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ABSTRACT

This collaboration between teachers in Saint Lucia (West Indies) and Peace Corps volunteers offers a comprehensive physical education program for children and youth ages 10-18 years, including lesson plans, evaluation and assessment techniques, and psychological and physical growth and development characteristics for this age group. The program is not geographically-specific, and it contains pictures, drawings, charts, and graphs to illustrate various points. The curriculum has four main goals: to develop and maintain a high level of health-related fitness, to develop a knowledge of the sciences of physical education, to develop positive attitudes and behaviors for psychosocial development, and to develop and maintain a high level of skill-related fitness. The text includes notes for teachers on anatomy and physiology, biomechanics, body fat and weight control, cardiovascular fitness, circuits, flexibility, nutrition, sport psychology, and skill-related fitness. (Contains 15 references.) (NAV)

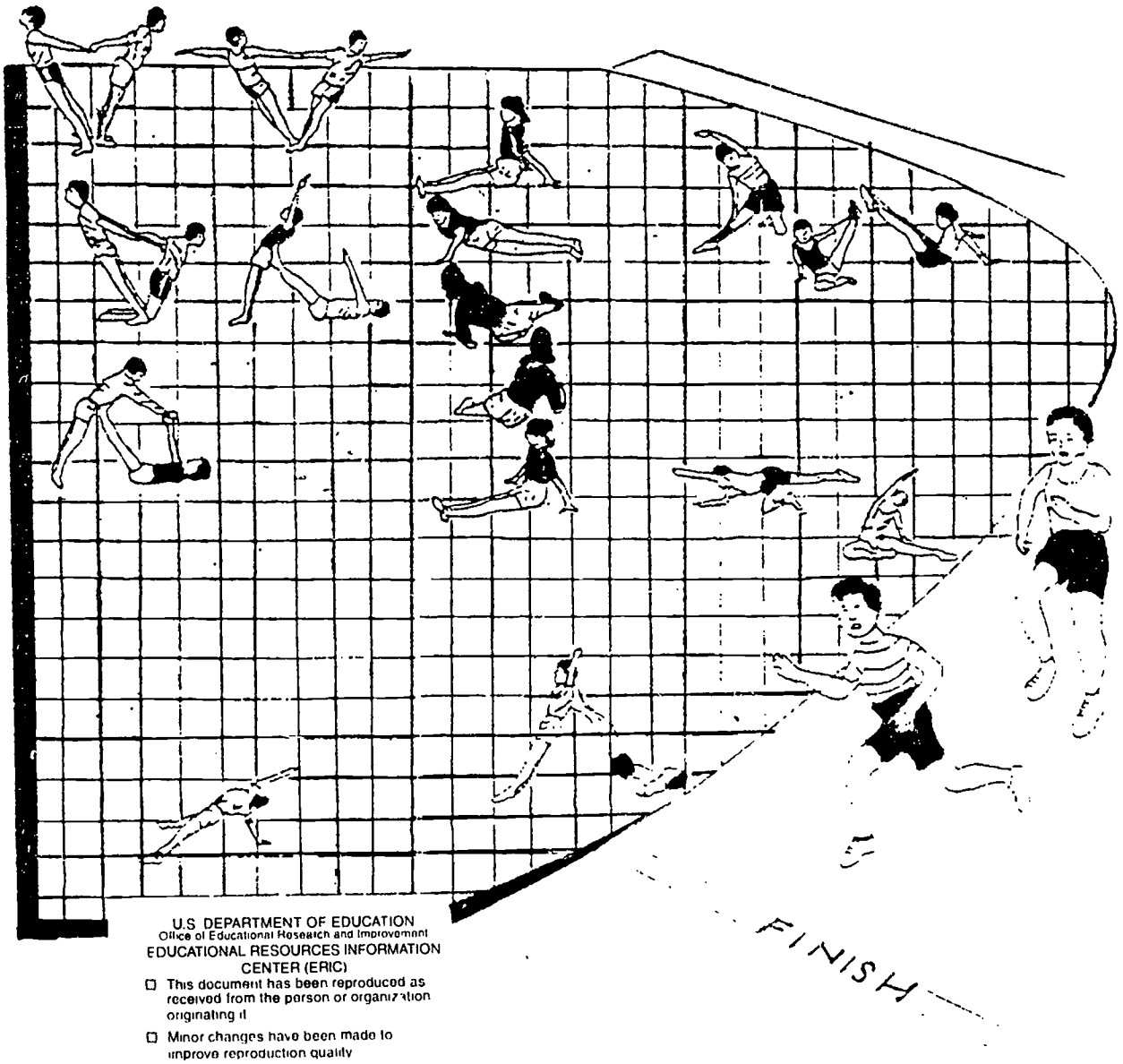
ED 391 804

# PHYSICAL EDUCATION CURRICULUM GUIDE

# FOR

# SECONDARY SCHOOLS





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# PHYSICAL EDUCATION CURRICULUM GUIDE

# FOR

# SECONDARY SCHOOLS

A Collaborative Effort by Physical Education Specialists/Physical Education Teachers and the Peace Corps Volunteers

Castries, Saint Lucia

July 1994

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To Mr Garnier
Compliments of CAMDU

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We gratefully acknowledge the adaptation of some of the
illustrations and tables with their accompaning text
in this Physical Education Curriculum Guide
from the reference sources indicated
on pages 200-201

## Defining Physical Education

Physical Education is an integral part of education and contributes to the development of the individual through planned movement, physical activity and exercise. Physical Education includes a body of knowledge that depends on many disciplines including the physical, biological and behavioural sciences.

## Preface

**by Gaspard Charlemagne, Education Officer for Secondary Schools**

Physical Education has undergone much revision and updating during the past five years and this revolution in content, methodology, strategy and philosophy is a direct result of four main factors:

1 The reorganization and restructuring of the management of Sports and Physical Education brought about by a new psychology, sociology and philosophy of the subject.

2 The link that has been established between the Ministry of Education and the Peace Corps five (5) year project in Physical Education and Sports. This has engendered a new relationship and partnership between local Physical Education teachers and Peace Corps Volunteers. Because this partnership required a new look at the knowledge, skills and understanding of the scope and limits of the teachers' knowledge and responsibility it became necessary to provide a broader syllabus and an accompanying guide.

3 The need to recognize the pivotal role that Physical Education and Sports can play in the fight against indiscipline and other social ills among our youth. This consideration gave the subject greater urgency and emphasis.

4 The Physical Education Specialists' and organizers' outstanding organizational skills and their determination to raise the level of Sports and Physical Education at all levels of the school system but more especially at the Secondary School level. It is this determination that propelled them into securing a broader and more comprehensive approach to the teaching of Physical Education and Sports.

This guide is designed for use by teachers and others involved in Physical Education at the schools. It is hoped that it will provide useful information and thereby stimulate worthwhile discussion among teachers. It is intenc d as a guide only and does not claim to address all the issues involved in Physical Education and Sports.

The effort in producing this guide must be given due praise and gratitude.

# The need for a Physical Education Curriculum

**by Theophila Charles, Curriculum Officer**
**Physical Education and Sports**

According to Bucher (1964) the term Physical Education takes on a new meaning after a consideration of the word education. The word physical refers to the body. It is often used in reference to various bodily characteristics such as physical strength, physical development, prowess, health and appearance. It refers to the body as contrasted to the mind. Therefore, where the words Physical Education are used, one is referring to the process of education that seeks to develop and maintain the human being through participation in physical education activities.

Physical Education is a very important part of the educational process. It is neither a "frill" or an "ornament" that has been tacked on to the school programme as a means of keeping children busy nor is it restricted to competitive sporting activities. It is instead, a vital part of education. Through a well directed Physical Education Programme, children develop skills for the worthy use of leisure time, engage in activity that is condusive to healthful living and develop skills that contribute to their physical, social and mental health.

Physical Education should comply with the same guidelines that justify the inclusion of any subject area within a school's curriculum. One guideline states "...we might ask as a criterion for any subject taught at a secondary school, whether, when fully developed, it is worth for an adult to know, and whether having known it as a child makes a person a better adult". Thus, a physical education curriculum is justifiably placed in the curriculum for the meaning it has to both the child and the adult.

We need to plan a programme for physical education because nowadays there is a greater interest in sport on the part of the children, the general public and employees. Teachers are also being encouraged to make changes. There must be an initiation of some kind. New knowledge is being discovered and previous knowledge is

being overriden. Pupils need to cope with the demands of society, therefore, we need to reappraise what we are offering.

It is important that a physical education programme should aim to provide opportunity for the individual and for the group to learn from skilled teachers, activities that are invigorating, to develop teachers mentally and educationally, and that will lead to positive physical, social, mental and emotional growth. This implies that the resultant growth and development of children through directed physical activities should affect the total child and the nation as a whole.

Physical education, with its emphasis on building a physically, emotionally, mentally and socially fit person, plays an important role in modern day education. The mind and body represents a unit in the person. One gives strength to the other, one supports the other and both function harmoniously in the educated person.

# TABLE OF CONTENTS

## Part 2: Notes for teachers

# Developing a Philosophy for Teaching Physical Education

## Introduction

Philosophy is simply the way you see situations and experiences in your life. This philosophy determines every thought, every action and every decision you make. Developing a philosophy in Physical Education means to make time to examine how well you know yourself, what you want to achieve as a Physical Education teacher and the situational factors in your workplace. Without this knowledge it is difficult to have a well-defined philosophy. Without a well-defined teaching philosophy it is difficult to be a successful and efficient teacher.

The term "teaching Physical Education" is often used to cover a wide range of activities. Physical Education involves teaching the benefits of physical fitness, appropriate strategies for physical exercise and development, sportsmanship and goodwill; it involves teaching physical skills; it involves coaching, administrative work, and developing organizational skills. As a good teacher you should have a code of ethics which places the rights and needs of your students before those of yourself. You will need to develop a caring and continuing relationship with the students you teach.

Participation in Physical Education is a social process. Your teaching will therefore have a great power to shape the lives of your students.

How does one develop a philosophy for teaching Physical Education?

A. *To get to know yourself better and what you want to achieve, ask yourself these questions:*

- **Why** do I teach?
- What do I **value** most in teaching? (e.g., winning, fun, student development?)
- Am I proud of how I **relate** to students as a teacher? (e.g., Is my style authoritarian, cooperative or casual?)

B. *What are the situational factors in your workplace that you need to be aware of?*

1b. **Who** is being taught?

- Age of students: younger students may need to be taught slowly and in small, simple steps.
- Students' gender: boys differ from girls in muscular strength, bone structure and body composition.
- Background: are the students already fit and leading a physically healthy life?; does their family value physical activity?; what provisions does the community make for exercise?; do financial contraints affect the student's involvement in sport?

2b. **How** is P.E. going to be taught?

- Availability of equipment, space and funding.
- Size of class: how many students are there in the class?; is there enough equipment and space for all students?; what is the class make-up in terms of gender distribution and ability?
- Administerial and Ministerial requirements: is there a programme already in effect in the school or in the community?; have you consulted the Calendar of Activities for the year?

3b. **When** is P.E. to be taught?

- Class time available (length of teaching period).
- School timetable and time of day that classes are taught.
- Weather conditions and alternative facilities.
- Do local or school events coincide with international events?

# Lesson Planning

## Introduction

Planning is one of the most important skills a teacher possesses; teachers who plan better, teach better. Each teacher has his or her own style of planning. Some make more extensive plans than others, but one thing is clear: There are few effective teachers who do not make written plans.

The goal of this section is to give teachers practical information on how to plan daily lessons, sequence units, and write instructional objectives.

### Planning daily lessons

Most teachers incorporate some aspects of the following in every daily lesson:

- a brief review of the previous lesson(s)
- an introduction to the new lesson
- a series of activities that allow students to learn and practice the lesson content
- some form of closure or summing up of the lesson

### Example of lesson plan

See following page.

# LESSON PLAN FORMAT

Subject: _____

Topic: _____ Date: _____

Objectives: This tells what the students should be able to do by the end of the lesson. Each objective should be written in behavioral terms.

| Time | Activity/Procedures | Materials |
|---|---|---|
| Write an estimate of the time required for step. | The procedures required to teach the activity should be described here in outline form. Be sure to include both what the teacher will do and what the students do. Make provision for review, introductions, practice activities, and a closing activity. | Include a list of all equipment and materials needed, how much, how many and preparations which must be done before class. |

Evaluation: How will you know that the students have accomplished your objectives? Write down the formal or informal method of assessment you plan to use.

Comments: How would you do the lesson differently next time. What are special points to remember? Is one activity particularly effective?

## Sequencing and unit planning

Careful sequencing builds a strong foundation for students' understanding of the relationship between complex parts of one subject/skill. An instructional unit is a sequence of lesson plans that pertain to the same topic or objective.

In planning a unit a teacher should write down the:

*Topic*: What the unit is about.

*Goal*: A broad goal statement for the unit as a whole.

*Objectives*: General student performance that will demonstrate learning.

*Time*: Number of days/hours available for the unit.

*Activities*: A brief description of activities for each day and week.

*Materials*: Any equipment or materials which need to be purchased or made ahead of time.

Types of sequencing systems include:

- From shorter to longer activities.
- From skills of observing to skills for practicing.
- From familiar to unfamiliar ideas/skills.
- From easy-to-organize to difficult-to-organize activities.
- From simple to complex ideas/skills.
- From teacher-directed to student-directed activity.
- From abstract concepts to concrete situations.
- From concrete situations to abstract ideas.

## Writing instructional objectives

The clearer a teacher can be in identifying which activities demonstrate mastery of a particular topic/skill, the easier it is for him or her to set up learning activities, the student to carry these out, and the teacher to evaluate the student's performance.

An instructional objective is a statement which identifies exactly what the student should do, how well it should be done, and how long it should take or under what conditions the given task should be completed.

Any complete instructional objective has the following three parts:

**Type of behaviour** - the specific action or performance expected of the student.

**Condition** - the circumstance(s) under which the behaviour is to be demonstrated.

**Criteria** - the degree or level to which the behaviour must be demonstrated to be acceptable.

Example:

"From within a circle of 2 metres diameter (condition), the student will be able to release the shotputt from a T-position (behaviour) and surpass a throwing distance of 2.5 metres (criteria)".

These are key verbs that can be used to form objectives in the domain of physical education:

1st phase of teaching (the student becomes aware of action to be performed through senses): chooses, describes, detects, differentiates, distinguishes, identifies, isolates, relates, selects, separates.

2nd phase of teaching (the student becomes ready to act mentally, physically and emotionally): begins, displays, explains, moves, proceeds, reacts, responds, shows, starts, volunteers.

3rd phase of teaching (the student performs the skill): runs, jumps, throws, swims, kicks, bats, bowls, shoots, sprints, hops, skips, dodges, etc.

Note that the verbs have to be measurable in nature. For example, the verb "understands" is not measurable itself, unless it is followed by another behaviour that indicates the student's understanding.

For example:

Wrong: The student will understand how to shoot a basketball.

Right: Given 5 tries, the student will be able to shoot successfully 3 baskets.

# Evaluation and assessment techniques

## Introduction

The purpose of this chapter is to help physical education teachers establish performance standards and design a grading system that suits their individual needs.

## Evaluation procedures

Evaluations provide essential information to teachers and students on how well they are progressing. Students should be informed of evaluation procedures at the beginning of each term. The four goals and their specific objectives outlined in this guide should comprise the frame of reference against which these evaluations are conducted.

Students can be evaluated at the end of each instructional unit, term and at the end of the school year. For purposes of evaluating student performance at the end of each instructional unit, the goals should be clearly stated as instructional objectives. Once the instructional unit is finished, students should be evaluated on how well they have met these objectives.

As there are no overall evaluation standards for physical education in secondary schools in St. Lucia, teachers are left to choose the criteria that best fit their teaching philosophy and their school make-up, including factors like timetabling, facilities and school requirements; for example, some schools require a test at the end of the year; some require letter grades rather than percentages.

Teachers should consider the following terms and definitions when developing objectives and performance criteria:

*Attendance*. Attendance represents the first step toward participation. Flexible provisions, such as allowing one or two absences, should be clearly communicated to students at the start of each term. Provisions should be made for make-up work.

*Commitment*. Commitment is determined by behaviours that indicate how well students are working toward accomplishing a goal.

*Cooperation*. Cooperation reflects adherence to class rules, adaptability to new situations, and sensitivity to others.

*Creativity*. Creativity reflects the ability to explore alternative solutions to movement problems as well as to create new movement forms and patterns.

*Dressing*. Clothing should be appropriate.

*Effort*. Effort is determined by behaviours that indicate how frequently, long, and intensely students are involved in instructional units.

*End versus means*. Letter grades, points, awards, trophies, and other reward symbols are often used to motivate students. However, when rewards are perceived as goals, they may encourage student dependence on rewards and detract from appreciating and enjoying the process of learning.

*Evaluation criteria*. Physical education teachers should be explicit in defining evaluation criteria and in communicating this information to students, parents and other educators.

*Improvement*. Improvement is determined by the difference between early and later performances.

*Participation*. Benefits of the goals are not possible without regular participation.

*Performance criteria*. Performance criteria are predetermined performance objectives.

*Poor achievers and problem students*. These students often demonstrate negative attitudes toward physical education, themselves or both. Not participating in physical education activities may be a way of avoiding failure, regardless of what the report book suggests.

*Self-direction*. Self-direction reflects the ability to evaluate abilities, think critically and plan for personal growth.

*Sex biases*. Girls and boys must be encouraged to participate in all activities that they are capable of performing including those that may be viewed as traditionally male or female. Evaluation and grading practices must be the same for both sexes.

*Work habits*. Work habits reflect the manner in which class requirements are completed.

Because evaluations can stimulate both positive and negative emotional responses, evaluations can either facilitate or impair the teaching-learning process. However, when evaluations are viewed as a means rather than as an end, they become less threatening and can improve instruction and student performance. Ways in which teachers can make evaluations positive learning experiences, follow:

- Clarify student expectations and evaluation methods at the beginning of each instructional unit.
- Provide students with opportunities to establish goals and evaluate their progress in attaining them.
- Provide students with early assessments and evaluations so they can make the necessary adjustments to improve their perfomances.
- Reduce threatening situations by providing sufficient instruction and practice time before an evaluation is made.

- Emphasize activities that are not graded, such as taking chances, risking failure, and being creative.
- Use a variety of evaluation instruments at the beginning, during and at the end of instructional units.
- Recognize progress when it occurs and allow students to achieve at different rates of speed.
- Assess readiness to learn, abilities, skills, and attitudes to determine appropriate objectives.
- Use positive approaches whenever possible. Negative approaches, such as debasing comments or threats to lower grades, are not effective.
- Demonstrate patience, understanding and concern for students who face difficulties and encourage and praise both effort and achievement.
- Create a learning atmosphere in which students are not afraid to make mistakes and are not penalized for making them.
- Conduct private conferences with students who cause problems. The conferences should be open dialogues between the teacher and the student.

## Assessment techniques

### A. Observation

Examples of proficiency standards that can be observed:

1) Demonstrate positive self-image through participating regularly and in all instructional units of the programme.
2) Successfully interact with others; for example, show courtesy on playing field, take turns.
3) Wear standard uniform when participating in P.E.class.

**B. Projects**

Through independent study (e.g., library research) students can be assessed on their creativity, thoroughness, and presentation skills.

**C. Testing**

Written assessment of student learning ranges from short quizes to the and of term (or year) examinations.

Examples of areas for testing include:

- Physical fitness:

  *Proficiency standard*: Score between the 25th and 50th percentiles on approved fitness test.

- Knowledge of sports:

  *Proficiency standard*: Know and understand the basic rules of each sport, activity or dance. Demonstrate basic water safety skills. Select and perform a basic skill of a sport, activity or dance, such as a serve in volleyball, or a front roll in gymnastics.

- Knowledge of sport sciences:

  *Proficiency standard*: Locate 5 major muscle groups. Draw the heart and circulatory system. Identify 5 sports injuries and name their possible cause and treatment.

## Grading

Grades symbolize the cumulative achievements of individual students in a form that can be communicated to them and to their parents. In the selection of a grading system, the strengths and the weaknesses of each system should be considered.

**Pass or fail grading**. The pass or fail grading system does not encourage improvement and reinforces negative connotations for the value of physical education. Research in grading systems in physical skills learning suggests that letter grades are more effective than pass or fail grades.

**Letter grading**. Letter grading is a common way in which achievement is measured and reported. The letters used and the level of achievement they describe are:

*A*. This rating indicates excellent performance and means that the student is making exceptional progress in attaining his or her goals and objectives.

*B*. This rating indicates very good performance and means that the student is meeting above-minimum or above-average standards for passing.

*C*. This rating indicates passing performance and means that the student is meeting minimum or average standards for passing.

*D*. This rating indicates that the student needs to improve in order to meet minimum standards for passing.

*F*. This rating indicates that the student received no credit and that his or her performance was unacceptable.

**C. Percentage Grading**

Can be used in the same manner that letter grading is used.

# Psychological and Physical Growth and Development Characteristics for ages 10 to 18 years

## Psychological growth and development characteristics

### Ages 10 to 14

| *CATEGORIES* | *CHARACTERISTICS* | *IMPLICATIONS* |
|---|---|---|
| **Attention span** | Increased attention span as compared to primary school years | Increase the length of the class. Make games, dance patterns, gymnastic sequences, and tasks more complex. |
| **Emotions** | Need for security and acceptance | Use activities to help develop a positive self-concept and peer acceptance. |
| | Fluctuation of behaviour and attitudes in later middle years | Be consistent in class control and understand each individual's needs to guide behaviour. |
| | Behaviour varied - boisterous, aggresive, rebellious, restless, skeptical, critical | Plan vigorous activities to chanel energy. Provide opportunities for leadership to learn aspects of authority. |
| | Need to feel worth in self | Plan for self-testing activities and low-level competition. Offer choices and minimize fear of failure, punishment, critisism and sarcasm. |
| | | Make each student feel needed and important. |
| **Social** | Peer relations and opinions important | Allow for demontrations and class discussion for evaluation. |
| | Team competition more enjoyable | Provide for challenging activities and low-level competition. |
| | Physical skill important socially | Provide a good intructional programme with an interhouse and interschool programme to complement it. |
| | Feeling of belonging to a group strong | Plan many group activities and use individual demontrations with descretion. |

| | | |
|---|---|---|
| (continued) | Social behaviour poor | Teach socially acceptable behaviour. |
| | Independence beginning to develop | Increase students' responsibility in programming. |
| | Physical attractiveness important | Increase activities to develop body awareness, self-confidence, and poise. |

**Ages 15 to 18**

| *CATEGORIES* | *CHARACTERISTICS* | *IMPLICATIONS* |
|---|---|---|
| **Cognitive** | Ability to use logic and reasoning in making decisions | Placed increased reliance on logic and reasoning rather than authority-based discipline. |
| **Affective** | Ability to recognize their feelings, appreciate the feelings of others, and put themselves in the place of others | Plan activities to help students deal intellectually with concepts of sportsmanship cooperation, emotional control and fair play. |
| **Maturity** | Approaching physical and mental maturity | Provide opportunities for student involvement in programme planning, administration, and leadership. |

## Physical growth and development characteristics

### Ages 10 to 14

| *CATEGORIES* | *CHARACTERISTICS* | *IMPLICATIONS* |
|---|---|---|
| **Structural** | Sudden spurts in growth in later middle years; growth occurs earlier in females than males | Plan vigorous large muscle activities and make activities more strenuous. |
| | Large discrepancies in growth rates between males and females | Plan activities that are suitable to wide ranging levels of maturity and variations in physical size and ability. Give guidance and knowledge to develop a better understanding of these physical changes. |
| | Considerable strain caused by rapid growth | Avoid heavy body contact games and intense long distance running.<br>Encourage students to practice good posture habits. |
| | Awkwardness caused by different growth rates | Provide successful experiences using pregressions appropriate to ability level.<br>Provide daily challenges in balance and coordination activities. |
| **Heart and Lungs** | Greater endurance due to increased heart and lung size | Provide for more vigorous activities.<br>Increase distance and time of participation. |
| **Coordination** | Fine motor abilities improved | Provide more challenging activities using fine motor skills.<br>Place less emphasis on large luscle activities |
| | Coordination improving | Provide more challenging eye-hand activities with much repetition. |
| | Reaction time and eye-hand coordination rapidly improving at 13-14 years | Emphasize reaction time and eye-hand coordination activities. |

| | | |
|---|---|---|
| **Sex Differences** | Increase in male strength, decrease in flexibility with change in muscle mass; plateau reached for female strength in later middle years | Keep the same programming for males and females despite differences in their performance levels. |

**Ages 15 to 18**

| *CATEGORIES* | *CHARACTERISTICS* | *IMPLICATIONS* |
|---|---|---|
| **Structural** | Mature height and weight reached | Provide information to help students understand more about growth changes and motor development. |
| | Rapid growth in males, ages 14-16 | Plan strength-building exercises and activities. |
| **Heart and Lungs** | Heart and lungs mature | Provide progression in endurance activities to reach individual maximum performance. Monitor signs of overexertion. |
| **Coordination** | Fine motor skills developed | Teach more highly skilled games and activities |
| | Posture problems continue | Make students aware of the importance of good posture. |
| | Physical coordination at adult level; potential in reaction time nearly reached | Provide a balance programme to include these activities. |
| **Sex Differences** | Physical growth almost complete; differences in anatomical structure evident | Plan activitie that will allow for varying performance levels between females and males in running, throwing, and balance activities. |

## How to use the guide

The guide contains two main sections:

### The curriculum

The curriculum is comprised primarily of four goals (health- and skill- related fitness, the sciences of physical education and psychosocial development). Each goal has specific objectives. Each objective covers one area of teaching content.

Each area of teaching content is usually broken down into "Years". Years have been chosen intstead of Forms because the content applies to the time of introduction rather than the educational level of the student. In some instances the "Years" have been combined, either in two's (e.g., years 1 and 2) or fours (i.e., for all years).

Each Year is further broken down into "Topics for discussion", "Skills", "Activities", and "Concepts". The topics for discussion are mainly intruductory themes, theoretical sessions, or simply discussion provoking themes.

Skills are general performance objectives that can apply to a lesson or a lesson unit. Activities are specific performance objectives like upper body muscle building exercises and drawing of the cardiovascular circulation. Concepts are mainly notions that support or complement an activity (found mainly in the area of psychosocial development).

## Notes for Teachers

The notes for teachers are at the end of the guide and contain almost all the information needed for the teacher to be able to cover the discussions, skills and activities described in the curriculum. The notes contain up-to-date information at the time of publication; it is therefore the teacher's responsibility to keep abreast with the changes in the science of teaching physical education and the shifting attitudes in the methods of teaching this subject.

This guide is a starting point for the St. Lucian physical education teacher. It is essential, however, that resource books are made available for the teacher, and workshops are held in the various sporting disciplines.

# PART 1:

# CURRICULUM

# GOAL A

## TO DEVELOP AND MAINTAIN A HIGH LEVEL OF HEALTH-RELATED FITNESS

Objective I: *To develop cardio-vascular strength and endurance.*

Objective II: *To develop muscular strength and endurance.*

Objective III: *To develop flexibility.*

Objective IV: *To control weight and body fat.*

Physical fitness is divided into two categories: health-related fitness and skill-related fitness. Health-related fitness is considered the most important because you need it to maintain good health. A totally fit person, however, also has good skill-related fitness (described in Goal D).

Objective I: *To develop cardio-vascular strength and endurance.*

**Definition:** Cardio-vascular strength and endurance is the ability of the heart to deliver adequate amounts of blood to the body during either short or long periods of exercise.

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**Years 1 and 2**

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**Topic for discussion:** The importance of cardiovascular strength and endurance for health (see p.147).

**Skill:** Participate in aerobic activities for extended periods of time and maintain a heart rate appropriate for this age group (see p.151).

**Activities:**
- aerobics for 12 to 20 minutes
- running for 12 to 20 minutes
- footbal, basketball, tennis, netball
- "bullseye", "catchers", "sway" (sweat)
- circuit training includes:
  - jumping rope
  - running with high knee lift
  - squat thrusts, jumping jacks

  (see p.158).

**Other recommended activities:**
- bike riding, swimming laps, fast walking

## Years 3 and 4

**Topics for discussion:**

1) Heart rate, resting heart rate and compute target heart rate (see p.149).
2) Introduce the FIT principle of exercise (see p. 154).

**Skill:** Participate in aerobic activities for extended periods of time and maintain a heart rate appropriate for this age group.

**Activities:**

- Perform with increased intensity the activities for years 1 and 2.
- Develop a personalized programme of exercise that will result in a healthy resting heart rate using the FIT principle.

Objective II: *To develop muscular strength and endurance.*

**Definition**: Muscular strength and endurance is the ability of the muscles to do heavy work and work for long periods of time without excessive fatigue.

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**Years 1 and 2**

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**Topic for discussion:** The benefits of muscular strength and endurance (see p.174).

**Skill:** Perform two exercises for upper body and two exercises for lower body strength and endurance using the exercises in Table 1.

**Table 1: Exercises and Muscle Groups**

| | *Exercise* | *Muscle group* |
|---|---|---|
| **Upper body** | Push-ups | Biceps, triceps |
| | Sit-ups | Abdominals |
| | Standing push-ups | Chest and upper arm |
| | Resistance exercises with partner eg. "human spring" | Chest and upper arm |
| **Lower body** | Squats (5-10) | Gluteous maximous (buttocks) |
| | Squat with upward extension (3-5) | Gluteous maximous |
| | Walking in squating position with hands clasped behind back (duck walk) | Quadriceps (front thigh) |
| | Heel raisers | Gastroonemious (calf) |
| | Bench steps | Quadriceps, gluteous maximous |
| | Circuit training (see p.158). | Combination of muscular and cardiovascular strength exercises |

## Years 3 and 4

**Topic for discussion:** Principles of developing muscular strength and endurance (see p.176).

**Skill:** Demonstrate exercises of years 1 to 4 (using Tables 1 and 2) to help students meet personal needs:
a) to improve personal appearance
b) to excel in sports
c) to handle overload in normal activity

**Table 2: Exercises and Muscle Groups**

| *Exercise* | *Muscle group* |
|---|---|
| Chin-ups | Biceps, shoulder, chest |
| Crunches | Abdominals |
| Lunges | Hamstrings, quadriceps |
| Back extensions | Back muscles |
| Partner leg lifts | Legs |
| Leg thrusts | Legs |
| Finger-tip push-ups | Upper body, fingers |
| Resistance push-ups | Upper body |
| Chair push-ups | Upper body |
| Shoulder dips | Upper body |
| Treadmill | Legs, cardiovascular endurance |

Objective III: *To develop flexibility.*

**Definition:** Flexibility is the ability to execute and maintain a full range of movements in all body joints easily and without undue muscle tension.

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**For all years**

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**Topics for discussion:**

1) The benefits of stretching (see p.165).
2) Types of stretching and precautionary measures (see p.165).

**Activities:**

(see pictures on pgs. 166-173).

Upper body:
- arm stretch (sideways, upwards)
- arm circles
- grasp hands behind back
- stretch arms behind head (with bent elbow)
- torso twist
- side stretch

Lower body:

*Hamstring* stretch (back thigh):
- straight legs and touching toes
- cross legs, keep them straight, touch toes.

*Quadricep* stretch (front thigh): in an upward position, grasp foot and pull heel to buttocks.

*Gastrocnemius* (calf) and *achilles tendon* stretch: lean on wall (or ground) and atretch one leg while bending the other.

*Total leg* stretch: in bent knees position, arms clasping knees, legs together, lean forward without lifting heels, then straighten legs slowly.

*Fencer's* stretch: lunge forward, with bent calf vertical to ground while the back leg rests on toes.

Objective IV: *To control weight and body fat.*

**Definition:** Weight control is the maintenance of appropriate body weight and percent of body fat according to accepted norms.

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**Years 1 and 2**

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**Topics for discussion:**

1) Define "fat", "overfat", "underfat" and "essential body fat" (see p.137).
2) Factors that affect body fat level (see p.137).

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**Years 3 and 4**

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**Topics for discussion:**

1) Methods of measuring body fat (see p.142).
2) FIT formula and fat control (see p.140).
3) How body fat percentages vary according to gender (see ps.137 and 142).
4) Show relationship between different types of physical activities and caloric expenditure (see p.145).
5) Discuss maintenance of optimal body fatness and gaining and losing body fat (see p.139).

**Activity:** Design a simple exercise/diet programme to either gain, lose or maintain weight.

# GOAL B

## TO DEVELOP A KNOWLEDGE OF THE SCIENCES OF PHYSICAL EDUCATION

Objective I: *To teach the basic principles of anatomy and physiology.*

Objective II: *To teach the basic principles of biomechanics.*

Objective III: *To teach health- and nutrition-related components of physical education.*

Objective IV: *To teach the cognitive components of sports, games, aquatics and dancing.*

Objective V: *To teach a basic understanding of Sport Sociology.*

Objective VI: *To teach a basic understanding of Sport Psychology.*

Objective I: *To teach the basic principles of anatomy and physiology.*

**Definition:** The basic knowledge of the skeletal, muscular, cardiovascular and nervous systems, and the effects of exercise and sport upon these systems.

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**Year 1**

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**Topics for discussion:**

1) The basic organization and systems of the body.
2) The skeletal system.

**Activities:**

1a. Discuss the three levels of the organization of the body: cellular, organic, systemic (see p. 117).

1b. Introduce the systems of the body: the skeleton and the muscles; the nervous, circulatory, respiratory, digestive, excretory and reproductive systems (see p.117).

