12 years	Playing safe games, flexible exercises, riding bicycle, coordinative activities, etc. Good quality playing equipment and safety measures should be considered.
Children between 13–19 years	All games and sports can be played at this stage. Aerobic activities are good for proper growth and development. Good coaching and sports environment should be offered to develop leadership qualities and team spirit among children.
Adults between 20–64 years	All games and activities can be done in a progressive manner. Adults having any medical problem should take the advice of physical trainer or coach. Muscular strengthening or aerobic exercises can be done. Activities like walking, jogging, dancing, swimming, weight training, cycling, gardening, etc. can be done.
Older person of 65 years and above	Activities can be selected on the basis of physical condition and ability of the person. A muscular strengthening, aerobic and balance – enhancing exercises can be done. Regular physical activities will enhance the health conditions of the person of this age group. Walking, jogging, cycling, sports, recreation, household works, gardening, etc. can be done.



**Figure 2.4** Physical activity in late childhood

Children of 3-4 years of age should spend 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, spread throughout the day. Physical activity should include standing, moving about, skipping, hopping, climbing frame, riding a bike, chasing games and ball games, and so on. When sedentary, they should be engaged in reading and storytelling with a caregiver.

### Children and Adolescents Aged 5–17 Years

They should do at least an average of 60 minutes per day of moderate to vigorous-intensity, mostly aerobic, physical activity, across the week. They can indulge in catching a ball, short distance running, playing safe games, flexible exercises, riding bicycle, and so on. They should incorporate vigorous-intensity aerobic activities, as well as those that strengthen muscle and bone, at least 3 days a week. They should control the amount of time spent being sedentary, particularly the amount of recreational screen time.

### Adults Aged 18–64 Years

They should do at least 150–300 minutes of moderate-intensity aerobic physical activity or at least 75–150

minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week. They should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits. Activities like walking, jogging, dancing, swimming, cycling and so on can be undertaken. Adults with health conditions should seek medical advice before embarking on any physical activity.

### Adults Aged 65 Years and Above

In their weekly physical activity, older adults should undertake a variety of multicomponent physical activity that lays stress on functional balance and strength training at moderate or greater intensity, on 3 or more days a week, to enhance functional capacity and to prevent falls. Exercises should be done in a progressive manner. Adults with health conditions should seek medical advice before embarking on any physical activity.

## WOMEN'S PARTICIPATION IN SPORTS – PHYSICAL, PSYCHOLOGICAL AND SOCIAL BENEFITS

### Women's participation in Sports in India

Women's participation in sports has a long history in India, with examples dating back to characters in the *Mahabharata* engaging in physical activities for recreation. However, women were subsequently excluded from sports due to various factors, including societal constraints and lack of support. In the latter half of the 20th century, women's participation in sports increased significantly, though there remains a disparity in participation rates between genders.

To address this, India has implemented programs such as the Khelo-India scheme and National Sports Talent Search Scheme to promote women's participation in sports. While past psychological, social, and economic factors hindered women's participation, these are now largely overcome.



**Figure 2.5** Indian sportswomen have given a much needed impetus to Indian sports.

### Why Fewer Women Participate in Sports

The disparity in women's participation in sports is a global phenomenon, affecting all aspects of sports, from participation to administration. Female athletes continue to face obstacles such as unequal pay, less media coverage, and different injuries compared to male athletes. Many female athletes have peacefully protested against these inequalities through strikes, social media campaigns and using other mediums of protest. The reasons behind the low rate of women's participation in sports in India are discussed below:

1. Lack of Adequate Legislation for Gender Equality
2. Lack of Time to Dedicate to Sports
3. Masculine Sports Culture
4. Lack of Self-confidence
5. Lack of Interest
6. Lack of Female Sportspersons as Role Models
7. Lack of Fitness and Wellness Movement
8. Lack of Education among Women
9. Fewer Number of Women Coaches
10. Attitude of Society towards Women's Sports Participation
11. Lack of Personal Safety
12. Lack of Proper Access to Facilities

The International Olympic Committee (IOC) has taken steps to encourage female participation in sports and administration, including setting a goal for 49% women's participation in the next Olympic Games. The Constitution of India also ensures gender equality and elimination of gender bias in games and sports.

As more women participate in sports, positive attitudes towards gender equality are being fostered. Sports can contribute to social empowerment and the development of important skills such as communication, teamwork, leadership, respect and sportsmanship. Sports participation benefits not only health but also overall development and does not discriminate based on factors such as race, sex, caste, creed or colour.

### Physical, Psychological and Social Benefits of Women's Participation in Sports

Participation in sports has a number of physical, psychological and social benefits for women. Women who participate in sports can reduce the chances of developing lifestyle diseases and maintain better physical health. In addition, they can also enjoy psychological benefits such as stress management, improved self-esteem and confidence, and better emotional control. Furthermore, participating in sports can improve coordination, communication, inter-relationships and cooperation. Therefore, women's participation in sports should be encouraged and supported at all levels, including schools, colleges, universities, and national and international competitions.

#### Physical Benefits

Participating in sports provides women with various physical benefits. They are as follows:

1. **Lifestyle Diseases:** Sports participation helps women stay active and reduces the chances of lifestyle diseases such as diabetes, high blood pressure and obesity.
2. **Bone Density:** Women have a higher risk of developing osteoporosis than men. Sports can help women increase their bone density and have stronger bones.
3. **Toned Muscles:** Regular exercise and sports

participation increase muscle tone in women, helping them stay strong.

4. **Cardiovascular System:** Regular exercise increases the number of capillaries, allowing for better oxygen intake. This enables women to participate in sports for longer periods without getting tired.
5. **Obesity:** Obesity is a common lifestyle disease that affects women more than men. Regular participation in sports can help women stay in shape and maintain a healthy weight.

#### Psychological Benefits

Participation in sports has a significant impact on women's psychological well-being. Some of the psychological benefits of participating in sports are as follows:

1. **Stress Management:** Physical activity releases hormones that help reduce stress levels. Women who participate in sports can manage their stress better than those who do not.
2. **Control Emotions:** Regular participation in sports makes women emotionally stronger and better equipped to manage their emotions.
3. **Confidence:** Winning in sports boosts the confidence of women and empowers them to achieve more in all walks of life.
4. **Self-Esteem:** Participation in sports helps women realise their self-worth, boosting their self-image and sense of self-esteem.
5. **Leadership:** Sports help women develop leadership skills that they can apply both on and off the field.

#### Social Benefits

Participation in sports can also have various social benefits for women. Some of these benefits are as follows:

1. **Coordination:** Sports increase coordination and the ability to work with others.
2. **Communication:** Communication is essential in sports. Participation in sports helps women become more vocal and expressive.
3. **Inter-relationships:** Women learn to maintain healthy relationships with others, both on and off the field.

4. **Cooperation:** Women learn to cooperate with each other in sports, which helps them work harmoniously with others in all aspects of life.

Women's participation in sports should be encouraged and supported in all aspects of life. To increase participation, awareness programs should be conducted, and women should be encouraged to participate in competitive sports. Families, media

and society should also encourage and support women's participation in sports. By providing proper facilities, appointing women coaches and eliminating cultural and social negativity, women can participate in sports and live a better, healthier life. With recent success in international competitions, it is clear that women can excel in sports and make a significant contribution to their country's success.

## EXERCISES



### A. Objective Type/Multiple-Choice Questions

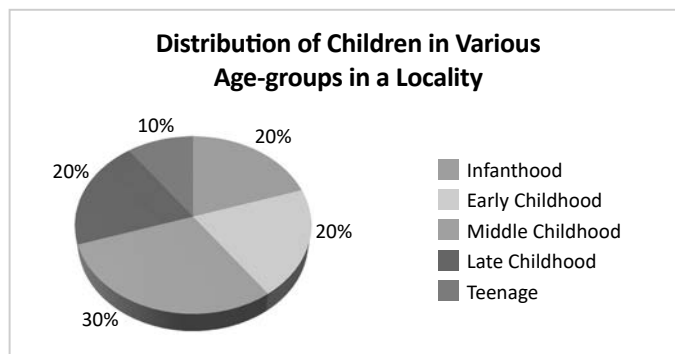
#### I. Multiple-Choice Questions:

1. What is physical activity according to the WHO?
  - (a) Any movement produced by smooth muscles that requires energy expenditure
  - (b) Any movement produced by skeletal muscles that requires energy expenditure**
  - (c) Any movement produced by cardiac muscles that requires energy expenditure
  - (d) None of these
2. What is the leading risk factor for global deaths according to the WHO?
  - (a) Lack of physical activity**
  - (b) Poor nutrition
  - (c) Smoking
  - (d) Excess physical activity
3. Recommended sleep hours for 3 – 4 years children are
  - (a) 10 – 13 hours**
  - (b) 12 – 14 hours
  - (c) 9 – 11 hours
  - (d) 11 – 14 hours
4. What are some obstacles faced by women athletes?
  - (a) Lower pay and less media coverage**
  - (b) High pay and extensive media coverage
  - (c) Equal pay and equal media coverage
  - (d) None of these
5. What organisation encourages participation in National Olympic Committees and International Federations?
  - (a) International Football Association
  - (b) International Olympic Committee**
  - (c) International Basketball Federation
  - (d) Sports Authority of India
6. What is one physical benefit of women's participation in sports?
  - (a) Reduced stress levels
  - (b) Improved emotional control
  - (c) Increased bone density**
  - (d) Enhanced leadership skills
7. What is one social benefit of women's participation in sports?
  - (a) Improved coordination**
  - (b) Reduced risk of obesity
  - (c) Boosted self-esteem
  - (d) Better emotional control

## II. Data-Based Questions:

**CBQ**

Given below is the chart which depicts the distribution of children in various age-groups in a locality:



On the basis of the pie-chart given above, answer the following questions:

- The locality has a gym. Which age-group(s) do you think it would benefit?  
(a) Infants and toddlers (b) Teenagers  
(c) Adults between 20 and 64 years (d) Both (b) and (c)
- The age group that indulges in interactive floor-based activities is .....  
(a) infants and toddlers. (b) children between 5 and 8 years.  
(c) children between 9 and 12 years. (d) teenagers.
- All games and sports can be played at this age group.  
(a) Infants and toddlers (b) Teenagers  
(c) Children between 9 and 12 years (d) Children between 5 and 8 years

### B. Very Short Answer Type Questions

- What are some of the diseases that can be prevented or managed with regular physical activity?
- What should be the maximum duration for which infants should be restrained in prams/strollers or high chairs?
- What are some psychological constraints that hindered women's participation in sports?
- What is Khelo-India scheme?
- What are some psychological benefits of women's participation in sports?
- What can women do to participate in sports and live a better and healthier life?

### C. Short Answer Type-I Questions

- What are some of the physical activities that toddlers should engage in according to the WHO guidelines?
- What are the WHO's recommendations for the amount of moderate-to vigorous-intensity physical activity that children and adolescents aged 5–17 should do?
- What are some skills that can be developed through sports participation?
- What is the Constitution of India's stance on gender bias in sports?
- How can women benefit physically from participating in sports?
- How can women benefit socially from participating in sports?

## D. Short Answer Type-II Questions

1. What are the WHO's recommendations for the amount of moderate-intensity aerobic physical activity that adults aged 18–64 should do?
2. What are the WHO's recommendations for the physical activity that older adults should undertake?
3. How has women's participation in sports changed in recent times?
4. What are some ways in which sports can contribute to the development of society and community?
5. How can sports participation help women manage stress levels?
6. How can women's participation in sports help them develop leadership skills?

## E. Long Answer Type Questions

1. What are the benefits of regular physical activity according to the WHO? Discuss the recommendations provided by the WHO for different age groups and specific population groups.
2. What are some initiatives taken by the Government of India to promote women's participation in sports, and how do they contribute to gender equity and empowerment?
3. How can women's participation in sports be encouraged and supported at all levels?

# 3



## Yoga as Preventive Measure for Lifestyle Disease

**BACK PAIN AND ARTHRITIS: PROCEDURE, BENEFITS AND CONTRAINDICATIONS OF TADASANA, URDHWAHASTOTTANSANA, ARDHA CHAKRASANA, USHTRASANA, VAKRASANA, SARALA MATSYENDRASANA, BHUJANGASANA, GOMUKHASANA, BHADRASANA, MAKARASANA, NADISHODHANA PRANAYAMA**

### What is Back Pain? \_\_\_\_\_

Back pain is pain felt in the back and may be neck pain (cervical), middle back pain (thoracic), lower

back pain (lumbar), or may be in the coccydynia (tailbone) region. It may differ in intensity or duration. Sometimes, it may extend to the hands and feet.