2a. Discuss functions of the skeleton: as supporter of the body, protector of parts of it, and a facilitator of motion (see p.119).

2b. Locate major bones on diagram or model (see p. 120).

2c. Discuss types of joints: synovial (hinge, ball and socket, saddle, sliding and pivot joints), fibrocartilaginous (eg, intervertebral joints) and fibrous (the skull) (see p.119).

## Year 2

**Topic for discussion:** The basic muscular system.

**Activities:**

1. Define types of muscles (skeletal, smooth, cardiac) (see p.121).
2. Discuss composition of skeletal muscles (muscle belly, muscle fibers, muscle origin and insertion, muscle tendons) (see p.121).
3. Locate major muscles on diagram (see p. 123).
4. Explain muscle contraction (see p.122).
5. Practice exercises for the different major muscles combining notes on muscular strength (see p.26).

## Year 3

**Topic for discussion:** The cardiovascular system.

**Activities:**

1. Discuss principal structures of the system and how these are connected to each other by using diagram (heart, arteries, veins, capillaries) (see p.125).
2. Discuss how the system transports oxygen to the muscles, and trace the path through the lungs and the bloodstream (see p.125).
3. Relate this material to the cardiovascular fitness unit (see ps.147 and 151).

## Year 4

**Topic for discussion:** The basic nervous system.

**Activities:**

1. Discuss the division of the nervous system (central and peripheral), and that the central system is divided into the brain and the spinal cord (see p.128).
2. Discuss the main parts of the nerve (cell body, dendrites, axon, nerve fiber and the synapses) using a diagram (see p.129).
3. Discuss how the nervous system functions (see p. 129).
4. Discuss how exercise and sport may improve the function of the nervous system (see p.129).

Objective II: *To teach the basic principles of biomechanics.*

**Definition:** Biomechanics is the science that studies the mechanics and the laws of physics as they apply to the human body.

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**Years 1 and 2**

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**Topics for discussion:**

1. Movement is the result of the muscular and skeletal systems (refer to the unit on anatomy).
2. Basic concepts of human movement: force, linear and rotational movement, speed, acceleration, momentum, and gravity (see p.132).

**Activities:**

1a. To demonstrate these basic concepts you may compare these three broad jumps: one with little force, one with full force, and one with a twisting motion (eg, jump and spin at the same time).

1b. You may also demonstrate speed, momentum and acceleration in running and sprints.

2. Videos of sports activities may also demonstrate the basic concepts (eg, diving, basketball, pole vault, sprints).

## Years 3 and 4

**Topic for discussion:** Cover the concepts of proprioception, velocity, momentum transfer, summation of forces, and center of gravity (see p.133).

**Activities:**

1. Blindfold students and ask them to walk in a straight line, or to find their way amongst objects to demontrate proprioception.
2. Explain and demonstrate how the summation of forces apply to sport skills (see ps 134-136).

Objective III: *To teach health- and nutrition-related components of physical education.*

**Definition:** Knowledge of what constitutes a good diet, what is the importance of a good diet to an exerciser or a sportsperson, eating disorders, and drug use in sport.

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**Year 1**

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**Topics for discussion:**

1. The four food groups and their relationship to a healthy body and to exercise (see p.177).
2. The FIT formula and nutrition (frequency, intensity and time of meals) (see p.178).
3. Factors that affect a person's nutrient needs (see p.178).
4. The importance of rest and sleep: muscle relaxation, decreased blood pressure, growth hormone release, heart rate reduction (see p.179).

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**Year 2**

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**Topics for discussion:**

1. Eating and drinking before exercise and sport: "sports drinks", meals, fluids (i.e., water, sports drinks), snacks (see p.182).
2. Making nutritious food choices: reading labels, salt and sugar intake, dehydration (see p.180).

## Year 3

**Topics for discussion:**

1. Nutrients the body needs: carbohydrates, proteins, fats, vitamins, minerals, water (see ps.183-188).
2. Eating disorders: anorexia nervosa, bulimia (see p.189).

## Year 4

**Topic for discussion:** Drugs in sport (see p. 190 A).

**Activities:**

-Define drug abuse and doping.
-Drug classification.
-Effect of drugs on performance in sport.

Objective IV: *To teach the cognitive components of sports, games, aquatics and dancing.*

**Definition:** The history, rules, strategy, safety measures and equipment selection and care for the above activities.

For each of these activities consult sports reference books.

Objective V: *To teach a basic understanding of Sport Sociology.*

**Definition:** The ability to identify the relationship between society and the role of sport as it reflects on the sport participant and society itself.

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**Year 1**

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**Topic for discussion:** Tobacco and alcohol sponsorship.

a. Tobacco and alcohol sponsorship as it pertains to St Lucia and the Caribbean.

b. The ethical aspects of this type of sponsorship.

c. The negative and positive effects of this type of sponsorship on the sport, the participants, and how it reflects on the rest of society.

d. What are the alternatives for this type of sponsorship in St Lucia and the Caribbean?

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**Year 2**

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**Topic for discussion:** Gender and sport.

a. What type of sports do females and males tend to participate in, in St Lucia and the Caribbean?

b. What type of support do females get from their family and society as a whole to participate in sport? Is this support similar or different to support the males generally receive?

c. How does the media (radio, television, cable television, newspapers) treat female sport in St Lucia?

d. What do you think are the reasons for the differences that exist in levels of participation, the types of sports, and media coverage between female and male sport?

## Year 3

**Topic for discussion:** Sport as a reflection of society.

a. What are the similarities between sport (individual and team) and looking for a job, going to school, taking music lessons?

b. What are the differences between sport and the above activities?

c. What types of people do you think tend to participate in certain kinds of sports and why do you think that is?

## Year 4

**Topic for discussion:** The athlete's career.

a. Discuss what you think are the effects of early participation in highly organized and competitive sport on children (e.g., international gymnasts start at the age of 2-3 and become Olympic medalists at 14-15 years of age).

b. Can n athlete all of her or his time to her or his sport in St Lucia and become a professional athlete? Do you know of such people?

c. What are the difficulties of being a sportsperson when one has a full-time job?

d. What do you think happens to athletes when they finish their career? What type of feelings would they experience when their career is over, and what are the posssibilities of using their skills to help other athletes or themselves, to make a living out of their knowledge and skills in the sport?

**Other discussion topics:**

Other topics that may be discussed if it is considered appropriate are: Politics within sport, Gambling and sport, Influence of media on sport, Cheating in sport, Aggression in sport. It should be noted that social issues that involve sport are specific to each country and/or geographical region; for example, cricket and netball are commonwealth counties' sports and are a product of the British influence on some Caribbean countries. Another example is that aggression in sport is more prevalent in European football stadiums, so the context of the discussion on aggression may be different.

**Note to teachers:**

Students should be encouraged to express their ideas freely, to bring up personal experiences, and to focus as much as possible on St Lucia's current sport millieu, and then connect it to the wider Caribbean and to other countries.

Objective VI: *To teach a basic understanding of Sport Psychology.*

**Definition:** Knowledge of how sportspeople and exercisers of low to elite levels cope mentally with their respective activities: training, setting goals, adhering to an exercise programme, competing.

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**Year 1**

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**Topics for discussion:**

1) Introduction to Sport Psychology. Define sport psychology, explain the role of a sports psychologist, and explain the main concerns of the field of study of sport psychology (see p. 191).
2) What do you think are the positive and negative effects of training for one position only (e.g., netball wing attack, football midfielder)?
3) How do you think spectators can affect an athlete's performance?
4) Discuss the characteristics of an authoritarian coach, a democratic team captain, a "pushy" parent, a fair referee.

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**Year 2**

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**Topic for discussion:** Goal setting (see ps 192-193).

a. Define goal setting.
b. What types of goals should we set?
c. Areas in which to set goals.
d. Discuss how to set goals.
e. Discuss how goals setting can be used in all areas of human endeavour.

**Activity:** Ask students to choose an area of physical performance and set goals for a period of time.

## Year 3

**Topic for discussion:** Exercise adherence (see p.193).

a. Define exercise adherence.

b. Ask children to identify the exercise/fitness programmes and facilities in St Lucia, starting from their own communities.

c. How does the setting in your community facilitate or hinder people to participate in an exercise programme, or create and adhere to their own, personal exercise patterns?

d. What alternatives/solutions can you find to ensure that you adhere to your exercise programme?

## Year 4

**Topic for discussion:** Mental preparation (see p.194).

a. Define mental preparation.

b. Getting psyched-up during competition.

c. Signs of over-excitement.

**Activity:** Relaxation technique (see p.196).

# GOAL C

## TO DEVELOP POSITIVE ATTITUDES AND BEHAVIOURS (PSYCHOSOCIAL DEVELOPMENT)

Objective I: *To teach good sportsmanship.*

Objective II: *To teach cooperation and team work.*

Objective III: *To learn to share and develop with one's peers by giving and receiving support.*

Objective IV: *To teach appreciation of regular physical activity*

Objective V: *To teach emotional control.*

Objective VI: *To teach leadership and followership skills.*

Objective VII: *To develop a positive self-concept.*

**Definition:** Psychosocial development in Physical Education is the building of interpersonal relationships, personal growth, and self-esteem through physical activity.

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**For all years**

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Objective I: *To teach good sportsmanship* -- the ability of both boys and girls to accept victory and defeat with graciousness and to play according to the rules and spirit of the game.

**Concepts and activities:** The student will learn to take turns.

The student will demonstrate an understanding of sportsmanship by working with his or her class, and by dividing themselves into equally skilled groups for activities.

The student will understand the concepts of good sportsmanship as they apply to spectators.

The student will learn to win and lose graciously, to congratulate opponents, and to treat officials respectfully.

Objective II: *To teach cooperation and team work* -- the ability to participate and interact with teammates to achieve common goals.

**Concept:** Social development follows a predictable pattern; first the student plays alone, then the student engages in parallel play, and finally the student participates as a member of a team.

**Activities:** Participates in activities with a partner.

Participates in extracurricula activities frequently.

Functions as an effective team player.

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Objective III: *To learn to share and develop with one's peers by giving and receiving support.*

**Concept:** Team sports and group activities provide an opportunity to develop support networks.

**Activities:** Demonstrates consideration for others by not dominating control of the game.

Selects own teammates for group games based on equity.

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**Concept:** Physical activity needs for women and girls are the same for men and boys.

**Activity:** Participates in classes grouped according to ability which involve both girls and boys.

Objective IV: *To teach appreciation of regular physical activity* -- recognition of the importance of frequent exercise for both enjoyment and physical fitness.

**Concept:** Participation in physical activities increases appreciation of the beauty of the dynamic human body.

**Activities:** Expresses feeling through movement and music.

Participates in outdoor education activities.

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**Concept:** Participation increases appreciation and respect for movement activities of the student's culture.

**Activities:** Researches and teaches a folk or ethnic dance to his or her classmates; shows enjoyment in folk, and ethnic dancing.

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Objective V: *To teach emotional control* -- the ability to demonstrate acceptable emotional behaviour in both stressful and nonstressful situations.

**Concept:** Physical activities provide opportunities to develop self-discipline and sre constructive outlets for aggression.

**Activities:** Displays self-discipline by accepting decisions made by officials, even if she or he does not agree with those decisions.

Treats competitors fairly.

Objective VI: *To teach leadership and followership skills* -- the ability to both give and carry out instructions and suggestions to achieve a common goal.

**Concept:** Students will at one time or another be leaders or followers.

**Activities:** Acts as captain of a team.

Follows suggestions and instructions by team captain and coach.

Seeks teammates of lesser ability to help them improve their game skills.

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Objective VII: *To develop a positive self-concept* -- a confident self assured feeling about one's abilities and worth.

**Concept:** Physical activities are most enjoyable when they offer challenges, risks, and potential for success.

**Activities:** Displays willingness to attempt a new physical skill.

Rearranges equipment to create a greater challenge.

Seeks to compete with others to improve performance.

---

**Concept:** Physical Education can increase self-esteem.

**Activities:** Works to achieve reasonable personal performance goals.

Seeks competition with others of equal or greater ability.

Demonstrates skill in one rhythmic, one aquatic and one outdoor education activity.

# GOAL D

## TO DEVELOP AND MAINTAIN A HIGH LEVEL OF SKILL-RELATED FITNESS

Objective I: *To develop skill-related fitness.*

Objective II: *To teach sports skills.*

Objective III: *To teach body awareness and movement qualities, primarily through dance.*

We have already mentioned that physical fitness is divided into two categories: health-related fitness and skill-related fitness. The six parts of skill-related fitness - agility, balance, coor iination, power, speed and reaction time - are related to performing well in sports and using physical skills.

Objective I: *To develop skill-related fitness.*

**Definition:** Skills are specific physical tasks that people can perform, such as catching, throwing, swimming, batting and dancing. Skill-related fitness is a group of basic abilities that help you learn particular skills.

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**Years 1 and 2**

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**Topics for discussion:**

1. Identify and define skill-related fitness components (see p.197).
2. The benefits of skill-related fitness (see p.197).

**Activities:** Do a self-evaluation of your balance, coordination and reaction time (see p.199 A).

**Other activities related to reaction time**

- Calling and responding to game strategies and giving signals in team sports.
- Responding to referee a..d umpire signals and calls.
- Responding to flags and lights.
- Using a basketball or swimming timer.

## Years 3 and 4

**Topics for discussion:**

1. Factors that affect skill-related fitness (see p. 198).
2. Ways to improve skill-related fitness components (see p.199).

**Activities:** Do a self-evaluation of your agility, power and speed (see p.199 B).

**Other activities related to skill fitness**

- Kick to target.
- Dribble ball in amongst obstacles.
- Place the ball in desired location using bat.
- Be able to follow gymnastics or choreographic routine.
- Tread water and successfully retrieve underwater object.

Objective II: *To teach sports skills.*

Sports in general include such activities as football, basketball, volleyball, netball, cricket, dance, track and field, and traditional games of other countries; and sports and other recreational activities for lifetime use -- such as tennis, running, archery, swimming and golf.

Sports included in this manual are:

Athletics
Basketball
Cricket
Football
Gymnastics
Netball
Swimming
Tennis
First Aid

## ATHLETICS

### Overview of teaching content

Year 1

*Objectives*: Introduction to athletics, running events and starts.

Year 2

*Objectives*: To teach:
Strengthening exercises.
Discus throw.
Long jump.
High jump.
Fitness components.

Years 3 and 4

*Objectives*: To teach:
Shotputt.
Pole vault.
Javelin.
Triple jump.
Relays.
Hurdles.

## Breakdown of skills and activities to meet objectives

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**Year 1**

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**A. Objectives**: Introduction to athletics, running events and starts.

**B. Skills/Activities**:

*1. Introduction to athletics*

a. Discuss history of athletics, breakdown of events, current status worldwide and in St. Lucia.

*2. Running events*

a. Discuss contribution of leg muscles and cardiovascular activity to running different distances.

b. Running drills for:
- observing breathing
- balanced action (of hands, head and torso)
- feeling of drive
- increase of power and range of movement

c. Stretching exercises for warm-up and cool-down.

d. Shuttle relays, handicaps, speed games.

*3. Starts*

a. Standing start.

b. Crouch start.

c. Block start.

*4. Jumping*

a. Standing broad jump.

## Year 2

**A. Objectives:** To teach:

Strengthening exercises.
Discus throw.
Long jump.
High jump.
Fitness components.

**B. Skills/Activities:**

*1. Strengthening exercises*

a. For legs and ankles.
b. Inrease range of movement for all joints.
c. For hamstrings and calf muscles.
d. For back muscles.
e. For upper body muscles.
f. Abdominals.

* See muscle strength and endurance section for specific exercises.

*2. Discus throw*

a. Practice stance, the throwing action and the follow-through.
   - without object
   - with small ball (e.g., cricket ball)
   - within a confined space
b. Emphasize and practice safety rules.

*3. Long jump*

a. Approach run.
b. Use of take-off board.
c. Measuring one's distance run.
d. Repeat broad jump.
e. Discuss and demonstrate various jumping styles ("sail", "hang" and "stride" jump).

4. *High jump*

   a. The approach run.
   b. Take-off.
   c. Measuring one's distance run.
   d. Flop practice from a high box.
   e. Practice jump on mats to encourage jumpers to go high.
   f. Discuss and demonstrate various jumping styles ("fosbury flop" and scissors).

5. *Fitness components*

   a. Muscular endurance.
   b. Flexibility.
   c. Agility.
   d. Speed.
   e. Power.
   f. Cardiovascular endurance.

## Years 3 and 4

**A. Objectives:** To teach:

Shotputt.
Pole vault.
Javelin.
Triple jump.
Relays.
Hurdles.

**B. Skills/Activities:**

*1. Shotputt*

a. Practice stance, the throwing action and the follow-through.
   - without object
   - with ball or coconut
   - within a confined space

b. Emphasize and practice safety rules.

*2. Javelin*

a. The run.
b. Practice stance, the throwing action and the follow-through.
c. Emphasize and practice the safety rules.

*3. Pole vault*

This event should **only** be taught if proper equipment, supervision and instruction is available.

a. Approach run.
b. Take-off.
c. Off the ground:
   - hang phase
   - tuck (or rock-back) phase
   - "pull-push" phase
d. Landing.

4. *Triple jump*

   a. Approach run.

   b. Preparation for take-off.

   c. Off the ground:

      - the hop, the step and the jump

5. *Relay racing*

   a. Baton changing elements.

      - the grip

      - proper delivery and reception

   b. Ways of baton changes

      - visual and non-visual

      - overhand and underhand

   c. Organizing your team.

   d. Importance of bend running.

   e. The use of acceleration zone.

   f. The proper use of change-over zones.

6. *Hurdles*

   a. The clearing technique.

   b. Approaching run and in-between hurdle run (i.e., number of steps).

## BASKETBALL

### Overview of teaching content

Year 1

*Objectives*:
1. Introduction to basketball (history and current status).
2. To teach the basic skills of dribbling, shooting, passing and defence.

Year 2

*Objectives*:
1. Skill development.
2. Team play skills and skill combinations.
3. Rules of the game.

Years 3 and 4

*Objectives*:
1. Team game strategies.
2. Refine skill technique.

## Breakdown of skills and activities to meet objectives

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**Year 1**

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**A. Objectives:** 1. Introduction to basketball (history and current status).

2. To teach the basic skills of dribbling, shooting, passing and defence.

**B. Skills/Activities:**

*1. Introduction to basketball*

Discuss history of athletics, breakdown of events, current status worldwide and in St. Lucia.

*2. Dribbling*

a. Dribble 20m to a partner using right hand. Partner holds up fingers and has dribbler call how many fingers are up (this is so the dribbler does not look at the ball or the ground). Dribble back with left hand to starting point still looking at fingers.

b. Dribble zig-zag pattern in and out of obstacles (chairs).

c. Stationary dribbling with eyes closed.

d. Play "tag" while dribbling.

e. Combination relay: dribbling/shooting/passing.

*3. Shooting*

a. Lay-up lines.

b. Jump shot lines.

c. Combination relay: dribbling/shooting/passing.

4. *Passing*

a. Pass at targets.

b. Partner passing: one person throws chest pass while other simultaneously throws bounce pass.

c. Zig-zag passing in between students in parallel lines.

5. *Defence*

a. Shuffle-step and slide in the direction of the dribbler ("follow the leader").

## Year 2

**A. Objectives:**

1. Skill development.
2. Team play skills and skill combinations.
3. Rules of the game.

**B. Skills/Activities:**

*1a. Dribbling - repeat same drills as Year 1 and add:*

a. "Keep-away".

b. "Knock-out" - two or more dribblers dribbling within the foul circle and try to knock away the ball(s) of the other dribbler(s) while keeping her/his own ball and limbs inside the circle.

*1b. Shooting - same drills as in Year 1 and add:*

a. Left hand shooting.

b. Distance shooting.

c. Speed shooting: most shots in a minute, 30 sec., etc

d. "Horse": lead player takes a shot. If it goes in, second person must make the same shot. If it goes in, third person must make the same shot, and so on. Whoever misses a shot that the previous persaon has made, he/she shall receive an "H". If he/she already has an "h", then give and "o". If he/she has an "o" give an "r", and so on. Once a person has spelled "H-O-R-S-E", they are out of the game. Last one remaining is the winner.

*1c. Passing - same as Year 1 and add:*

a. Three-person weave.

b. Run and pass with partner.

*1d. Defence - same as Year 1 and add:*

a. One-on-one, person to person practice.

b. Box-out rebound practice.

*2a. Team play skills*

a. Zone defence vs. person-to-person.
b. Full court play.
c. Picks and screens.
d. Dribble and shoot.
e. Dribble and pass.
f. Catch and shoot.
g. Pivoting.
h. Getting free to catch a pass.

*2b. Begin to use basketball game situations through drills*

a. "One-on-one".
b. "Three-on-three".

## Years 3 and 4

**A. Objectives:** 1. Team game strategies.
2. Refine skill technique.

**B. Skills/Activities:**

*1. Team drills/games*

a. One-on-one.
b. Three-on-three.
c. Five-on-five.

*2. Games for improving skills*

a. Games with no dribbling allowed.
b. Games with minimum amount of passes before shooting is permitted.

## FOOTBALL

### Overview of teaching content

Year 1

*Objective*: To give an introduction to the game of Football (history, curreny status, future and purpose).
To learn basic skills.

Year 2

*Objective*: To review the basic skills and learn positions on the field.

Year 3

*Objectives*: Combination of skills - drills which incorprate two or more skills, e.g., Passing and trapping.
Shooting the football for goal scoring.

Year 4

*Objectives*: Review of previous years.
Game situations using offense and defensive strategies.
Play game using officials and game rules.

## Breakdown of skills and activities to meet objectives

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**Year 1**

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**A. Objective:** To introduce the game of Football (history, current status, future and purpose of the game), and to learn basic skills of the game.

**B. Skills/Activities:**

1. *Basic ball handling* - moving the football around with different parts of the foot.
2. *Ball juggling skills* - with head and shoulders, chest, thighs and knees, instep and side of foot.
3. *Passing* -
   - partners passing back and forth
   - triangle pass with three players
   - square pass with players in a square passing across and next to one another
   - wall pass- one stationart player (wall) and two roaming players passing to recieve from the wall
   - lob pass- passing in any format using only in the air passes.
4. *Trapping*- With a trow-in pass the students trap with:
   - inside of foot
   - outside of foot
   - bottom of foot
   - thigh
   - chest
   - shoulders.

   Move from a trap into a dribble.

5. *Dribbling*- a line drill around a cane:
   - with only the inside of the foot
   - with only the outside of the foot
   - with only the left foot and then only with the right
   - speed dribble with both feet
   - dribble between several obstacles.

## Year 2

**A. Objective:** Review the basic skills of the game and learn the positions on the field.

**B. Skills/Activities:**

*1. Positioning* - there is a basic format of the positions on a football field*, however that format can be altered in any way provided that the number of players on the field is always eleven per side.

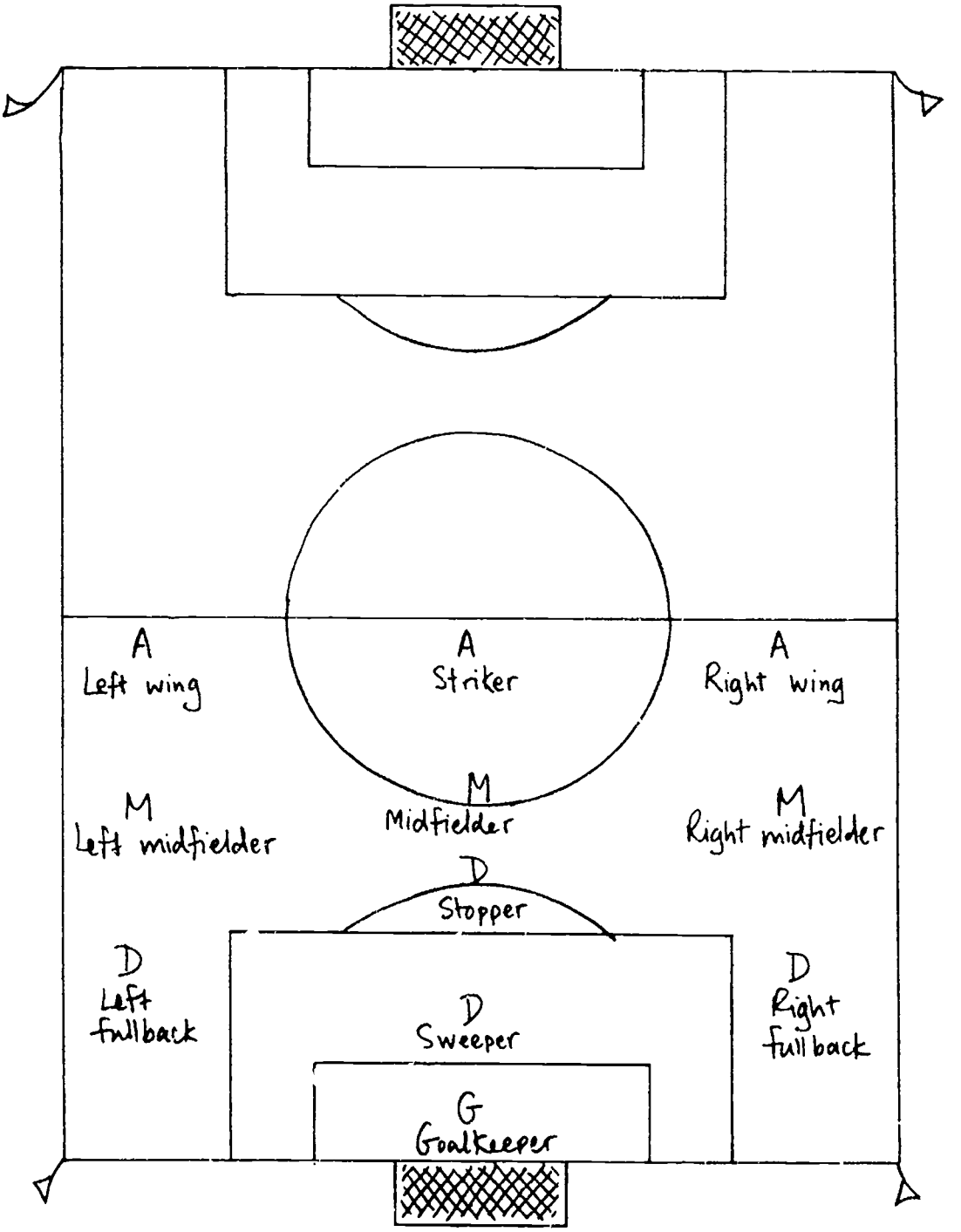
1a. Attack positions or offence (A). In a basic format there are three (3) offensive payers on the front line.

1b. Midfielders (M). These players are also attack players as well as defenders. There are three midfielders in a basic format.

1c. Defenders (D). These players play mostly defense and are set up in a diamond shape grid.

1d. Goal Keeper or Golie (G). This player stays with in the box in front of the net. Essentially this player is the last resort. The golie can use any part of his/her body to keep the ball out of the goal.

* The field at the start of a game *



## Year 3

**A. Objectives:**

1. Combination of skills- drills which incorporate two or more skills eg. Passing and trapping
   Dribbling and passing
   Trapping and dribbling
2. Shooting- the most difficult task in soccer can be done with an instep drive, a full volley, a half volley or a swerve shot. Players should try each shot with both feet to teach proficiency.
3. Goal tending.

**B. Skills/Activities:**

*2a. Instep*

Plant balance foot several inches to side of ball, flexed at the knee for stability. Eyes on ball, shoulders square with target. Body and knee of kicking leg over ball. Foot firm as it cotacts ball. Momentum forward through point of contact. Complete with follow through.

*2b. Full-volley*

Move to spot where ball will drop. Balance leg flexed, eyes on the ball. Knee of kicking foot over ball. Lean forward as foot contacts ball. Ball contacted on full intep. Short powerful snap of leg.

*2c. Half-volley*

Move to where ball will drop. Knee of balance leg flexed, eyes on ball. Lean forward, ball kicked at instant it hits ground. Kicking foot straight downward on contact. Short, powerful snap of leg through the ball.

*2d. Serve-shot*

Balance foot planted beside ball. Kicking foot fully extended, eyes on the ball. Foot contacts ball to left or right of vertical midline. Momentum forward through the ball raises kicking foot to waist level or above.

*3a. Goal tending - drills for the goal keeper:*

-bounce and catch-keeping hands in butterfly position i.e., with fingers spread and thumbs touching
-jump and catch
-toss and catch
-kneeling save to side
-diving to save
-standing dive
-fall/role after dive

## Year 4

**A. Objectives:**

a. Review previous years.

b. Game situations using offensive and defensive positions.

c. Play game using officials and game rules.

## GYMNASTICS

### Overview of teaching content

Years 1 and 2

*Objectives*: The mastery of junior stunts. For example, jump and tuck, controlled landings and forward rolls.

Year 3

*Objectives*: The mastery of all variations of rolls and springs and the round-off.

Year 4

*Objectives*: Mastery of combination of skills using height and speed.

## Breakdown of skills and activities to meet objectives

---

**Years 1 and 2**

---

**A. Objectives:** The mastery of junior stunts.

**B. Skills/Activities:**

*1. Basic lead-up activities*

a. Rocker.

b. Jump and tuck.

c. Scales (backward leg raise).

d. Turns and spins.

*2. Rolls*

Forward, side and backward.

*3. Stands*

Headstands, handstands and cartwheels.

*4. Springs*

Head springs.

*5. Balances*

Crouch, one leg, arabesque, backbend, side scale, walk on balance beam and walk and change direction on beam.

*6. Partner balances*

Shoulder balance on thighs and hand balance on knees.

## Year 3

**A. Objectives:** The mastery of all variations of rolls and springs and the round-off.

**B. Skills/Activities:**

*1. Rolls*

a. Forward roll from a hands-and position.
b. Backward roll into a handstand position.
c. Diving forward roll.

*2. Springs*

a. Front hand spring.
b. Back hand spring.

*3. The round-off (cartwheel with a two foot landing)*

a. Practice steps preceeding the round-off (example: number of steps).
b. Add a tuck jump to the landing of the round-off.

## Year 4

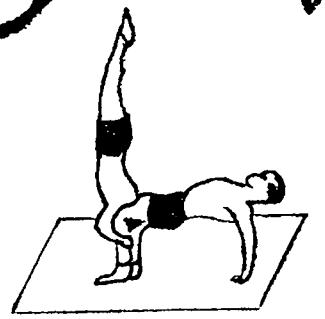
**A. Objectives:** Mastery of combination of skills using height and speed.

**B. Skills/Activities:**

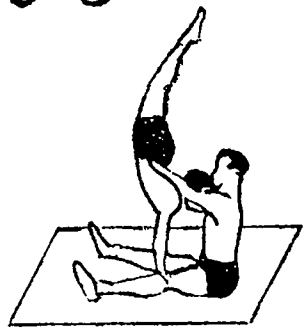
*1. Combination of skills*

a. From a selected elevation, jump to the mat with a proper landing, then do three forward rolls the third ending in a headstand and then go into a bridge/crab position.
b. In a standing position, jump a half turn, perform four cartwheels in sequence to finish with a front handspring.

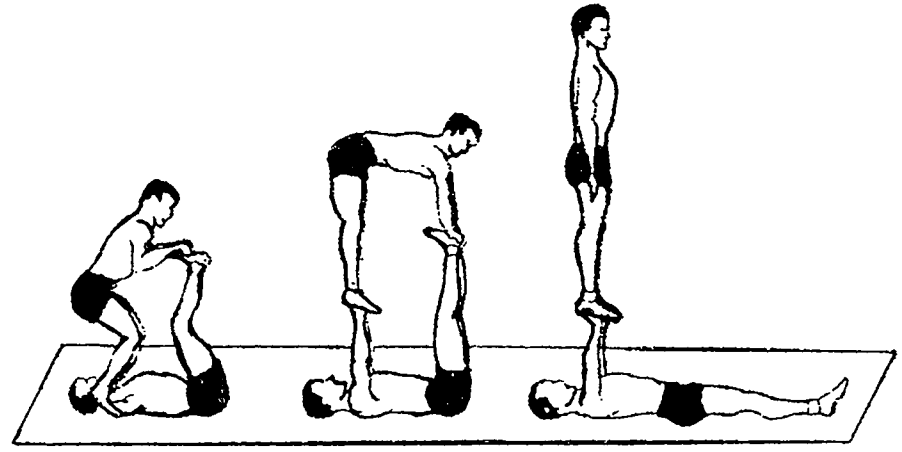
# Balances



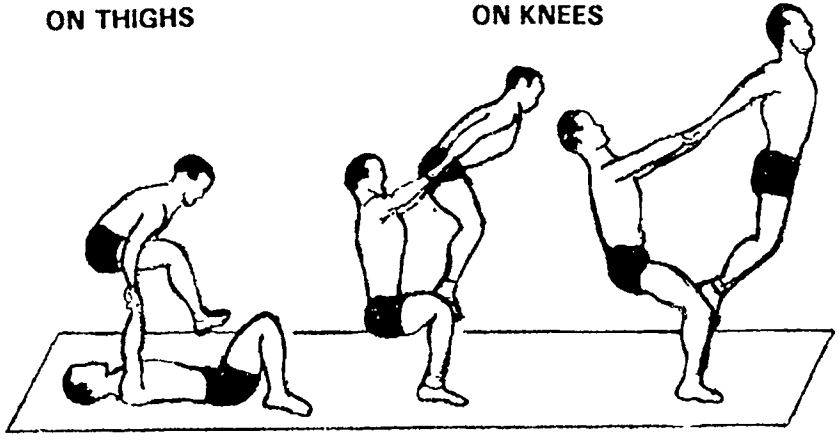
SHOULDER BALANCE
ON THIGHS



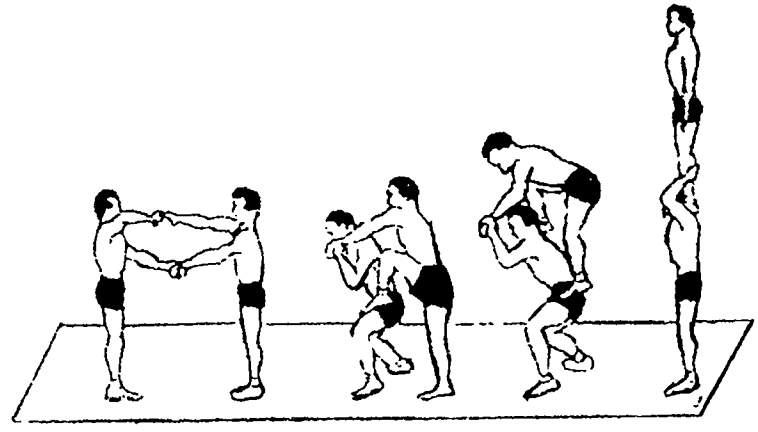
HAND BALANCE
ON KNEES



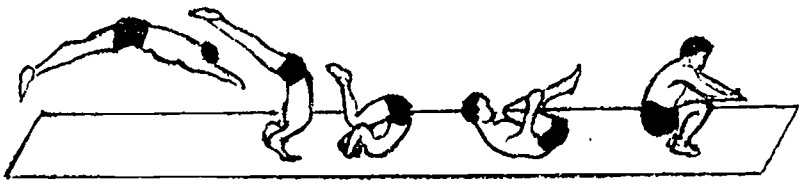
FOOT-TO-HAND BALANCE



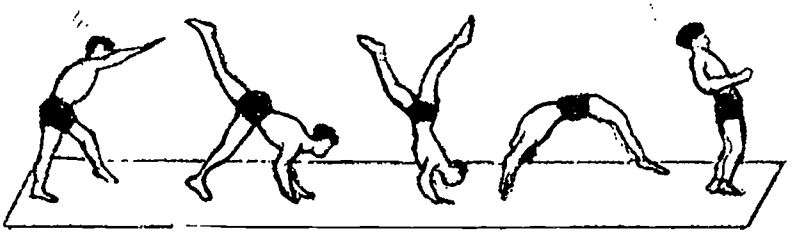
KNEE STAND



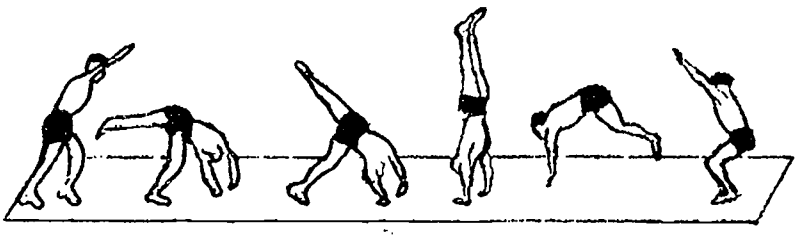
WALK UP SHOULDER MOUNT



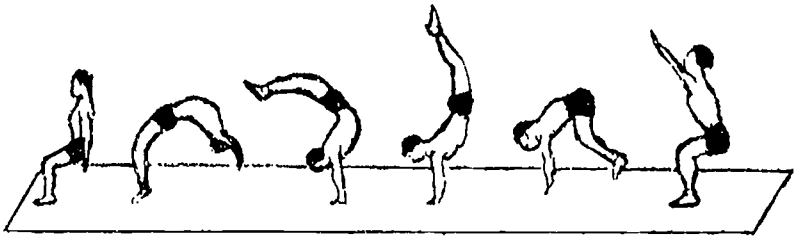
DIVE



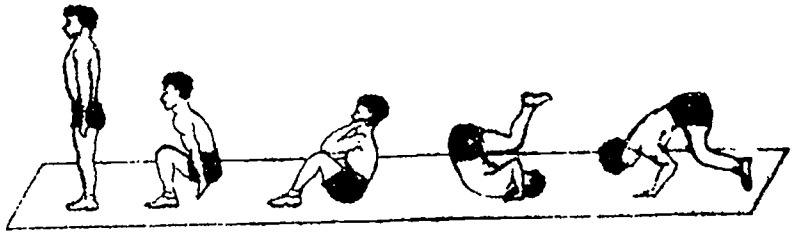
HAND SPRING



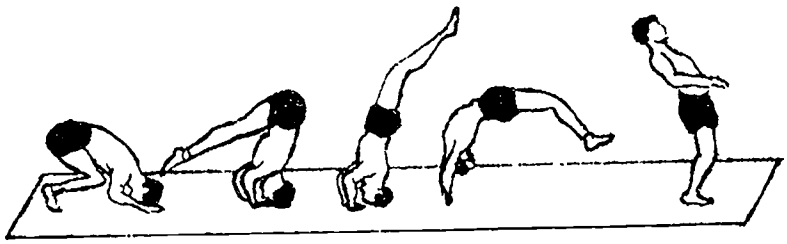
ROUND OFF



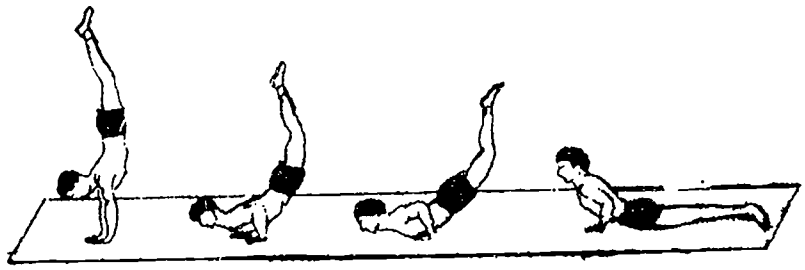
BACKHAND SPRING



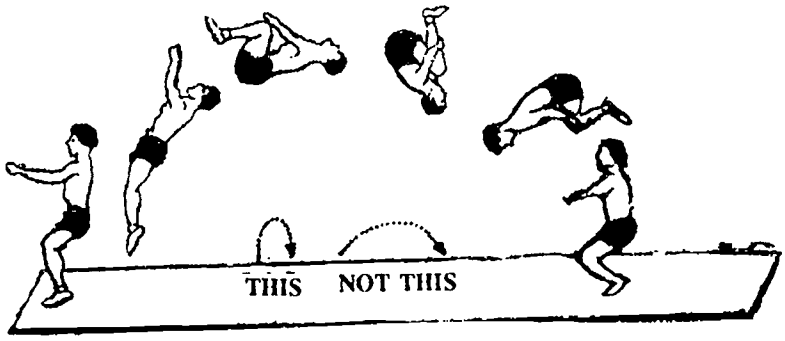
BACKWARD ROLL



HEAD SPRING

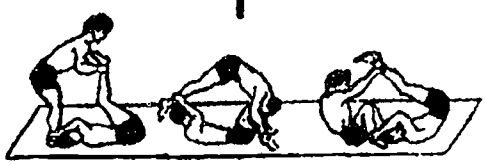


CHEST ROLL

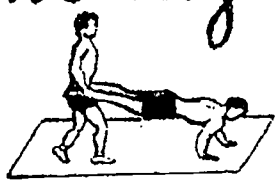



BACK SOMERSAULT

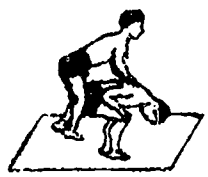
# Multiple Tumbling



DOUBLE ROLL



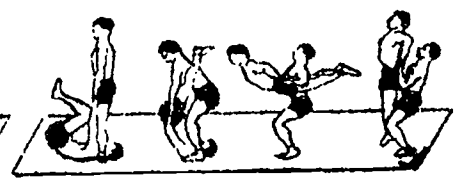
WHEELBARROW



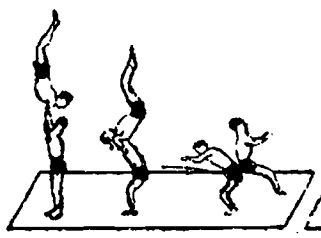
LEADFROG

TANDEM WALK

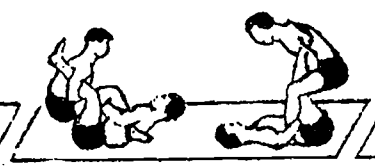
CENTIPEDE WALK



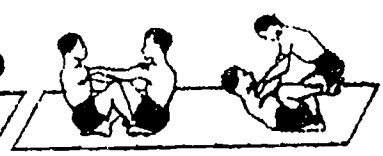
ARMPIT PICKUP



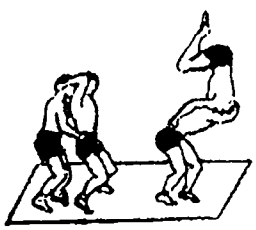
ROLL DOWN



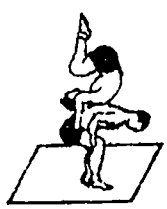
LOCKED-LEG ROCKER



SITTING ROCKER

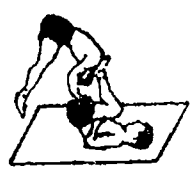


NECK-THROW FRONT SOMERSAULT

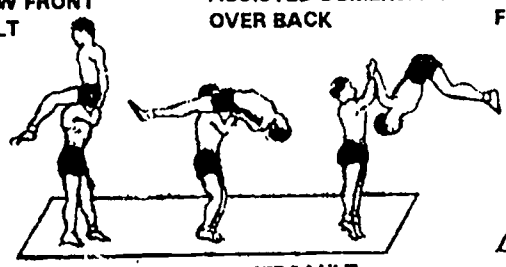


ASSISTED SOMERSAULT OVER BACK

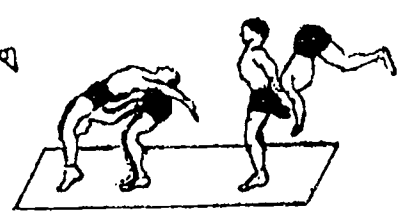
FOOT TO DEI VIS FR. SOMERSAULT



ASSTD SOMERSAULT FROM BUTTOCKS



ASSTD. BACK SOMERSAULT FROM SHOULDER SIT



NECK-LIFT BACK SOMERSAULT

# NETBALL

## Overview of teaching content

### Year 1

*Objectives*: Introduction to netball (history, status).
Ball control, catching, throwing and passing.

### Year 2

*Objectives*: Marking, defending and intercepting.
Shooting.
Basic rules of the game.

### Year 3

*Objectives*: Toss-up and throw-in.
Rules of the game and minor games.

### Year 4

*Objectives*: Positions and responsibilities.

**Breakdown of skills and activities to meet objectives**

---

**Year 1**

---

**A. Objectives:** Introduction to the game (history, status).
Ball control, catching, throwing and passing.

**B. Skills/activities:**

*1. Ball control*

Ball familiarization:
-one and two hand exersizes
-throw ball up and retrieve
-throw ball against the wall and retrieve
-roll ball along the ground and retrieve
-throw ball into a space and retrieve

*2. Catching and throwing*

a. Catching with one hand: stand facing a wall about one step from it. Rebound ball at head height using one hand, do five throws and catches with left then right hand. Repeat the activity with the ball and each hand higher than your head.

b. Two players. Each player throws five catches to the left, five to the right and five overhead. The other player retrieves.

c. Two players, one is the runner and the other the catcher. The catcher stands facing the wall about three steps from it. She rebounds the ball off the wall 5 times with the right hand and 5 times with the left and catches it. At the same time the runner sprints back and forth between two markers 5 meters apart. The runner must stop when the ten throws have been completed. The runner keeps score of the number of runs. Players swap roles. The player with the highest number of runs is the winner.

*Passing*

a. One-handed shoulder pass:

-at chest height

-at head height

-with left arm extended from the body

-with right arm extended from the body

b. Two-handed pass:

-Four catchers and one feeder. Feeder throws to the side of the first catcher. The catcher must sprint, catch, stop, balance, step and pass the ball back to the feeder. The catcher sprints to the end of the line.

c. The bounce pass:

-Two players stans three meters apart with chalk marks on the ground between them. One player attempts to bounce the ball on the chalk marks for her partner to catch.

-The thrower attempts to bounce the ball into the hands of the catcher.

d. Lob pass.

e. Underarm.

## Year 2

**A. Objectives**: Marking, defending and intercepting.
Shooting.
Basic rules of the game.

**B. Skills/activities:**

*1. Marking - Practice:*

a. Positioning yourself close to opponent.
b. Positioning yourself in-between her and the ball.
c. Keeping a view of your opponent and the ball at all times.

*2. Defending and intercepting*

-Two throwers and one defender. The defender runs between two cones trying to intercept the pass between the two throwers who are throwing at various heights.
-Two throwers, one attacker and one defender. The throwers pass the ball back and forth. The defender stays with the attacker trying to keep both the ball and the attacker in view. The defender must decide when to try to intercept the pass.

*3. Shooting*

-Using chalk draw lines on the ground. From those lines practice shooting without a defender. Practice stepping back, to the side and forward to take the shot. Then practice with the addition of a defender.
-With a skipping rope skip ten times fast. Immediately following shoot five goals. Skip again ten times and shoot five goals. Repeat until you have made 30 goals.

## Year 3

**A. Objectives:** Toss-up and throw-in.
Rules of the game and minor games (5-player).

**B. Skills/activities:**

1. *Toss-up: Practice batting the ball*

   Two jumpers, two catchers and a thrower: The thrower throws the ball high between the batters who stand 3ft apart with hands on their sides. The jumpers try to bat the ball to their respective catchers. Experiment with varying directions of the bat: forward, left, right and a hook over the head.

2. *Throw-in:*

   Practice correct standing (foot up to the line), umpire's call ("Play!"), throwing within 3 seconds of the umpire's call and throwing to the nearest third of the court.

## Year 4

**A. Objectives:** Positions and responsibilities.

**B. Skills/activities:**

Consult reference book for the players' positions at the start of the game.

## SWIMMING

### Overview of teaching content

Year 1

*Objectives*: To learn basic water skills.

Year 2

*Objectives*: To learn the crawl stroke.

Year 3

*Objectives*: To learn backstroke and side stroke.

Year 4

*Objectives*: To refine crawl and backstroke.
To learn elementary butterfly and breastroke skills.

## Breakdown of skills and activities to meet objectives

---

**Year 1**

---

**A. Objectives:** To learn basic water skills.

**B. Skills/activities:**

*1 Water adjustment, floating*

a. Blow bubbles, face in water, submerge head.
b. Prone float and recovery.
c. Back float and recovery.
d. Float on back for 30 seconds.

*2. Glide, kick*

a. Prone glide and recovery.
b. Back glide and recovery.
c. Prone glide with kick.
d. Back glide with kick.
e. Kick on front holding kickboard, head in water.

*3. Combined activities*

a. Float on back, roll over face down and roll again.
b. Combined stroke on back.
c. Submerge head and retrieve object underwater.
d. Wade out waist deep, push off bottom and swim 3m to shallow landing, then walk back to land.

*4. Treading water*

a. Body upright, legs moving as if peddling a bicycle, hands moving in and out in a relaxed manner.

## Year 2

**A. Objectives:** To learn the crawl stroke.

**B. Skills/activities:**

*1. Rhythmic breathing*

a. Face in water, breathe on each side.

*2. Crawl teaching sequence*

a. Kicking (with kickboard)

- with head in water
- roll from side to side: the hips, the feet and the shoulders must roll towards and from the bottom of the sea/pool
- with one hand on board, breathing on the free side
- alternate hands and breathing on the free side

b. Repeat above exercises without kickboard

c. Arm movement

- with kickboard, kicking, one hand on board, the other hand doing the crawl stroke
- hands extended forward, kicking, one arm doing the crawl stroke
- same as above, but each hand does the stroke, with a lapse time in-between ("catch-pull-catch")
- same as above, speeding up the time between strokes (decreasing lapse time)
- incorporate breathing with the stroke, using both sides to breathe

*3. Underwater swim*

a. Dive, scissor (flutter) kick, hands on sides.

b. Dive, dolphin kick, hands extended forward.

c. Surface dive to recover object 2m underwater.

*4. Combined activity*

a. Begin in chest deep water, float on back for 15 seconds and swim 3m to shallow landing.

Note to teachers:

a. All the drills/steps may be practiced without kicking.

b. When things get out of tune, return to the basics (previous steps), make corrections, reinforce correct style and proceed.

c. Speed is highly irrelevant to learning the stroke. The longer time lapse during breathing or pulling, the more likely it is that the person will develop good timing (syncronization). Also, the time lapse allows the person to use their glide (body momentum).

## Year 3

**A. Objectives:** To learn backstroke and sidestroke.

**B. Skills/activities:**

*1. Backstroke teaching sequence*

a. The kick (kicking on one's back)

- hugging board on chest
- with hands on side ("like a soldier")
- with one, and then both hands extended behind head ("position 11 and 1 o'clock)
- rolling from side to side (in the aforementioned positions): the feet, the hips and the shoulders must roll towards and from the surface of the sea/pool

b. The stroke

- one hand extended behind head, the other does the recovery phase (when the hand moves but does not exert force)
- both hands extended behind head, the other does the pull phase (when the hand is exerting force)
- as above, one hand does the complete backstroke
- as above, each hand does the complete backstroke but stops to meet and hols the other hand between strokes

c. Combination activities

- combination of the above activities, with or without kick, with long lapses of time between strokes to practice gliding and with emphasis on rolling from side to side

*2. Side stroke*

a. Use treading water kick.

b. Use side scissor kick.

*3. Combined activities*

a. Wade out 10m, then swim underwater to recover an object 1m deep.

b. Wade out chest deep, tread water for 30 seconds, then swim 15m to shallow water.

---

**Year 4**

---

**A. Objectives:** To refine crawl and backstroke.
To learn elementary butterfly and breastroke skills.

**B. Skills/activities:**

*1. Reafine crawl and backstroke*

a. Prepare students for competitions.

b. Practice crawl and backstroke with waves. In both cases the head should be above the water, In crawl, the hands will recover closer to the surface of the water. In backstroke less rolling may be appropriate.

*2. Elementary skills for butterfly*

a. Kick underwater (like a dolphin).

b. Kick on surface with hands on sides and then with hands extended.

c. Combination of butterfly kick and crawl stroke with breathing on side.

*3. Elementary skills for breastroke*

a. Hand movement in "up-side-down heart shape" with breathing, extension of body and glide.

b. Combination of breastroke and crawl kick.

c. Using the kickboard, the whip kick.

Note to teachers:

Other teaching areas that should be fitted around the core are:

1. Water safety should be demonstrated and practiced each year. Practice reaching and throwing rescues using rope, towel, stick, with someone the same size. In the third and the fourth year combine different size children.
2. Diving (if pool available)
   - Jump off the side of the pool (shallow side) and swim 3m unaided back to side.
   - Jump off side into deep water, level off, turn over onto back and swim 3m on back to the side of the pool.
   - Practice diving into water, from edge of pool first, from crouched position next and then from standing position.
   - Dive head first into deep water, then level off and swim to the side of the pool.
   - Jump into deep water, level off and swim 10m crawl stroke.
   - Jump into deep water, swim 3-4 body lengths underwater, surface and swim to the side of the pool.

# TENNIS

## Overview of teaching content

### Year 1

*Objectives*: Introduction to tennis.
Learn basic skills.

### Year 2

*Objectives*: Moving to the ball, footwork and volleying.
Rules and point system.

### Year 3

*Objectives*: Learn advance skills.
Games.

### Year 4

*Objectives*: Refine skills.
Singles and doubles competitions.

**Breakdown of skills and activities to meet objectives**

---

**Year 1**

---

**A. Objectives:** Introduction to tennis (history, status).
Learn basic skills.

**B. Skills/activities:**

*1. Proper grip and body position*

-forehand
-backhand
-serve
-have students lightly bounce ball up off racquet to exeperience "feel" and to learn control

*2. Forehand*

-backswing, stride, stroke, follow through (without ball)
-using ball, have students bounce ball in front of them, stride and complete forhand stroke
-continue with forehand but begin tossing the ball on one bounce to students, have students return over net

*3. Backhand*

-backswing, stride, backhand stroke and follow through (without ball)
-using ball, have students bounce ball in front of them, stride and complete forehand stroke
-continue with backhand but begin tossing ball on one bounce to students
-have students return over net

4. Serving

-without ball use steps; drop hands, ball toss while bringing racquet in ready position. Then serve and follow through

-use a ball to practice proper ball toss but do not strike the ball. Concentrate on proper ball height and body position

-allow students to serve over the net

---

**Year 2**

---

**A. Objectives**: Moving to the ball, footwork and volleying. Rules and point system.

**B. Skills/activities**:

1. Toss ball to students in various directions to work on footwork - forward, backward and side to side.
2. Volleying - using a rebounding wall, volley the ball over the net to partner.

## Year 3

**A. Objectives:** Learn advanced skills (volleying, lob shots and net play).
Games.

**B. Skills/activities:**

1. *Volleying*
   -same activity as in year 2 with increased distance between players.
2. *Lob shots*
   -practice high lob to end of court
   -practice returning the lob on the fly and on the bounce
3. *Net play*
   -volley with students close to the net
4. *Organize competitions demonstrating learned skills*
   -most serves in service box
   -number of successful volleys

## Year 4

**A. Objectives:** Refine skills.
singles and doubles competitions.

**B. Skills/activities:**

1. Organize games and competitions where students can use their learned skills.
2. Organize singles and doubles competitions.

## VOLLEYBALL

### Overview of teaching content

Year 1

*Objectives*: Introduction to volleyball.
Pass overhead, dig pass, serving.

Year 2

*Objectives*: Positions, rotation, receiving and setting.
Organizing the play, rules, point system.

Year 3

*Objectives*: Spiking, blocking and game systems.

Year 4

*Objectives*: Game tactics and refinement of skills.

## Breakdown of skills and activities to meet objectives

---

**Year 1**

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**A. Objectives:** Introduction to volleyball.
Pass overhead, dig pass, serving.

**B. Skills/activities:**

*1. Volleying overhead*

a. Volleying overhead to one's self.
b. Volleying against a wall.
c. In partners, one tosses the ball and one sets the ball.
d. Combination of short and long passes.
e. Back pass.
f. Pass-move-pass drill: Player A sets to player B, B sets to herself while A runs behind B to receive pass from A.

*2. Dig Pass (forearm or bump pass)*

a. Partner pass drill: one tosses and one bumps.
b. Continuous bumps to ones self.
c. Passing-to-target drill: one tosses over net, second bumps to third at the net.
d. Forearm pass for accuracy drill: students have to bump ball to a specific area on the court.

*3. Serving*

a. Serve to wall drill
b. Partner serve at net drill: one serves to other from opposite side of net.
c. End line serve drill: partners stand on opposite end lines. Practice over and underhand serves.
d. Serve for accuracy drill.
e. Call and serve drill: call persons name and serve to them. Game format: 3 points if you serve to the

person, 2 points if you serve to the person in the same row, and 1 point if the ball goes to any other part of the opposite court.

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**Year 2**

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**A. Objectives:** Positions on court, rotation, receiving serves, setting and organizing the play.

**B. Skills/activities:**

*1. Position on court, areas of responsibility.*

a. Classroom lecture.

b. Demonstrate body position and areas of responsibility(front row/back row, setter/server).

*2. Rotation*

a. Explain rotation on court.

b. Explain in relation to gaining points and serve.

*3. Receiving serves*

a. Practice tossing or serving ball to players who will then bump ball to setter.

b. Practice calling for receiving serve.

c. Practice long and short serves to improve team coordination.

*4. Setting*

a. Practice high outside set.

b. Practice short middle set.

c. Practice back setting.

*5. Organizing the play and combination drills*

a. Serve, bump and set drill.

b. Serve, pass and set drill.

## Year 3

**A. Objectives:** Spiking, blocking and game systems.

**B. Skills/activities:**

*1. Spiking*

a. Dink-to-target drill (dink means to tap the ball; target may be in front row on other side of net).
b. Spike against wall drill.
c. Spike for direction drill (determine areas to direct the ball).
d. Bounce-and-spike drill over the net.
e. Combination: Serve, bump, set and spike drill.

*2. Blocking (one and two blockers)*

a. Toss-to-block drill.
b. Blind blocking drill - 3 players: tosser and blocker on one side, one attacker on other side. Tosser tosses ball, attacker spikes onto blocker.
c. Double blocking drill - same as above but add another blocker.

*3. Game Systems*

Teach positions for defense and offense with combination drills (use resource books for specific stategies).

## Year 4

**A. Objectives:** Review of skills, game positions and tactics. Refine skills.

## FIRST AID

This section will not profess advanced medicine nor recommend that you attempt it. This will not cover mouth to mouth resuscitation nor cardio-pulmonary resuscitation (i.e. rescue breathing and CPR), however, all physical education instructors should be International Red Cross Certified in these techniques as well as in Standard First Aid.

This section will cover basic first aid for common sporting ailments in a 4-step analysis format (i.e. definition, prevention, diagnoses, treatment). In all cases an ounce of prevention is worth a pound of cure. While it is common knowledge that stretching and proper warm-ups can help prevent injuries, many other preventative (and often simple) measures can be taken to avoid problems. Some of these are:

1. Proper diet and rest.
2. Sufficient fluids before and during participation (i.e. a litre of water 30 minutes before training/competition).
3. Proper officiating to avoid dangerous play or playing conditions.
4. Policing sporting areas for danger, i.e. traffic, bee hives, trash, wet slicks, etc...
5. Protective gear, clothing, accessories, creams, etc...
6. Emergency phone numbers and quick access to medical professionals.
7. Knowing one's physical limits and skill capacity. (In other words, don't over do it!)

8. Presence of medical personnel, first aid kit, shade, water cooler and ice packs. These are not only preventative for they may also help reduce the fear and anxiety of an injured participant as well as (hopefully) serve the function of facilitating immediate first aid.

**Abrasions, Cuts and Lacerations**

**Definition:** These are classes of wounds in which the continuity of skin and other tissues is broken.

**Prevention:** Little prevention can be afforded other than the recommendation to play it safe.

**Diagnosis:** Cut or open skin and bleeding.

**Treatment:**

1. Use direct pressure on the wound and elevate to stop the bleeding immediately.
2. Clean the wound to prevent contamination and infection.
3. Provide shock care.
4. Obtain professional medical assistance when necessary.

**Contusions (Bruises)**

**Definition:** These are internal wounds in which there is tissue damage, usually some bleeding, but the skin is not broken. It is caused by forceful contact. Fluid loss may occur out of the orifices of the body, i.e. bloddy nose.

**Prevention:** Play safely.

**Diagnoses:** There is often dull and numbing soreness at the point where contact occured. Discoloration may occur. If you suspect

internal organ injury (i.e. the person is coughing/vomiting up blood) see a medical professional immediately. Swelling may occur at contact point.

**Treatment:**

1. For suspected simple injuries, ice to the area (with pressure) immediately. Ice frequently for 48-72 hours to minimize bleeding and swelling.
2. For nose bleeds, direct pressure with ice to the nose while the person's head is tilted forward when possible. You do not want blood clotting in the head; allow it to drain.
3. For suspected serious internal injury, contact professional medical personnel immediately, provide shock care and keep the person calm.

**Cramps ('Stitches')**

**Definition:** Muscle fibers will bulge or pop out of proper layering if they have oxygen debt, nutrient debt or sudden massive waste build up.

**Prevention:** Proper training and stretching in advance of participation. Proper diet/liquids in advance. Proper breating during event.

**Diagnoses:** Sharp, pinching pain in afflicted muscles. Muscles may "tighten" or "lock". Often a small bulge can be seen. No discoloring.

**Treatment:**

1. Get the fibers back into proper alignment through slow stretching or massaging the lump lightly.
2. Maintain high blood flow or increase it if necessary.
3. Immediate rest, controlled breathing and eat nutrient energy bars or fruit if necessary.

**Dehydration**

**Definition:** Excessive fluid loss.

**Prevention:** Plentiful drinking of water, juice, or skim milk two days in advance of an event as well as one to two hours in advance. Also know your limits in the weather at the time of participation.

**Diagnoses:** Many symptoms: Excessive thirst, sluggishness, dizziness, fever, dried lips eyes or nose, headache. While this may obviously occur after excessive sweating it can also occur as quickly as in thirty minutes of resting in the sun if you haven't properly hydrated yourself.

**Treatment:**

1. Drink lots of water. Aspirin may help.
2. Rest.
3. Stay out of sunlight and heat whenever possible.

**Heat Exhaustion**

**Definition:** A response to heat characterized by fatigue and weakness due to excessive fluid loss through sweating.

**Prevention**: Proper diet/fluids (i.e. advanced hydration). Awareness of the participant's limitation and weather conditions.

**Diagnoses**: Person will have normal body temperature, but will be sweating heavily, weak, pale and feel headache, cramps and probably dizziness.

**Treatment**:

1. Have him/her sip water
2. Lay down the victim and raise feet no more than twelve inches off the ground. Do this in the shade.
3. Loosen clothing.
4. Wet sponge the person slowly.
5. Rest.

**Heat Stroke**

**Definition**: This is a life threatening emergency. It is an excessive increase in body temperature and a malfunction of the sweating/cooling processes. Most dangerous in young children.

**Prevention**: Extreme caution during events in high heat. Proper diet and hydration. Water cooler and shade in continuous use.

**Diagnoses**: Extremly high body temperature. Hot, dry red skin with no sweating. A strong and fast pulse. Person may be weak, dizzy or unconscious.

**Treatment**:

1. Should be aimed at cooling the body immediately without overchilling. Water baths, wet chilling rags, easy dousings with cool water and shade.

2. When body temprature is significantly cooled, switch to fanning or drafting.
3. Seek medical professionals at once.

**Fractures (Broken Bones)**

**Definition**: A crack or break in a bone.

**Prevention**: Play safe.

**Diagnoses**: It usually takes great force or specifically applied force to break a bone, so sharp pain is usually felt immediately apon impact. Often the breaking of the bone may be heard. Swelling will occur as well as redness and tenderness. Depending on the break, throbbing pain and soreness may follow.

**Treatment**:

1. Do not play doctor. Immobilize the limb/bone/patient.
2. Get medical help immediately. The sooner a bone is realigned the better the bone will heal, but let professionals do it.
3. Provide shock treatment.

**Insect Bites/Stings**

**Definitions**: Insects bites are when insects use jaw-like pinchers, often without venom, to 'bite' or pinch an intruder. Insect stings are when insects use a 'stinger' usually with venom, to pierce an intruder or agitator.

**Prevention**: Police the playing venue for nests. Also be aware of any participants who have allergic reactions to insect stings.

**Diagnoses**: Vary from person to person and insect to insect. Usually sharp pain and redness in wasp bites, bee stings, etc... If weakness, dizziness, severe swelling or shortness of breath occur, the person may be having an allergic reaction.

**Treatment**:

1. Remove the participant from potential nesting area.
2. For simple bite/sting, ice will reduce swelling and help you remove stinger.
3. If the person shows sighns of an allergic reaction, get professional assistance immediately.

**Shock**

**Definition**: A depressed state of vital body functions such as blood flow and thermoregulation.

**Prevention**: Safe playing conditions will reduce or even allay the degree of shock, which is increased by fear and anxiety. Give all participants peace of mind if they become injured.

**Diagnoses**: Pale, cool skin that can also be moist and clammy. Weakness, semi-consciousness; rapid pulse which is weak; rapid and weak or irregular breathing. Dilated pupils.

**Treatment**:

1. Increase blood circulation if possible. If there is no head injury, lay the victim down and raise the persons feet no more than 12 inches.
2. Light limb massage.
3. Keep victim warm if their skin is cool.
4. Get professional help.

## Sprains

**Definition**: This is a tearing of ligaments or tendons in or around a bodily joint.

**Prevention**: Proper stretching/warm up. Safe playing and proper equipment. Proper advance training.

**Diagnoses**: Sharp and immediate pain in joint area. Swelling, stiffness and tenderness follow. Severe sprains may produce a loud audible snap. Numbness and dicoloration may occur soon.

**Treatment**:

1. Application of R.I.C.E.: Rest, Ice, Compression and Elevation.
2. Rest the injured joint immediately and immobilize it if possible.
3. Ice, applied with pressure, will minimize swelling and blood loss in the joint. Ice should be applied frequently for 15-20 minute periods for 24-72 hours.
4. Compress the joint with tight wraps (ice, bandages, tight shoe laces) to help remove swelling and fluids from the joint.
5. Elevate the joint above the heart so that the swelling and fluids are slowed from reaching the joint.
6. Seek professional medical care.

## Strains/Pulls

**Definition**: A stretching of fascia (ligaments, joints, tendons and muscles) without mentionable tearing often. Torn muscles can vary in degree.

**Prevention**: Same as for sprains.

**Diagnoses**: Slight immediate sharp pain, for minor strains, with degree of pain increasing directly with the increase of severity of strain. Severe muscle tears will have severe immediate pain, rush of warmth and discoloration to the area.

**Treatment**:

1. For minor strains, rest and rehabilitative excercises. Heat/warmth directly applied to area may promote healing after 24-48 hours rest.
2. For major muscle tears, R.I.C.E for 24-48 hours. Then rest until professional personnel recommend heat and or rehabliliative excercises.

Objective III: *To teach body awareness and movement qualities, primarily through dance.*

**Definition:** Being aware of how the body moves and adjusts to flow, weight, time and space, and to be able to recognize the aesthetic and expressive elements of movement.