Figure 3.1 Back pain

The common causes of back pain are incorrect body posture resulting from poor build of the body or slouching due to use of electronic gadgets, accidents, excessive weight, muscle strains and/or spasms, sports injuries, lack of exercise, etc.

### What is Arthritis?

Arthritis is a condition that causes inflammation and pain in the joints. There are many types of arthritis, including osteoarthritis and rheumatoid arthritis. The causes of arthritis are varied and include genetics, injury, infection and autoimmune disorders. Risk factors include age, gender, obesity, and previous joint injuries. Treatment options include asanas, pranayama, medication, physical therapy and surgery.

### Tadasana

This asana allows the whole body to stretch, thereby refining its flexibility, correcting its posture, and getting rid of the tension and stress in the lower back. See page 52 of the book.

### Urdhwahastottansana

See page 63 of the book.

### Ardha Chakrasana

Ardha Chakrasana ('Ardha' meaning 'half' and 'Chakra' meaning 'wheel') is also known as the half wheel pose. In this posture, as the body takes the shape of a half wheel, hence it is called Ardha Chakrasana. It is a warm-up asana which prepares the body for more difficult asanas.

#### Procedure

1. Stand straight. Now, support the back at the waist with all the fingers together pointing downward or forward.
2. With slow inhalation, bend backwards from lumbar region stretching the neck muscles.
3. Remain in this pose for few seconds with normal breathing.
4. Inhale and slowly come up. Do it for three to four times.

#### Benefits

- ❖ It eases constipation when practised in the morning, which helps in maintaining a proper digestive system.



Figure 3.2 Ardha Chakrasana

- ❖ It is an important asana for people with excessive fat, especially around the waist.
- ❖ It also helps in improving the heart rate. Thus, two common problems of the modern world namely asthma and high blood pressure can be controlled through this asana.
- ❖ It makes the spine flexible and strengthens the spinal nerves and the neck muscles. It also improves breathing capacity.

#### Contraindications

- ❖ Do not perform this posture in case of vertigo or a tendency to giddiness.
- ❖ Persons with high blood pressure should bend with care.

### Ushtrasana

See pages 56–57 of the book.

### Vakrasana

See pages 64–65 of the book.

### Sarala Matsyendrasana

See page 67 of the book.

### Bhujangasana

See pages 58–59 of the book.

### Gomukhasana

See page 61 of the book.

### Bhadrasana

Bhadrasana, also known as Gracious Yoga, is



Figure 3.3 Bhadrasana

derived from two Sanskrit words - *Bhadra*, meaning auspicious or gracious, and *Asana*, meaning yoga pose.

### Procedure

1. Starting position: Sit on the mat with legs fully stretched forward.
2. Bring the feet, with the toes pointing outward, close to the generative organ, the heels touching the perineum very closely.
3. Clasp the feet (if required) to bring the heels as close to the body as possible.
4. Place the hands on the respective knees, pressing them down.
5. Keep the neck straight, upper body (chest)

forward, stomach held in normal contour, focus eyes at one point straight ahead.

### Benefits

- ❖ This pose helps to loosen the joints by flexing and stretching the tendons. The muscles of the pelvis, knees and ankles become more flexible.
- ❖ It relieves tension from the spinal region.
- ❖ It provides relief in cases of sciatic, varicose vein and menstrual disorders.
- ❖ It helps in preventing arthritis.
- ❖ The practise of this pose improves posture.
- ❖ It promotes concentration.
- ❖ Good for those who find it difficult to sit in more classical postures like Padmasana and Vajrasana.

### Contraindications

Although beneficial for prevention from arthritis, practitioners with serious arthritis should consult yoga expert before practising this asana.

### Makarasana

See pages 67–68 of the book.

### Nadishodhana Pranayama

See pages 68–69 of the book.

## EXERCISES



### A. Objective Type/Multiple-Choice Questions

#### 1. Multiple-Choice Questions:

1. Arthritis is a condition that causes inflammation and pain in the
  - (a) lungs.
  - (b) eyes.
  - (c) **joints.**
  - (d) stomach.
2. What is Tadasana?
  - (a) A yoga pose that helps to loosen the joints
  - (b) A yoga pose that helps to stretch the neck muscles
  - (c) A yoga pose that helps to correct posture
  - (d) **All of these**
3. What is the procedure for Ardha Chakrasana?
  - (a) Lie on your back and lift your legs
  - (b) Stand straight and bend forward
  - (c) **Stand straight and bend backward from the lumbar region**
  - (d) Sit cross-legged and twist your torso



4. What is Bhadrasana?
  - (a) A yoga pose that promotes concentration
  - (b) A yoga pose that provides relief in cases of sciatic and menstrual disorders
  - (c) A yoga pose that helps in preventing arthritis
  - (d) **All of these**

### B. Very Short Answer Type Questions

1. What is the benefit of Tadasana?
2. What is the meaning of the term Ardha Chakrasana?
3. What are the benefits of practising Bhadrasana?

### C. Short Answer Type-I Questions

1. What are the two types of arthritis?
2. What are the contraindications for Ardha Chakrasana?
3. What are the treatment options for arthritis?

### D. Short Answer Type-II Questions

1. What are the benefits of Tadasana?
2. What are the benefits of Ardha Chakrasana?
3. What is the procedure for Bhadrasana?

### E. Long Answer Type Questions

1. Explain the types and causes of arthritis.
2. Describe the benefits and procedure of Ardha Chakrasana.



# 4

## Physical Education and Sports for CWSN (Children With Special Needs – *Divyang*)

### CONCEPT OF CLASSIFICATION AND DIVISIONING IN SPORTS

Classification and divisioning are methods used in disability sports to ensure that athletes with disabilities are able to compete fairly. These methods involve grouping athletes based on

various factors such as age, gender, weight and abilities. The purpose of classification and divisioning is similar to the grouping system used in mainstream sports. The goal is to minimise the impact of these variables on sports performance. Classification is a grouping process associated with Paralympics and para-athletes, where athletes are

categorised based on their disability. Divisioning, on the other hand, is a performance-based system of grouping athletes associated with Special Olympics. This method groups athletes based on their skill level.

## Classification in Paralympics

The International Paralympic Committee (IPC) has developed a classification process that aims to promote “sporting excellence for all athletes and sports in the Paralympic Movement, while providing fair competition”. The purpose of classification is to ensure that a participant’s impairment is relevant to their sporting performance and to ensure that they compete equitably with other athletes. The IPC has identified two main roles of the classification process. The first is to determine eligibility, and the second is to group athletes for competition. To be eligible, a participant must have a permanent impairment that limits their ability to participate in the sport.

## Classification Process

Generally classification process for Paralympics sports has three or four steps.

1. The first step is a medical assessment.
2. The second step is a functional assessment, which involves two parts:
  - a. Observing a sportsperson in training
  - b. Observing the sportsperson in competition.
3. A number of people are involved in this process, including:
  - a. Individual classifiers
  - b. Medical classifiers
  - c. Technical classifiers
  - d. Chief classifier
  - e. Head of classification
  - f. Classification panel
  - g. Classification committee.

## Classifications in Paralympics (Eligible Impairments)

See pages 82–83 of the book.

## Divisioning in Sports by Special Olympics

Special Olympics has a fundamental rule called ‘divisioning’, which involves matching or grouping

athletes at a competitive level. Athletes competing in the same division are of the same gender, around the same age, and most importantly, of similar competitive ability.

What sets Special Olympics competitions apart from other sports organisations is that they encourage athletes of all ability levels to participate, and every athlete is recognised for their performance. Competitions are designed so that athletes compete with others of similar ability in equitable divisions.

## Implementation of Divisioning

The implementation of divisioning in Special Olympics competitions involves categorising athletes based on their ability, age and gender. The primary determinant of an athlete’s division is their ability, which is typically based on an entry score from a previous competition or a seeding round or preliminary event at the current competition. Age and gender are also significant factors in establishing competitive divisions, with separate age groups for individual and team sports. Therefore, athletes are initially categorised by their age group, followed by gender and ability, in the divisioning process. The goal of divisioning is to ensure that athletes are competing against others of similar skill levels, creating a fair and equitable playing field for all participants.

## Process of Divisioning in Special Olympics Competitions

- ❖ Athletes are initially categorised by their age group, with separate age groups for individual and team sports. The age categories for Special Olympics competitions vary depending on whether the sport is an individual or team sport. For individual sports, the age categories are 8–11 years, 12–15 years, 16–21 years, 22–29 years, and 30 and above. For team sports, the age categories are 15 and under, 16–21 years and 22 and above. These age categories are used in the divisioning process to ensure that athletes are competing against others of similar age and skill level.
- ❖ Athletes are then categorised by their gender.
- ❖ Athletes are then categorised by their ability, which is typically based on an entry score from

a previous competition or a seeding round or preliminary event at the current competition.

- ❖ Athletes are placed into competitive divisions based on their age group, gender and ability, with the goal of ensuring that athletes are competing against others of similar skill levels.
- ❖ Athletes compete within their respective divisions, with medals and awards given out based on their performance within their division.
- ❖ It is important to know that the exact process of divisioning may vary depending on the specific competition and sport involved, as well as the number and skill level of the athletes participating.
- ❖ In order to ensure fair divisioning, both athletes and coaches are required to adhere to the Special Olympics Official Sport Rules and the Athlete's Code of Conduct. This ensures that all participants understand and respect the rules and expectations of the competition, promoting fairness and sportsmanship among all involved.

### Maximum Effort Rule

In order to ensure fairness in the divisioning process of Special Olympics competitions, the 'maximum effort rule' is in place. This means that athletes are expected to give their best effort during preliminary trials and final rounds, and coaches are expected to motivate their athletes to do so. Any Special Olympics athlete who does not participate honestly or fails to adhere to the maximum effort rule may violate the spirit of competition and even face disqualification from the event. This rule is designed to promote fairness and encourage athletes to give their best effort in all phases of the competition.

### CONCEPT OF INCLUSION IN SPORTS, ITS NEED AND IMPLEMENTATION

#### Concept of Inclusion

In UNESCO's Education for All (EFA) Global Monitoring Report on out-of-school populations (2014), it was observed that 1.4 million Indian children of ages 6 to 11 are not receiving formal education. Almost half of the students in primary

school drop out before completing five years, while only 42% complete high school. Some of the contributing factors are shortage of teachers and schools in relation to the population, poor quality of teaching and learning, social and cultural factors, poverty, etc. This is the case with general education and the general population; in such a condition, inclusive education – education of students with learning disabilities and special needs – is a huge challenge to be met. That said, it is not an impossible task to achieve.

The matter of inclusive education was first adopted at the World Conference on Special Needs Education: Access and Quality (Salamanca Statement, Spain, 1994), and reinforced at the World Education Forum (Dakar, Senegal, 2000). In this statement, the respective governments of participating nations were asked to prioritise inclusive education. Inclusive education was described as the “*recognition of the need to work towards 'schools for all' – institutions which include everybody, celebrate differences, support learning, and respond to individual needs.*”

Additionally, the importance of inclusive education is also highlighted by United Nations Standard Rules on Equalisation of Opportunities for Person with Disability Proclaiming Participation and Equality for All. UNICEF declares: “*inclusive education is not only about issues of input, such as access, and those related to processes such as teacher training, but it involves a shift in underlying values and beliefs, along with very specific approaches, positions, and solutions.*”



**Figure 4.1** Inclusive education plays an important role in bringing people with special needs into the mainstream.

At the Jomtien World Conference in Thailand, 1990, education was recognised as a fundamental human right. Of the many goals adopted by the delegates, the following are relevant to inclusive education:

- ❖ universal access to learning
- ❖ a focus on equity

In the context of India, the Kothari Commission raised the issue of inclusive education in 1966, and the government introduced Integrated Education for Disabled Children (IEDC) Scheme in 1974. Project Integrated Education for Disabled Children (PIED) was launched by NCERT in 1987 in collaboration with UNICEF to streamline the inclusion of students with disabilities in general education. The National Policy on Education (1986), the Programme of Action (1992), the District Primary Education Programme (1997), Sarva Shiksha Abhiyan (2001), were some of the measures which also laid stress on the integration of students with special needs into the mainstream. The Universalisation of Elementary Education, which launched SSA, made the crucial declaration of access, enrolment and retention of all children of 6–14 years of age in school, with a policy of ensuring education for Child With Special Needs (CWSN).