## DANCE

### Overview of teaching content

Year 1

*Objectives*:
1. Body awareness.
2. Awareness of weight and time qualities.

Year 2

*Objectives*:
1. Development of spatial awareness.
2. Awareness of the flow of the body.
3. Travelling.

Year 3

*Objectives*:
1. Adaptation to a partner.
2. Instumental use of the body.

Year 4

*Objectives*:
1. Basic effort actions.
2. Occupational rhythms.

## Breakdown of skills and activities to meet objectives

---

**Year 1**

---

**A. Objectives:** 1. Body awareness.
2. Awareness of weight and time qualities.

**B. Skills/Activities:**

*1. Introduction to the body*

a. The body in motion and stillness.
b. Symmetric and asymmetric use of the body.
c. Emphasis of parts of the body.
d. Attention to specific parts of the body.
e. Weight transference and gesture.
f. Relationship of parts of the body.

*2. Introduction to weight and time*

a. Weight qualities: how light or strong movement can be done.
b. Time qualities: duration of the movement.
c. Weight and time qualities: combining the above.
d. Meter: time divided into measureable units.
e. Rhythm.

## Year 2

**A. Objectives:** 1. Development of spatial awareness.
2. Awareness of the flow of the body.
3. Travelling.

**B. Skills/Activities:**

*1. Introduction to space*

a. Using the space
b. Spatial areas
c. Body zones
d. Extension in space
e. Space words
f. Basic spacial actions

*2a. Variation of speed and awareness of body parts*

Find a space. Running on the spot, increase speed until you are moving your feet up and down as fast as you can. Slow down, but do not stop. Repeat two or three times.

*2b. Space awareness*

Using all the space available use light running steps and travel quickly and continually while increasing and decreasing your speed of travel.

*2c. Awareness of different body parts*

In a space. Shake your hands slowly, then quickly. Repeat action using feet, hands and feet, other body parts and all of the body at the same time.

2d. *Simultaneous movement: When all parts of the body are acting or moving at the same time.*

Find an interesting low curled position on the ground. On the drum beat, uncurl and stretch along the ground moving all body parts at the same time. Quickly curl up again. Repeat two or three times. Now uncurl all body parts slowly (to the count of 10) and slowly curl up again. Repeat.

2e. *Successive movement: When one body part acts or moves after another, in sequence, each part arriving at the final position at different times.*

a. In a curled position. On drum beat, stretch one part of your body only. Each time you hear the drum beat, stretch out a different body part until all body parts are stretched.

b. Repeat, encouraging use of all body parts.

3. *Travelling*

Taking small steps, travel as fast as you can, stop and "freeze" on drum beat. Repeat, taking long steps and travelling as slow as you can.

## Year 3

**A. Objectives:** 1. Adaptation to a partner.
2. Instrumental use of the body.

**B. Skills/Activities:**

*1a. Copying movement*

a. While facing a partner make:
- the same curled shapes
- the same twisted shapes
- the same stretched shapes

b. Select the favorite of each of these shapes and after holding the shape for the count of 1-2-3, change to the next shape, but using the same movement as partner to change shape.

*1b. Dancing together*

a. In a space. Moving lightly in an indirect pathway. On given signal, meet up with the nearest person to you and do turning movements together. on signal, leave partner and travel freely again.

b. With your partner, choose three different ways of meeting and parting. Start away from your partner, travel towards each other, meet and then part.

*2. Instumental use of body parts and body*

a. Imagine that you have a knife in your hand. Show how you would hold the knife and then show the action the knife could make, e.g., cutting, chopping, spreading, scraping.

b. Form a large circle around the teacher. As she beats the drum, move towards her. Act/feel as though you are being drawn to her by some strange strong force. When she shakes the bell, scatter, leave the center and finish in a low position on the floor.

## Year 4

**A. Objectives:** 1. Basic effort actions.
2. Occupational rhythms.

**B. Skills/Activities:**

*1a. Thrusting*

a. In a space. Strong stamping and jumping, travelling around and avoiding others.

b. In a space sitting down. To drum beat (or clap) show a strong, direct, quick thrusting movement using the arms. Hold final position.

c. Repeat thrusting action with arms and then using different parts of the arm (wrist, elbow, shoulder) and the leg (sole of foot, instep, heel, knee, hip) to lead the thrust.

*1b. Slashing*

a. In a space. Travel by leaping and turning. Use arms to whip and slash through the air. Stand still and then walk lightly in a straight line. Repeat several times.

b. To the cymbal and chime bar move on the spot and travel. Do slashing movements on the spot to the cymbals and gliding movements while traveling to the chime bars.

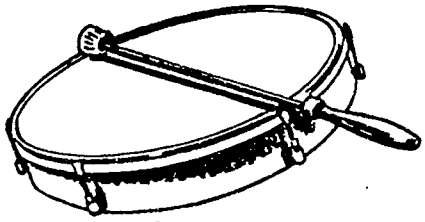
*2. Miming working actions*

a. In a space, standing. Let the hand swing from the wrist. Gradually bring in the whole of the arm, the trunk and finally the whole body. Make the swing so big and vigorous that you have to leave the groung or move from where you are standing.

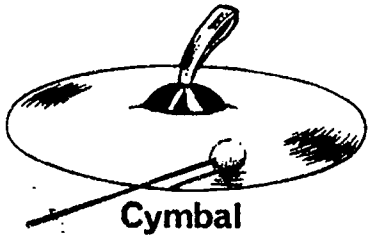
b. Using a forward-backward or side-to-side directon, take a few quick steps in both directions. Start slowly and with little effort gradually increasing the speed, distance and strength of the running. Feel the whole body moving as the momentum takes the body in the different directions.

## SUITABLE STIMULI FOR DANCE

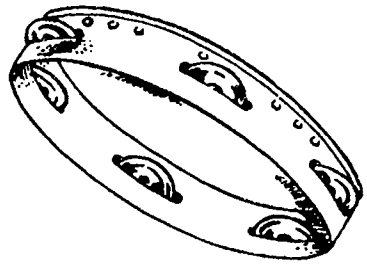
*A. PERCUSSION INSTRUMENTS*



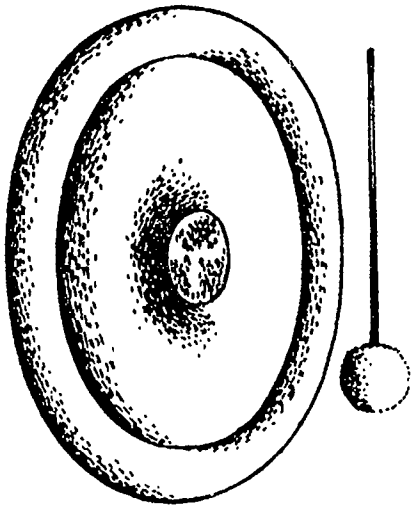
Dance drum
or
Tambour



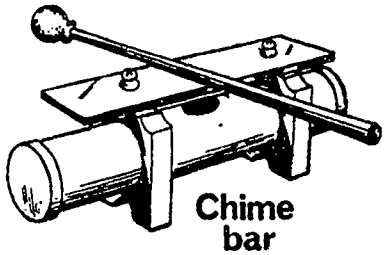
Cymbal



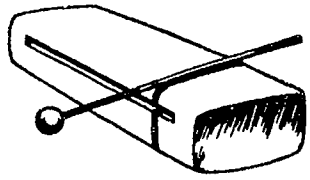
Tambourine



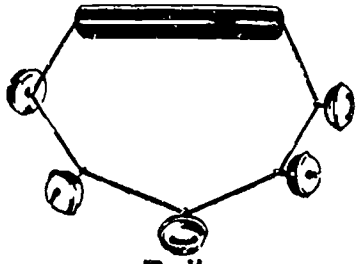
Gong



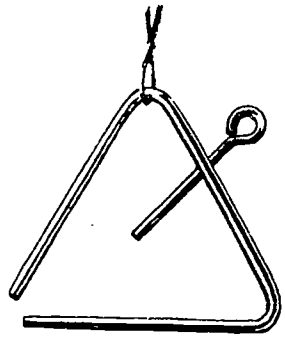
Chime
bar



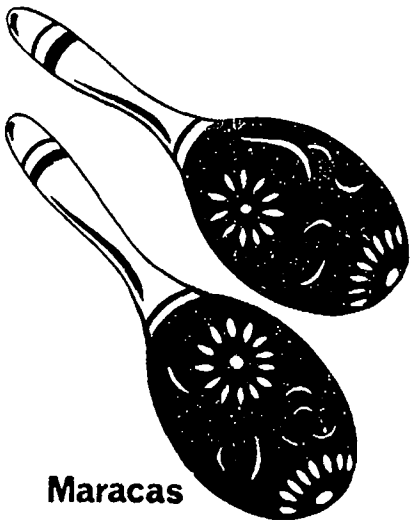
Woodblock



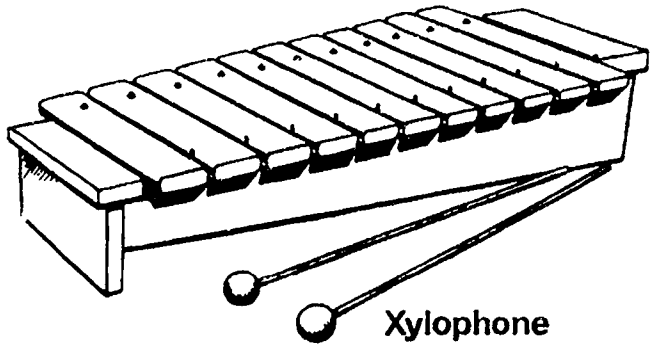
Bells



Triangle



Maracas



Xylophone

# PART 2:

# NOTES FOR TEACHERS

# NOTES FOR

# ANATOMY AND PHYSIOLOGY

## The three levels of organization of the body

The basic functional unit of the body is the cell. About 75 trillion cells make up the adult human body. Each of these is a living entity in itself, capable of existing, forming chemical reactions, and contributing to the overall function of the body - also capable in many instances of reproducing itself to replenish the cells that die. The cells are the building blocks of the tissues and organs. A tissue is a composite of cells and their surrounding intercellular substances (like fluid, tissue gel, or calcium salts in bone). The organs of the body are composed of different types of tissues. There are four types of tissue: connective, epithelial, nervous and muscular. Muscular tissue is the base of the muscular system. This is how cells, organs and systems are interrelated.

## The systems of the body

**The nervous system** is composed of the brain, the spinal cord and the peripheral nerves (which are divided into cranial and spinal nerves). The brain and the spinal cord together constitute the central nervous system and the peripheral nerves are called the peripheral nervous system.

**The circulatory system** is composed of the heart, the arteries, the capillaries and the veins. Circulating around and around through the body, the blood acts as a transportation system for conducting various substances from one place to another. It is this system that carries nutrients to the tissues and then carries excretory products away from the tissues.

**The respiratory system** the three fundamental portions are the air passageways, the lungs, and the blood vessels of the lungs. Air is moved in and out of the lungs by contraction and relaxation of

is moved in and out of the lungs by contraction and relaxation of the respiratory muscles, the most important of which is the diaphragm. Blood flows continually through the lung blood vessels, and only a very thin membrane separates the air from the blood. This membrane is very porous to gases, which allows free passage of oxygen into the blood and carbon dioxide from the blood into the air.

**The digestive system** food, after being swallowed passes successively through the stomach, the duodenum, the jejunum, the ileum, the colon, the sigmoid colon, the rectum and the anus. Along the entire extent of the digestive tract, digestive glands secrete digestive enzymes and other substances especially when food is present. The salivary glands, the pancreas and the liver also secrete through ducts that empty into the tract.

**The excretory system** is comprised of two kidneys, the ureters (which transport urine from the kidney to the urinary bladder), the urinary bladder (which stores the urine until it is secreted), and the urethra (which transports the urine to the exterior).

**The reproductive systems**. The principal female organs are the ovaries (which form ova and release these into the abdominal cavity), the fallopian tubes (which conduct the ovum from the abdominal cavity to the uterus), the uterus (in which the fetus grows to babyhood), and the vagina (which is the canal from the uterus to the exterior). The principal organs of the male are the testes (which form the sperm), the vas deferens (which conducts the sperm away from the testes), the seminal vesicles and the prostate gland (which form special secretions for nourishment or activation of the sperm), the urethra and the penis.

# The skeletal system

## Functions of the skeleton

The skeleton is the frame around which all else is built. It allows us to stand upright; as a result we can stand for a long time without feeling sore muscles. The cavities, such as the rib cage, the cranium or the pelvis, also protect organs; namely the heart and the lungs, the brain and the reproductive system. The skeletal muscles are attached to the bones, thus allowing for movement.

## Types of joints

There are three types of joints (see Figure B1):

1. Synovial joints, which are more common, they have a wide range of motion, and a joint space surrounded by a synovial membrane. The shapes and the ranges of motions of these joints differ greatly. We have **hinge** joints which allow movement around only one axis (elbow and finger), **ball and socket** joints which allow movement along multiple axes, including rotary movement (hip and shoulder), **saddle** joints which allow motion in two planes (proximal joint of the thumb), **sliding** joints which allow slightly curved joint surfaces to slide over each other (joints between the multiple short bones of wrist and ankle), and **pivot** joints which allow rotation around a central axis (vertebrae that support the head).
2. Fibrocartilaginous joints which have no joint space, but the end of the bones are separated by a fibrocartilaginous cushion. For example, the fibrocartilage between the vertebrae called vertebral disk.
3. Fibrous joints occur between the bones forming the cranial vault and most other parts of the skull.

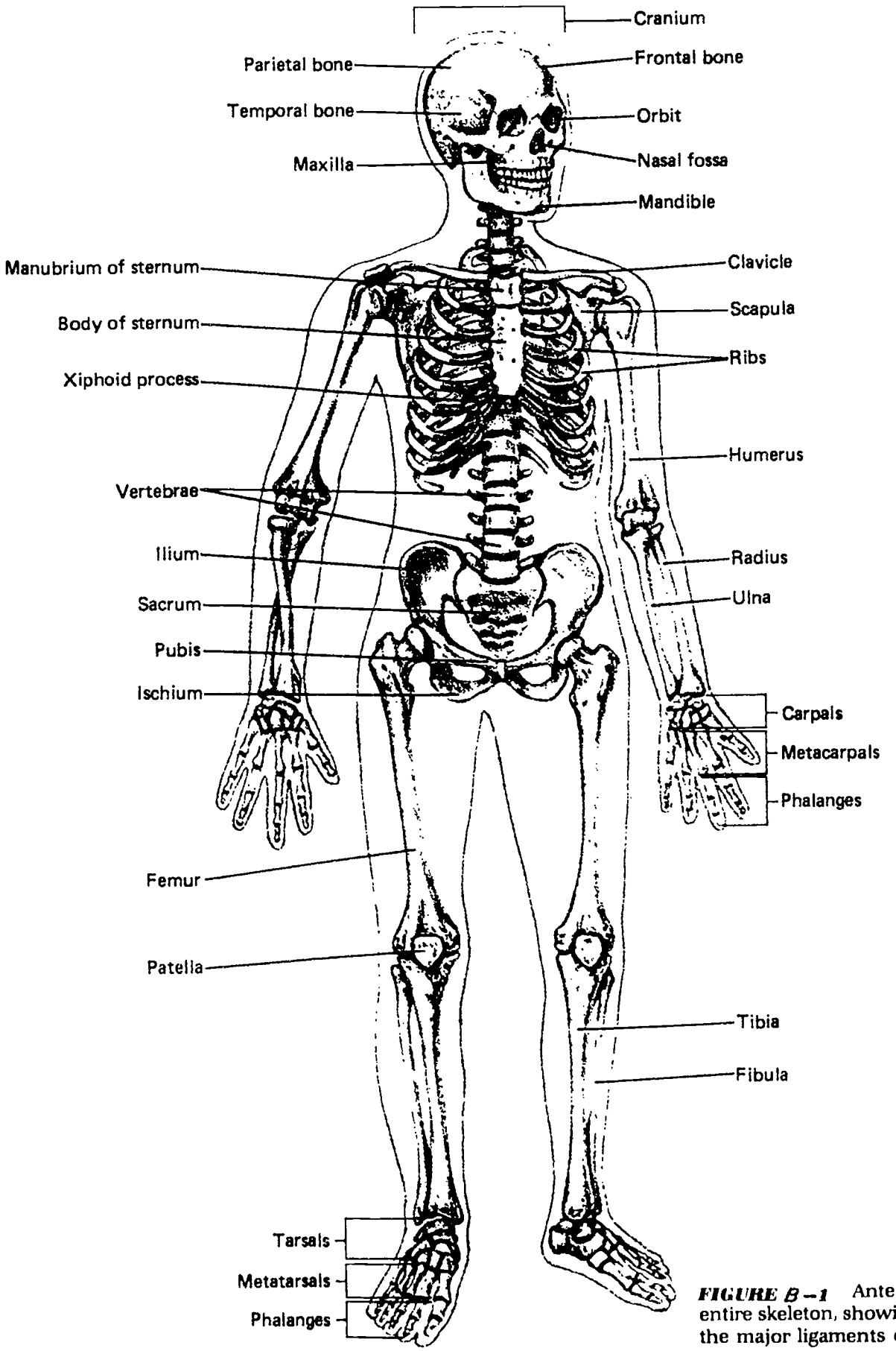



***FIGURE B–1*** Anterior view of the entire skeleton, showing also to the left the major ligaments of the skeleton.

# The muscular system

## Types of muscles

There are three types of muscles: the **skeletal** muscle which is attached to bones and causes body movement, the **cardiac** muscle which forms the muscular mass of the heart, and the **smooth** muscle, which is an integral part of most of the internal organs of the body, such as the intestines, uterus, and blood vessels (see Figures B3 and B4).

## Composition of skeletal muscles

Skeletal muscle usually is attached to two bones. Normally, one of the bones is much more secure than the other, so when the muscle contracts only the second bone moves. The attachment of the muscle to the bone that does not move is called the **origin** of the muscle and the attachment to the bone that does move is called the **insertion** of the muscle. The contractile portion of a muscle is called the **muscle belly**. This is comprised of thousands of long parallel **muscle fibers**. At their ends, before attaching to the bone, the muscle fibers fuse with an extremely strong collagenous fiber called **tendon fiber** which has strength equal to nylon. These fibers constitute the **muscle tendon** (see Figure B2).

## Muscle contraction

Each skeletal muscle is composed of a few hundred up to many tens fo thousands of parallel **skeletal muscle fibers**, each of which runs the entire length of the muscle. In turn, each muscle fiber contains several hundred to several thousand parallel **myofibrils**. Inside of each myofibril, are millions of minute molecular filaments, the **myosin** and **actin filaments**, that

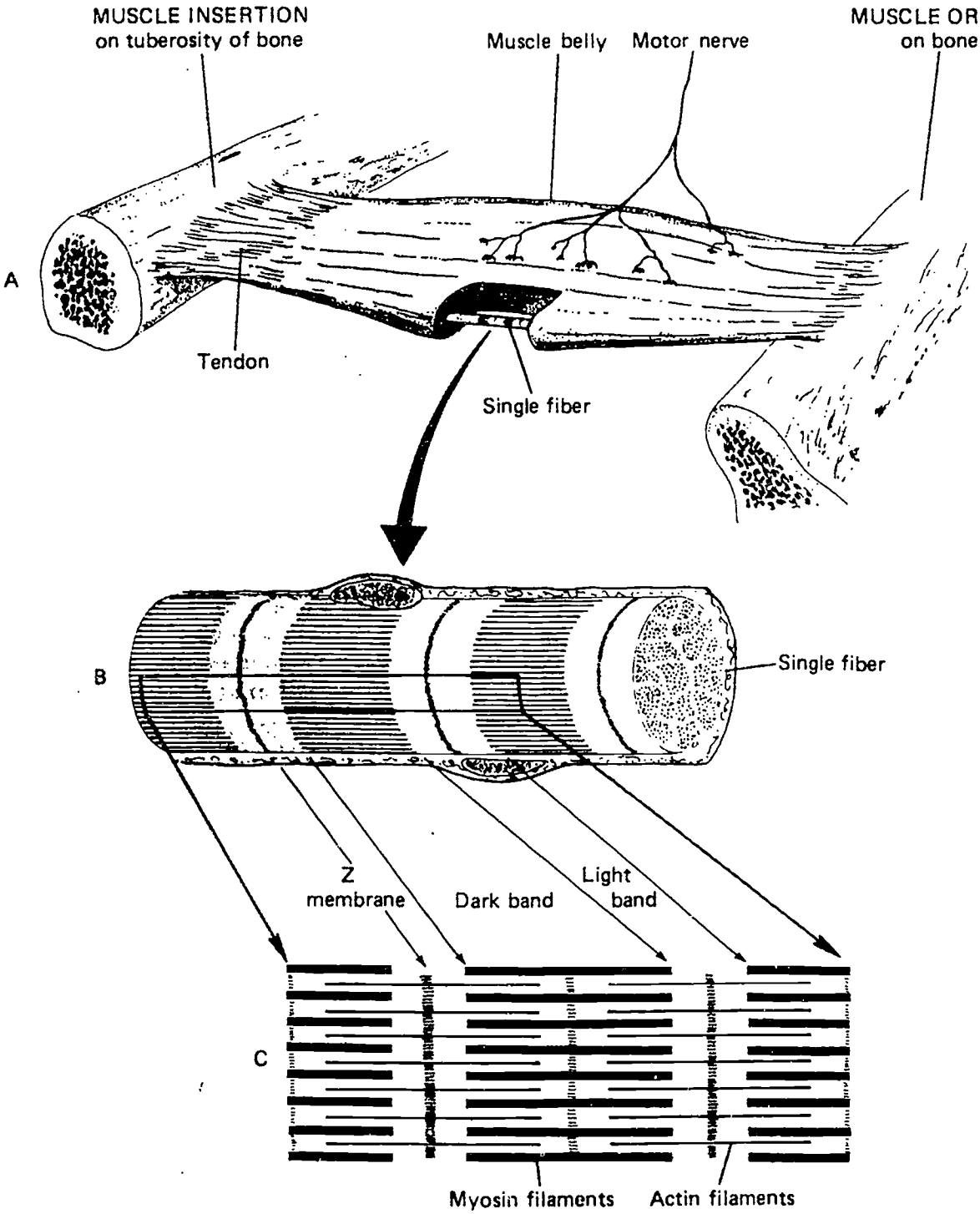



***FIGURE*** B2 Basic functional anatomy of muscle. (A) The muscle belly, its attachment to bone, and its nerve supply. (B) A single muscle fiber. (C) Arrangement of actin and myosin filaments within the muscle fiber to cause a sliding motion that leads to contraction.

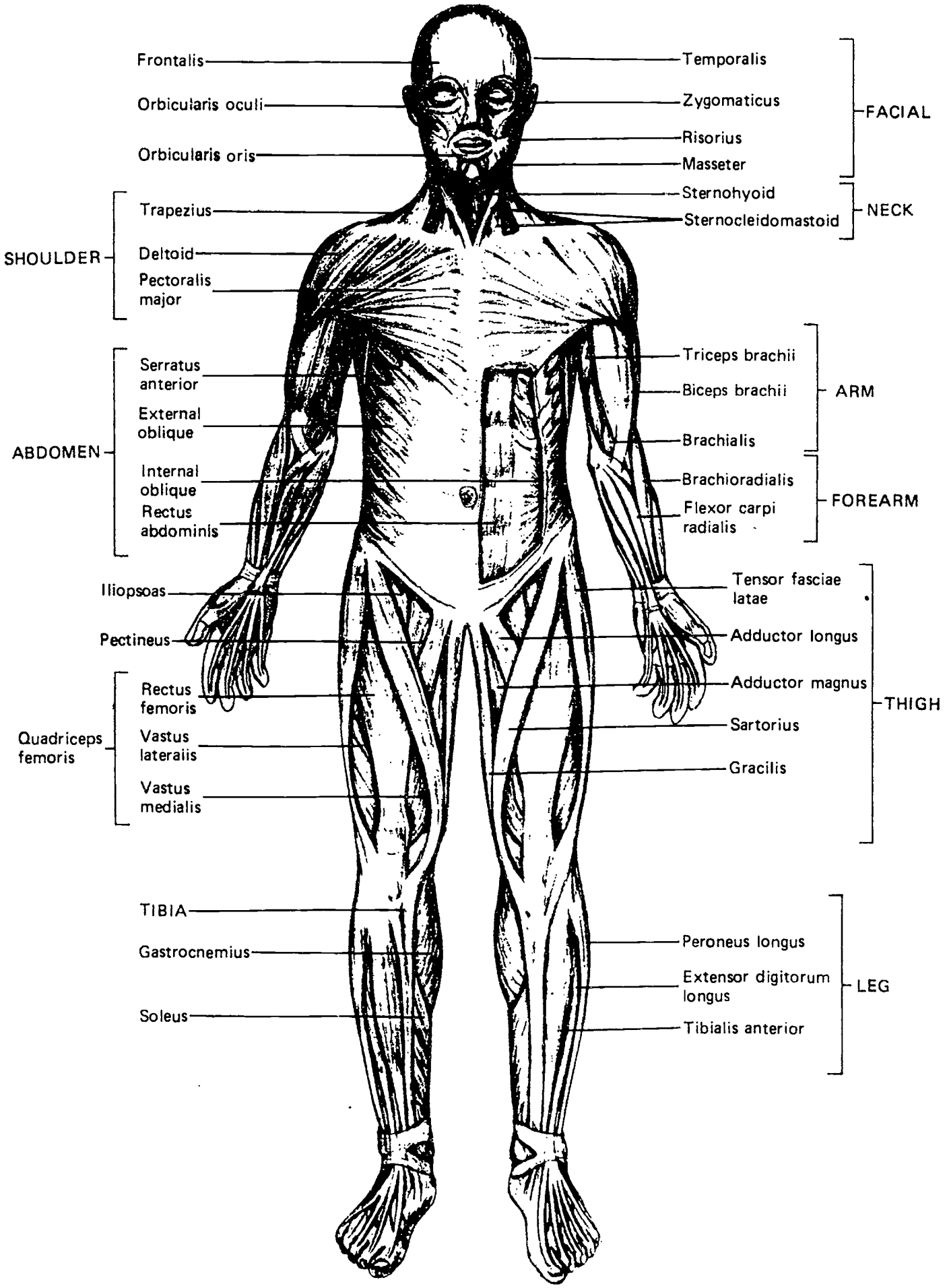



***FIGURE*** **B3** The anterior superficial muscles of the body.

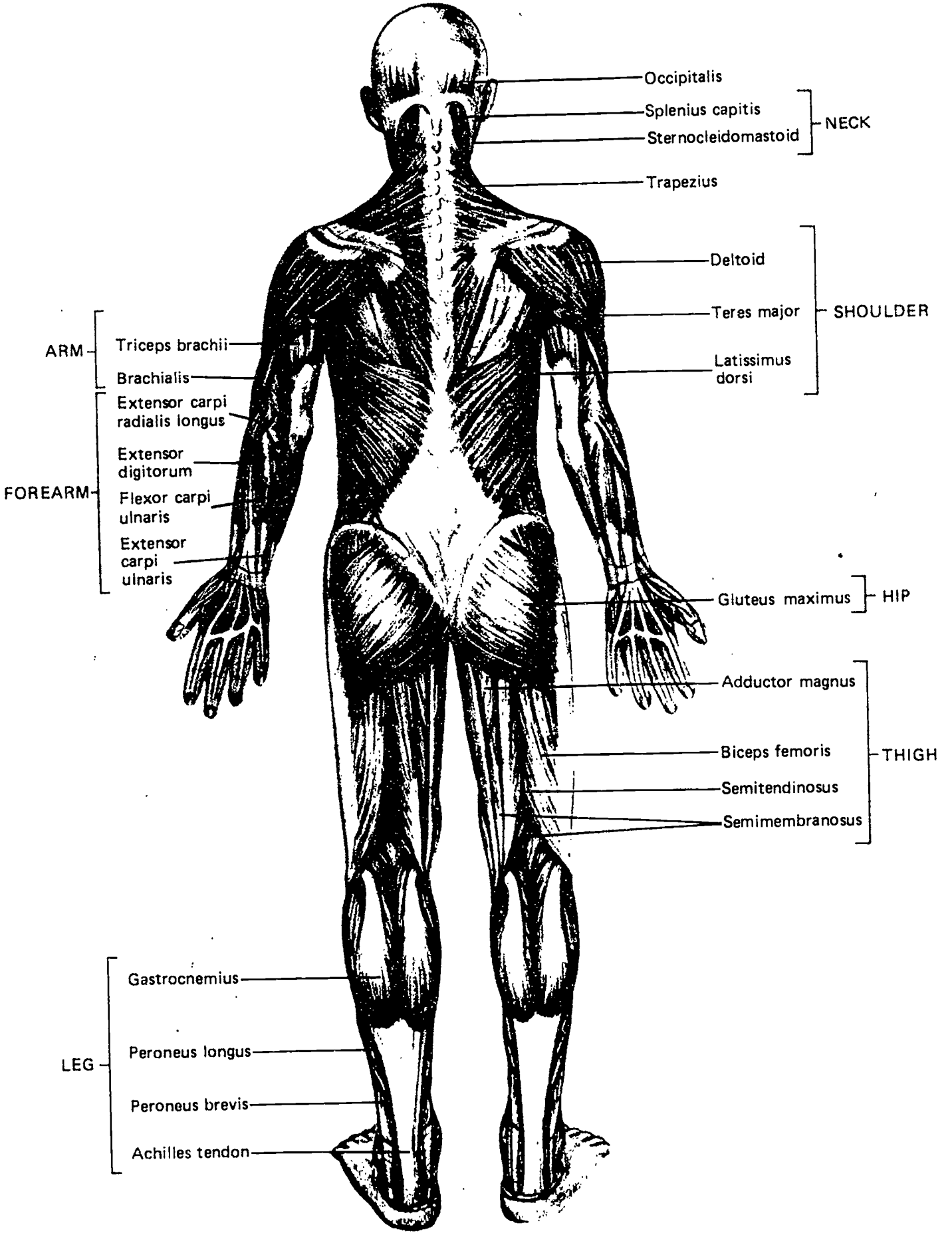



**FIGURE 84** The posterior superficial muscles of the body.

alternate with each other. When a nerve signal activates a muscle, calcium ions are released between these filaments, and these ions cause the actin and myosin filaments to slide together and shorten in length, thus resulting in a contraction of the muscle (see Figure B2).

## The cardiovascular system

### Principal structures of the cardiovascular system

The **heart** is the pump, the **arteries** transport the blood to the tissues, the **veins** transport the blood from the tissues back to the heart, and the **capillaries** (which are minute porous vessels connecting the smallest arteries with the smallest veins in all tissues of the body) where nutrient substances and waste products pass between the blood and tissue fluids. The heart (cardio-system) is actually two separate pumps; the **right heart** pumps blood through the lungs and the **left heart** pumps blood through the remainder of the body. The vascular-system is divided into two separate divisions; the **pulmonary circulation** which includes the arteries, capillaries and veins of the lungs, and the **systemic circulation**, which includes tha arteries, capillaries and veins of the remainder of the body (see Figures B5 and B6).

### Oxygen path in cardiovascular system

Oxygen is one of the nutrients needed by the body's tissues. It is carried by the blood and tissue fluids to the cells, where it combines chemically with foods to release energy. This energy is used to promote muscle contraction, secretion of digestive juices, conduction of signals along nerve fibers, and synthesis of many substances needed for growth and function of the cells. When oxygen

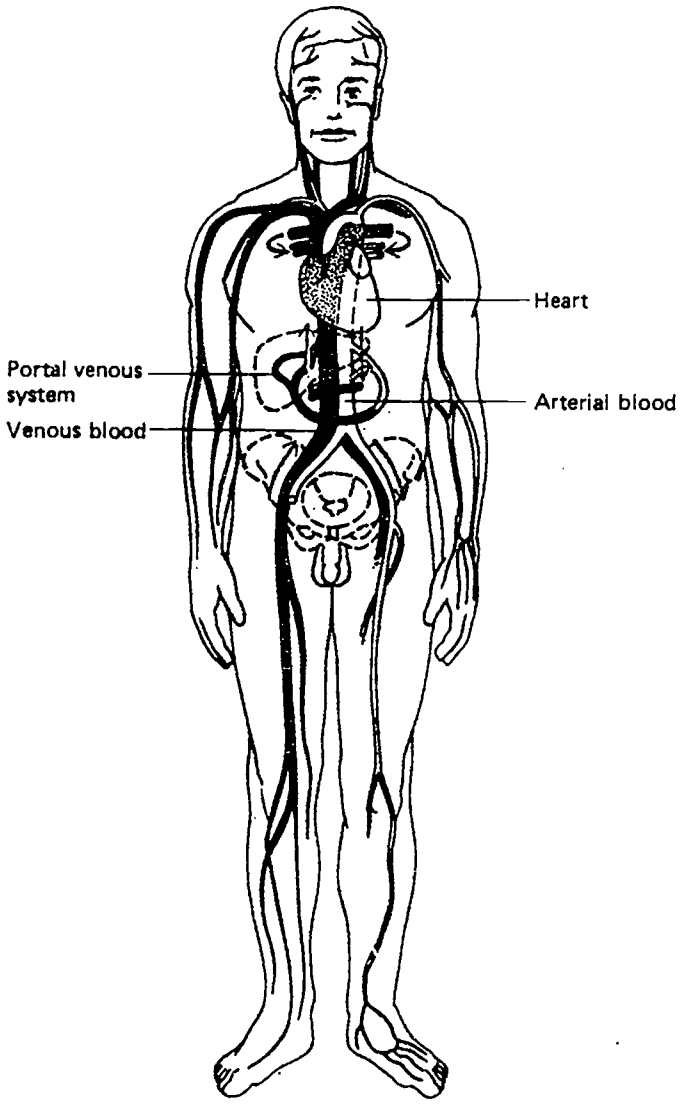



***FIGURE*** B5 An anatomical overview of the circulatory system.

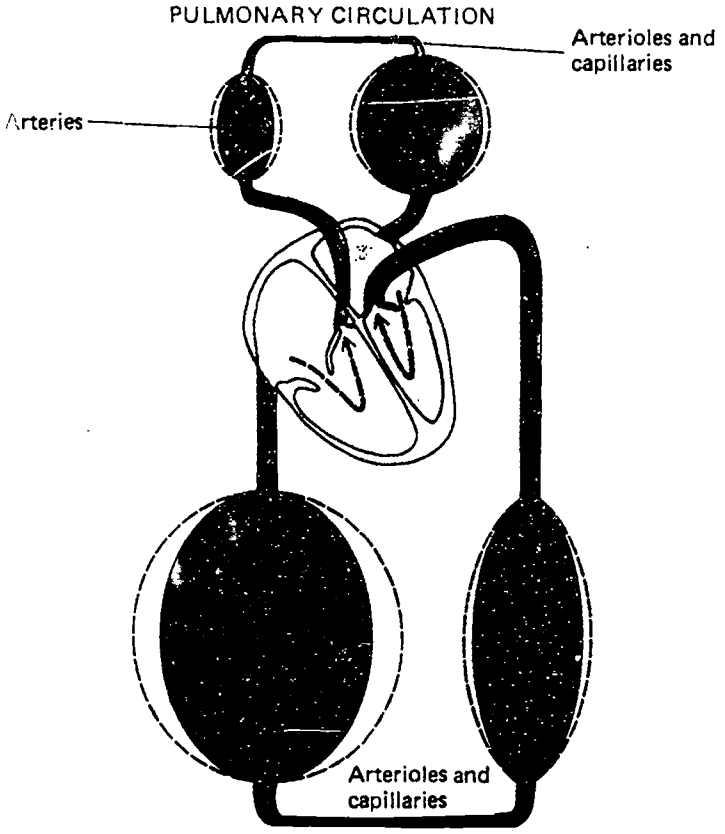



***FIGURE 3.6*** Schematic representation of the circulation, showing the two sides of the heart and the pulmonary and systemic circulations.

combines with foods to liberate energy, carbon dioxide is formed. This diffuses through the tissue fluids into the blood in the lung capillaries and is carried by the blood to the lungs. The, the carbon dioxide diffuses from the blood into the lung air to be breathed out into the atmosphere (see also notes on the Respiratory system).

## The nervous system

### The division of the nervous system

The central nervous system is comprised of the brain and the spinal cord. The brain is the principal integrative area of the nervous system - the place where memories are stored, thoughts are conceived, emotions are generated and other functions related to our psyche and to complex control of our body are performed. To perform these complex activities, the brain is divided into many separate functional parts.

The spinal cord serves two functions. First, it serves as a conduit for many nervous pathways to and from the brain. Second, it serves as an integrative area for coordinating many subconcious nervous activities, such as reflex withdrawal of a part of the body from a painful stimulous, reflex stiffening of the legs when a person stands on her feet, and even crude reflex walking movements.

The peripheral nervous system is comprised of **afferent** fibers transmitting sensory information into the spinal cord and brain, and the **efferent** fibers, for transmitting motor signals back from the central nervous system to the periphery, especially to the skeletal muscles (see Figure B8).

Central nervous system neuron and function

(see also notes on nervous system in 'Systems of the body')

A typical neuron of the brain or spinal cord has the following principal parts:

**Cell body** which is the part from which the other parts of the neuron grow, and which provides nourishment to the neuron.

**Dendrites** are multiple branching outgrowths from the cell body. Most signals are received through the dendrites.

**Axon** is the portion that is called the nerve fiber. They carry the nerve signals to the next nerve cell in the brain or spinal cord or to the muscles and glands in peripheral parts of the body.

**Axon terminals and synapses** are the contact points (knobs) through which signals are transmitted from one neuron to the next. When stimulated, the synaptic knob releases a minute quantity of a hormone called **transmitter substance** which stimulates the next neuron (see Figure B7).

**How can sport and exercise improve control of your body?**

Your heart muscle is not like your arm or leg muscles. To move your arm or leg, your muscles respond to a message sent by your brain. Muscles such as these respond when you brain tells them to do so. In contrast, your heart is not controlled voluntarily. It beats regularly without you having to tell it to beat. Nerves controlled by the brain automatically tell the heart to beat.

Regular exercise can influence your nervous system to slow down your heart rate. In other words, regular exercise helps your heart work more efficiently. Each heartbeat supplies more blood and oxygen to your body than if you do not exercise. In addition, a person with a slower heart rate can function more efficiently during an emergency or vigorous exercise.

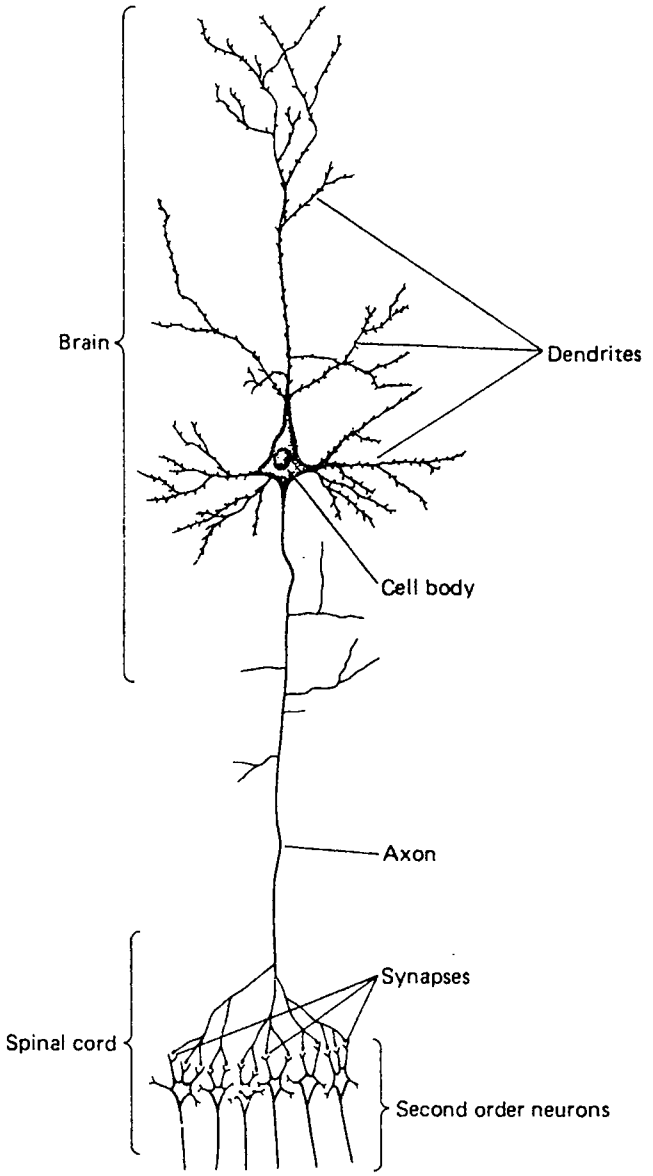



***FIGURE*** B7 Structure of a large neuron of the brain, showing its important functional parts.

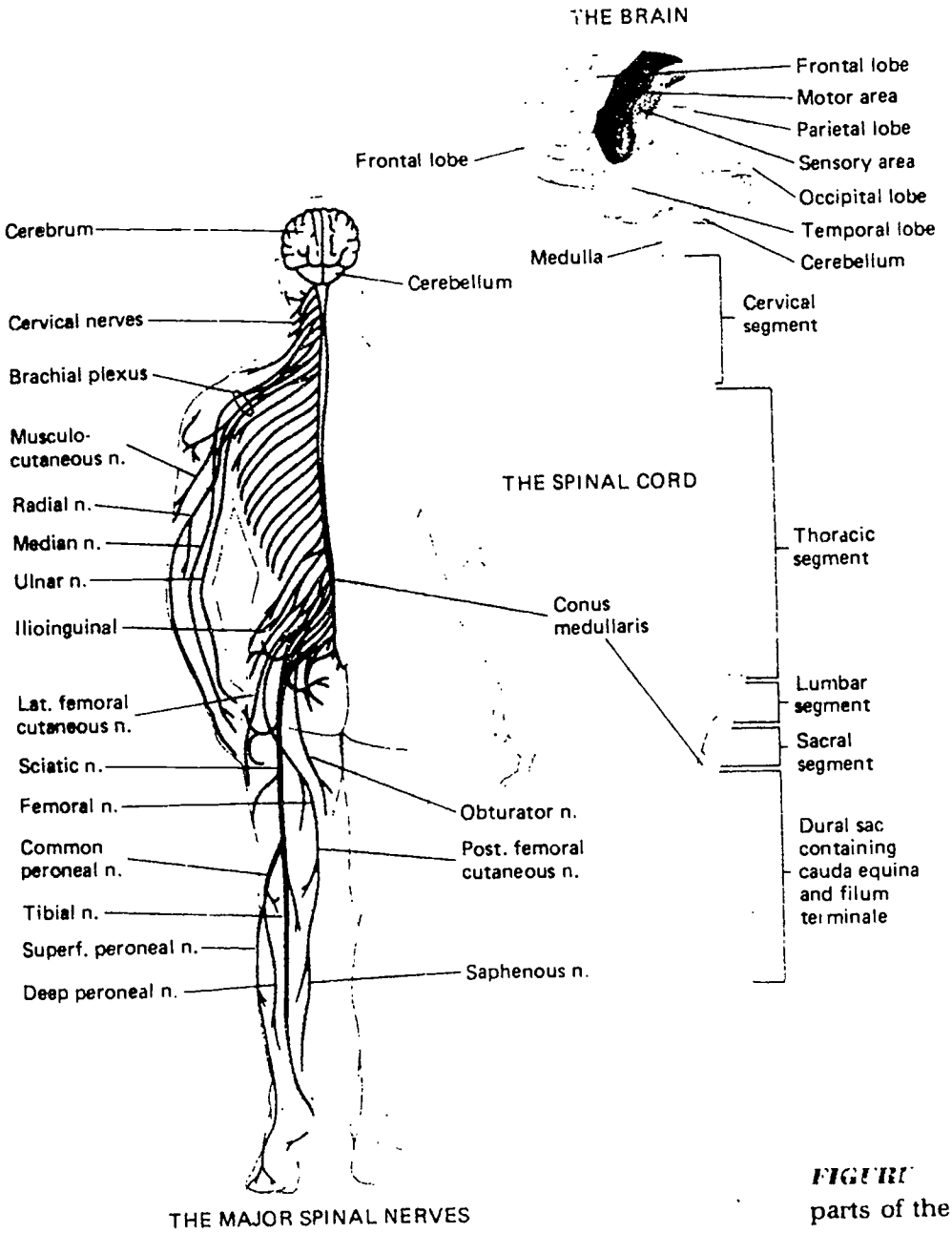



*FIGURE* B8 The principal anatomical parts of the nervous system.

# NOTES FOR

# BIOMECHANICS

# NOTES FOR BIOMECHANICS

## The use of biomechanics

Biomechanics can be used in various areas of physical activity to:

1. Perfect techniques of top athletes.
2. Develop coordination and motor skills in novice physical education students.
3. Show differences in gender which can also differ from person-to-person. For example, women's shoulder joints are structurally different from men's (i.e., women cannot throw the ball/object in the same manner as men), women's pelvis/hips tend to be wider than men's and angled differently, providing a better anchor for the muscles associated with balance.
4. Avoid injury. Movements outside the natural range of movement can cause pain and/or injury.

## Vocabulary

**Acceleration**: a change in speed and/or direction of a moving object. For example, the bowled cricket ball being batted away from its path towards the stumps; a long distance runner starting a "finishing kick" or sprint to close on the finish line.

**Center of gravity**: an imaginary point (in an object) on which gravity is pulling.

**Force**: a push or pull. For example, the launching of a shot put or the push-off of the ground in the long jump.

**Gravity**: a force pulling objects towards the earth. For example, "what goes up must come down".

**Linear movement**: motion along a straight line. For example, the 100m sprint.

**Momentum**: the force of an object (in motion) because of its weight and velocity. For example, sprinters cannot stop right at the finish line because their momentum causes them to run far past it.

**Momentum transfer**: the propagation of momentum through a distance. For example, moving the force from the ground up through the legs, hips, shoulder, elbow, wrist, and fingers in putting the shot.

**Musculoskeletal**: the combination of bones, muscles and connective tissues and the functions of these parts.

**Proprioception**: the relation and control of the body in space. It is the result of information sent from the musculoskeleton to the brain and back to the musculoskeleton. For example, walking through your house in darkness without bumping any objects; a gymnast doing flips; eye-foot coordination of a soccer player; a basketballer jumping and adjusting to avoid a defender.

**Rotational movement**: motion about an axis of rotation. For example, a discus thrower spinning to build up speed in the throw.

**Speed**: the rate at which something moves. For example, bowling a cricket ball at 100km/hr.

**Summation of forces**: the total force created by combining forces generated in progressive movements. For example, a high jumper's jump in the jogging approach, sprinting the last few steps, pushing with the legs, and swinging upwards with the arms.

**Velocity**: the speed and direction of something moving. For example, bowling a cricket ball at 100km/hr away from the batsman.

Newton's laws of motion and their application in Physical Education

Physics provide us with, courtesy Sir Isaac Newton, three principles which are the rpimary ways in which physics are applied to physical education.

**Newton's first law of motion:** All bodies remain in a state of rest or uniform motion in a straight line unless acted upon by an external force.

**Newton's second law of motion (law of acceleration):** The acceleration of a body is proportional to the force causing it and in the same direction in which the force acts.

**Newton's third law of motion ( law of reaction):** Every action has an equal and opposite reaction.

These three laws are very technical. How do they appear more commonly? Several examples are included, some of which overlap.

The first law says that an object will continue doing what it is currently doing unless something else affects it. A football will remain at rest in the corner of the field until the player performs the corner kick. A cricket ball willl travel in a straight line to the stumps unless the bowler spins it, the batman hits it, or the ground or stumps deflect it.

The importance of this law is that it tells us that a ball, a javelin, a discus, etc. will move in the direction we want, at the speed we want, over the distance we want, if we impart the appropriate force to it. If the swing of a player's foot imparts force straight through the center of gravity of the football, the football will travel straight with little loss of power. If the swing of a palyer's foot imparts force to the side of the center of gravity of the football, the ball will spin and thus curve while in

the air and lose power. If a player's arm imparts a force at a low trajectory (i.e., flight path of object) for a basketball, the shot will have little arc and be too long, probably hitting the back of the basket. If a player's arm imparts a force at a high trajectory, the basketball will have too much arc and probably be short, hitting the front of the basket.

The bottom line of Newton's first law is that the ball, the javelin, the discus will only do what you tell it to do. If your force tells it to be low, it will be. If your force tells it to be high and short it will be. The mechanics of your body will determine how the force is imparted to the object or even to the ground. The better your mechanics (i.e., the better your technique) the more efficient will be your motion and skill.

Newton's second law is fairly direct. The greater the force you exert, the greater the change in speed and/or direction (i.e., acceleration) of the object to which you impart this force. The harder you throw the cricket ball, the farther it will travel. The more spin you apply to the football on your corner kick (that is, the further away from the center of gravity of the football your foot hits the ball), the greater will be the curve in the flight of the ball. The faster you twist your hips and whip your arm in the javelin toss, the further it will travel.

The javelin, shotput, and discus throw are three excellent examples of proper appplication of physics and biomechanics in sport. A common myth is that the strength of the thrower will most greatly affect the distance of the throw. While strength is a factor, it has nothing whatsoever to do directly with the length of the throw. The speed of the throw directly affects the length of the throw, and Newton's law says that the greater the speed, the further

the throw. A good thrower will generate great force against the ground (by running fast with the javelin, spinning fast with the discus, pushing fast with the shot) and tranfer the momentum of this motion through each joint in the line with the throw in a progressive manner.

In this way, the force generated by the feet against the ground is added next to the force generated by the knees, to the force generated by the hips, to the force generated by the shoulders, the elbow, the wrist and lastly the fingers. This is an easy example of *momentum transfer* and the *summation of forces*. If the joints did not act in this progressive order, momentum would shift up and down the body, thus losing force.

Newton's third law is probably the most commonly known yet hardest to experience by the senses. What it says, is that if a sprinter imparts a strong force backwards against the starting blocks, the starting blocks will impart a strong force accelerating the sprinter forward. If a swimmer, with her or his hands and feet, moves the water in a direction behind her or him, then the water will move her or him forward with an equal force.

Questions to think about:

1. In what other sports and physical exercises can you see these 3 principles exemplified?
2. How can you use these principles to improve performance?
3. Can you see how these principles arise in areas other than physical education? In the home or at work, for instance?

# NOTES ON

# BODY FAT AND WEIGHT CONTROL

# NOTES ON BODY FAT AND WEIGHT CONTROL

## Definitions

*Fat* is a kind of body tissue, just like muscles, bones and body organs such as the liver, kidneys and lungs. Fat is an insulator, because it helps your body to adapt to heat and cold. It also acts as a shock absorber that can protect your body organs and bones from injury. Finally, fat is stored energy that is available when your body needs it.

*Essential body fat* is the minimum amount of body fat that the person should possess. For females, less than 11% is considered too little body fat. For males, less than 6% body fat is considered too low.

*Overfat* means having too much body fat. Females are considered overfat if more than 25% of their body weight is fat. Males are considered overfat if more than 20% of their body weight is fat.

*Underfat* means having too little body fat.

*Obesity* is a term that describes people who are very overfat. Females are considered obese if more than 35% of their body weight is fat. Males are considered obese if more than 30% of their body weight is fat.

## Factors that affect body fat level

1. Heredity: people inherit their body type from their parents. This means that they are born with a tendency to be lean, muscular or fat. Inherited tendencies make it hard for some people to control body fatness.

2. Early fatness: fat children and teenagers are more likely to become fat adults. Young people who are overfat develop extra fat cells that makes it easier to get fat later in life. A person with

extra fat cells can lose the fat and keep it off, but it is more difficult fo rthem to do so than it is for other people.

## Maintaining optimal body fatness

The amount you eat and the amount you exercise are the major factors in achieving and maintaining an ideal level of body fat. To many people, the word "diet" means a weight-loss programme. Here, however, it refers generally to a person's eating habits.

*Diet*: When you eat, you take in Calories. The Calorie, a heat unit, refers to the energy available in the food. A typical teenage male needs to consume about 2,500 to 3,000 calories per day to maintain an ideal level of body fat. A teenage female needs about 2,000 to 2,500 calories per day to maintain an ideal body fat level. This difference is partly because males are larger in body size and have a greater amount of muscle mass.

*Exercise*: When you exercise, your body burns calories for energy. Every activity used some calories. The more vigorous an activity, the more calories the body burns. When you increase your exercise, you increase the number of calories you consume for your body to burn, or your body uses stored calories in fat.

An active person uses less energy each day and therefore needs to consume fewer calories. A very active person, such as a professional soccer player, uses many more calories per day than an average person. As a result, a very active person needs to consume more calories than the average person.

## Gaining or losing body fat

Every food you eat contains calories. Of course some foods have more calories than other foods. The more calories a food has, the more fattening it is. Since fat is stored energy (stored calories), one way to lose fat is to take in fewer calories than your body needs or uses. A pound of fat contains 3,500 calories. Therefore, you can lose a pound of fat by eating 3,500 calories less than you normally do in a given time. You can also gain a pound of fat by eating 3,500 calories more than you usually eat in a given time.

Exercise can help control your level of body fat. Since your body works harder than normal when you exercise, it uses additional calories during exercise. People who feel they are too thin, but do not have eating disorders (such as anorexia nervose or bulimia), can gain weight by consuming additional calories. Exercise, particularly strength-building exercise, can also benefit these individuals by helping build muscle. Eating more and doing this kind of exercise can help increase weight and make the person look her or his best without causing unnecessary gains in body fat. For those people who inherited lean body types, it will take a while to "fill out", but the combination of proper diet, proper exercise, and physical development during adolescence will do the job.

## The FIT formula and fat control

Both diet and exercise play an important role in maintaining an ideal level of body fat. Because diet and exercise are important in fat control, each has a fitness target zone as shown in Table A3.

**Fitness Target Zones for Fat Control**

| | Diet | Exercise |
|---|---|---|
| **Frequency** | • Eat 3 regular meals daily or 4 or 5 small meals. Regular, controlled eating is best for losing fat. Skipping meals and snacking is usually not effective. | • Exercise daily. Regular exercise is best for losing fat. Short or irregular exercise does little for controlling body fat. |
| **Intensity** | • To lose a pound of fat, you must eat 3,500 calories less than normal.<br>• To gain a pound of fat, you must eat 3,500 Calories more than normal.<br>• To maintain your weight, you must keep the number of Calories you eat the same. | • To lose a pound of fat, you must use 3,500 Calories more than normal.<br>• To gain a pound of fat, you must use 3,500 Calories less than normal.<br>• To maintain your weight, you must keep your exercise level. |
| **Time** | Neither diet nor exercise results in quick fat loss. Medical specialists recommend that a person lose no more than 1 or 2 pounds of weight per week without medical supervision. Both diet and exercise can be used to safely lose 1 or 2 pounds per week. | |

## Normal weight and Target weight

Typical weight tables list the average weight range for people, according to age, height and weight. You can use this table to compare your weight to other your height, age and sex. However, weight tables do not show body fat percentages.

Ideal weight, called target weight, is the one at which you have the proper amount of body fat. For your age group, males with less than 16 percent fat and females with less than 21 percent fat are at, or below, their target weights. See Table A4 for normal weight ranges.

**Normal Weight Ranges**

| Males | | | | | Females | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Height | | Age | | | Height | | Age | | |
| Feet | Inches | 13–14 | 15–16 | 17–20 | Feet | Inches | 13–14 | 15–16 | 17–20 |
| 4 | 6 | 69–72 | | | 4 | 6 | 73–76 | | |
| 4 | 7 | 73–76 | | | 4 | 7 | 76–79 | | |
| 4 | 8 | 78–81 | | | 4 | 8 | 79–82 | | |
| 4 | 9 | 82–85 | 82–85 | | 4 | 9 | 86–89 | 91–94 | |
| 4 | 10 | 87–90 | 87–90 | | 4 | 10 | 91–94 | 98–101 | 99–102 |
| 4 | 11 | 88–91 | 88–91 | | 4 | 11 | 96–909 | 102–105 | 104–107 |
| 5 | 0 | 89–92 | 97–100 | 101–104 | 5 | 0 | 104–107 | 106–109 | 109–112 |
| 5 | 1 | 97–100 | 101–104 | 106–109 | 5 | 1 | 105–108 | 109–112 | 113–116 |
| 5 | 2 | 100–103 | 106–109 | 114–117 | 5 | 2 | 106–109 | 112–115 | 116–119 |
| 5 | 3 | 106–109 | 111–114 | 121–124 | 5 | 3 | 110–113 | 115–118 | 120–123 |
| 5 | 3 | 113–116 | 115–118 | 124–127 | 5 | 4 | 115–118 | 120–123 | 125–128 |
| 5 | 5 | 116–119 | 120–123 | 129–132 | 5 | 5 | 119–122 | 124–127 | 129–132 |
| 5 | 6 | 120–123 | 126–129 | 134–137 | 5 | 6 | 126–129 | 128–131 | 134–137 |
| 5 | 7 | 126–129 | 132–135 | 137–140 | 5 | 7 | 127–130 | 131–134 | 137–140 |
| 5 | 8 | 130–133 | 135–138 | 140–143 | 5 | 8 | 128–131 | 135–138 | 143–146 |
| 5 | 9 | 135–138 | 139–142 | 147–150 | 5 | 9 | 129–132 | 137–140 | 148–151 |
| 5 | 10 | 141–144 | 142–145 | 149–152 | 5 | 10 | 130–133 | 139–142 | 153–156 |
| 5 | 11 | 146–149 | 149–152 | 152–155 | 5 | 11 | | 142–145 | 158–161 |
| 6 | 0 | 151–154 | 152–155 | 156–159 | 6 | 0 | | 146–149 | 163–166 |
| 6 | 1 | | 158–161 | 162–165 | | | | 146–149 | 163–166 |
| 6 | 2 | | 160–163 | 167–170 | | | | | |
| 6 | 3 | | | 177–180 | | | | | |
| | & over | | | | | | | | |

## Methods of measuring body fat

X-rays, computers, underwater weighing, are among methods to measure levels of body fat. Each method requires special equipment and must be done by trained specialists. One easier method, that still requires special equipment are skinfold measurements. Skinfold calipers are used to measure skinfolds to estimate body fat percentage. For teenagers, upper arm (triceps) and calf measurements provide a good estimate of fat percentage.

Body measurements is a procedure that uses weight and waist measurements for men and height and hip measurements for women. Work with a partner to take measurements.

*Males: Waist and Weight*

1. Pull the measuring tape firmly, but not tightly, around your waist, even with your navel. Measure your waist to the nearest half inch.
2. Weigh yourself while fully clothed, but without shoes. Find your weight to the nearest pound.
3. Use the Body Measurement Table A5 to estimate your percentage of body fat. Place the ruler so that it cuts across the left vertical line at the mark for your weight and across the right vertical line at the mark for your waist measurement. Your estimated percent of body fat is the number where the ruler intersects the slanted line.
4. Use the Target Body Weight Table A4 to find your target weight.

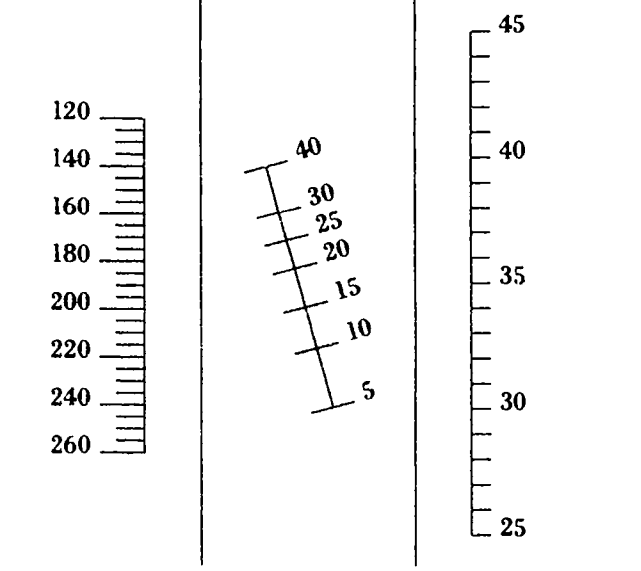
*Females: Hip and Height*

1. With clothes on, measure your hips at the widest point with a measuring tape. Pull the tape firmly, but not tightly. Be sure the tape is at the same level all the way around your hips. If

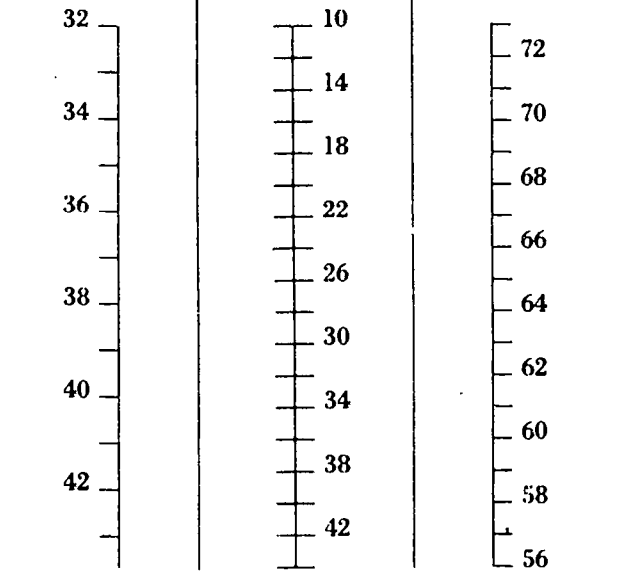
it is off line, you will get an incorrect measurement. Measure to the nearest half inch.

2. Remove shoes and measure your height to the nearest half inch.
3. Use the Body Measurement Table A5 for females to estimate your percentage of body fat. Place the ruler so that it cuts across the left vertical line at the mark for your hip measurement and across the right vertical line at the mark for your height. Your estimated percent of body fat is the number where the ruler intersects the center line.
4. Use the Target Body Weight Table A4 to find your target weight.

**Body Measurement: Males**




**Body Measurement: Females**



## Calories burned per hour

Every type of exercise burns some calories. The more calories burned while exercising, the more body fat is lost. The Energy Expenditure Table A6 shows the approximate number of calories burned per hour during vigorous recreational play of activities, not from official competition or leisure play. It lists the approximate number of calories burned per hour, for a person who weighs 100 pounds, 120 pounds, 150 pounds, 180 pounds, or 200 pounds.

Find the weight value nearest your own weight. Add 5% to the number of calories for each 10 pounds you weigh above the listed weight value. Or, subtract 5% from the number of calories for each 10 pounds you weigh below the listed weight value. Use the Energy Expenditure table to determine which physical activities are best for burning calories. Then see which activities particularly appeal to you.

## Energy Expenditure

| Activity | Calories Used (per hour) | | | | |
|---|---|---|---|---|---|
| | Weight: 100 lbs. | 120 lbs. | 150 lbs. | 180 lbs. | 209 lbs. |
| Backpacking/Hiking | 307 | 348 | 410 | 472 | 513 |
| Badminton | 255 | 289 | 340 | 391 | 425 |
| Baseball | 210 | 238 | 280 | 322 | 350 |
| Basketball (half court) | 225 | 225 | 300 | 345 | 375 |
| Bicycling (normal speed) | 157 | 178 | 210 | 242 | 263 |
| Bowling | 155 | 176 | 208 | 240 | 261 |
| Canoeing (4 mph) | 276 | 344 | 414 | 504 | 558 |
| Circuit Training | 247 | 280 | 330 | 380 | 413 |
| Dance, Ballet | 240 | 300 | 360 | 432 | 480 |
| Dance, Aerobic | 315 | 357 | 420 | 483 | 525 |
| Dance, Modern | 240 | 300 | 360 | 432 | 480 |
| Dance, Social | 174 | 222 | 264 | 318 | 348 |
| Fencing | 225 | 255 | 300 | 345 | 375 |
| Fitness Calisthenics | 232 | 263 | 310 | 357 | 388 |
| Football | 225 | 255 | 300 | 345 | 375 |
| Golf (walking) | 187 | 212 | 250 | 288 | 313 |
| Gymnastics | 232 | 263 | 310 | 357 | 388 |
| Horseback Riding | 180 | 204 | 240 | 276 | 300 |
| Interval Training | 487 | 552 | 650 | 748 | 833 |
| Jogging (5½ mph) | 487 | 552 | 650 | 748 | 833 |
| Judo / Karate | 232 | 263 | 310 | 357 | 388 |
| Racquetball / Handball | 450 | 510 | 600 | 690 | 750 |
| Rope Jumping (continuous) | 525 | 595 | 700 | 805 | 875 |
| Rowing, Crew | 615 | 697 | 820 | 943 | 1025 |
| Running (10 m.p.h.) | 625 | 765 | 900 | 1035 | 1125 |
| Skating, Ice / Roller | 262 | 297 | 350 | 403 | 438 |
| Skiing, Cross-Country | 525 | 595 | 700 | 805 | 875 |
| Skiing, Downhill | 450 | 510 | 600 | 690 | 750 |
| Soccer | 405 | 459 | 540 | 575 | 621 |
| Softball (fast pitch) | 210 | 238 | 280 | 322 | 350 |
| Swimming (slow laps) | 240 | 272 | 320 | 368 | 400 |
| Swimming (fast laps) | 420 | 530 | 630 | 768 | 846 |
| Tennis | 315 | 357 | 420 | 483 | 525 |
| Volleyball | 262 | 297 | 350 | 403 | 483 |
| Walking | 204 | 258 | 318 | 372 | 426 |
| Waterskiing | 306 | 390 | 468 | 564 | 636 |
| Weight Training | 352 | 399 | 470 | 541 | 558 |

## MULTIPLE CHOICE

Choose the letter of the best answer.

a 1. Fruits, molasses, sugar, and honey contain (a) simple carbohydrates. (b) complex carbohydrates. (c) fiber. (d) protein.

a 2. Foods that contain a high ratio of nutrients to Calories are considered (a) empty Calories. (b) complete proteins. (c) incomplete proteins. (d) nutritionally dense.

a 3. Which nutrient provides twice as much energy per gram as carbohydrates? (a) protein (b) minerals (c) vitamins (d) fats

a 4. Which substance is not digestible? (a) fiber (b) complex carbohydrates (c) minerals (d) fats

a 5. Which is a source of incomplete protein? (a) fruit (b) milk (c) molasses (d) beans

c 6. Which product contains unsaturated fat? (a) bacon (b) lard (c) corn oil (d) butter

d 7. How many of the 22 amino acids does your body manufacture in your cells? (a) 4 (b) 6 (c) 8 (d) 14

b 8. Which vitamin dissolves in water, but does not dissolve in fat? (a) A (b) B (c) D (d) K

d 9. Which nutrient helps carry wastes out of and nutrients into your cells? (a) vitamins (b) minerals (c) fats (d) water

a 10. From which food group do you need only two servings per day? (a) meat-poultry-fish-beans (b) bread-cereal (c) fruit-vegetable (d) milk

## MATCHING

Match the definition in Column I with the term it defines in Column II.

| Column I | Column II |
|---|---|
| f 11. method of classifying foods | a. carbohydrates |
| l 12. classified as saturated or unsaturated | b. cholesterol |
| j 13. water-soluble or fat-soluble | c. complete proteins |
| i 14. made of amino acid units | d. fats |
| c 15. foods with all 8 essential amino acids | e. fiber |
| g 16. nutients that provide energy | f. four food groups |
| b 17. waxy, fat-like substance | g. nutrients |
| h 18. study of foods and how they nourish the body | h. nutrition |
| e 19. type of carbohydrate your body cannot digest | i. protein |
| k 20. food substances needed for cell growth and maintenance | j. vitamins |

# NOTES ON

# CARDIOVASCULAR FITNESS

# NOTES ON CARDIOVASCULAR FITNESS

## Definition

Cardiovascular fitness is fitness of the heart, lungs, blood, and blood vessels. "Cardio" is from the Greek word for heart; "vascular" refers to blood vessels. Of the eleven parts of fitness, cardiovascular fitness is the most important. It helps you increase your energy level, letting you be active for longer periods of time without tiring or getting out of breath. Cardiovascular fitness also helps you look good because it helps you control your weight and develop a good physique, or figure.