Additionally, the Ministry of Human Resource Development introduced a National Action Plan in 2005 for incorporating inclusive education. The IEDC scheme was also replaced by the 'Inclusive Education of the Disabled at the Secondary Stage' (IEDSS) for providing inclusive education for students with disabilities in Classes 9 to 12.

Inclusive education simply means bringing students with disabilities under the same umbrella under which students of general education are covered. The idea is to treat them equally and provide them the same academic and vocational opportunities that their peers receive.

### Need of Inclusion

- ❖ Students with special disabilities already face certain disadvantages and limitations, which does not mean that they should be deprived of the knowledge and experience obtained by others at their schools. They too should enjoy the fundamental human right of education.

- ❖ Inclusive education is a big step towards integration of students with disabilities in the greater fold of the society. It will not only make them informed and skilled individuals but also produce more capable citizens for the nations.
- ❖ Inclusive education will also reduce the discrimination faced by people with disabilities. Here, mention may be made of Ira Singhal, who did not let her disability prevent her from topping the UPSC Exam in 2014 – her second attempt. She had already cleared the exam in 2010 in her first attempt but was denied a posting owing to her spinal cord problems and related motor inabilities and extremely short height.
- ❖ Inclusive education also has multiple benefits for students with special needs, such as enhancement of their social skills and emotional intelligence, development of principles and cultural sensibilities and generally enrichment of their lives. The same can be said of their classmates, who through the close contact established in the classroom, begin to nurture high levels of empathy and social cognition.

### Implementation of Inclusion

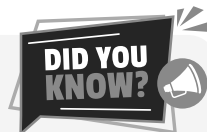
In order to facilitate inclusive education successfully, the following measures may be considered:

- ❖ There should be a proper realisation of the Right to Education (RTE) Act and its provisions, and inclusion of students with special needs under its aegis. All marginalised students should be welcomed by schools whose task is to educate one and all without bias.
- ❖ Specialised training programmes should be arranged for teachers who are given the responsibility of working with students with disabilities, since the requirements of this section of the population are different from the general trend.
- ❖ At schools, an entire team of experts, from special educators and physiotherapists, to counsellors and occupational therapists, should be present to look after the various needs.
- ❖ Curricula and instructional design prepared for students with disabilities should have plenty of room for adjustments, without dumbing down the content.
- ❖ Schools should be able to provide necessary

facilities, including ease of transport and sanitation and equipment – from wheelchairs and assistive devices to basics like stationery and audiobooks – for their students to enable learning methods that are suitable and interesting for students with special needs.

- ❖ It is important to involve parents in the education of students with disabilities, since their care and nurture are also to be taken up at home. Another concern is that parents and guardians should be fully aware of the progress of the student at the school, and their inputs sought on how to proceed in case of trauma or special situations. They will also be able to meet other parents and guardians and thus form a supportive community.
- ❖ Students with disabilities should be treated as the general population of the school and not approached with sympathy, which will only have a negative impact on their self-esteem. The onus is on the teachers to cultivate a healthy environment where differently abled students can successfully learn and attain self-growth.

The Ministry of HRD launched Saksham Scholarship Scheme in 2014 to provide support and encouragement to 1000 differently abled students to pursue technical education in a year. For more information, visit: [mhrd.gov.in](http://mhrd.gov.in)



- ❖ Steps such as frequent training programmes should be carried out, along with evaluation and upgradation of the programmes.
- ❖ If the existing curriculum proves to be ineffective, then measures for improvement of the structure should be taken up after consultation with experts in the field.
- ❖ At the government level, action should be taken to adopt and execute frameworks such as the Convention on the Rights of the Child and the Dakar Framework for Action. It would also be productive to work with NGOs that specialise in the area for developing plans on successful implementation of inclusive education.



## EXERCISES

### A. Objective Type/Multiple-Choice Questions

#### I. Multiple-Choice Questions:

1. What is the grouping process associated with Paralympics called?
 

(a) Divisioning	(b) <b>Classification</b>
(c) Categorisation	(d) Grouping
2. What is the grouping process associated with Special Olympics called?
 

(a) <b>Divisioning</b>	(b) Classification
(c) Grouping	(d) Categorisation
3. What is the rule used by Special Olympics to achieve fairness called?
 

(a) <b>Maximum Effort Rule</b>	(b) Average Effort Rule
(c) Best Effort Rule	(d) Minimum Effort Rule
4. What is the second step used in classification for Paralympics?
 

(a) Medical Assessment	(b) <b>Functional Assessment</b>
(c) Conditional Assessment	(d) Emotional Assessment
5. What is the number of Indian children who are not receiving formal education, according to the UNESCO report of 2014?

- (a) **1.4 million** (b) 1.5 million  
(c) 1.3 million (d) 1.2 million
6. What is the aim of inclusive education?  
(a) To treat disabled students separately  
**(b) To bring disabled students under the same umbrella as general education**  
(c) To provide separate academic and vocational opportunities for disabled students  
(d) To segregate disabled students from general education
7. When was education recognised as a fundamental human right in the Jomtien World Conference?  
(a) **1990** (b) 1994  
(c) 2000 (d) 2014
8. What is the name of the scheme launched by the Ministry of Human Resource Development for incorporating inclusive education in 2005?  
(a) Integrated Education for Disabled Children (IEDC)  
(b) Inclusive Education of the Disabled at the Secondary Stage (IEDSS)  
**(c) National Action Plan for the Education of Children with Disabilities (NAPED)**  
(d) Universalisation of Elementary Education (UEE)

## B. Very Short Answer Type Questions

1. What is classification in disability sports?
2. What is divisioning in disability sports?
3. What are some of the contributing factors for the shortage of teachers and schools in India?
4. What are the goals relevant to inclusive education adopted at the Jomtien World Conference?

## C. Short Answer Type-I Questions

1. What is the purpose of classification and divisioning in disability sports?
2. What is the maximum effort rule in Special Olympics competitions?
3. What is the meaning of inclusive education?
4. What are the benefits of inclusive education for students with special needs?

## D. Short Answer Type-II Questions

1. What is the classification process for Paralympic sports?
2. How does divisioning work in Special Olympics competitions?
3. When was the matter of inclusive education first adopted?
4. What was the scheme launched by NCERT in collaboration with UNICEF in 1987 to streamline the inclusion of students with disabilities in general education?

## E. Long Answer Type Questions

1. Explain the eligibility criteria and grouping process in Paralympic classification.
2. Discuss the implementation and importance of divisioning in Special Olympics competitions.
3. What are some measures taken by the government of India to lay stress on the integration of students with special needs into the mainstream?



# Sports and Nutrition

## EATING FOR WEIGHT CONTROL – A HEALTHY WEIGHT, THE PITFALLS OF DIETING, FOOD INTOLERANCE AND FOOD MYTHS

### Meaning of Healthy Weight

In a 1998 study published by the American National Institute of Health, a healthy weight was defined as:

*“A healthy weight is considered to be one that is between 19 and 25 (BMI). If the BMI is between 25 and 29 an adult is considered overweight. If the BMI is 30 or greater, the person is considered to be obese.”*

While BMI or Quetelet’s Index is one indicator of healthiness, it is not the sole determinant. Someone with the appropriate healthy weight might have their mass distributed in the wrong areas.

A healthy weight is the weight which suits our body’s height without compromising on any health factor. A person with a healthy weight has the

right BMI and is free from major health problems, such as heart diseases, kidney failure, diabetes, infections and so on.

### Calculating BMI

BMI, or Body Mass Index, is the ratio of body weight to the square of the height. Mathematically, it can be shown as:

$$BMI = \frac{\text{(weight in kg)}}{\text{(height in m)}^2}$$

The WHO criteria for underweight, normal or healthy, overweight and obesity is given below:

Table 5.1 BMI chart

Category	BMI (Body Mass Index)
Underweight	< 18.5
Normal weight	= 18.3 – 24.9
Overweight	= 25 – 29.9
Obesity Class 1	= 30 – 34.9
Obesity Class 2	= 35 – 39.9
Obesity Class 3	> 40

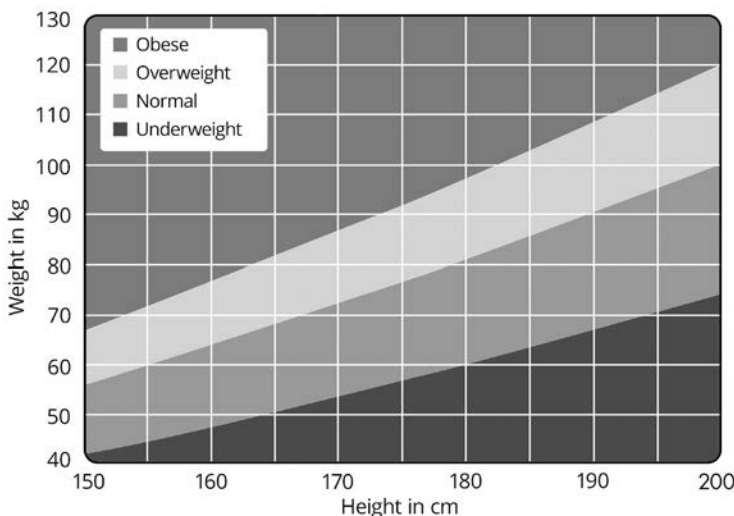


Figure 5.1 Body Mass Index

As already stated, we should look beyond BMI to understand what it means to have a healthy weight. It is achieved through lifestyle modifications and the principle of ‘eating what we need to live, not living to eat’. The ideal weight is always accompanied by a normal and wise attitude towards food selection and portion.

### How to Maintain Healthy Body Weight

- ❖ **Goal Setting:** Finding out your weight in relation to height, lets you know if you need to gain or lose weight further. Once this becomes clearer,



### Extension Activity

Collect the health data of your class from your school infirmary/health and fitness department and prepare a sample diet chart for each of the following types of students:

- (a) Overweight
- (b) Underweight
- (c) Vegetarian
- (d) Non-vegetarian
- (e) Vegan

set a target for how much change you want to see within a month with the right diet and exercise. It is recommended that you start with smaller targets and raise your levels with each successful phase.

- ❖ **Health, Not Wealth, is the Key:** Though it is tempting to lose weight to look good, it is best to lose weight to be healthy. Try to achieve or maintain a BMI between 18.5 and 24.9. If you are male, your waist should measure less than 40 inches and if you are female your waist should be less than 35 inches. If your BMI or waist goes beyond these limits you may face variety of health risks.
- ❖ **Control Calories Count:** Cut 100 calories a day if you have exceeded your ideal weight.
- ❖ **Change Lifestyle for the Better:** Minor changes in lifestyle and proper exercise can help maintain body weight. Taking the stairs instead of lifts and escalators, walking reasonable distances instead of commuting by automobiles, taking part in physical activities, reducing the amount of time spent on electronic gadgets, etc. are some positive lifestyle changes that can be undertaken without investing extra time, resources and energy.
- ❖ **Get the Support of Those Who Matter:** Involve those around you in your plan to lose weight so that you have an unending source of motivation. If there's anybody you know undergoing a similar change, it is even better. Human beings are known to work better as teams and in competitive environments.
- ❖ **Yoga:** Yogic exercises like meditative asanas bring relief from stress and tension. They can be used to maintain proper weight.
- ❖ **Saying No to Fatty Foods:** Fats have maximum number of calories, but if not utilised, they get

stored as body fat. Fatty foods, especially junk foods, should be cut down from one's diet.

- ❖ **Avoid Overeating:** Eating more than what our body needs leads to weight gain. Eat nutritious food as per the demands of your age, height, gender, and physical activity levels.
- ❖ **Avoid Carbohydrate Rich Food:** While carbohydrates give us energy, consuming high carbohydrate foods like sugar, rice, potatoes, etc. without using them up with the appropriate amount of physical exertion is not advisable.
- ❖ **Eat the Right Number of Meals:** It is inadvisable to skip meals just so we can lose weight. The better idea is to eat smaller meals at frequent intervals, with the portions matching the energy requirements. This means a heavy breakfast, a properly adequate lunch and a light dinner.
- ❖ **Say No to Alcohol:** Alcohol is directly absorbed from the blood stream and deposited as fat; it can thus increase weight and bloat your cheeks and abdomen. Even if it has to be consumed for social purposes, it must be taken at minimal levels. The best approach, however, is abstinence.
- ❖ **Exercise Regularly:** Though some of our calorie intake is used up during respiration, digestion, sleeping and other bodily activities, leftover calories get stored as body fat, leading to weight gain. Regular exercise can help in this situation by helping in burning the excess calories. When our calories intake and burning calories cancel each other out, our body weight remains the same.



Figure 5.2 Be active, be fit, be healthy.



Maintaining a healthy weight is not an easy work; it requires a lot of effort and discipline from the individual's side. However, it is not an impossible task to achieve. From what we have learned above, implementing strategic eating and exercise can enable us to remain physically fit with the right body weight.

## The Pitfalls of Dieting

Nowadays, we are realising the advantages of having a healthy physique and fit body in general. Those who are overweight have plenty of diet charts and exercise methods to choose from in order to lose weight. Most, however, do not want to face the physical challenge of exerting their body on a regular basis. This may be due to several reasons: lack of time, lack of willpower, laziness, etc. They compensate instead with dieting.

The catch with dieting is that without exercise, it remains a temporary solution. Research has found that 90% of dieters gain all their weight back, sometimes even more than that. In fact, there are various pitfalls of dieting that keep us away from reducing weight at a steady pace:

- ❖ **Extreme Reduction of Calories:** Our body needs a specific amount of calories for proper functioning. Cutting that intake severely, say 1800 calories a day, cannot supply sufficient energy. Any dieting method that reduces your calories intake drastically lowers body metabolism. Though weight will be lost ultimately, it will be too excessive and dangerous for health. We now know that being underweight is just as destructive as being overweight.
- ❖ **Restriction of Selected Nutrients:** Dieting restricts components of food like carbohydrates and fats since they can get converted to body fat. If this continues, then the body will weaken, lose its immunity and become vulnerable to several deficiency diseases and conditions.
- ❖ **Skipping Meals:** There is a direct relationship between metabolic rate and body weight. A good metabolic rate allows you to maintain or lose weight. Skipping meals therefore ends up lowering metabolism to conserve energy. This also means you are more likely to eat more than your body can process in the next meal.

- ❖ **Intake of Calories through Drinking:** The idea that calorie-laden fluids are a better dieting option is incorrect. Drinks such as sodas, processed juices with added sugar, coffee with cream and sugar, etc. all contribute to weight gain.

- ❖ **Intake of Pre-packaged and Labelled Foods:** Dieters are tempted to use products that have unrealistic labels on them like 'sugar-free', 'diet soda', 'fat-free', etc. Depending on these items for sustenance will leave lasting damages on the body, as they cannot provide you with the nutrients or energy your body needs.

- ❖ **Avoiding Exercise:** Exercising and dieting are two sides of the same coin. If the diet provides energy, the exercise part expends it so that very little is left in the body as deposited fat.



### Art Integration

Host a cook-without-fire workshop for the students of your class where a balanced meal will be prepared.

## Food Intolerance

Food intolerance occurs when a person has difficulty digesting a particular food. It is sometimes referred to as food sensitivity and varies from person to person. Food intolerance is neither frequent nor fatal; it can be avoided by dietary control.

**Causes of Food Intolerance:** Food intolerance is caused by part or complete ineffectiveness of the body enzymes responsible for breaking down or absorbing the food. This defect may be innate, diet-related or induced by some illness.

**Symptoms of Food Intolerance:** The onset of symptoms is usually slower and maybe delayed by many hours after the food is taken. Signs include nausea, stomach pain, vomiting, diarrhoea, flatulence, gas, cramps, heartburn, headache and nervousness.

**Management of Food Intolerance:** There are no valid tests for intolerance. The only way to identify the causes is by accurately recording the times and duration of all symptoms as well as everything you eat. Guidance can also be provided by a doctor who can diagnose and manage dietary consumption.

## Food Myths

Food myths are unfounded and unscientific misconception surrounding the consumption of particular foods, such as:

1. **Less Carbohydrates Make Healthier:** Whole grains are the healthiest carbohydrates. They reduce the risk of chronic diseases. Avoid refined carbohydrates.
2. **Less Calories in Oils/Margarine than Ghee/butter:** Oils/Margarine are made from vegetable oils. Researches show that margarine is unhealthy as it contains trans fats. Trans fats are bad for heart health.
3. **Apples and Brinjals are Rich Source of Iron Because They Turn Brown When Cut:** Due to an enzymatic reaction, apples and brinjals turn brown when cut. They are good source of fibre but not iron. It is a misconception.
4. **Potatoes Make You Fat:** As we all know, carbohydrates are the energy source of our body. One does not gain weight by simply eating carbohydrates as long as intake of starchy food is not excessive.
5. **Fat-free Products will Help You Lose Weight:** So, frequent intake of fat-free products may still lead to weight gain, as their calorie content is similar. Without full utilisation of the calorie intake, weight gain will always be a problem.
6. **Eggs Cause Heart Problems:** Eggs are in fact beneficial for health as they provide protein, vitamins A, B, D, zinc, iron, calcium and phosphorus, etc.
7. **Weight Gain is Caused by Unprocessed Food:** If your body has not processed the food, it means it hasn't absorbed the calorie content. Therefore, failure to process certain foods actually leads to weight loss.
8. **Food Cravings are Driven by Deficiency:** Food cravings are caused mostly by emotional needs. We are inclined to wanting more of what we shouldn't have.
9. **Spicy Food Causes Ulcer:** In reality, what happens is that spicy food worsens an already irritable bowel. Ulcer is caused mostly by the bacteria *Helicobacter pylori*.

## IMPORTANCE OF DIET IN SPORTS

### – PRE, DURING AND POST COMPETITION REQUIREMENTS

Proper nutrition plays an important role in the training and performance of athletes. By choosing the right foods and following a varied diet, athletes can improve their performance and reap long-term health benefits. The principles of nutrition and a balanced diet are equally applicable to the field of sports. Athletes must adjust their energy intake and macronutrient and micronutrient proportions based on the requirements of their sport. Their diet should aim to maintain the desired body weight and composition for their sport, support adequate nutrient levels, and promote healthy nutritional habits during training, competition and the off-season. Any imbalances in nutritional intake can adversely affect their performance potential. Providing athletes with a nutritious diet not only improves their performance but also supports good health.

### Importance of Diet in Sports

The importance of diet in sports cannot be overstated. Sports persons have greater demands on their body, and proper nutrition is essential to meet these demands, facilitate post-training recovery, and achieve body composition goals. The nutrient composition of the diet can be manipulated to a certain extent to meet the requirements of different games. Optimal nutrition before, during and after competition can improve performance, delay fatigue and accelerate recovery. Knowledge of nutrition is also critical to the success of fitness, weight loss and weight gain programs for athletes, particularly for those who play in weight categories. During the off-season, the diet should prevent excessive weight gain and maintain body composition. Certain nutrients, taken as ergogenic aids, can have psychological and physiological effects that enhance athletic performance. Hydration is equally important, and athletes must ensure sufficient intake of fluids and electrolytes to maximise hydration before, during and after exercise. Adequate diet also enhances physiological adaptations during training.

## Carbohydrates in Sports and Exercise

Carbohydrates are the main energy source for exercise. Strength athletes need 55% of total calories from carbohydrates, while endurance athletes need 60–70%. Type and timing of carbohydrate intake matter too. Complex carbohydrates are best before competition, and simple sugars should be avoided one hour before exercise. Simple carbohydrates are good for energy replacement after exercise, while complex carbohydrates are preferred pre-exercise. Carbohydrates take 4 hours to digest and become muscle/liver glycogen, so pre-exercise meals should be 4–6 hours before. A light carbohydrate/protein snack 30–60 minutes before exercise (50 g carbohydrate, 5–10 g protein) boosts carbohydrate availability and decreases protein breakdown.

## Proteins for Exercise and Training

Proteins are important for exercise and training to increase muscle mass and prevent muscle tissue breakdown. The ICMR recommends a protein intake of 12–14% of total calories or 1–2 g/kg body weight. Good quality protein sources like milk, meat, fish and eggs should be included in a well-balanced diet. Protein supplementation is not necessary if athletes maintain energy balance and consume 15% of their calories from protein. Excessive protein intake (> 2 g/kg of body weight) can lead to renal degeneration and bone porosity, dehydration and urinary calcium loss.

## Fat Intake in Sports and Training

Athletes should limit their dietary fat intake to 25–30% of total calories. Choosing sources of healthy fats such as polyunsaturated and monounsaturated fatty acids (PUFA found in vegetable oils, nuts, Oil seed and MUFA found in ground nut oil, fish oil) over saturated fats (found in animal fat and butter). Inclusion of egg whites, fish and skimmed milk instead of high-fat animal foods can help maintain total cholesterol levels below 200 mg/day.

## Vitamins and Minerals

Athletes need more vitamins and minerals due to their high energy needs and free radical production. Eating a variety of nutrient-dense foods, especially fruits and vegetables, can provide

the required amount. Excess intake of vitamins and minerals does not improve performance unless there is a deficiency. A balanced diet with a variety of nutrient-dense foods is the best way to obtain adequate vitamins and minerals. Supplements should not replace food.

## Pre-Exercise or Pre-Event Meal

Pre-exercise meal should fuel glycogen stores and maintain hydration to prevent fatigue, weakness, and interference with sports performance. It should consist of high-carbohydrate, moderate protein, low-fibre, and low-fat foods providing 500–1000 kcal. Avoid high sugar foods to prevent early fatigue, cramping and dehydration. Small meals or snacks every 2–3 hours on regular training days are recommended. Meals should be taken 2–4 hours before exercise or less if semi-solid or liquid. Avoid unfamiliar or allergenic foods and foods heavy on the stomach. Optimal hydration status and sufficient muscle glycogen stores delay the onset of fatigue, and athletes should consume sufficient fluids and electrolytes at regular intervals. Water is the best fluid for this purpose, and sports drinks with sugar levels up to 2% may be taken. Dehydration signs include dark urine, decreased urine output, rapid heart rate, headache, irritability and confusion. Dehydration for weight loss should be discouraged as it affects sports performance.

## During Exercise

To perform optimally during exercise, it is important to maintain water balance, control body temperature, sustain normal blood sugar levels and delay fatigue. Adequate carbohydrate and fluids should be consumed during small breaks in events like tennis or boxing. Carbonated beverages, fizzy drinks and caffeine-containing drinks should be avoided. For exercises lasting more than 60 minutes, carbohydrate-electrolyte beverages with 5–8% carbohydrates can be taken. Endurance athletes in events lasting more than two hours should consume carbohydrate-rich solids or liquid meals during exercise, as muscle glycogen levels diminish.

## Post-Training/Competition

Post-training or competition, recovery is essential to

optimise performance and reduce the risk of injury. Focus should be on replenishing fluids, refilling carbohydrate stores and replacing electrolytes. Rehydration should begin during exercise and continue after exercise ends, and athletes should

drink more fluid than is lost. High-carbohydrate foods should be consumed immediately after intense or prolonged exercise. A balanced meal with carbohydrates and protein should be eaten within two hours of the event.

## EXERCISES



### A. Objective Type/Multiple-Choice Questions

#### I. Multiple-Choice Questions:

1. What is the healthy weight range (BMI) according to the American National Institute of Health?  
(a) BMI between 18 and 24  
(b) **BMI between 19 and 25**  
(c) BMI between 25 and 29  
(d) BMI greater than 30
2. Which of the following is not a major health problem associated with unhealthy weight?  
(a) Heart diseases  
(b) Kidney failure  
(c) Diabetes  
(d) **Migraines**
3. What is BMI?  
(a) Body Muscle Index  
(b) **Body Mass Index**  
(c) Body Metabolism Index  
(d) Body Mobility Index
4. Why is it inadvisable to skip meals in order to lose weight?  
(a) It can lead to overeating later.  
(b) It can cause nutrient deficiencies.  
(c) It can slow down metabolism.  
(d) **All of these**
5. What is the recommended percentage of total calorie intake for carbohydrates for strength athletes?  
(a) 45 per cent  
(b) 50 per cent  
(c) **55 per cent**  
(d) 60 per cent
6. What type of fats are recommended for athletes?  
(a) Saturated fats  
(b) Trans fats  
(c) **Polyunsaturated and monounsaturated fatty acids**  
(d) Both a. and b.
7. What is the recommended pre-exercise meal calorie intake?  
(a) **500–1000 kcal**  
(b) 1000–2000 kcal  
(c) 2000–3000 kcal  
(d) 3000–4000 kcal
8. What is the recommended protein intake for athletes?  
(a) 8–10% of total calories  
(b) 10–12% of total calories  
(c) **12–14% of total calories**  
(d) 14–16% of total calories

### B. Very Short Answer Type Questions

1. What is the recommended waist measurement for males and females to maintain a healthy weight?
2. What are some lifestyle changes that can help maintain a healthy body weight?

3. What is the importance of proper nutrition in sports?
4. What is the recommended protein intake for athletes according to ICMR?