## Cardiovascular fitness and good health

To develop and maintain good health, you need to strengthen your heart muscle and also improve the other parts of your cardiovascular system. By exercising regularly, you will have a stronger heart muscle than the person who does very little exercise. You also increase the fitness of other parts of your cardiovascular system, such as the blood vessels and blood.

Scientific studies show that active people have less heart disease and are less likely to die from heart attacks than inactive people. Some symptoms of heart disease start to develop when people are in their teens, Therefore, it is important to develop and maintain cardiovascular fitness early in life.

BENEFITS OF EXERCISE ON THE HEART, LUNGS, AND BLOOD VESSELS

| | |
|---|---|
| **Heart** | - muscle gets bigger<br>- pumps more blood per beat<br>- beats fewer times per minute<br>- works more efficiently |
| **Lungs** | - slower but deeper breathing while exercising<br>- work more efficiently |
| **Blood vessels:** | |
| **Arteries** | - less fat in the bloodstream<br>- less risk of atherosclerosis<br>- development of extra blood vessels<br>- less risk of blood clot leading to heart attack |
| **Veins** | - stay healthy |

## Achieving cardiovascular fitness

There are two kinds of exercise: aerobic and anaerobic. Each can be performed to achieve cardiovascular fitness.

*Aerobic exercise*. The term 'aerobic' means 'with oxygen'. Aerobic exercise is exercise that is steady enough for the heart to supply all the oxygen your muscles need. Aerobic activities include jogging, walking, swimming, and bicycling at a slow, steady pace.

*Anaerobic exercise*. The term 'anaerobic' means 'without oxygen'. Anaerobic exercise is done in short, fast bursts. As a result, the heart cannot supply blood and oxygen to the muscles as fast as the muscles can use it. Without oxygen, you cannot exercise very long. You need frequent rests during anaerobic exercise to 'catch your breath'. Anaerobic activities include the 100-metre dash, 50-metre breaststroke, basketball and handball.

## The heart, heart rate, resting heart rate and target heart rate

Because your heart is a muscle, it benefits from exercise and activities, such as jogging, swimming or walking long distances. Your heart acts as a pump to supply blood to your body systems. Your *heart rate* is the number of times your heart beats per minute to pump blood through your body. Your *resting heart rate* is taken when you are relatively inactive. A person who exercises regularly might have a resting heart rate of 55 to 60 beats per minute, while a person who does not exercise regularly might have a resting heart rate of 70 or more beats per minute. A very fit person's heart beats approximately 9.5 million times less each year than that of the average person (see Table A1 for target heart rates).

When you exercise vigorously, your muscles need more oxygen. Your heart pumps more blood to supply your muscles with more oxygen. Your heart has two ways to get more blood to your muscles: by beating faster or by sending a greater amount of blood with each beat. If your muscles do not get enough oxygen and their waste products are not removed, they cannot work effectively. As a result, the ability of your muscles to contract will be reduced; they will become tired. Obviously, your heart's ability to pump blood is very important when exercising, especially when exercising for an extended length of time.

Follow these steps to take your resting pulse:

1. Place your three middle fingers on the side of your throat near your Adam's apple. Press lightly and move your fingers until you locate your pulse.

2. Use a clock or watch to count your pulse for one minute. Try taking your pulse twice.

Computing your target heart rate:

Each part of physical fitness has target heart rates. Frequency and time are relatively easy to determine. Intensity is more difficult to determine. Use this activity to familiarize yourself with the concept of target heart rate - a way to determine cardiovascular fitness. Note: Before doing this activity, exercise several days a week for several weeks. See also notes on page 152-53.

Counting your pulse:

Count your pulse to find how high your heart rate rises during an activity.

1. Start counting immediately after the activity.
2. Practice finding your pulse within 5 seconds or less. Count your pulse for 15 seconds. Multiply that number by 4 to find your heart rate per minute. This number is your intensity level for that activity.

Determining target heart rate:

Your resting heart rate is the number of times your heart beats per minute when you are still. Follow these steps to determine how high to raise your heart rate while jogging so that you are exercising within your fitness target zone:

1. Find your resting heart rate on the chart. Then find your aerobic intensity level. If you have not exercised at least three days a week for the last month, use the "Beginner" column. If you have been active, use the "Regular" column. Note: People

over age 20 should reduce their intensity by 5 beats for every ten years over age 20. Record your level.

2. Jog 200 to 500 yards, as set by your instructor. Jog at a steady pace the entire distance. Be especially careful not to run faster at the end of the jog. You want your heart rate after exercise to be as near as possible to your heart rate during exercise. Jog slower than you think you should the first time you jog. Do not race. This activity is to help you find your own best intensity level.
3. Immediately after jogging, count your 15-second heart rate. Multiply by 4 to get your heart rate in beats per minute.
4. Try jogging that distance 3 times. Rest several minutes between jogs. After each jog, record your heart rate. On the second and third jog, try to jog at a pace that will raise your heart rate as near as you can to your own target heart rate.

**Table A1: Target Heart Rates**
(in beats per minute)

| Resting Heart Rate | Beginner | Regular |
|---|---|---|
| Below 50 | 135-140 | 145-150 |
| 51-70 | 140-145 | 150-155 |
| 71 and over | 145-150 | 155-160 |

## TARGET HEART RATE (THR)

The concept of "target heart rate" is a popular method used to help exercisers understand "how hard" to workout to become aerobically fit. Becoming aerobically conditioned is a result of strengthening the cardiorespiratory system. To accomodate demands of exercise, the heart must pump faster and you must breathe more frequently in order to deliver the oxygen rich blood to your working muscles. When the cardiorespiratory system adapts to this increased demand placed upon it, conditioning/strengthening has occured (the heart and lungs become more efficient, and therefore can have a greater work output at any given heart rate).

To achieve the several direct and indirect benefits of becoming aerobically fit, it is recommended by the American College of Sports Medicine to participate in aerobic exercise (large, continuous and rhythmical movement using large muscle groups) at 50%-85% of your maximum heart rate reserve, 3-5 days/week, for 20-60 minutes per session. A good training intensity can be estimated, based on your age and resting heart rate.

As a result of good aerobic conditioning, you will eventually notice a decrease in your resting heart rate. Because resting heart rate is used in determining your training intensity level, it is important to routinely take your resting heart rate, and recalculate your target heart rate each month as you progress with your aerobic fitness program.

### TARGET HEART RATE FORMULA

1. Determine your resting heart rate (RHR)
   It is best to measure your resting heart rate on a Saturday morning lying in bed, when you have not been awakened by the alarm. While relaxed, take your pulse for one full minute, counting the first beat as "zero."

2. Determine your predicted Maximum Heart Rate (MHR)
   MHR = 220 - age  i.e. 220 - age 35 = 185 bpm (predicted maximum)

3. Determine your Heart Rate Reserve (HRR)
   HRR = MHR - RHR  i.e. 185 MHR - 65 RHR = 120 HRR

4. Determine your Target Heart Rate Range (THR)
   (HRR x .5) + RHR = lower end of THR  i.e. (120 HRR x .5) + 65 RHR = 125
   (HRR x .85) + RHR = higher end of THR  (120 HRR x .85) + 65 RHR = 167


### 3 METHODS USED TO MONITOR AEROBIC EXERCISE INTENSITY:

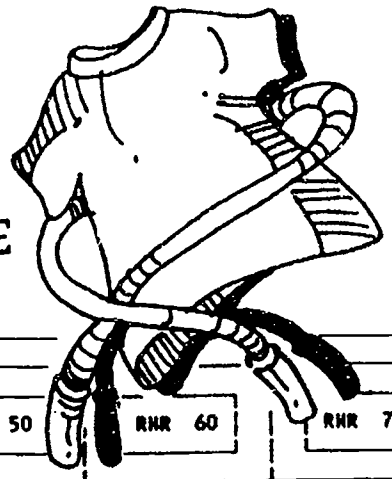
1. Target Heart Rate
   The above target heart rate formula is used to ESTIMATE a good training level for you. Beginning exercisers should initially workout at the lower end of the range. More fit individuals can workout within the range at whatever level is comfortable. You must listen to how you feel because this formula could potentially over or underestimate your training level.

2. Rating Of Perceived Exertion
   Knowing the target heart rate formula is an estimate, it is most important to exercise according to your perception of the intensity. For example, if you are at the lower end of your target heart rate zone and feel that you are working very hard, your target heart rate has probably been overestimated, and you should not attempt to continuosly strive to attain the upper end of your range.

3. Talk Test
   During aerobic exercise, you should be able to carry on a conversation without much difficulty. If talking during exercise is difficult, lower your intensity. The "conversational pace method" is a very practical rule of thumb.

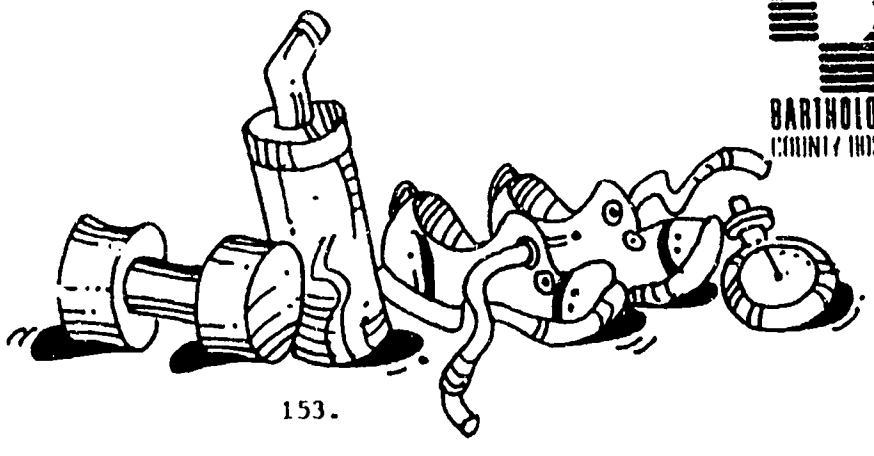
From a health perspective, there is absolutely no benefit to exceeding your training zone based on the above three methods. These guidelines have been developed for the apparently healthy exercise participant who does not have any known risk factors for developing heart disease. If you are currently under the influence of prescribed medication, it is highly recommended that you consult with your physician regarding its effects on exercise.
(Revised 8/90.)

# TARGET ♥ RATE TABLE



| AGE | RHR 50 | RHR 60 | RHR 70 | RHR 80 | RHR 90 |
|---|---|---|---|---|---|
| 20 | 125-175 | 130-180 | 135-180 | 140-180 | 145-185 |
| 25 | 125-175 | 130-175 | 135-175 | 140-180 | 140-180 |
| 30 | 120-170 | 125-170 | 130-175 | 135-175 | 140-175 |
| 35 | 120-165 | 125-165 | 130-170 | 135-175 | 140-170 |
| 40 | 115-160 | 120-160 | 125-165 | 130-165 | 135-165 |
| 45 | 115-155 | 120-160 | 125-160 | 130 160 | 135-160 |
| 50 | 110-150 | 115-155 | 120-155 | 125-155 | 130-160 |
| 55 | 110-150 | 115-150 | 120-150 | 125-150 | 130-155 |
| 60 | 105-145 | 110-145 | 115-145 | 120-150 | 125-150 |
| 65 | 105-140 | 110-140 | 115-140 | 120-145 | 125-145 |

BARTHOLOMEW COUNTY HOSPITAL



## The FIT formula and cardiovascular fitness

The best way to determine if an exercise contributes to cardiovascular fitness is to measure the increase in your heart rate during exercise. There are two target heart rates for cardiovascular fitness - one for aerobic exercise and one for anaerobic exercise. Table A2 lists the minimum duration of exercise needed to develop cardiovascular fitness. More time is necessary if you want to improve other parts of fitness as well.

**Table A2**
**Fitness Target Zones for Cardiovascular Fitness**

| | Aerobic | Anaerobic |
|---|---|---|
| **Frequency** | Exercise at least 3 days a week. For best results, exercise 3 to 6 days a week. | Exercise at least 3 days a week. For best results, exercise every day. |
| **Intensity** | Raise your heart rate to your target heart rate zone. | Raise your heart rate to your target heart rate zone. |
| **Time** | Keep your heart rate in target zone for at least 15 minutes and for up to an hour. | Keep your heart rate in target zone for 10 to 40 seconds. Rest by walking or doing slow exercise for 3 times the length or the exercise. Total exercise time should be at least 15 minutes. |

## Cardiovascular fitness tests and charts

One-mile run: Take the 1-mile run test for your own information. Do your best, but keep in mind that individuals' abilities differ; this is not a race. Your goal is a 'good fitness' rating. Once you achieve a 'good fitness' score, a faster time does not necessarily improve your health. However, it might help you to perform better in a sport or other activity. Note: Exercise for several days a week for several weeks before you take this test. See chart for One-mile run.

As you take the test, try to set a pace that you can keep up for the full mile. A steady pace is best. If you start too fast and then have to slow down at the end, you will probably not be able to run as fast for the entire distance.

1. Run or jog for one mile in the shortest time possible. Your score is the amount of time it takes you to run the mile.
2. Find your rating on the cardiovascular fitness rating chart.

Twelve minute run: Follow the same directions as for the 1-mile run, only run as far as you can in 12 minutes. Your score is the distance you cover in 12 minutes (measured to the nearest 20 yards). Use the cardiovascular fitness rating chart to determine your rating. See chart for 12-minute run.

The step test: To do this test, step up and down on a twelve-inch high bench for 3 minutes. Note: Exercise several days a week for several weeks before you take this test. See chart for Step test.

1. Step up with your right foot. Step up with your left foot.

2. Step down with your right foot. Step down with your left foot. Repeate this 4-count (up, up, down, down); step 24 times each minute.
3. Immediately after stepping for 3 minutes, sit down and count your own neck pulse. Begin counting within 5 seconds after you stop stepping. Count for 1 minute.
4. Record your results. You are only expected to do this test once unless your instructor tells you otherwise. Check your cardiovascular rating and write it down.

## Rating Charts: Cardiovascular Fitness

### One Mile Run *(time in minutes and seconds)*

| Age | | Good Performance | Good Fitness | Marginal Fitness | Low Fitness |
|---|---|---|---|---|---|
| 13 years or less | males | 7:30 or less | 7:31–9:00 | 9:01–9:56 | over 10:00 |
| | females | 7:30 or less | 7:31–9:00 | 11:01–12:29 | over 12:30 |
| 14–16 years | males | 7:30 or less | 7:01–8:00 | 8:01–9:29 | over 9:30 |
| | females | 9:15 or less | 9:16–10:30 | 10:31–11:59 | over 12:00 |
| 17 years or more | males | 6:40 or less | 6:34–8:00 | 8:01–8:59 | over 9:00 |
| | females | 9:15 or less | 9:16–10:30 | 10:31–11:59 | over 12:00 |

### 12 Minute Run *(distance in yards)*

| Age | | Good Performance | Good Fitness | Marginal Fitness | Low Fitness |
|---|---|---|---|---|---|
| 13 years or less | males | over 2650 | 2500–2649 | 2400–2499 | 2399 or less |
| | females | over 1900 | 1800–1899 | 1700–1799 | 1699 or less |
| 14–16 years | males | over 2800 | 2600–2799 | 2500–2599 | 2799 or less |
| | females | over 2100 | 1900–2099 | 1700–1899 | 1699 or less |
| 17 years or more | males | over 3000 | 2800–2999 | 2600–2799 | 2599 or less |
| | females | over 2300 | 2000–2299 | 1700–1999 | 1699 or less |

### Step Test *(beats per minute)*

| Age | | Good Performance | Good Fitness | Marginal Fitness | Low Fitness |
|---|---|---|---|---|---|
| 13 years or less | males | 90 or less | 91–98 | 99–120 | above 120 |
| | females | 100 or less | 101–110 | 111–130 | above 130 |
| 14–16 years | males | 85 or less | 86–95 | 96–115 | above 115 |
| | females | 95 or less | 96–105 | 106–125 | above 125 |
| 17 years or more | males | 80 or less | 81–90 | 91–110 | above 110 |
| | females | 90 or less | 91–100 | 101–120 | above 120 (or those who cannot step 3 minutes) |

# NOTES ON

# CIRCUITS

# CIRCUITS

Circuits in physical education are simply groups of activities put together to aid the participants' physical and skill development. In a circuit a number of activities is set out and the participant approaches them in one of two ways. Either she or he will perform one activity for a specified period of time, noting how many times the task is completed before moving on, or he or she will have a target number of times to complete an activity before moving on. In the latter instance the time taken is noted. Circuits are normally used as part of a general training programme and are hence loosely called circuit training.

Circuit training develops both muscular endurance and cardiovascular efficiency and is an important part of any aspiring sports player's training. The beauty of circuits is that they can be improvised almost anywhere - home, games hall, gym, spare room or outdoor on a sports field (though, obviously, because of weather conditions it is highly preferable to have indoor facilities). Also, and this is important for youngsters, it is a safe way of gaining strength (as distinct, say, from over ambitious or even unsupervised weight-training programmes)

## General guidelines for circuits

1. As a general rule, a circuit should not last much more than 20 minutes, otherwise you are likely to get to the stage where 'dead horses are being flogged'! The timing of individual activities depends entirely upon the participants' needs and the teacher's knowledge of their ability. Similarly the organiser should allow for rests between each part of the circuit

2. Exercises should, of course, always be in appropriate body segment rotation, i.e., upper, middle and lower. Never, for example, have chins-on-the-beam fcllowed by press-ups.
3. Do not have too many exercises in your circuit: six is adequate, eight or nine a maximum.
4. Select the timing of your circuit sensibly. For example, athletes working on a technique session should do their circuit training afterwards as they should always be fresh for technique work. Middle-distance runners going for a steady run, however, can quite easily accomodate a hard circuit, rest for a while, and then go for thei run, possible even doing a further circuit on their return.
5. The duration of exercises sometimes presents problems to coaches or teachers. With a large class of mixed ability there is bound to be some 'traffic congestion' as the fitter ones catch up, and even pass the less capable. There must be a mean of testing progression. The best method is to test each person individually for the maximum in each exercise and then give two-thirds of this number (for example, if the individual can do sixty as a maximum, then he or she can be given forty in the circuit). In this way individuals are working near maximum capacity. As times are reduced and fitness improves simply increase the number of repetitions in each exercise.

## Example of curcuit training programme

| Station # | |
|---|---|
| 1 | Push-ups - 2/3 of one minute maximum |
| 2 | Sit-ups - 2/3 of one minute maximum |
| 3 | Burpees - do for one full minute at moderate speed |
| 4 | Tricep dips - 2/3 of one minute maximum using bench or steps |
| 5 | Back extension - do for one full minute at moderate speed |
| 6 | Squats - 2/3 of one minute maximum |
| 7 | Arm circles - Forward (small 15 sec., large 15 sec.) Reverse (small 15 sec., large 15 sec.) |
| 8 | Alternate toe touch - do for one full minute at moderate speed |
| 9 | Jumping jacks - do for one full minute at moderate speed |

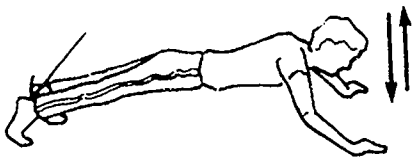
Note: Teachers should administer one minute exercise tests in order to ascertain the one minute maximum. Students are to spend one minute at each station. There is a 15-30 second recovery period between each station.

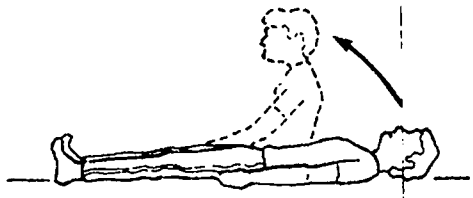
General Circuits

A few sample circuits might include the following.

## Without Gymnastic Equipment

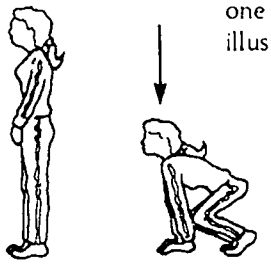
1 Press-ups: Body straight, chin and chest to the floor together.

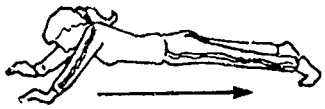


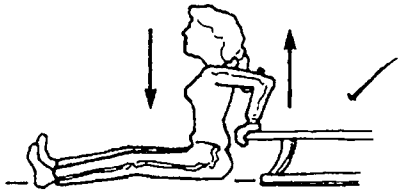


2 Sit-ups. Raise the trunk to the vertical and return (there is no need to have hands behind the neck, do any twisting action or push the head down to the knees).

3 Burpees: From a standing position, drop down into a squat, thrust the legs out to full extension behind, bring them back to the squat, and stand up again. All four movements are done on the one spot. The individual elongated sequence above is for illustration purposes only.

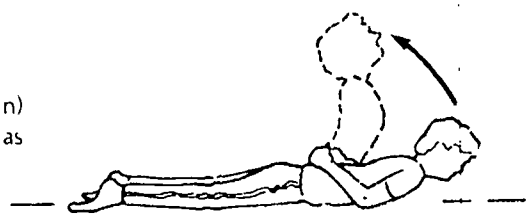


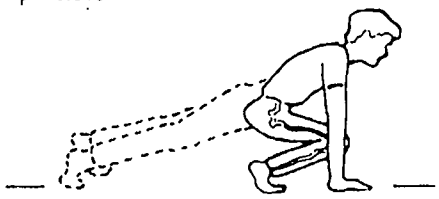




4 Dips on bench: From extended arms, lower hips down to the floor keeping close to the bench until elbows are flexed to 90° angle before fully extending arms again

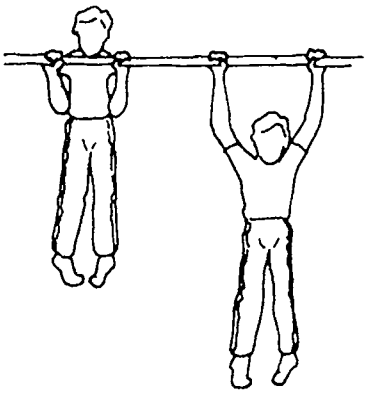
5 Back extension: Clasp hands behind neck or back (as shown) before arching the back trying to look as far back and behind as possible



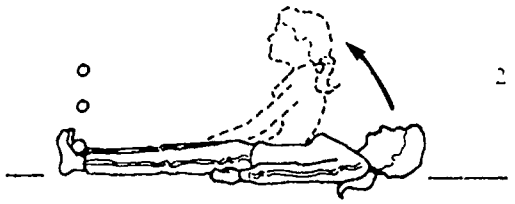


6 Squat thrusts: From the crouch position throw the feet back into full extension before returning to the starting position, making sure that the knees touch the elbows.

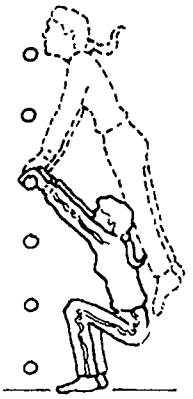
## With Gymnastic Equipment (1)



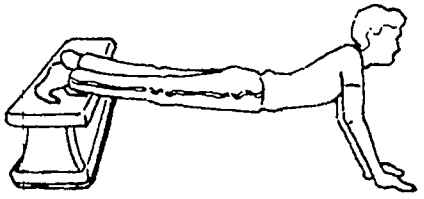
1 Chins-to-the-beam or horizontal bar: Overgrasp the beam pulling the body up till the chin clears the beam or bar. Extend fully to the starting position and repeat



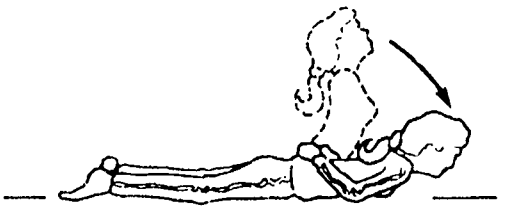
2 Sit-ups with feet under the wall bars: These are the same as the free-standing form described earlier, only this time the feet may be hooked under the wallbars or held by somebody.



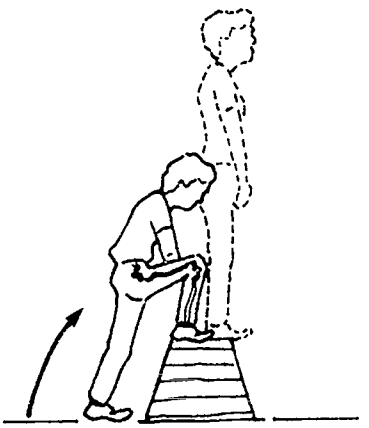
3 Deep squat wallbar thrusts: Squat down fully grasping the wallbars as high as possible. From there thrust the body up vertically trying to get the chest as high as possible on the wallbars. On return go back down into a full squat once more. The hands never leave the wallbar they first gripped and the exercise must be performed correctly i.e. right up right down



4 Press-ups with feet elevated on bench: This is exactly the same as the normal press-up with the feet elevated to concentrate greater weight (resistance) towards the upper parts of the body



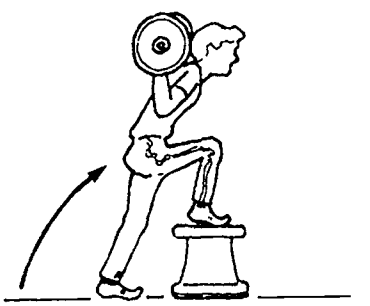
5 Back extension with feet under the wall bars: As before but this time with the feet anchored under the wallbars or held by somebody

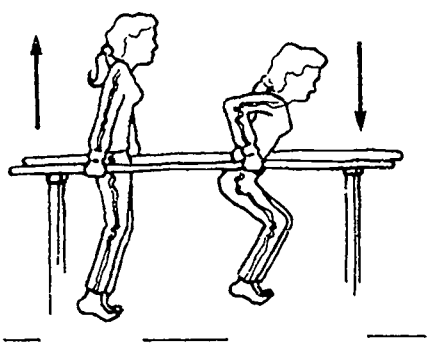


6 Bench stepping or Box-stepping: Have the box at a height where the knee is flexed to about 90° (or slightly more). Extend fully into upright position. Alternate legs accordingly.

## With Gymnastic Equipment

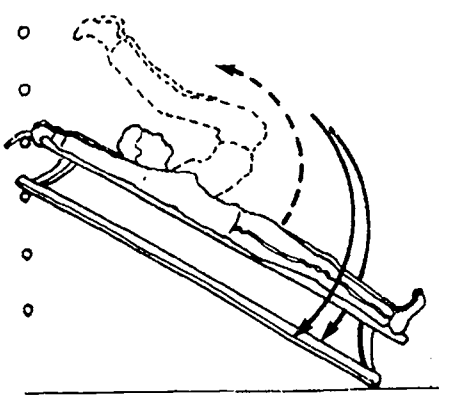
1 Step-up on bench with barbell or hard weights: Extend the legs fully as before and change legs regularly. Take particular care in this exercise. The soles of shoes should have sufficient tread to ensure a good grip when placing the flexed leg on the box. Any slipping can be dangerous.

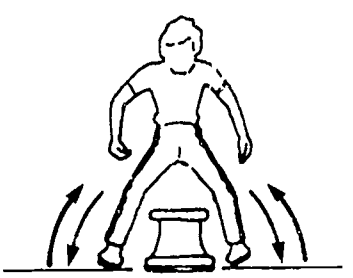




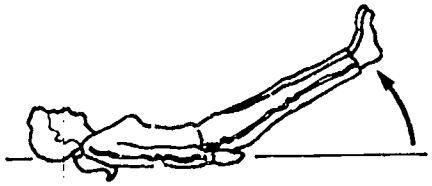
2 Dips on parallel bars: Full 90° bend of elbows then up to complete extension.

3 Abdominal overhead swings from bench hooked to wall bars: From the back lying position on the bench swing both legs overhead to touch the wallbars as shown. Separate the feet as they pass the bench on the way down: this avoids bruising of the heels and also gives added momentum for the subsequent upward swing again.



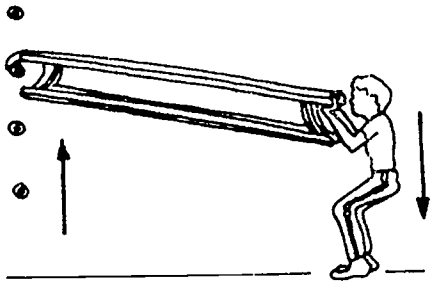


4 Stride jumping on and off bench: This can be performed with or without weights. As with the step-ups with weights, care should be taken to ensure good grip between shoes and bench

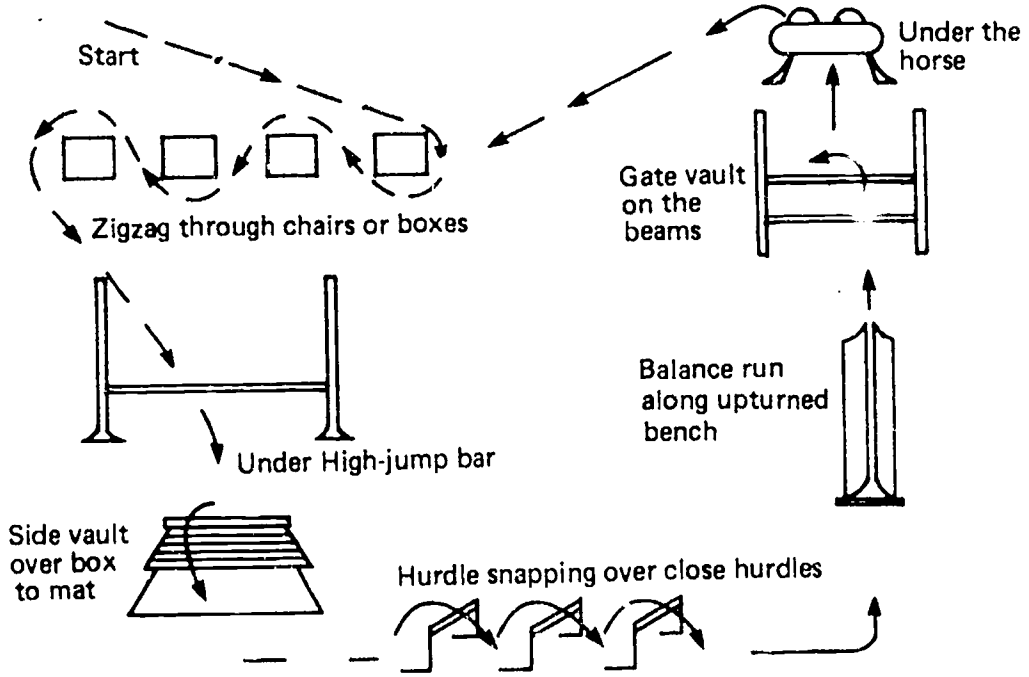


5 Back extension or feet elevation: Raise feet approximately 3-6 inches from the floor, hold, then lower. Weighted discs may be used to increase resistance (place cushion under them to protect the front of feet).

6 Bench-lifting and squatting: Hook the bench on to wallbars at an appropriate height. Raise to full extension above head then lower to full squat.



The following diagram illustrates a sample circuit that could be used as a good warming up exercise or as a timed, competitive event (care and supervision should be exercised in the latter).



# NOTES ON

# FLEXIBILITY

# NOTES ON FLEXIBILITY

## Benefits of flexibility

1. Helps you perform activities more easily.
2. Reduces your risk of soreness or muscle/joint injury.
3. Increases your range of motion in the joints and in the muscles.
4. It helps you improve your muscle strength without becoming muscle-bound (a condition in which one or more joints are limited in their range of motion by muscles that are too short).
5. Improves athletic ability.

## Types of stretching

*Static stretching*: stretching as far as you can without pain, and holding that stretched position for a minimum of 10 to 15 seconds.

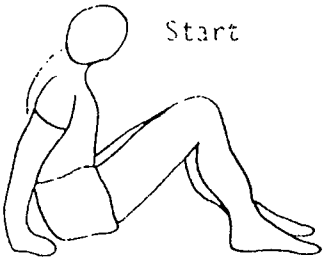
*Ballistic stretching*: is a series of quick but gentle bouncing or bobbing type motions that are not held for a long time.