### C. Short Answer Type-I Questions

1. What is BMI and how is it calculated?
2. What are some health problems associated with an unhealthy weight?
3. What is the recommended percentage of total calorie intake for carbohydrates for endurance athletes?
4. What is the recommended time frame for pre-exercise meals?

### D. Short Answer Type-II Questions

1. What are some steps one can take to maintain a healthy body weight?
2. Why is it important to look beyond BMI when understanding what it means to have a healthy weight?
3. What are the consequences of excessive protein intake for athletes?
4. What are the signs of dehydration during exercise?

### E. Long Answer Type Questions

1. Explain some of the pitfalls of dieting and why it may not be an effective long-term solution for achieving a healthy body weight.
2. What is the role of carbohydrates in sports and exercise, and what are the recommendations for carbohydrate intake before, during and after exercise?



# 6

## Test and Measurement in Sports

### MEASUREMENT OF CARDIOVASCULAR FITNESS — HARVARD STEP TEST

Cardiovascular fitness is the ability of the heart, blood cells and lungs to supply oxygen-rich blood to the working muscle tissues and the ability of the muscles to use oxygen to produce energy for movement. A person's ability to deliver oxygen to the working muscles is affected by many physiological parameters, including heart rate, stroke volume, cardiac output and maximal

oxygen consumption. Cardiovascular fitness can be measured using the following tests.

#### Harvard Step Test —————

In 1943, Belgian–American physiologist Lucien Brouha and his associates C W Health and A Graybiel developed a cardiovascular endurance test known as the Harvard step test at the Harvard Fatigue Laboratories during World War II.

**Purpose:** To measure aerobic fitness.

**Objective:** To perform step test continuously

without break for 5 minutes or until exhausted.  
**Equipment:** A bench or platform of 20 inches tall for men and 16 inches tall for women, a stopwatch and a metronome.



Figure 6.1 Harvard step test

**Procedure:** The participant is asked to step-up on the platform and down again at a rate of 30 steps per minute (i.e. one step every 2 seconds) for 5 minutes continuously or until she/he gets exhausted. In this context, exhaustion is the point at which the participant can no longer maintain the stepping rate for 15 seconds.

As soon as the participant completes the cycle, she/he is asked to sit-down and the total numbers of heartbeats are counted between 1 to 1.5 minutes.

**Scoring:** The score is given based on the following formula:

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

The fitness level may be determined from the parameters given below:

Table 6.1 Norms for Harvard Step Test

Rating	Fitness Index
Good	81 or above
Average	50 – 80
Poor	up to 49

### Advantages and Disadvantages

The advantage of the Harvard step test is its simplicity. Minimum equipment, time and cost are required and the test itself is easy to execute. The disadvantage lies in the failure to account for physiological differences between individuals,

especially in height and weight, while the height of the platform to be used is standardised.

### JOHNSON – METHNEY TEST OF MOTOR EDUCABILITY (FRONT ROLL, BACK ROLL, JUMPING HALF-TURN, JUMPING FULL-TURN)

The Johnson-Metheny Test of Motor Education is an updated version of the Johnson Educability Test designed in 1932.

**Objective:** The main objective of this test battery is to assess neuromuscular skill capacity. It consists of ten items.

In 1938, Metheny analysed the test and removed six items, resulting in four motor stunts remaining. These stunts include the following items:

1. Front Roll
2. Back Roll
3. Jumping Half-Turns
4. Jumping Full-Turns

Boys are required to perform all four stunts, while girls are only required to perform first three stunts.

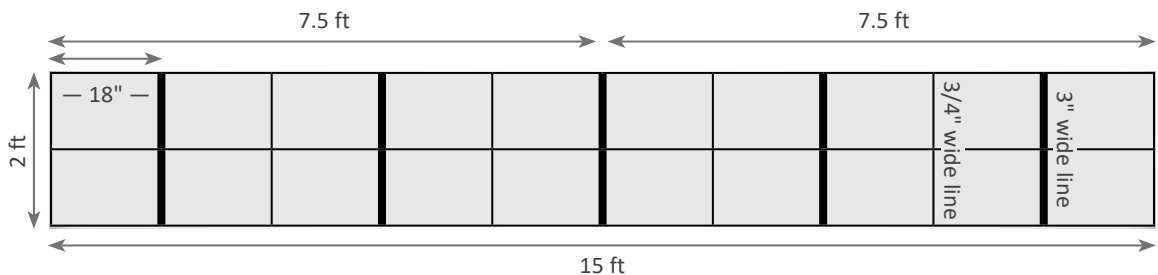
**Test Area:** The test area for the Johnson–Metheny motor educability test battery is a canvas that measures 15 feet in length and 2 feet in width. The canvas is marked as illustrated in Figure 6.2.

The 15 feet length is divided into ten sections, each measuring 18 inches. The transverse lines are 3 inches and 3/4 inches wide alternatively. The centre of the lines is 18 inches apart. Additionally, a 3/4 inch wide line is marked lengthwise in the centre of the mat area.

#### Procedure:

1. **Front Roll:** The student is instructed to perform two front rolls while disregarding the long middle dividing line. The first roll should be up to 7.5 feet, specifically within the 3-inch wide centre line. The second roll should be within the other half of the 7.5 feet marked area. The student must avoid touching the limits or overreaching the mentioned zones.

**Scoring:** Each correctly performed roll earns 5 points, with a maximum of 10 points for both rolls. If the student overreaches the side line (either right or left) during a roll, two points are deducted for each roll. One point is deducted for overreaching the end limit on each roll, and



**Figure 6.2** Testing area of Johnson-Metheny motor educability test battery

a full deduction of five points is made if the student fails to execute a true front roll.

2. **Back Roll:** In the Back Roll test, the student is asked to perform two back rolls within the marked canvas area. The rolls must be executed without touching the limits or overreaching the specified zones. Each correct roll earns the student 5 points, with a maximum of 10 points for both rolls.

**Scoring:** Points are deducted for overreaching the side lines or end limit during each roll. A full deduction of 5 points is made if the student fails to execute a true back roll.

3. **Jumping Half-Turns:** This test requires the participant to start with their feet on the first 3-inch line and jump to the second 3-inch line with both feet. They must execute a half turn, either to the right or left. Then, they must jump to the third 3-inch line and execute a half turn in the opposite direction to the first half-turn. The participant must continue jumping to the fourth and fifth 3-inch lines, executing half-turns alternately to the right and left.

**Scoring:** Scoring for this test involves a maximum of 10 points for perfect execution of all four jumps. Two points are deducted for each incorrect jump, such as not landing on both feet on the 3-inch line, turning the wrong way or both.

4. **Jumping Full-Turns:** In this test, the participant starts with their feet outside the marked area at the centre of the lane. They are required to jump with their feet together to the second rectangular space while executing a full turn with their body either to the right or left. They must continue jumping to alternate rectangular spaces across the marked mat, executing full turns while rotating their body in the same direction and landing on both feet every time.

**Scoring:** Scoring for this test involves a maximum of 10 points for the perfect execution of all five jumps. Two points are deducted if the participant fails to keep their balance on landing on both feet, turns too far, or oversteps the squares.

## EXERCISES



### A. Objective Type/Multiple-Choice Questions

#### I. Multiple-Choice Questions:

1. What is the purpose of the Harvard step test?
  - (a) To measure flexibility
  - (b) To measure muscular strength
  - (c) To measure anaerobic fitness
  - (d) **To measure aerobic fitness**
2. What is the rate at which the participant is asked to step-up and down during the Harvard step test?
  - (a) 20 steps per minute
  - (b) 25 steps per minute
  - (c) **30 steps per minute**
  - (d) 35 steps per minute

3. At what point is exhaustion considered during the Harvard step test?
  - (a) When the participant reaches 30 seconds of stepping
  - (b) When the participant can no longer maintain the stepping rate for 5 seconds
  - (c) When the participant can no longer maintain the stepping rate for 10 seconds
  - (d) **When the participant can no longer maintain the stepping rate for 15 seconds**
4. What is the formula for calculating the Fitness Index Score (long-term) during the Harvard step test?
  - (a) Duration of exercise in seconds  $\div$  Sum of three pulse counts in recovery
  - (b) Duration of exercise in seconds  $\times$  Sum of three pulse counts in recovery
  - (c) Duration of exercise in seconds  $+$  Sum of three pulse counts in recovery
  - (d) **Duration of exercise in seconds  $\times$  100  $\div$  (5.5  $\times$  pulse count of 1–1.5 minutes after exercise)**
5. How many items are included in the Johnson-Metheny Test of Motor Education?
 

(a) Three items	(b) Six items
(c) <b>Ten items</b>	(d) Twelve items
6. Which of the following is not a stunt required for girls in the Johnson-Metheny Test of Motor Education?
 

(a) Front Roll	(b) Back Roll
(c) Jumping Half-Turns	(d) <b>Jumping Full-Turns</b>
7. What is the maximum score for the Jumping Full-Turns test in the Johnson-Metheny Test of Motor Education?
 

(a) 5 points	(b) <b>10 points</b>
(c) 15 points	(d) 20 points

## B. Very Short Answer Type Questions

1. Who developed the Harvard step test?
2. What is the criterion for exhaustion in the Harvard step test?
3. Who analysed the Johnson Educability Test and removed six items to create the Johnson-Metheny Test of Motor Education?
4. What is the size of the canvas used in the Johnson-Metheny Test of Motor Education?

## C. Short Answer Type-I Questions

1. What are the physiological parameters that affect a person's ability to deliver oxygen to the working muscles?
2. What is the formula for the Fitness Index Score in the Harvard step test?
3. How is the canvas marked in the Johnson-Metheny Test of Motor Education?
4. What are the scoring rules for the Back Roll test in the Johnson-Metheny Test of Motor Education?

## D. Short Answer Type-II Questions

1. What are the advantages of the Harvard step test?
2. Describe the procedure for the Jumping Half-Turns test in the Johnson-Metheny Test of Motor Education.
3. What are the scoring rules for the Jumping Full-Turns test in the Johnson-Metheny Test of Motor Education?

## E. Long Answer Type Questions

1. Describe the procedure of the Harvard step test.
2. Describe the Johnson-Metheny Test of Motor Education and its objectives.





# Physiology and Injuries in Sports

## PHYSIOLOGICAL CHANGES DUE TO AGEING

### Meaning of Ageing

Ageing is a multifaceted and natural phenomenon of gradual decrease in the body's functional capacity and degeneration of its physical structures. It is marked by deterioration of organs and tissues that affects all human beings in certain degrees after a particular age. This process is genetically determined and modulated by environmental factors, such as, diet, exercise, sunlight, pollutants, gravity and contamination by microbes, etc. It is an irreversible physical change brought on by the passage of time and cannot be undone.

### Changes due to Ageing

Ageing starts to set in after the body's functional systems attain the state of highest capability, which hits during 20–30 years of age. The findings of various studies reveal that most of the systems of the body start deteriorating from age 30 by 1% every year. Numerous changes take place in the body with progression of the ageing process. They are discussed as follows:

- 1. Changes in Muscle Size and Strength:** Due to ageing, muscle mass decreases. As the muscles diminish in size, they lose strength and ultimately become weak. Muscular strength starts receding during 35–45 years of age. Interestingly, it is observed that decrease in strength generally does not reach over 20% of the total strength of an individual who is 60 years of age.
- 2. Changes in Metabolism and Body Composition:** When we get old, energy requirement comes down and metabolism rate decreases. As a result, body fat increases and lean body weight (bones, tissues, muscle and water) decreases. The metabolism rate continues to decline with age and overall body fat piles up constantly.
- 3. Changes in Bone Density:** The process of ageing changes the structure of bones. Mineral deposits in bones, such as, calcium and phosphate, start depleting in the early 40's. Consequently, bones become less dense and more permeable, which is why people over 40 years are prone to bone injury in comparison to younger ones. Because of the weakening of bones, the capacity to support weight decreases and the risk of fracture increases. Low bone density can cause osteoporosis. An individual's vertebrae may also wear off and cause a decrease in height with age.
- 4. Changes in Respiratory System:** Ageing affects the respiratory system adversely. Respiratory muscles become stiff and lose efficiency. The tissues and muscles around the airways are unable to keep the airways completely open, causing the airways to shut easily. Chest muscles grow weak and as a result the ribcage is unable to expand and contract as usual while breathing. The diaphragm gets weak, which causes insufficient inflow and outflow of air. Along with that, CO<sub>2</sub> removal also decreases. Therefore, O<sub>2</sub> level and gaseous exchange are reduced. The

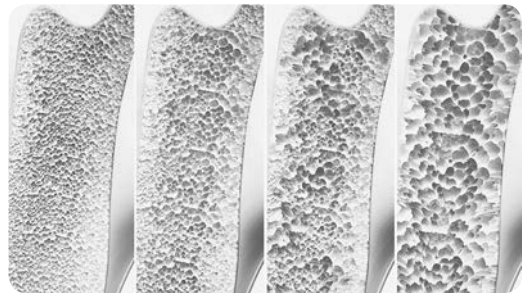


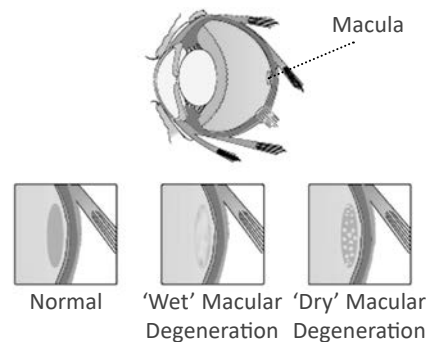
Figure 7.1 Changes in the structure of bones with age

overall endurance of the respiratory system is diminished. This is accompanied by shortness of breath and fatigue. The residual volume increases, while tidal volume, vital capacity, O<sub>2</sub> uptake and lung capacity decrease with age.

5. **Changes in Cardiovascular System:** Due to ageing, the cardiac muscles lose elasticity and flexibility. The left ventricle wall thickens; subsequently, cardiac output, stroke volume and blood flow decline. Walls of arterial vessels become tough and stiff, which causes high blood pressure. Valves inside the heart harden with age. Moreover, there is a slight thickening of capillary walls. This slows down nutrients and waste exchange. All of these contribute to low endurance and insufficient nutrient supply to the body.
6. **Changes in Nervous System:** As we age, the functioning of the nervous system starts declining. The brain and spinal cord lose their size and weight, and the nerve cells and blood flow decrease. The nerve cells also get damaged and transmit signals slowly. As a result, reflexes and movements of the body slow down. Memory power and thinking ability get impaired with age. But these changes may vary to a certain degrees in different people and the brain also produces a new network of nerve endings to adjust with these changes.
7. **Changes in the Gastrointestinal System:** Age-related changes affect the liver significantly. The capacity of the liver to clear drugs from the system and to repair damaged cells is reduced along with the blood flow. Secretion of saliva, hydrochloric acid and digestive enzymes decreases; mastication of food becomes inefficient due to the loss and decay of teeth; swallowing, breaking down and absorption of food become difficult; and the movement of food from the stomach and along the digestive tract also slows down.
8. **Changes in Urinary System:** With increasing age, tissues and filtering units of the kidneys reduce and kidney-related blood vessels become hard. The kidney begins to take a longer time to remove waste products. The bladder muscles get weak and the tissues lose their elasticity. Therefore, bladder capacity reduces. This causes

urinary retention, bladder control problems and increased risk of urinary infections.

9. **Changes in Flexibility:** Ageing reduces the possible range of movement of our body. Tendons, ligaments and joint capsules lose their elasticity. A research estimated that human beings lose 8–10 cm of lower back and hip flexibility as they get old.
10. **Changes in Senses:** Ageing causes sensory changes in the body. Vision, hearing, touch, taste and smell become less sharp. These changes are more pronounced in vision and hearing. The following are some of the changes in our vital senses:
  - ❖ **Changes in vision:** It is the most evident change of ageing among almost every individual. As we grow old, the cornea becomes less sensitive and the retina loses its efficiency. The pupils shrink and respond slowly to light in the forties. It is observed that the pupils lose one-third of their size by the age of 60 years. The lenses turn yellow and slightly cloudy, and lose their



**Figure 7.2** Changes in vision is a common problem in elderly people.

flexibility. Decrease of peripheral vision is a common problem in elderly people.

- ❖ **Changes in hearing:** Auditory impairment is another common problem of old age. The structures of the inner ear change and function ineffectively. Loss of hearing causes problems with balancing while sitting, walking or standing. The ability to distinguish certain sounds also diminishes. Tinnitus, a persistent abnormal ear noise, is prevalent among older adults.
- ❖ **Changes in taste:** The number of taste buds decline with age. The remaining taste buds also

diminish in size. The taste buds lose sensitivity to different types of tastes after the age of 60 years. So, the sense of taste reduces and naturally, it can kill the appetite and enjoyment while eating.

- ❖ **Changes in smell:** Ageing also decreases the sense of smell, usually after 50 years of age. This

is due to loss of smell receptors and decrease in mucus production in the nose.

Taking into consideration all these physiological changes mentioned above, we can sum up that ageing affects the structure and functions of various systems in our body, which causes a progressive degeneration of the entire body.



## EXERCISES

### A. Objective Type/Multiple-Choice Questions

#### I. Multiple-Choice Questions:

1. What is ageing?  
(a) A reversible change  
(b) A change in the genetic structure  
(c) **A natural phenomenon**  
(d) A change caused by environmental factors
2. At what age does the process of ageing start?  
(a) 20–30 years  
(b) **30–40 years**  
(c) 40–50 years  
(d) 50–60 years
3. At what age does muscle strength start decreasing?  
(a) 20–30 years  
(b) 30–35 years  
(c) **35–45 years**  
(d) 45–60 years
4. Which system of the body is affected by ageing that causes urinary retention and bladder control problems?  
(a) Respiratory system  
(b) **Urinary system**  
(c) Cardiovascular system  
(d) Gastrointestinal system
5. What causes osteoporosis in people over 40 years of age?  
(a) **Decreased bone density**  
(b) Increased bone density  
(c) Increased mineral deposits  
(d) Increased bone permeability

### B. Very Short Answer Type Questions

1. What causes the increase in body fat in old age?
2. What causes the decrease in muscle strength due to ageing?
3. What is osteoporosis?

### C. Short Answer Type-I Questions

1. How does ageing affect the cardiovascular system?
2. What are the changes that occur in the respiratory system due to ageing?
3. What changes occur in the gastrointestinal system due to ageing?

### D. Short Answer Type-II Questions

1. How does ageing affect the functioning of the nervous system?
2. How does ageing affect bone density?

### E. Long Answer Type Questions

1. How does ageing affect the gastrointestinal system?
2. What are the changes that occur in the urinary system due to ageing?



# Biomechanics and Sports

## TYPES OF LEVERS AND THEIR APPLICATIONS IN SPORTS

### Meaning of Lever

A lever is a simple and ordinary tool to lift a heavy object with lesser effort than we would have expended without it. It gives us mechanical advantage by maximising force to overcome resistance. If you observe carefully, you will see levers all around you – from your fingers, arms and legs, to openers and pumps. In fact, our body movements are created by bones, ligaments and muscles which together form a system of lever. For example, when a person works out, the muscles pull on the bones, acting as a lever and creating movements.

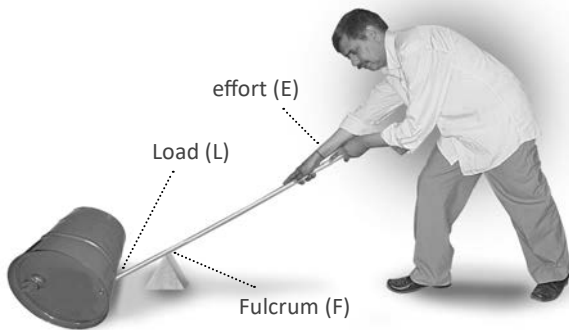


Figure 8.1 Basic parts of a lever

A lever has three components:

1. **Fulcrum:** The point where the lever pivots or rotates.
2. **Load:** The force of the lever system or the resistance.
3. **Effort:** The force applied by the lever system user.

### Types of Lever and Applications in Sports

Depending on the location of the fulcrum, there are three types of levers.

**Class 1 Lever:** In this type of lever, the fulcrum is between the effort and the load. Examples: see-saw, crowbar, scissors, etc.

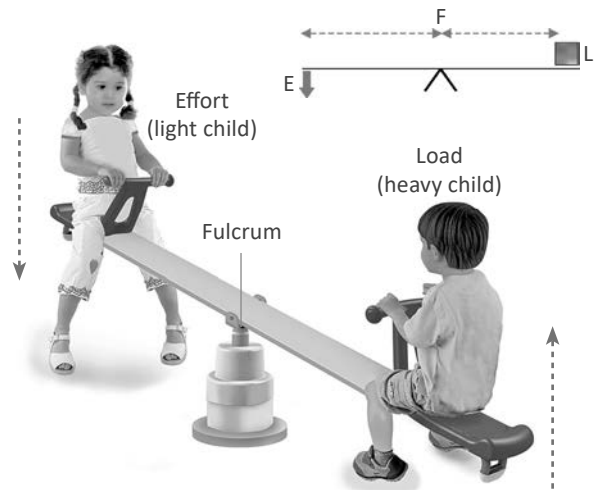


Figure 8.2 Class 1 lever

When we nod, the top of the spinal cord acts as the fulcrum, allowing the head to move. When we throw something, the muscles at the shoulder exert the force while the shoulder joint acts as the fulcrum. In rowing, the force is applied by the rower's arms, the oarlock acts as the fulcrum and the water (the load) offers the resistance. Class 1 lever is also applied in seated dumb bell triceps extension.

**Class 2 Lever:** In this type of lever, the load lies

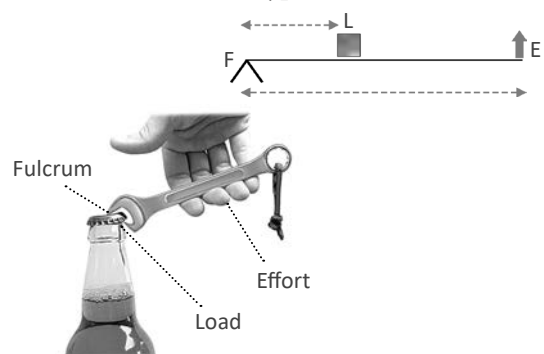


Figure 8.3 Class 2 lever

between the fulcrum and the effort. Examples: wheelbarrow, bottle opener, nutcracker, etc.

When we stand on tiptoe, the length of the feet acts as the arm of the lever, the balls of the feet serve as the fulcrum and the Achilles, tendon and calf muscles as the effort. During full-body push-ups, the feet act as the fulcrum, the body weight acts as load and the hands pressing against the ground as effort.

**Class 3 Lever:** In this type of lever, the effort lies between the fulcrum and the load. Examples: tongs, a baseball bat, a hockey stick, shovels, etc.

Tennis rackets, baseball bats, fishing poles, and even our own forearms are all examples of Class 3

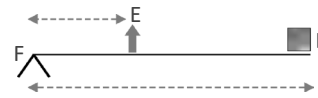


Figure 8.4 Class 3 lever

levers. In biceps curls, the force is exerted by the bicep muscle between the fulcrum at the elbow joint and the weight in the hands.



## EXERCISES

### A. Objective Type/Multiple-Choice Questions

#### I. Multiple-Choice Questions:

- What is a lever?
  - A complex tool to lift heavy objects
  - A simple tool to lift heavy objects**
  - A tool used to move small objects
  - A tool used to measure weight
- Which component of the lever system is the force applied by the user?
  - Fulcrum
  - Load
  - Effort**
  - Lever arm
- Which type of lever has the load between the fulcrum and the effort?
  - Class 1
  - Class 2**
  - Class 3
  - None of these
- What is an example of a Class 3 lever?
  - See-saw
  - Wheelbarrow
  - Tennis racket**
  - Scissors

### B. Very Short Answer Type Questions

- What is the purpose of a lever?
- What are the three components of a lever?

### C. Short Answer Type-I Questions

- Explain Class 1 lever used in sports with an example.
- Explain how the Class 2 lever works while doing full-body push-ups.

### D. Short Answer Type-II Questions

- What is the difference between Class 1 and Class 3 levers?
- How is the length of the feet used as the arm of the lever in Class 2 lever?

### E. Long Answer Type Question

- Explain the applications of levers in sports with suitable examples.



# Psychology and Sports

## MOTIVATION – ITS TYPE AND TECHNIQUES

### What is Motivation?

We hear a lot about the word ‘motivation’, whether as a part of our textbooks or in our life outside of the classroom. Without motivation, nothing can be accomplished. But what is motivation? Is it the desire for success? The will to do something? Psychologists define motivation as the cause of people’s actions, desires and needs, the primary driver of goal-oriented behaviour.