## Precautionary measures

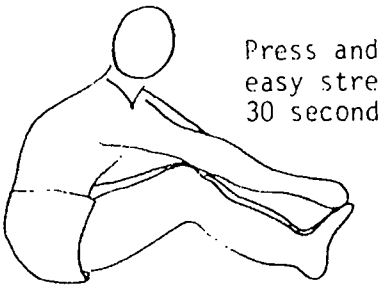
Static stretching exercises are safer than ballistic stretching exercises since you are less likely to stretch to far and injure yourself. If you are active in sports it is important that that part of your exercise programme includes movements used in your sports, which may require ballistic stretching. Thus, some flexibility exercises should resemble the sports movements (e.g., fast throwing and sprinting). In ballistic stretching especially, one must stretch gently. Stretching too quickly or overstretching can cause injury.

Static Flexibility Exercises

a) First Stage. . . . . start each flexibility exercise by slowly moving the desired body segment toward its final end-point of movement. Near the end of the exercise, press and slow the movement down to an easy stretch, then hold this position for 30 seconds.

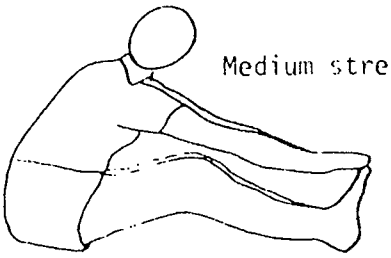


Start



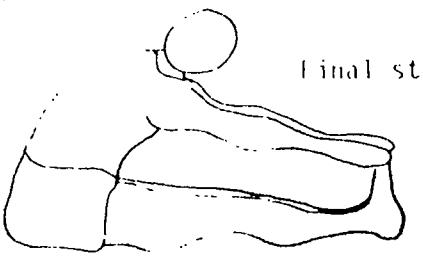
Press and hold an easy stretch for 30 seconds.

b) Second Stage. . . . . as the muscle relaxes and the feeling changes to that of a milder stretch, press a little further until the legs are at a medium stretch. Hold for an additional 30 seconds.



Medium stretch for 30 seconds.

c) Third Stage. . . . . again, as the muscle relaxes, press to a near maximum, developmental stretch and hold for a final 30 seconds. At this point a warm feeling should occur in the stretched area.



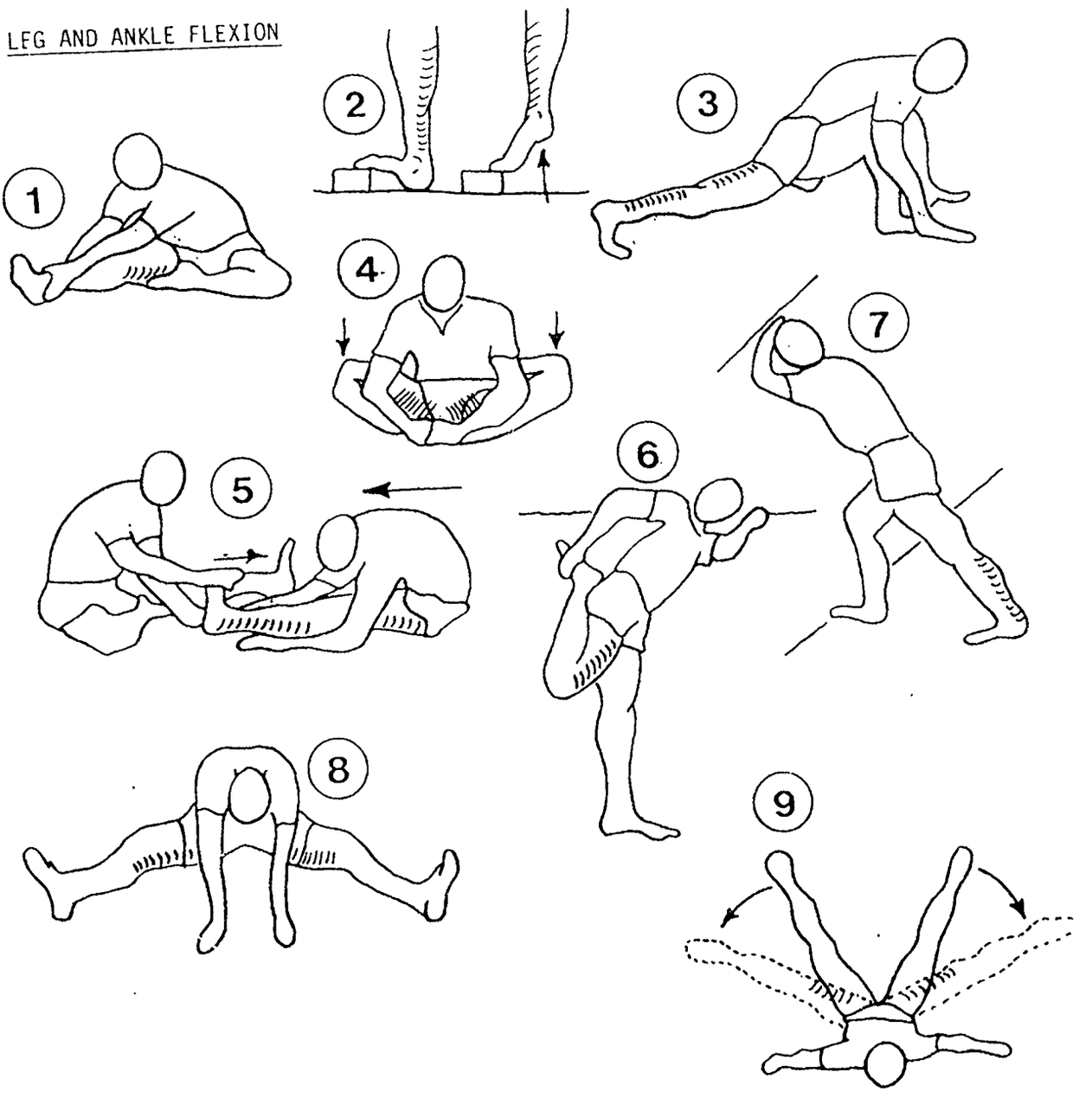
Final stretch for 30 seconds.

There is a difference between the feeling of a proper stretch and pain. Suggest to the students that they should press into the stretch by how they feel. Avoid forcing to a predetermined position. Pushing too far or hard can be injurious.

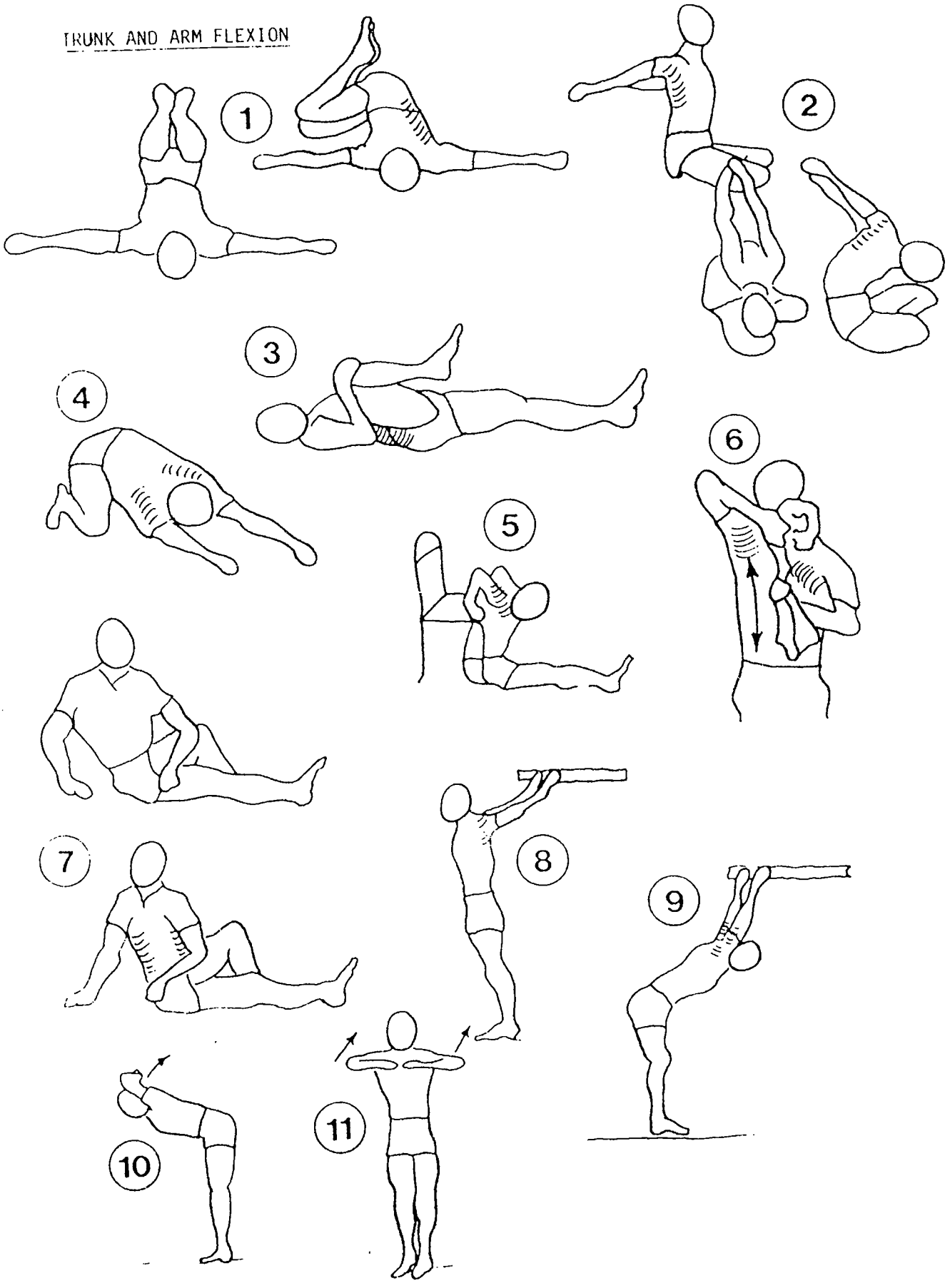
Remember, do not bob and bounce -- rather, progressively press and hold. Sudden ballistic movements which are sharp and rapid only inflame, tear, and injure the muscles and other connective fibres surrounding the joints.

After the students have completed each stretching movement, have them gently shake the area out and allow the muscle to relax

LEG AND ANKLE FLEXION



TRUNK AND ARM FLEXION



reach. Make sure students heads do not move forward and their elbows do not drop below shoulder height.

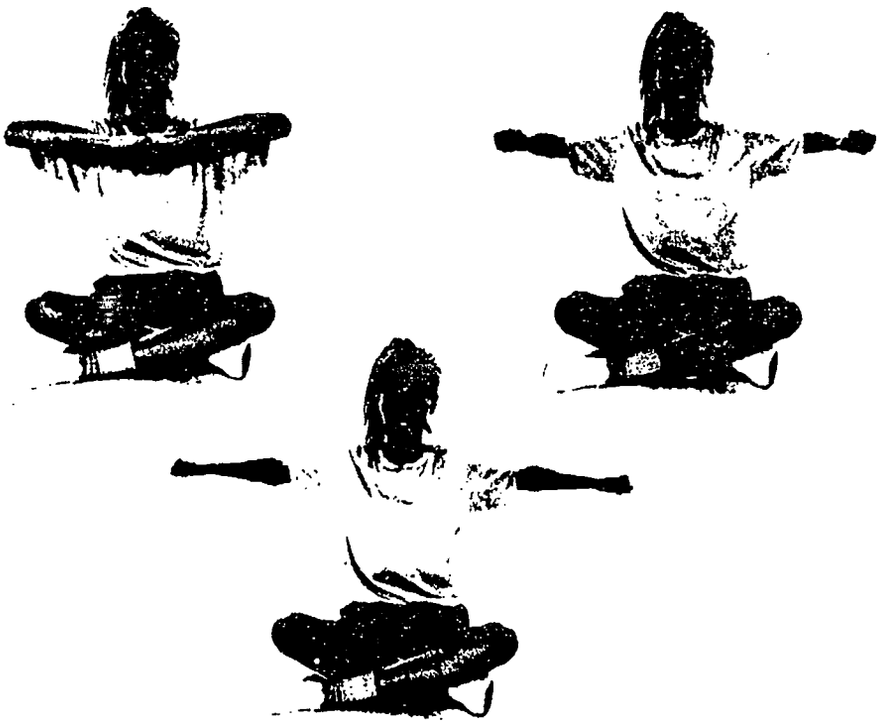
ply too much force.

## ARM REACH

● This exercise stretches your shoulder and chest muscles.

**Static Stretch**

1. Sit on the floor or on a bench. Keep your chin in and your back straight. Have a partner stand and place his/her knee between your shoulder blades.
2. Raise your arms to shoulder level. Bend your elbows to point back at your partner.
3. After you pull your elbows back as far as possible, have your partner gently pull them back *slightly* farther. Hold the position for 10 to 15 seconds.



**Ballistic Stretch**

1. Sit on the floor or on a bench. Keep your chin in and your back straight. Raise your arms to shoulder level and bend your elbows so they point sideways.
2. Touch your fists in front of your chest. Then jerk your elbows backward. Return to starting position.
3. Fling your arms back again, straightening your elbows. Alternate the bent-arm jerk with straight arm fling.
4. Count 1 repetition each time you move your bent elbows back. Complete 6 repetitions.

*Caution:* Be sure your head does not go forward when your arms go back.

## SIDE STRETCHER

● This exercise stretches your trunk muscles.

**Static Stretch**

1. Stand with your feet about 12 inches apart. Hold your right hand behind your neck. Hold 10 pounds of weight in your left hand, down at your side.
2. Bend as far as you can to your left side. Try to lower the weight to knee level or lower. Hold the position for 10 to 15 seconds.
3. Hold the weight in your right hand and repeat the stretch on your right side. *Caution:* Do *not* twist your spine or bend forward or backward.

**Ballistic Stretch**

● Follow the same procedure as for the static stretch, but make these changes:

1. Do *not* use the weight.
2. Bounce up and down gently after you have reached as far as you can to your left side. Bounce 6 times. Then change sides and repeat on your right side. *Caution:* Do *not* twist your spine or bend forward or backward.

**Strategy** When performing the side stretcher, make sure students do not bend forward or push hips out sideways.

stretcher make sure students keep the rear foot flat on the floor and lean far enough to feel the calf stretching.

## CALF STRETCHER

● This exercise stretches your calf muscles and Achilles tendon.

**Static Stretch**

**Part A**

1. Assume a lunge position. Your right knee should be bent and forward. Your left leg should be straight and back as far as possible; your left foot remains flat on the floor, heel down. Rest your hands on your right knee.
2. Hold the position for 10 to 15 seconds. Keep your left knee straight and heel down.
3. Change legs and repeat procedure

**Part B**

● Follow the same procedure as for Part A, but make these changes:

1. Bend the knee of your back leg and shift your weight on to it.
2. Keep your foot flat on floor, heel down. You should feel a pull in your Achilles tendon.

**Ballistic Stretch**

**Part A**

● Follow the same procedure as for the static stretch, but make these changes:

1. Stretch your left leg backward with the toes on the floor. *Gently* try to force your heel to the floor. Bounce 6 times.
2. Change legs and repeat the procedure.

**Part B**

● Follow the same procedure as Part A, but gently bounce on your back knee, keeping your heel on the floor.

## LOW BACK STRETCHER

● This exercise stretches the muscles of your lower back. It is only done statically.

1. Lie on your back and bring both knees to your chest.
2. Use your arms to squeeze your knees toward your chest. Hold this position for 6 to 15 seconds.

thigh stretcher make sure students drop the hips forward and down so stretch is felt on front of the hip joint of rear leg

## HIP AND THIGH STRETCHER

● This exercise stretches muscles on the front of your hip joint.

**Static Stretch**

1. Kneel on your left knee. Keep your right knee directly above your right ankle. Stretch your left leg back. Place your hands on the floor.
2. Keep your left knee on the floor as you shift your pelvis and trunk forward. You should feel a pull on the front of your left hip joint. Hold this position for 10 to 15 seconds.
3. Change your leg position and repeat with your right leg.

**Ballistic Stretch**

● Follow the same procedure as for the static stretch, but make these changes:

1. Gently bounce at your pelvis 6 times.
2. Then change your leg position and bounce 6 times on your right leg.

allow the knee of the bent leg to bend too much or allow the bent leg to turn in during the back-saver toe touch.

## BACK-SAVER TOE TOUCH

● This exercise stretches muscles on the back of your hips and legs. It is a better flexibility exercise than the sit-and-reach test used in the self-evaluation since it places less stretch on your back and more on the leg. The self-evaluation test is safe to use one time as a test, but it is not recommended as an exercise for your workout. This exercise is only done statically, not ballistically.

1. Sit on the floor with your right leg straight. Bend your left leg and place your left foot flat on floor.
2. Grasp your right ankle with both hands. Pull with your arms. Try to touch your head to your knee. Hold the position for 10 seconds.
3. Repeat with your left leg straight and your right knee bent.

# IMPROVING YOUR FLEXIBILITY

Just as maintaining muscular endurance and cardiovascular fitness are lifelong commitments, so is maintaining and improving your flexibility. You can develop flexibility through calisthenics and sports, but you can also work with a partner to improve flexibility. Most of the activities on these two pages require a partner. Choose a partner who is about your height and weight.

## POSTURE STRETCH

● This exercise improves your upper back flexibility.

1. Sit back to back with your partner. Raise both arms overhead. Clasp your partner's hands.
2. Have your partner lean forward *very slowly* and *gently* pull your arms. You should relax and let your head and trunk lean backward. Be sure to tell your partner when to stop pulling.
3. Hold your position for 10 seconds.
4. Take turns repeating this procedure. Each person should complete 3 repetitions.

## STICK JUMP

● This exercise improves flexibility in your shoulders, trunk, hips, and legs.

1. Use both hands to hold a length of broomstick or thick dowel rod in front of your thighs. Your hands should be a little farther apart than shoulder width.
2. Jump high and swing the stick under your feet and behind your body without losing your grip.
3. Jump over the stick again, this time swinging the stick back toward the front of your body.

*Caution:* This activity is most safely done on a gymnastics mat or other surface that will "give" in case you fall.

## WRING THE DISH TOWEL

• This exercise improves flexibility in your shoulders, hips, and trunk.

1. Stand facing your partner. Hold each other's hands.
2. Start with your left foot while your partner starts with the right foot. Crouch slightly and without releasing hands, take turns stepping over your left arm (partner's right) and into the middle of the "hole" formed by your arms.
3. Turn back to back, swinging your arms overhead without releasing your grip.
4. Continue to turn and then both step out of the "hole" with the other legs. You should finish facing each other and still holding hands.

## BACK TOUCH

• This exercise improves flexibility in your shoulders.

1. Reach your right hand over your right shoulder and down your spine as if you were pulling up a zipper. Hold this position while you reach your left hand behind your back, bend your elbow and reach up your spine.
2. Clasp your fingers or touch your fingers.
3. Repeat the procedure, this time reaching with your left hand over your left shoulder.

## WRAP AROUND

• This exercise improves shoulder and neck flexibility.

1. Reach your right hand behind your head. Try to touch the left corner of your mouth. You can turn your head if needed.
2. Repeat the procedure, using your left hand to touch the right corner of your mouth.

# NOTES ON

# MUSCULAR STRENGTH

# NOTES ON MUSCULAR STRENGTH

## Introduction

Strength allows the muscles to lift. Endurance allows the muscles to lift for longer periods of time. Strength exercises increse the size of muscle fibers, so the whole muscle increses in size and becomes stronger. Muscular endurance improves because the ability of all fibers (slow, fast and intermediate twich) to use oxygen improves.

With training, even fast-twich fibers use some oxygen to release energy. As ability to use oxygen improves, muscles use fuel more efficiently and can work for longer periods of time.

## Benefits of muscular strength and endurance

You need good muscular strength and endurance to :

1. Lift light loads repeatedly and to lift or move your own body weight for long periods of time (e.g., barbers, dentist and store clerks have to stand most of the day).
2. Maintain good posture.
3. Avoid the possibility of having backaches, muscle soreness and injuries.
4. Acheive good mental health.
5. Not tire easily.
6. Improve athletic skill, ability and performance.

## Vocabulary

*Slow twich muscle fibers* contract at a slow rate. These fibers contain many structures that release energy. The energy in these fibers is released "aerobically", using oxygen from the blood

Muscles composed mainly of slow-twich fibers do not tire very easily. They have the greatest endurance of all muscles.

*Fast-twich fibers* contract at a fast rate. However, these fibers have fewer energy-releasing structures. Energy is released "anaerobically", without the use of oxygen. Anaerobic processes are less efficient than aerobic ones. Thus, while muscles composed mainly of fast-twich fibers have great strength, they are less likely to have endurance.

*Intermediate fibers* have characteristics of both slow- and fast-twich fibers. They contract at a fast rate and contain many energy-releasing structures. Energy in intermediate fibers is also released aerobically so they they too, have much endurance. But because intermediate fibers contract at a faster rate, muscles containing many intermediate fibers have strength as well as endurance.

*Low-intensity exercises* can build the muscular endurance for daily activities. For this type of endurance, you lift only the body part you move daily. Examples include, raising and lowering your arms, jogging in place, and lifting and lowering your legs while lying on your side.

*Medium-intensity exercises* can build the muscular endurance needed for good fitness. These exercises include body-weight calisthenics such as pull-ups, sit-ups and knee dips. These exercises helps people to do vigorous activities without tiring quickly and builds some muscle strength. It also helps them maintain a healthy back and good posture.

*High intensity exercises* can build muscular endurance needed for high-level perfomance. Usually, people choose weight lifting to improve on their performance.

*Isotonic exercises* are those exercises in which muscles shorten or lengthen as they contract and body parts move. For example, weight lifting, calisthenics.

*Isometric exercises* are those in which the muscles contract when working against a stationary object or body part that is prevented from moving. For example, pushing against a wall.

## Fitness principles and strength

### 1. Principle of overload

A muscle must contract harder than normal if it is to become stronger. If a muscle is worked less than normal, it will weaken. If a muscle is always worken against the same amount of resistance, it will maintain the same strength. Your muscles eventually adapt to the load, so it feels easy to move. When it begins to feel easy, increase the load.

### 2. Principle of progression

Overload gradually - increase the load over a period of time - to get the best improvement in muscle strength. You can injure yourself if you try to lift too much weight too soon. Also, lifting too much weight too soon will not result in as much strength gain as would occur if you progressed gradually.

### 3. Principle of specificity

You must exercise the specific muscles you expect to develop. For example, leg exercises develop the legs. This principle also means that you should do some strength exercises that closely resemble the movement that you want to eventually use.

# NOTES ON NUTRITION-

# AND HEALTH-RELATED COMPONENTS OF

# PHYSICAL EDUCATION

# NOTES ON NUTRITION- AND HEALTH-RELATED COMPONENTS OF PHYSICAL EDUCATION

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The four food groups and recommended servings

Food scientists have provided a relatively easy way to plan a balanced diet. By eating the daily recommended number of servings from each of the four food groups, you should get all the nutrients for a balances healthful diet. The four food groups are the meat-poultry-fish-bean group, the bread-cereal group, the fruit-vegetable group and the milk-cheese group (see Table B1).

**Table B1: Using the Four Food Groups**

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The four food groups and recommended servings

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**Table B1: Using the Four Food Groups**

**Using the Four Food Groups**

| | Food | Serving Size |
|---|---|---|
| **Meat-Poultry-Fish-Bean Group**<br>2 servings/day | bean, meat, poultry, or fish | 2 or 3 ounces cooked |
| | eggs | 2 |
| | legumes (beans or peas) | 1 cup cooked |
| | peanut butter | 4 tablespoons |
| | nuts or sunflower seeds | 2 ounces |
| **Fruit-Vegetable Group**<br>4 servings/day | potato | 1 medium size |
| | orange | 1 |
| | cooked vegetable | 1 ½ cup |
| | fruit juice | ½ cup |
| | cooked fruit | ½ cup |
| **Bread-Cereal Group**<br>4 servings/day | whole-grain wheat bread | 1 slice |
| | cooked cereal | ½ cup |
| | ready-to-eat cereal | 1 cup |
| | cooked rice | ½ cup |
| | wheat germ | ¼ cup |
| | cooked pasta | ½ cup |
| | tortilla | 1 6-inch |
| **Milk Group**<br>4 servings/day | milk or yogurt | 1 cup |
| | cottage cheese | ½ cup |
| | cheese | 2 ounces |
| | ice cream or ice milk | 1-¾ cup |

## The FIT formula and nutrition

Notice in Table B2, how the FIT formula applies to nutritional fitness. If you eat too little or too much of one or more nutrients, you are not eating a balanced diet. In time, eating too many or too few nutrients affects your health. In the same way, your health can be weakened by a steady diet of "junk" food, fad diets, fast foods, and incorrect use of mineral and vitamin supplements.

**Table B2: Fitness Target Zones and Nutrition**

| Consume the recommended number of servings from each of the four food groups. | |
|---|---|
| **Frequency** | Eat three meals a day. An occasional snack is allowed. |
| **Intensity** | The number of calories you consume each day should fall within the range based on your sex, your age group and your level of physical activity. |
| **Time** | Eat meals at regular intervals, such as morning, noon and evening. |

## Factors affecting a person's nutrient needs

When selecting foods, determine your own particular nutritional requirements. All people need the same nutrients, but they do not necessarily need the same amounts of each. A person's nutrient needs vary according to age, sex, height, and weight. Young people who are going through puberty and those who are still growing have special nutritional needs. They should eat foods high in potassium, calcium and iron (see Minerals Table). These minerals aid in the development of bones and blood. By eating the correct number of servings from the four food groups, including foods high

in calcium, potassium, and iron, you probably are consuming a balanced diet.

## The importance of rest and sleep

Rest and sleep help your body rebuild itself and reenergize. While you sleep, several changes occur in your body. Your heart rate slows by about 10 to 15 beats per minute, your blood pressure decreases and you take fewer breaths per minute. Your muscles lose tension during sleep. Growth hormone is released into the blood. You are actually growing while you are alseep and resting. Your need for sleep and the times at which you go to sleep and awaken are individual.

Each person has a natural inborn energy cycle or *biorhythm*. Your biorhythm determines when your highest peaks of energy occur and when you feel most sluggish. Sometimes it is helpful to plan your activities around this energy cycle. When you feel sluggish you will also want to check your diet to see if it is well balanced.

Most adolescents sleep 7 to 9 hours each night. You may need more sleep if you feel fatigued or overly tired. You may feel fatigued if you have exercised strenuously or if you are under stress. Fatigue may also result from a starvation diet, lack of sleep, or illness.

Sometimes you cannot get to sleep. This is normal. But when your inability to sleep becomes a pattern, you have *insomnia*. Insomnia has several cause - stress being the leading one. Insomnia is one of the most frequent symptoms of depression. Eating or drinking foods and beverages high in caffeine or sugar tends to stimulate you and may cause insomnia. Eating late,

consuming spicy foods, and drinking alchoholic beverages are also causes. Follc ing are some tips for getting a good night's sleep. Select a medium-hard matress for your bed. This type of matress will support your back. Try to keep your environment quiet, or play soft, restful music.

If you have difficulty sleeping try some relaxation exercises. For example: stand with your feet about a foot apart; let your torso droop forward, slightly stretching your lower back and thigh muscles; keep the knees straight; bob slowly and gently from one side to the other. You might drirk a glass of milk; milk contains tryptophan, which acts as a natural sedative. Examine your lifestyle; what are the sources of stress that you might change?

Teaching strategies

Have students design a 24-hour chart. Students can be creative and utilize any format or style they desire. Within the 24-hour chart, have students write acivities in which they normally engage. Then have students examine their own biorhythms. When are they most energetic? When do they slow down? When do they feel hungry?

## Making nutritious food choices

While many of your meals might be selected and prepared by other people, most teenagers make their own food choices for breakfast and lunch. These guidelines can help you make nutritious food choices:

- **Eat a variety of foods**. Choose from each food group and from a variety from within each of the groups.
- **Try to reach your target weight and maintain it**. Be aware of the number of calories you eat.

- **Avoid fatty foods and fried foods**. Choose lean meat, fish, poultry, dried peas and beans, low fat or skim milk. Limit your intake of fried foods; instead bake, barbeque, poach, steam and use other alternatives to frying.
- **Eat complex carbohydrates and ample fiber**. Choose starchy vegetables, fruits, and whole grain breads and cereals. If possible, eat more raw than cooked or processed fruits and vegetables.
- **Avoid too much sugar**. Limit desserts to low-sugar, high-nutrient choices, such as low-fat yoghurt, fresh fruit and juices.
- **Limit your intake of salt**. Table salt contains sodium and chlorine, two minerals your body needs in small amounts only.
- **Eat three, regularly-spaced meals per day**. Do not skip breakfast. A snack is fine, provided it is nutritious and it does not cut down on your appetitite for your main meals.
- **Read the labels on food containers**. Labels list all ingredients in order of decreasing weight. A product called "Orange drink" might have a label that reads, "filtered water, sugar, corn syrup, fumaric and citric acid (for tart flavour) ascorbic acid, artificial colours". By weight, this product contains more water than any other ingredient. Also, be aware that this product contains no orange juice as such.
- **Drink plenty of water**. Drink about 2 quarts (eight 8-ounce glasses) of fluids per day. Fluids include water, milk, juice and other beverages. People who lack the normal amount of body fluids are said to be dehydrated. As a result of dehydration, their bodies cannot function normally. When they replenish lost fluids by drinking liquids, they are said to be rehydrated. You can become seriously dehydrated if you are doing strenuous

exercise in hot weather. In addition, dehydration can occur if you have an illness, such as stomach or intestinal flu, in which you lose a great deal of liquid.

## Eating before exercising

Some athletes mistakenly think that they need meat, "high energy" drink, or a food supplement before they compete or exercise. Meat is high in protein and fat, both of which are digested slowly. As a result, meat eaten within two hours of activity might interfere with a person's performance. Similarly, scientists have found that drinking a beverage high in sugar before or during exercise actually can decrease the level of performance. Athletes do not need to drink so-called "sports drinks". Use the guidelines below to determine what to eat or drink before exercising.

- **Eat 1 to 3 hours before exercising**. The time you eat before exercising depends on your choice of food and the amount of time it takes to digest the food.
- **Eat a sensible, easily digested meal**. This meal may contain small quantities of complex carbohydrates like whole grains, and less protein and fat, like meat and cheese.
- **Avoid snacks before and during exercise and competition**. You may snack during an activity if the activity lasts more than 90 minutes. Your body does not have enough time to digest a snack eaten during a short activity. Recommended snacks are bananas, oranges, raisins, granola bars.
- **Drink fluids before, during, and after competition**. Drink water rather than special sports drinks.

## Nutrients your body needs

Scientists have identified 45 to 50 different nutrients - food substances required for the growth and maintenance of your cells. These nutrients have been divided into six groups - carbohydrates, proteins, fat, vitamins, minerals and water. By eating the right amounts of foods containing these nutrient groups, you should get a balanced, healthful diet, The six groups are described here.

### Carbohydrates

Carbohydrates are nutrients that provide you with energy. Many foods are sources of carbohydrates. *Simple carbohydrates*, such as fruits, milk, molasses and honey, are sugars that can be used by your body with little or no change during digestion, Breads, vegetables and grains are examples of *complex carbohydrates* - foods that contain more of the other nutrients than do simple carbohydrates.

Examples are starchy fruits, roots and tubers, such as yam, sweet potatoe, cassava, breadfruit, green banana, eddo and dasheen. Thus, you receive the benefits of a variety of nutrients by eating complex carbohydrates. Such foods are considered nutritionally dense, meaning they contain large amounts of nutrients for the number of calories they provide.

*Fiber* is a type of carbohydrates that your body cannot digest. Therefore, fiber supplies no energy. Fiber helps you avoid intestinal problems, and might reduce your chances of developing some forms of cancer, like colon cancer. Fiber sources include the leaves, stems, roots and seed coverings of fruits, vegetables and grains. Some examples of food high in fiber content are whole-wheat and whole grain breads (cereal grains such as rice, oatmeal, wheat flour and oats), unskinned fresh fruits, raw vegetables,

nuts and seeds. Fiber in your diet provides bulk that aids in eliminating wastes.

Protein

Proteins are the building blocks of you body. The cells in your body are made up of proteins. Foods containing proteins come from animal products, such as milk, eggs, meat, and fish. In addition, some plants such as beans and grains, are good sources of proteins. Examples are red peas, pigeon (gungo) peas, black-eyed peas, cow peas, broad beans and peanuts.

Proteins are composed of even smaller building blocks, called *amino acids*. Combinations of 22 kinds of amino acids form hundreds of different kinds of proteins. Cells in the human body can manufacture 14 of the 22 amino acids; people get the other eight amino acids - known as the *essential* amino acids - from the foods they eat.

Foods with all eight essential amino acids are said to contain complete proteins. Complete proteins come from animal sources such as meat, milk products and fish. Foods that contain some, but not all essential amino acids are said to contain incomplete proteins. Sources of incomplete proteins are beans, nuts, rice, and certain other plants. A daily diet that includes foods with both complete and incomplete proteins usually provides ample essential amino acids. People who regularly eat meats, fish, poultry, eggs and milk products are probably getting enough proteins. People who do not eat meat, or those who are trying to lose weight, should make sure they include enough complete proteins in their diets.

Fats

Like carbohydrates, fats provide energy. However, ounce for ounce, fats provide twice as much energy as carbohydrates do. Fats are major constituents in animal products and in some plant products, such as nuts, vegetable oils and avocado pear.

Fats have many important functions in the human body. They are necessary for the growth and repair of cells. Fats dissolve certain vitamins and carry them to the cells where they are needed. In addition, fats enhance the flavour and texture of foods. For instance, fats are responsible for the appetizing aroma of roast beef.

Because of differences in chemical structure, fats are classified as *saturated* and *unsaturated*. In general, saturated fats are classified as solid at room temperature; unsaturated fats are liquid at room temperature. Saturated fats come mostly from animal products, such as lard, butter, coconut oil, milk and meat fats. Unsaturated fats come mostly from plants, such as sunflowers, corn, soybeans, olives, almonds and peanuts. Also, fish produce unsaturated fats in their cells.

*Cholesterol* is a waxy, fat-like substance found in the saturated fats of animal cells, including those of humans. You not only produce your own cholesterol, you consume cholesterol in certain foods. Some people have abnormally high levels of cholesterol that can contribute to atherosclerosis and other heart diseases. Medical experts recommend limiting cholesterol in your daily diet by eating foods low in cholesterol and low in saturated fat.

Minerals

Minerals are nutrients that perform many different functions in regulating the activities of cells. Minerals have no calories and provide no energy. However, a small amount of minerals are essential for good health.

Minerals come from elements in the earth's crust. They are present in all plants and animals. Table B3 shows some major functions of minerals and food sources in which important minerals are concentrated in useable amounts.

**Table B3**

**Functions and Sources of Minerals**

| Minerals | Function in the body | Food sources |
|---|---|---|
| Calcium | Builds and maintains teeth and bones; helps blood clot; helps nerves and muscles function | Cheese; milk; dark green vegetables; sardines; legumes |
| Phosphorus | Builds and maintains teeth and bones; helps release energy from nutrients | Meat; poultry; fish; eggs; legumes; milk products |
| Magnesium | Aids breaking down of glucose and proteins, regulates body fluids | Green vegetables; grains; nuts; beans; yeast |
| Sodium | Regulates internal water balance; helps nerves function | Most foods; table salt |
| Potassium | Regulates fluid balance in cells; helps nerves function | Oranges; bananas; meats; bran; potatoes; dried beans |
| Iron | Helps transfer oxygen in red blood cells and in other cells | Liver; red meats; dark green vegetables; shellfish; whole-grain cereals |
| Zinc | Aids in transport of carbon dioxide; aids in healing wounds | Meats; shellfish; whole grains; milk; legumes |

Vitamins

Vitamins are needed for growth and repair of body cells. Like minerals, vitamins do not contain calories and provide no energy. Some vitamins are water-soluble; others are only soluble in fat. These factors are important since body fluids are watery solutions.

Vitamin C and the B-vitamins dissolve in blood and are carried to cells throughout your body. Excess B and C vitamins are eliminated from your body in urine. Thus, your body cannot "store" these vitamins for use later. As a result, you should eat foods containing vitamins B and C every day. Vitamins A, D, E and K dissolve in fat rather than in water. When more of these vitamins are consumed than are needed, the excess amounts are stored in fat cells in your liver and other parts of your body.

Taking too much of a vitamin supplement can cause vitamins to accumulate in your body. Even water-soluble vitamins are toxic, or poisonous, if taken in large amounts. Vitamin buildups have been known to cause liver damage and other serious health problems. Table B4 gives more information about vitamins.

Table B4

## Functions and Sources of Vitamins

| Vitamins | Function in the body | Food sources |
|---|---|---|
| B1 (Thiamin) | Helps release energy from carbohydrates | Pork; organ meats; legumes; greens |
| B2 (Riboflavin) | Helps breakdown ca.bohydrates, and proteins | Meat; milk products; eggs; green and yellow vegetables |
| B6 (Pyridoxine) | Helps breakdown protein and glucose | Yeast; nuts; beans; liver; fish; rice |
| B12 (Cobalamin) | Aids nucleic acid and amino acid formation | Meat; milk products; eggs; fish |
| Folacin | Helps build DNA and proteins | Yeast; wheat germ; liver; greens |
| Pantothenic acid | Involved in reactions with carbohydrates, and proteins | Most unprocessed foods |
| Niacin | Helps release energy from carbohydrates, and proteins | Milk; meats; whole-grain or enriched cereals; legumes |
| Biotin | Aids formation of amino, nucleic, and fatty acids and glycogen | Eggs; liver; yeast |
| C (Absorbic acid) | Aids formation or hormones, bone tissue, and collagen | Fruits, tomatoes; potatoes; green, leafy vegetables |
| A (Retinol) | Helps produce normal mucus, part of chemical necessary for vision | Butter; margarine; liver; eggs; green or yellow vegetables |
| D | Aids absorption of calcium and phosphorous | Liver; fortified milk; fatty fish |
| E (Tocopherol) | Prevents damage to cell membranes and vitamin A | Vegetable oils |
| K | Aids blood blotting | Leafy vegetables |

Water

Water is the single most important nutrient. You can live for some time without the other nutrients, but you cannot live more than a few days without water. Water makes up a large percent of all the foods you eat and the beverages you drink. Your own body weight is 60 to 70 percent water.

You lose two to three quarts of water a day perspiring, eliminating and breathing. In very hot weather, or when you exercise vigorously, you may lose even more. The water lost must be replaced by water in foods and beverages.

Water has many life-sustaining functions in the body. For example, it carries nutrients to cells and removes wastes from cells. Water helps regulate your body temperature. The water in body fluids is needed for the chemical reactions that continuously take place in cells.

Eating disorders

While poor nutrition can contribute to some health problems, eating disorders can also be harmful to your health. Two of the most common eating disorders are anorexia nervose and bulimia. Both disorders occur most often among girls and women than boys and men.

1. **Anorexia nervosa** is an eating disorder in which an individual severely limits food intake. People with this problem consider themselves overweight, even if they are dangerously underweight. To become thinner, anorexics suppress their bodies' normal urges to eat. Some anorexics exercise excessively to lose weight. Anorexics have been known to lose up to 50 percent of their normal weight. Anorexia can cause vitamin and mineral deficiencies, severe malnutrition, and dangerous loss of body

# Drugs and Physical Performance

Drug abuse is defined as the intentional use of drugs for reasons other than health. Many people try various drugs "for the fun of it" without thinking about the health risks involved. They do not believe drugs are that harmful, nor do they think they could ever become dependent on them. However, drug abuse is a critical problem worldwide.

Doping is the term used by the International Olympic Committee (IOC) to describe the use of a drug designed to improve physical performance. The IOC is primarily concerned with the ethics of using artificial means to increase performance and gain an unfair advantage in competition. While others wrestle with the problems of ethics, we are more concerned with the physiological and psychological health of the individuals who take these powerful drugs and hormones.

This article provides background information on the most common drugs that affect physical performance. Understanding the effects of these drugs can help you become better prepared to deal with drug use among physical education students and athletes.

## Drug Classification

The IOC divides "doping" into three classes.

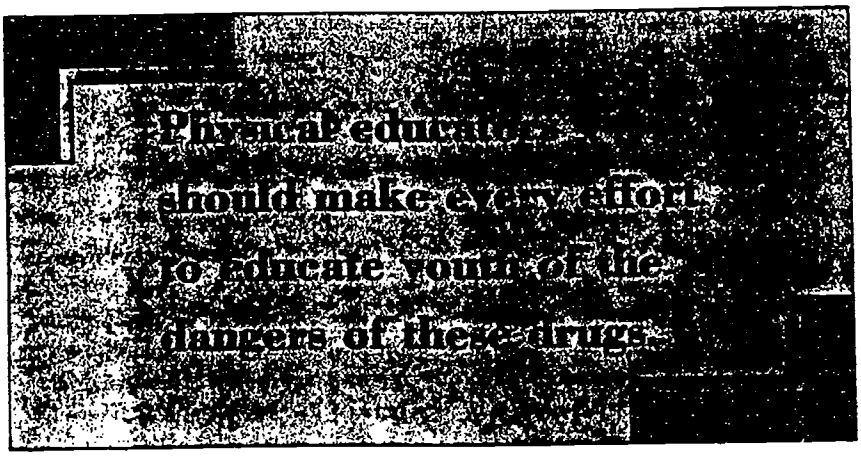
- *Class I* This class includes stimulants, narcotics, anabolic steroids, human growth hormones, beta blockers, and diuretics. These are all banned from use in competition and are more fully detailed below.
- *Class II* This class refers to blood reinjection, known as "blood doping." In this practice, blood that was previously removed from an athlete is reinjected prior to a competition. This is done in order to gain an advantage in endurance because the extra blood cells can carry more oxygen to weary muscles. However, while the blood is stored, it can actually lose its ability to carry oxygen. Blood doping is illegal in competition, although athletes are not tested for it.
- *Class III* Drugs in this class are alcohol, local anesthetics, and corticosteroids. These substances do have implications for physical performance, and have restrictions for use, but are not automatically banned from use in competition.

## Class I Drugs

The drugs included in Class I are considered to have the most serious consequences on the body. The physical and mental effects of these drugs can not only affect physical performance but can sometimes be lethal. The effects of these drugs are highlighted below, with special emphasis on anabolic steroids.

- *Stimulants* Stimulants are drugs that speed up the work of the nervous system and can be highly addictive. Amphetamines, nicotine, cocaine, ephedrine, and caffeine are all stimulants. Stimulants can help physical performance by increasing alertness, competitiveness, and hostility, and by reducing fatigue. They can also cause a person to feel afraid, nervous, and depressed. Stimulants increase heart rate, blood pressure, body temperature, and breathing rate. Use of cocaine, or the highly potent form of cocaine known as crack, can cause dependence, brain damage, heart attack, stroke, violent behavior, damage to nasal passages and lungs, risk of AIDS (if needles are shared), or death.
- *Narcotics* Narcotics are strong depressant drugs derived from opium and are used to relieve pain. Narcotics can also cause confusion and loss of coordination. Heavy doses of narcotics can cause the heart or lungs to stop working. Narcotics such as morphine, codeine, heroin, and methadone can produce physical and mental dependence quickly. Withdrawal symptoms can be severe and painful. People who share needles to inject heroin are also at risk for AIDS.
- *Beta Blockers* Beta blockers decrease anxiety and slow the heart rate, making them useful in sports requiring careful control and concentration, such as archery and shooting. However, side effects of beta blockers include decreased endurance, low blood pressure, congestive heart failure, blood circulation problems, gastrointestinal problems, hair loss, and impotence.
- *Diuretics* Diuretics help people lose weight by losing body fluids. They often are found in sports where specific weight requirements are enforced, such as wrestling and weight lifting. The negative effects of using diuretics include leg and stomach muscle cramps and dehydration and severe chemical imbalances that can lead to heat exhaustion or cardiac arrest.

■ *Anabolic Steroids* Anabolic steroids are a synthetic form of the male hormone testosterone. The most common use for these drugs is to enhance the strength and size of muscles. Although steroids may indeed help build muscle mass, there is little proof they help improve performance over time. In addition, the list of adverse side effects is long and significant.



## Effects of Steroids

The hormone testosterone is responsible for functions in the body related to growth and physical development. When testosterone levels get too high, as with the introduction of steroids, the brain signals the body to shut down these growth processes. The average male normally produces 2.5 to 10 milligrams of testosterone each day. A steroid user often introduces an additional 100 milligrams of this hormone into the system daily. Some of the effects of steroid use are noticeable quickly; others may not show for 10 to 20 years after first taking the drugs.

Many of the side effects of steroids are related to the functioning of the reproductive system. In males, these include impotence, sterility, atrophied testicles, lowered sperm count, prostate enlargement, breast enlargement, and painful and prolonged erections. In females, the addition of testosterone leads to the development of masculine traits. These include deepening of the voice, increased body and facial hair, and scalp hair loss. Unlike men, these effects in women may be irreversible. Additionally, women may develop irregular menstrual cycles, uterine atrophy, shrinkage of breasts, and clitoral enlargement.

Other effects of steroids, experienced by both sexes, include liver damage, acne, hair loss or baldness, oily skin, depression, high blood pressure, heart disease, and cancer (particularly of the liver, kidney, and female breasts). Steroids are also noted for causing aggressive and violent behavior, known as "roid rage." Users may have temper tantrums or wild mood swings, and may become uncontrollably violent with little provocation.

Steroid use can also permanently stunt growth because the body responds to excess testosterone by stopping skeletal growth mechanisms. This makes steroid use among teenagers especially dangerous.

Of great concern is the fact that steroid use is spreading. Steroids are a growing part of college and high school athletics. Many nonathletes take steroids to "improve the way they look." In addition, users are taking higher doses for longer periods at an earlier age than ever before. Also, many users combine many types of steroids, a practice called "stacking," in the mistaken belief that more is better. Students may know that steroids are unhealthy and banned in competition. They may think, however, that steroids are not really dangerous and that the most serious thing to worry about when using them is getting caught.

It is estimated that one million people in the United States now take steroids as tablets or injections for no medical reason. Annual sales (primarily on the black market) exceed $100 million. The black market is fueled to a significant extent by quack steroids. Many come from foreign countries and contain impurities and are of questionable quality. Such quack steroids are more likely to cause unpredictable effects in the user.

## Human Growth Hormone

The powerful human growth hormone (HGH) produced by the pituitary gland is now made synthetically. It has beneficial uses for certain medical conditions, but it is now being used in addition to or instead of steroids because it is more difficult to detect in urine. HGH is used by both athletes and nonathletes who believe it will help them have stronger, larger bodies. The most serious effect of HGH is acromegaly, a condition in which the bones of the face, hands, and feet become permanently enlarged. In addition, diabetes, cardiovascular disease, goiter, excess sweating, impotence, and shortening of the life span (by as much as 20 years) can result.

fluids. If left untreated, anorexia nervosa can result in severe health problems or even death.

2. **Bulimia**. People with bulimia show a pattern of overeating followed by forced vomiting or use of laxatives to rid the body of food. Bulimia differs from anorexia nervosa in that the bulimic's weight might be normal. This disorder can contribute to kidney failure, urinary tract infections, ulcers, and other serious health problems.

Anorexics and bulimics often try to hide what they are doing, deny it, or are reluctant to accept help. If someone you know shows symptoms of these disorders, you might talk to them about your concerns and encourage them to seek professional help.

# NOTES ON SPORT PSYCHOLOGY

## Definition

Sport Psychology is the scientific study of human behaviour in the area of sport and exercise.

## The role of the sport psychologist

In the professional field there are two main areas of work: *Clinical sport psychology*: these psychologists deal with athletes who have severe or abnormal psychological problems (e.g., severe depression, anorexia, paranoia). *Educational sport psychology*: these psychologists deal with transferring information and techniques to sport and exercise participants (e.g., goal setting, pre-competition mental preparation).

## Main concerns in sport psychology

Two main questions are answered in scientific study:

1. What effect do psychological abilities (e.g., aggressiveness, preparedness, focusing, calmness) have on a person's performance in sport? For example, does a person who is aggressive compete better and perform better in boxing than a person who is more timid and less aggressive?
2. What effect does participation in sport and exercise have on the person's psychological development? For example, if a person participates in swimming, does the improvement in performance, skill, and technique improve the person's self-esteem and confidence? Sport, like any other social situation has the potential to have both a negative and positive influence on those involved. To a large degree, the usefullness of sport for promoting positive psychological development, depends on the leadership provided by

administrators, spectators, parents, captains and especially by the coach.

## Goal setting

*Definition*: A goal is a target. We set goals to help determine what is important to us, to help improve our performnce (by showing us our strengths and weaknesses), to help us focus our attention and effort, and to help us maintain our motivation (by reflecting improvement).

*Types of goals we should set*:

1. Performance and technique goals.
   - -win/lose outcome does not always reflect ability or improvement,
   - -performance/technique is more in control of the athlete than the outcome,
   - -allows for success even when you lose!
2. Long term as well as short term goals.
   - -long term goal: the ultimate objective or target that provides direction over the course of the season,
   - -short term goal: allows for periodic review of improvement and adds reward for ongoing effort.
3. Specific, measurable goals.
   - -numerical goals are easier to measure and evaluate,
   - -specific goals are easy to measure and observe.

*Areas in which to set goals*:

- fitness/aerobic (endurance), anaerobic (speed),
- physical skills,
- psychological skills (motivation, mental preparation,

attention),

- concentration, stress management,
- strength/weight (weight training, diet),
- fun (plan for satisfaction and enjoyment).

*How to set goals*:

- talk to your coach,
- select 2-3 goals; prioritize your needs,
- set target dates for achieving your goals.

## Exercise adherence

*Definition*: Exercise adherence is the process of initiating and maintaining an exercise programme.

*Introduction*: In recent years, research conducted by exercise physiologists and physicians has established a strong relationship between sedentary lifestyles and an increased risk in the development of cardiovascular and cardiorespiratory disease. As a result, many organized fitness and exercise programmes emerged with the objective of reducing the number of inactive individuals (for example, aerobics, step Reeboc, low impact aerobics, walking). However, in the United States there is evidence to show that almost 50% of the people who initiate a fitness programme drop out within the first few weeks or months.

Factors that affect exercise adherence:

1. Situational factors such as accessibility to the exercise setting (those who reside close to a facility are more likely to stay with the programme).
2. Attitudes of friends and relatives can also have an influence. The more supportive they are the more likely the person is to stay in the programme.

3. Adherence also depends on goal orientations (what your goals are for exercising). A task-oriented person is involved in exercise because she or he wishes to improve her or his fitness, or complete the exercise class for its own sake. A social approval-oriented person is involved in the task because she or he is seeking approval from significant other people in their lives. The goal of an ability-oriented person is to "look good" when comparing her or his ability with others. It is assumed that if these goals are met at the exercise setting then the person is likely to stay in the programme.

## Mental preparation

*Definition*: The mental preparation or countdown to competition should consist of getting the sportperson to develop a mental "warm-up" to go with the physical warm-up. This means monitoring and controlling emotions and thoughts so that the energy and excitement for competition slowly builds, and the athlete avoids becoming so overexcited or psyched-out that feelings of anxiety and worry rather than excitement and challenge occurs.

*Arousal during competition*: Being psyched-up, energized, activated, or "ready" is an intergration of mind-body feelings and thoughts that provide the sportsperson with a feeling of confidence, mastery and control. The sportsperson can learn to reach this state consistently by learning and practicing mental preparation skills, and learning how to regulate her or his arousal level before and during competition.

*Signs of overarousal (psyched-out)*: During pre-competition mental preparation sportspeople usually experience feelings of worry, stress, and anxiety, that come form pressure to "perform" from the coach, captain, spectators and sportspersons themselves.

Some of the immediate physical or somatic (body) cues (signs) of overarousal are: pulpitations of the heart, muscle tension, sense of fatigue, dry mouth, clammy hands (sweaty), butterflies in the stomach, a desire to urinate, nausea and vomiting, diarrohea, yawning, hyperventilation, increased heart rate, and increased respiratory rate.

*Relaxation technique*: Relaxation techniques are taught to regulate arousal at the sportspersons optimal level. Although a certain level of muscular tension is needed to perform, learning to train the muscles to relax totally develops a greater sensitivity to the person's bodily feelings and responses. Relaxing can assist in removing localized tension such as surrounding an injury. It can aid in the onset of sleep and can reduce insomnia problems that often afflict elite sportspeople. It can be used to regulate arousal before (mental preparation) competition, and before (momentary relaxation) the very onset of competition. It is also an essential skill in teaching a sportsperson imagery.

## Relaxation Technique

A. Lie down and relax your entire body. If you hear noises don't try to block them out, but focus on your breathing-inhaling, then exhaling slowly. If you want to move slightly, that's O.K. Close you eyes, take it easy and relax.

B. Tense the muscles of your right lower leg and foot by pointing your toe. You'll tense for 5-6 secs. and then relax. You should be able to feel the tension in the foot and the calf and then totally relax. When you relax feel the warmth in the muscles. Repeat this procedure again on the right leg and then repeat it twice for the left leg.

C. After tensing and relaxing the lower leg and foot, tense (for 5 secs.) and relax the thigh and buttocks region (twice for each leg). Tense the buttocks and thighs by pushing down with your butt.

D. Tense and relax the forearm and hand by making a fist. Do this twice for each arm.

E. Tense and relax the bicep of each arm by bending at the elbow and pretending you are doing a chin up. Repeat twice for each arm.

F. Tense (for 5 secs.) and relax the back muscles by arching the back up. Tense and relax the back twice.

G. Tense the stomach and chest muscles by breathing in deeply and releasing-relaxing. Do this twice.

H. Tense the neck and shoulders by shrugging your shoulders (pulling them together) and then releasing them and relaxing. Repeat this twice.

I. Tense the face and forehead by gritting your teeth and pulling your eyebrows together, then relax. Do this twice.

J. By now you should be completely relaxed (after about 20 minutes of tense-relax). Focus on the feelings of ease and looseness in your muscles, the deep breathing cycle you are in, and the calm, focused thoughts of your mindset. To a degree your <u>optimal</u> level of arousal should also represent a calm, focused, semi-relaxed state.

# NOTES ON

# SKILL-RELATED FITNESS

# NOTES FOR SKILL-RELATED FITNESS

## Definitions

**Agility** is the ability to change your body position quickly and to control your body's movements.

**Balance** is the ability to keep an upright posture while standing still or moving.

**Coordination** is the ability to use your senses together with your body parts.

**Power** is the ability to use strength quickly.

**Speed** is the ability to perform a movement or cover a distance in a short period of time.

**Reaction time** is the amount of time it takes you to move once you realize the need to act.

## Benefits of skill-related fitness

Developing and maintaining skill-related fitness influences your health. People who use skill-related fitness to improve their skills in sports and games are more likely to be physically active than those who do not have these skills. As a result, active people are more likely to improve their health through exercise. In addition, people who learn skills gain two other important benefits: they generally enjoy life and feel good about themselves. Perhaps you have had the experience of being uneasy at dance because you felt that you did not dance well. People generally enjoy doing things they do well. Improving your skill-related fitness is a first big step toward improving those skills that will help you enjoy life and improve your self-image.

## Factors that affect skill-related fitness

### Heredity

Medical evidence has shown that parts of skill-related fitness, such as speed and reaction time, are greatly influenced by heredity. Some people are able to run fast or react quickly because they inherited these traits from their parents. If you did not inherit a tendency to excel in these areas, it may be more difficult for you to perform skills that require those abilities. However, it is never impossible to improve skills, and often extra practice and desire make up for a lack of 'natural' ability.

### Practice

While skill-related fitness is needed to learn specific skills, you still must practice to improve those skills. Practice is what helps you improve skills such as hitting a tennis ball or batting a softball. While everyone cannot become an Olympic athlete, all people can learn the basic skills necessary to enjoy sports and to perform physical tasks efficiently.

### Principle of specificity

This principle applies to both skill- and health-related fitness. Just because you might excel in one part of skill-related fitness, you will not necessarily excel in other parts. This is ofetn the case even regarding abilities that seem closely related, such as reaction time and speed. For example, you might have great speed, which helps your skill of running down fly balls in the outfield during cricket. But poor reaction time prevents you from getting a good 'jump' on the ball. In this case, you might choose a sport or activity that emphasizes speed rather than reaction time.

## Improving skill-related fitness

**Agility** can be improved by practicing skills used in activities such as gymnastics, basketball, soccer and modern dance.

**Balance** can improve by standing or walking on a line or a beam, or balancing objects in your hands or on your head. Also by practicing skills used in activities such as ballet, platform diving, and some areas of gymnastics.

**Coordination** improves by practicing the skill you want to learn, like eye-hand, or eye-foot coordination. For example, basketball players would practice shooting and dribbling to improve eye-hand coordination. Practice skills using both the right sand left sides of your body.

**Power** is most likely to improve with repeated effort. Strength exercises may be used to improve power, although they may not build optimal power.

**Speed** may be increased if you increase your strength if you are not strong. You may also learn the best way to move for a particular activity, and then practice those movements.

**Reaction time** improves with practice because you learn when to react and what to react to. For example, sprinters can learn to react faster to the starting gun.

**Strategy** Refer to page T48 for self-evaluation notes and additional strategies.

**Strategy** If a large clock is unavailable, use stopwatches or have students count by saying "1001, 1002," and so on.

## SELF-EVALUATION

# BALANCE, COORDINATION, AND REACTION TIME

Use this self-evaluation to evaluation your balance, coordination, and reaction time. Keep these points in mind, especially if you score low:

- You can improve all parts of your skill-related fitness.
- Many activities do not require high levels of these abilities.
- You need not excel in an activity to enjoy it.

**WORKSHEET 11-1**

Use worksheet 11-1 to record your results of this self-evaluation.

**BALANCE** You need a 2" x 2" stick 1 foot long for these tests. Wear gym shoes while taking these tests. Record your scores on your worksheet. You may take 1 practice try before taking each test for a score.

### Test 1

1. Place balls of both feet across the stick so that your heels are on the floor.
2. Lift your heels off the floor and maintain your balance on the stick for 15 seconds. Keep your arms held out straight in front of you. Do not allow your heels to touch the floor or your feet to move on the stick once you begin.
3. Test yourself twice. Give yourself 2 points if you are successful on the first try, 1 point if you failed on the first try, but succeeded on the second, and 3 points if you were successful on both tries. Try test 2 even if you did not do well on test 1.

### Test 2

1. Stand on the stick with either your left foot or right foot. Your foot should run the length of the stick.
2. Lift your other foot off the floor. First, balance for 10 seconds with your foot flat. Then rise up on your toes and continue balancing for 10 seconds.
3. Test yourself twice. Give yourself 1 point if you balanced for 10 seconds flat-footed, and another point if you balanced on your toes for 10 seconds. Give yourself another point if you successfully balanced both flat-footed and standing on your toes. Your maximum score is 3 points.

**COORDINATION** You need three 24" dowel rods (1/2" diameter) for this test. Take three practice tries before taking the test for a score.

1. Hold a stick in each hand. Have a partner put a third stick across your sticks.
2. Toss the third stick in the air so that it makes a half turn. Catch it with the sticks you are holding. The tossed stick should not hit your hands.
3. Take this test 5 times tossing the stick to the right, and 5 times tossing to the left. Score 1 point for each successful catch.

**REACTION TIME** You need a yardstick and a partner for this test.

1. Have your partner hold the top of the yardstick with the thumb and index finger between the 1-inch mark and the end of the yardstick.
2. Position your thumb and fingers at the 24-inch mark on the yardstick. Your thumb and fingers should *not* touch the yardstick. Your arm should rest on the edge of a table with only your hand over the edge.
3. When your partner drops the stick without warning, catch it as quickly as possible between your thumb and fingers. Your score is the number on the yardstick at which you caught it.
4. Try this test 3 times. Your partner should be careful not to drop the yardstick after the same waiting period each time. You should not be able to guess when the yardstick will drop.

**SCORING AND RATING** After recording your individual test scores and total scores on your worksheet, find your *total score* for each test on the rating chart. Record your rating on your worksheet. In class, you might only have time to take each test once. However, try to retest yourself periodically. You might save your worksheet and use it to record future test results so you can note your progress.

**Rating Chart: Balance, Coordination, and Reaction Time***

| Performance Rating | Balance Test | Coordination Test | Reaction Time Test |
|---|---|---|---|
| High | 6 | 9 to 10 | more than 21 inches |
| Good | 5 | 7 to 8 | 19 to 21 inches |
| Marginal | 3 to 4 | 4 to 6 | 14 to 18 ¾ inches |
| Low | less than 3 | less than 4 | less than 14 inches |

*Note: Since skill-related fitness does not relate directly to good health, the "good fitness" rating is not used.

**Strategy** Refer to page T48 for self-evaluation notes and additional strategies.

**Strategy** If you have students keep time, emphasize that they should start the watches as the runner crosses the starting line and blow the whistles exactly 3 seconds later.

## SELF-EVALUATION

# AGILITY, POWER, AND SPEED

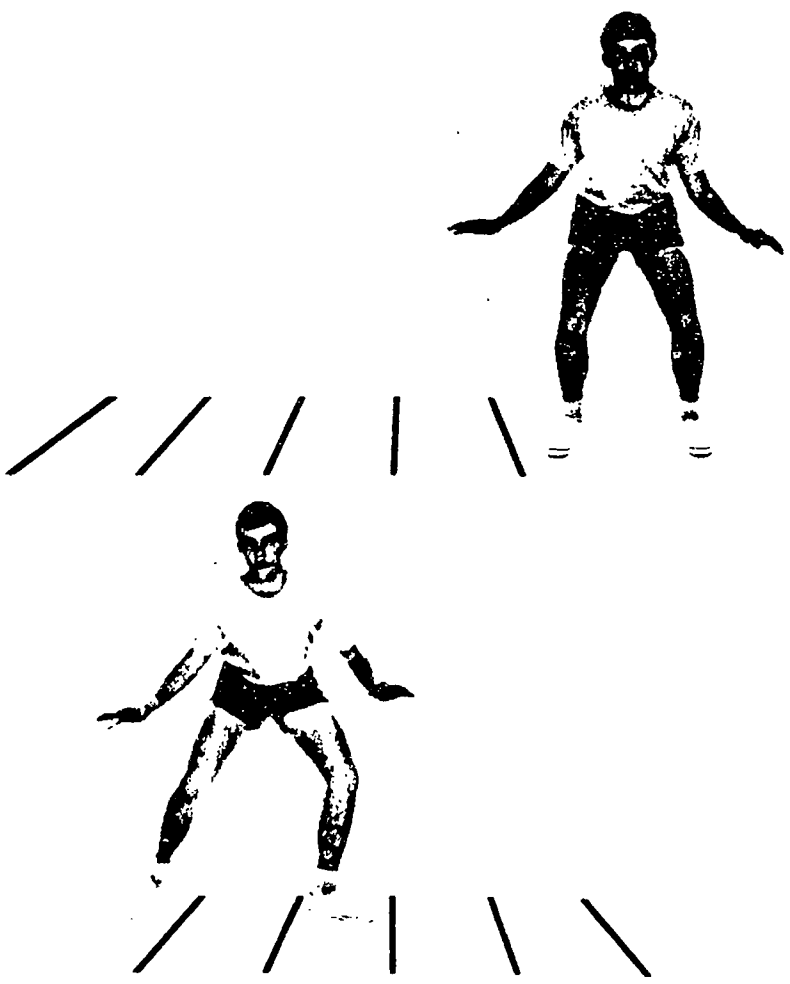
Use this self-evaluation to evaluate your agility, power, and speed.

**WORKSHEET 11-2**

Use worksheet 11-2 to record your results of this self-evaluation.

**AGILITY** Use masking tape or other materials to make five parallel lines on the floor, each three feet apart. Have a partner count while you take the test. Then count while your partner takes the test.

1. Stand with both feet to the left of the line at the far left. When your partner says "go," slide to the right until your right foot steps outside the far right line. Then slide to the left until your left foot steps outside the far left line. *Note:* Be careful not to cross your feet.
2. Repeat, moving right-to-left and back, as many times as possible in 10 seconds. Only 1 foot must cross the outside lines.
3. When your partner says "stop," freeze in place until your partner counts your score. Score 1 point for each line you crossed in 10 seconds. Subtract 1 point for each time you crossed your feet.
4. Take this test twice. Record the better of your 2 scores on your worksheet.



**Strategy** Test outside if your gym is too short to allow a running start, a 26-yard run, and space to stop safely.

**Strategy** Encourage a warm-up before the practice run.

**POWER** Use masking tape or other materials to make a line on the floor. You also need a tape measure.

1. Stand with both feet behind the line on the floor. Swing your arms forward, and jump as far as possible. Keep both feet together. Do not run or hop before jumping.

2. Have a partner measure the distance from the line to the *nearest* point where any part of your body touched the floor when you landed.

3. Take this test twice. Record the better of your 2 scores on your worksheet.

**SPEED** You need a stopwatch, a whistle, and a specially marked running course to take this test. Use masking tape or other material to make lines 2 yards apart starting 10 yards from the starting line for a total distance of 26 yards. Work with a partner who will time you with the stopwatch and blow the whistle to signal you to stop.

Try this test once for practice without being timed; then try it for a score. Record your score on your worksheet.

1. Stand 2 or 3 steps behind the starting line. Your partner will start the stopwatch when you cross the starting line.
2. When your partner says "go," run as far and as fast as you can until your partner blows the whistle 3 seconds later. Do not try to stop immediately, but begin to slow down *after* the whistle blows.
3. Your partner will mark where you were when the whistle blew. Measure the distance to the nearest yard line. Your score is the distance you covered in the 3 seconds *after* crossing the starting line.

**SCORING AND RATING** After recording your individual test scores on your worksheet, find your scores on the rating chart. Record your ratings on your worksheet.

**Rating Chart: Agility, Power, and Speed***

| Performance Rating | Agility (lines crossed) | | Power (inches jumped) | | Speed (yards run) | |
|---|---|---|---|---|---|---|
| | Males | Females | Males | Females | Males | Females |
| High | 31 or more | 28 or more | 87 or more | 74 or more | 24 or more | 22 or more |
| Good | 26–30 | 24–27 | 80–86 in. | 66–73 in. | 21–23 yds | 19–21 yds |
| Marginal | 19–25 | 16–23 | 70–79 | 58–65 | 17–20 | 15–18 |
| Low | less than 19 | less than 15 | less than 70 | less than 58 | less than 16 | less than 15 |

*Note: Since skill-related fitness does not relate directly to good health, the "good fitness" rating is not used.

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