‘Goal-oriented’ applies to all kind of activities, not just missions and long-term visions. Why do we cook food? To eat and fill up our stomach. The motivating factor in this case is hunger, and of course, the intention is to survive. Every conscious action we do is initiated and guided by a motivating factor. Study the diagram given below to understand the cycle of motivational events.

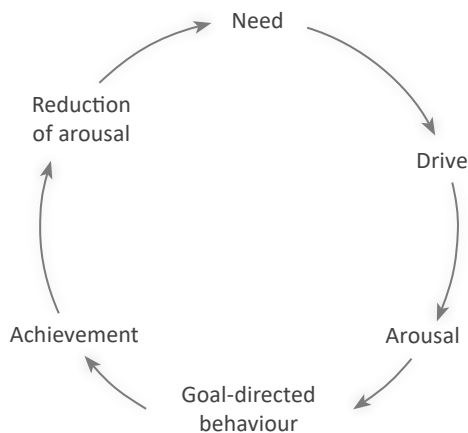


Figure 9.1 The motivational cycle

Given below are some definitions of motivation from experts:

*“Motivation is the driving force that spurs a person to action. It can be explained as a process to initiate guide and maintain behaviour over time.”*

– Robert Baron

*“Motivation is any condition that might energise and direct our actions.”*

– Crooks and Stein

*“Motivation is the general level of arousal to action in an individual.”*

– Alderman

### Types of Motivation

Motivation can be divided into two types: *intrinsic* (internal or inherent) motivation and *extrinsic* (external) motivation.

- Intrinsic Motivation:** Intrinsic motivation is one that seeks internal rewards and arises from within the individual. It does not depend on external pressures or considerations. Rather, it arises naturally and provides the individual enjoyment in the execution of the task. For example, a student who has a passion for painting will practice till she/he becomes skilled at it not because she/he is forced to, but because she/he wants to for her/his own satisfaction.

Intrinsic motivation is crucial for cognitive, social and physical development. Students who are intrinsically motivated are more likely to focus on their tasks and excel at them. This type of motivation is self-sustaining and also survives the passage of time. Therefore, it



Figure 9.2 It always seems impossible until it is done.



## Test Your Cant's

Once the student has become aware of what she/he cannot do, it is time to test if these hurdles can be overcome. It is true that some things will be out of our reach: we might not be able to become a world champion swimmer in a week. Perhaps, the flexibility of our body is low at the moment and we know we will be terrible at gymnastics. With the guidance of a trainer, we can determine if these limits can be pushed by exercising more and building our flexibility.

## Visualise Success

A studious student will picture herself/himself scoring good grades at the end of the academic year. A budding sportsperson might dream of becoming the state champion, then the national champion, and so on. This act of visualising success comes natural to us, and should be encouraged as long as it is accompanied by a corresponding amount of effort. Simply dreaming of success without working for it is unproductive. Visualisation of success can be used as a tool by forming a clear picture in the head, sticking to the plan and getting there eventually.

## External Sources of Motivation

Some motivation techniques come from outside, i.e. social support strategy: from friends, families, societies, coaches, spectators, etc. A student whose parents take a healthy interest in her/his pursuits will find it easier to continue her/his journey. At school or training areas, if the right arenas and equipment are available to her/him, the whole game will become more engaging. The attitude and strategies of the coach/trainer also matter to a large extent; coaches and trainers should be positive, knowledgeable, fair and communicative.



**Figure 9.4** Motivation helps in completing an objective and reaching a goal.

Finally, on the day of the competition, it is the crowd that will help carry the dream forward with their cheering. All of these are examples of external sources of motivation which can enable students to be successful at what they do.

## Constant Feedback and Evaluation

No matter how skilled or talented a person is, there is always room for improvement. Overconfidence can have negative impacts on one's performance; either one will get bored due to loss of thrill and excitement in the work one gradually finds too easy, or will not be able to assess oneself since they think they are doing the best they can. Consequently, the quality of work drops and they lose motivation. For this reason, one should be open to feedback and accept it gracefully. In fact, it is advisable to ask for feedback from someone who is not only knowledgeable in the area but is likely to give an unbiased opinion. By examining the feedback, we can understand what kind of training or Individualised Training/Education Program (ITP/IEP) or changes are necessary in our current performance or efforts so that we have the most effective strategy and time management to achieve a goal. This process of evaluation and adaptation will continuously supply motivation to an individual.

## Rewards and Awards

A reward is a prize or an incentive you get for making an effort. For instance, you receive a cash reward from your grandfather for cleaning his garden. An award is a special prize you receive as recognition for some specific service. For example, Arjuna Awards for outstanding players, several awards for actors, National Awards for various fields, etc. Although it is not advisable to work hard at something only for the sake of rewards and awards, it nevertheless helps to receive or win tokens of appreciation and admiration. Cash prizes are especially valuable to those in need of financial aid, while awards are a symbol of pride. This also ties in with the technique of visualising success. By knowing your targets, you are carving out your own path to success.

## Motivational Music and Talks

Fast thumping music is often played at training centres or in competition arenas to boost the



morale of the players and turn-up the enthusiasm and excitement. Music is indeed an integral part of sports. Major tournaments like the FIFA World Cup have official songs, while cheerleaders shout and dance to background music between the games. Those who exercise at gyms, or jog at parks can be seen with an earpiece plugged into their ears. Music is a great medium for channelising energy. It also enables you to concentrate more deeply.

Motivational talks are more for self-reflection and gaining insight than focus. Listening to the hardships faced by renowned sportspersons has the potential to straighten the perspectives and priorities of budding players. No one achieves success immediately. Interviews of sportspersons, talks given by them, and even screening movies that show their history, are great ways of encouraging the youth to continue their journey without losing hope and their discipline.



### Art Integration

Prepare a motivational speech to be delivered in the school assembly.

## EXERCISE ADHERENCE: REASONS, BENEFITS AND STRATEGIES FOR ENHANCING IT

There is no better ‘magic pill’ other than exercise. This is a common prescription for prevention, treatment and management of all types of diseases and ailments and disorders faced by human beings. Exercise adherence means inclination towards exercise. It is something like sticking to a habit of doing exercise regularly. If someone does regular physical activity in the form of sports or specific exercise related to fun or fitness, it becomes a good habit. And when this habit becomes automatic and one feels addicted, this concept is called exercise adherence. In such a case, one will certainly follow all the necessary steps to exercise regularly and will also follow a systematic routine for a prolonged period of time. One will have no reason to say ‘no’ to an exercise session. Exercise adherence is a very healthy habit where a person is benefited for her/his lifetime. If you want to add years to your life, then exercise adherence is the best addiction.



**Figure 9.5** Exercise adherence is essential to maintain good health.

## Reasons to Exercise

Reasons to exercise means why one should exercise. There are many reasons why everybody should exercise regularly. The basic reasons are given here:

1. If you want to stay young and fit, you need to exercise regularly.
2. Regular exercise improves the body metabolism which in turn enhances the growth and development process of the body.
3. It improves the defense mechanism of our body and keeps us disease free.
4. It helps to attain a good posture which in turn helps in developing a better personality.
5. If you want to experience the psychological and social benefits of exercise, then you should exercise regularly.
6. Exercise exposes your innate potential and helps you to understand yourself better.
7. Exercise helps you to connect better to your thoughts and actions.
8. Exercise optimises the body processes and helps in conserving body energy.
9. It minimises the adversities of old age and helps prolong your active life.
10. Last but not the least reason to adhere to exercise is that, exercise keeps you alert to deal with any emergency in your life and to come up with a better solution without panic.

## Benefits of Exercise

Exercise has got endless benefits. The benefits of

exercise can be explained under physical domain, psychological domain, social and intellectual domain, physiological domain, spiritual domain and so on. Some of the benefits are direct and some are indirect. Some of them are discussed here:

1. Some of the physical benefits can be referred to as the direct benefits of exercise. Example: size and shape of the muscles get better with exercise.
2. The strength, flexibility, muscle endurance and coordination of the muscles improve with exercise. This can be understood as direct physiological benefits of exercise.
3. Some other direct physiological benefits of exercise are – improves haemoglobin concentration, enhances body metabolism, improves circulation and bone density, leads to better pain tolerance, reduces risk of cardiovascular diseases along with some cancers and with falls in aged people, helps in weight management, etc.
4. Other indirect physical benefits are – improves posture and physical personality traits, etc.
5. Some of the indirect psychological benefits are – improves willpower, memory and determination; reduces stress and anxiety; improves self-motivation and self-esteem, etc.
6. Some of the indirect behavioural benefits of exercise are – better ethical conduct, better discipline, effective sleep, cooperation and friendly behaviour, sportsmanship.
7. Studies have also shown that exercise has many indirect benefits on the intellectual front.



**Figure 9.6** Regular exercise benefits, both body and brain.

Academic performance gets better; logical power, quick interpretation, reasoning and problem-solving capacity enhance.

8. Habit of exercise and participation in sports increases the social circle and social contacts. People who exercise regularly form a healthy group and tend to discuss constructive ideas. They usually stay away from unhealthy habits and anti-social acts.
9. Exercise spreads positive thoughts and encourages positive lifestyle because it helps in regenerating new cells in our body which means fresh energy in our body.
10. Exercise also improves the spiritual conduct of an individual because it helps to develop a strong connection between mind, body and soul.

Swami Vivekananda once said that people will understand god better in a football ground rather than in a temple.

### Strategies for Enhancing Adherence to Exercise

There is a common saying that ‘there is no gain without any pain.’ Here, pain refers to the systematic load given to the body systems for better performance. Exercise is basically painful. There might be many ways through which we can increase the adherence to exercise. Some of them are discussed subsequently:

1. Exercise should be introduced in a playful manner to the kids. Add variety to exercise.
2. It should be a part of everyday school activities.
3. Regularity should be maintained to develop a healthy habit. SMART and flexible goals help participants engage in exercise for longer time period with fun and satisfaction.
4. Benefits of exercise should be made clear so that those exercising know the reasons for doing exercise.
5. Social media, nowadays, is a very fast and important source to spread any concept. So, the concepts should be floated in the social media so as to reach to the masses. Some examples of a message can be: ‘Exercise can replace medicine’, ‘Exercise is an important medium to prevent disease’, ‘Exercise promotes intellectuality’, ‘Exercise adds life to years and

years to life' and so on. Health education should be promoted.

6. A culture should be developed in every family to promote adherence to exercise in the next generation.
7. It is a common tendency of a child or any individual to compete with fellows. So, competitive aspect should be introduced to an individual to increase the adherence to exercise, for example, organising physical activity circuit for fun and competition both to attract youngsters and elderly people to socialise as well as compete with each other.
8. Exercising venues or avenues should be increased in the society to encourage participation. For example, local parks and school fields should be open to the nearby societies to make a healthy use of the facilities.
9. Culture of promoting activities like yoga,



**Figure 9.7** Benefits of exercise

martial arts, swimming, gymnastics, etc. in schools is a good strategy to increase students adherence to exercise.

10. Exposure to outdoor camping and adventure and fun activities to the school and college students is again a very effective way to increase adherence to exercise.

## EXERCISES



### A. Objective Type/Multiple-Choice Questions

#### I. Multiple-Choice Questions:

1. What is motivation according to psychologists?
 

(a) <b>The cause of people's actions, desires and needs</b>	(b) The will to do something
(c) The desire for success	(d) The primary driver of goal-oriented behaviour
2. What is intrinsic motivation?
 

(a) Motivation that arises from external pressures.	(b) Motivation that seeks external rewards.
(c) <b>Motivation that seeks internal rewards.</b>	(d) Motivation that arises from both internal and external factors.
3. What is extrinsic motivation associated with?
 

(a) <b>Rewards and punishments</b>	(b) Personal satisfaction
(c) Internal goals	(d) Self-sustaining behaviour
4. What is the technique of motivation called that involves making a list of activities and following them?
 

(a) Goal setting	(b) Self-endorsement
(c) <b>Setting a daily activity schedule</b>	(d) Intrinsic motivation
5. What is exercise adherence?
 

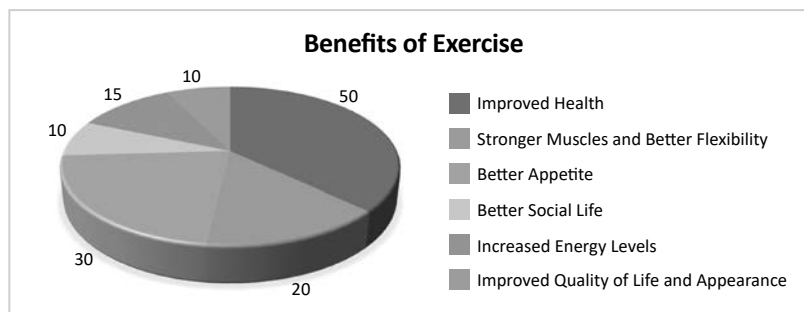
(a) <b>Inclination towards exercise</b>	(b) Taking a pill for prevention of diseases
(c) Disliking exercise	(d) None of these

6. What are the reasons to exercise?
  - (a) **To stay young and fit**
  - (b) To improve academic performance
  - (c) To develop unhealthy habits
  - (d) None of these
7. What are the indirect psychological benefits of exercise?
  - (a) **Reducing stress and anxiety**
  - (b) Improving haemoglobin concentration
  - (c) Improving body metabolism
  - (d) None of these
8. What is the benefit of exercise on the intellectual front?
  - (a) Better posture and physical personality traits
  - (b) **Improved academic performance**
  - (c) Improved circulation and bone density
  - (d) None of these
9. Which of these is not one of the strategies to enhance adherence to exercise?
  - (a) Introducing exercise in a playful manner to children
  - (b) Introducing an aspect of competition
  - (c) **Allowing people to exercise whenever they are in the mood to do it**
  - (d) Using social media to create awareness about the benefits of exercise
10. In which of the following cases is an extrinsic source of motivation not involved?
  - (a) A young swimmer being made to practice everyday by her swimming coach.
  - (b) A wrestler training harder because he wants to win the Arjuna Award.
  - (c) A tired marathon runner continuing to run because the crowd is cheering for him.
  - (d) **A sportsman maintaining strict control on his diet.**
11. Which of the following does not help in increasing adherence to exercise?
  - (a) Exercise should be a part of everyday school activities.
  - (b) **Exercise should be introduced as a subject to kids.**
  - (c) Regularity must be maintained to develop a healthy habit.
  - (d) Benefits of exercise should be made clear.

## II. Data-Based Questions:

CBQ

A survey conducted recorded the common benefits experienced by people:



On the basis of the pie-chart given above, answer the following questions:

1. What was the most common benefit experienced by people?
  - (a) Improved quality of life and appearance
  - (b) Increased energy levels
  - (c) Improved health
  - (d) Better appetite

2. Which of the two benefits went hand-in-hand?
  - (a) Increased energy levels and better social life
  - (b) Stronger muscles and better flexibility
  - (c) Improved health and better appetite
  - (d) Better appetite and increased energy levels
3. Which of the following benefits would indicate decreasing number of diseases?
 

(a) Better appetite	(b) Increased energy levels
(c) Better social life	(d) Improved health

## B. Very Short Answer Type Questions

1. What is motivation?
2. What are the two types of motivation?
3. What is exercise adherence?
4. What is the importance of exercise?

## C. Short Answer Type-I Questions

1. How is intrinsic motivation crucial for students' development?
2. How can the teacher instil intrinsic motivation in students?
3. What are the reasons to exercise?
4. What are the direct and indirect benefits of exercise?

## D. Short Answer Type-II Questions

1. Discuss in detail any three techniques of motivation. (CBSE 2020)
2. How can goal setting be used as a cognitive approach to motivation?
3. What strategies can be used to enhance adherence to exercise?
4. How does exercise improve the spiritual conduct of an individual?

## E. Long Answer Type Questions

1. How can teachers motivate students to perform well in school?
2. Differentiate between intrinsic and extrinsic motivation. Explain in detail goal setting and reinforcement as technique of motivation. (CBSE 2016)
3. What are the benefits of exercise and how can one adhere to regular exercise?

## F. Value-Based Question

Radhika is a student of 11 standard. She is a quiet person and never gets involved much with her friends, while her friends are outgoing and fun loving. She is a good student but never goes out to play with her friends. One day she meets Anne, a girl who lives in her neighbourhood. They both become friends. Anne told her about the benefits of regular exercise. Radhika realised her mistake and started doing exercise regularly. She thanked her friend for this suggestion and motivation.

**Answer the following questions based on the above passage:**

1. What do you mean by the term 'motivation'?
2. What are the benefits of exercise?
3. What kind of values does Anne possess?



## Training in Sports

### CIRCUIT TRAINING – INTRODUCTION AND ITS IMPORTANCE

#### Circuit Training

Circuit training is a type of resistance training that uses high-intensity aerobics in order to augment muscular strength and endurance. As is evident in the name itself, it consists of a set of exercises, which is to be repeated after completion of a circuit. It was developed by R E Morgan and G T Adamson in England's University of Leeds in 1957, and is a tough regime normally used for getting lean as opposed to increasing muscle mass. According to Morgan and Adamson, 'Circuit training is the training method in which certain exercises of various kinds are performed with or without apparatus with given dosage.'

During circuit training, fat loss occurs as high expenditure of energy and raised production of growth hormone lead to burning of fat. It is considered a better option compared to cardio training by experts since the latter lowers testosterone, increases cortisol and diminishes

muscle mass. Each circuit may be made up of 8 to 10 exercise sets with little or no rest in between, with different sets focusing on different muscle groups, so that the whole body gets a proper workout. The entire routine should last at least 30 minutes. An individual may create her/his own circuit based on her/his specific needs. That said, it is advisable to build the circuit with the help of a trainer who can suggest the most suitable exercises. A typical circuit training will have the following structure:

#### Upper Body Exercises

**Examples:** Squat ups, bench dips, back extensions, medicine ball chest pass, bench lift, incline press up, shoulder presses, bent-over rows, standing dumb-bell curls, triceps dips, push-ups, Russian ab twists, etc.

A selection may be made from the examples given above to build a single circuit. The same circuit may then be used repeatedly or one station may be swapped with a new one in order to keep things interesting.

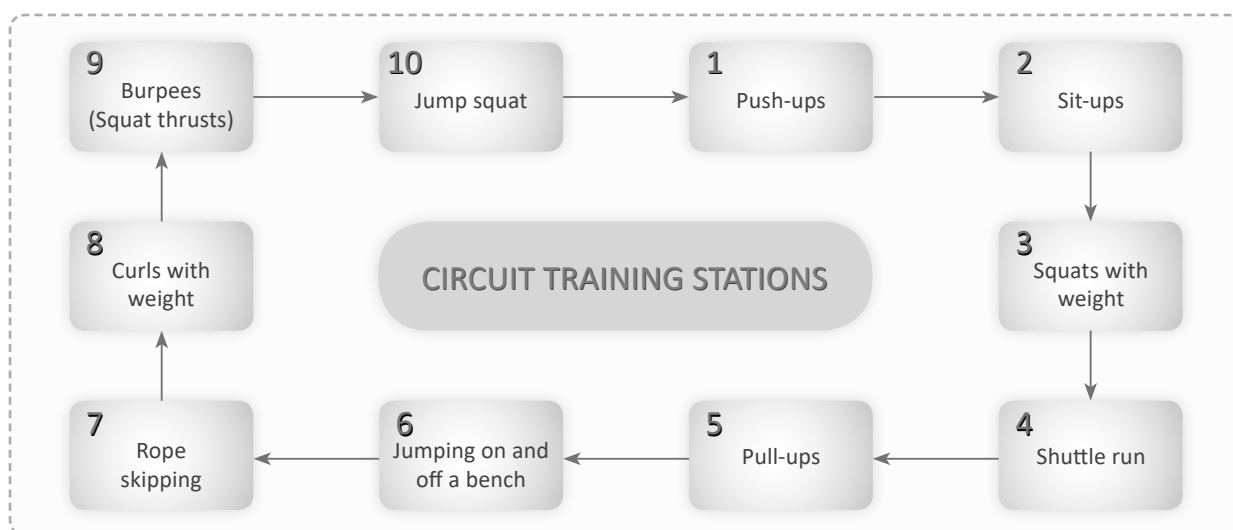


Figure 10.1 Circuit training consists of a number of exercises performed in rotation.

## Lower Body Exercises

**Examples:** Squat jumps, compass jumps, astride jumps, step-ups, shuttle runs, hopping shuttles, bench squats, sumo squats, calf raises, hamstring curls on a Swiss ball, deadlifts, etc.

## Core and Trunk

**Examples:** Sit-ups (lower abdominal), stomach crunch (upper abdominal), back extension chest raise, front plank, pull-ups, etc.

## Whole Body

**Examples:** Treadmills, squat thrusts, skipping, jogging.

Circuit training may also be done by alternating the above exercises with brisk walking or cycling. The point is to develop a circuit that can achieve a full body workout.

## Impact of Circuit Training

The impacts of circuit training are as follows:

- ❖ Circuit training is flexible and can be performed at the gym or at home, depending on the availability of equipment and time.
- ❖ It promotes muscle power, flexibility and endurance.
- ❖ It consumes fat and can be used to fight obesity and related physical disabilities.
- ❖ It builds and conserves lean mass, thereby improving functional fitness and reducing risk of diseases.
- ❖ It boosts cardiovascular fitness and enables an individual to exercise longer.

Some contraindications to be kept in mind with respect to circuit training are:

- ❖ It could be dangerous for people with high blood pressure and heart problems as they might not be able to cope with the rigorous and intense circuits.
- ❖ Diabetic patients should keep their blood sugar level in mind while adopting and executing circuit training.
- ❖ Low impact exercises are better for individuals suffering from arthritis.
- ❖ Anyone with a recent knee or back injury should avoid circuit training.
- ❖ Circuit training, like all other types of training, should be accompanied by a nutritious diet.



## Extension Activity

Write a letter to the Director of Central Board of Education requesting her/him to make circuit training period mandatory in every school's curriculum. Back your letter with the benefits and importance of circuit training in school students.

## Importance of Circuit Training

1. It is considered the most time-efficient way to develop strength and endurance of the muscles. This means it is ideal for even those people who don't have much time to spare for regular exercises.
2. In one circuit, a variety of exercises can be incorporated, targeting different muscle groups of the body.
3. Within a circuit, there is the flexibility to set the total number and type of stations according to the level, age group, gender and other characteristics of the trainee.
4. The intensity of the training programme can also be set and modified according to the various work stations.
5. Incorporation of different types of stations breaks the monotony of exercise.
6. It is generally a group training programme, where one can seek motivation from other trainees in the group.
7. It improves muscle tone and is the best training to lose excess body fat. It is ideal for building a lean look rather than bulking out.
8. It is a whole body workout where aerobic and anaerobic conditioning can be done at the same time and all the muscle groups can also be trained at the same time.



## Art Integration

Make your own gym equipment. Collect old plastic bottles and sand to make dumbbells of different weights from them. Similarly make a skipping rope out of old plastic bags.



## A. Objective Type/Multiple-Choice Questions

### I. Multiple-Choice Questions:

- What is circuit training?
  - Cardio training
  - Resistance training**
  - Yoga
  - Dance
- What is the recommended duration of a circuit training routine?
  - 15 minutes
  - 30 minutes**
  - 45 minutes
  - 60 minutes
- What is the impact of circuit training?
  - It decreases muscle power.
  - It increases risk of diseases.
  - It boosts cardiovascular fitness.**
  - It increases cortisol levels.
- Who developed circuit training?
  - R E Morgan and G T Adamson**
  - Arnold Schwarzenegger
  - Jane Fonda
  - Jack LaLanne

### II. Case-Based Questions:

CBQ

**An athlete is preparing to represent his country in the Olympics and is undergoing circuit training. On the basis of the description given, answer the following questions:**

- Which of the following exercises will he perform to exercise his lower body?
  - Squat jumps and shuttle runs
  - Front plank and crunches
  - Skipping and jogging
  - All of these
- Which of the following exercises will he perform to exercise his core and trunk?
  - Squat jumps and shuttle runs
  - Front plank and crunches
  - Skipping and jogging
  - None of these
- Which of the following exercises will he perform to exercise his whole body?
  - Squat jumps and shuttle runs
  - Front plank and crunches
  - Skipping and jogging
  - Only (a) and (c)

## B. Very Short Answer Type Questions

- When was circuit training developed?
- What is the ideal goal of circuit training?

## C. Short Answer Type-I Questions

- What is the recommended structure of a circuit training routine?
- What are the impacts of circuit training?

## D. Short Answer Type-II Questions

- What are some contraindications to keep in mind with respect to circuit training?
- What are some benefits of circuit training?

## E. Long Answer Type Questions

- How is circuit training different from cardio training and why is it considered a better option?
- Define circuit training. Draw a diagram of 8 (Eight) stations and explain its advantages. (CBSE 2019)

OR

What is circuit training? Draw a diagram of circuit training with 12 stations and explain its importance in sports. (CBSE 2020)