



SPORTS SCIENCE

WHAT IS SPORTS SCIENCE?

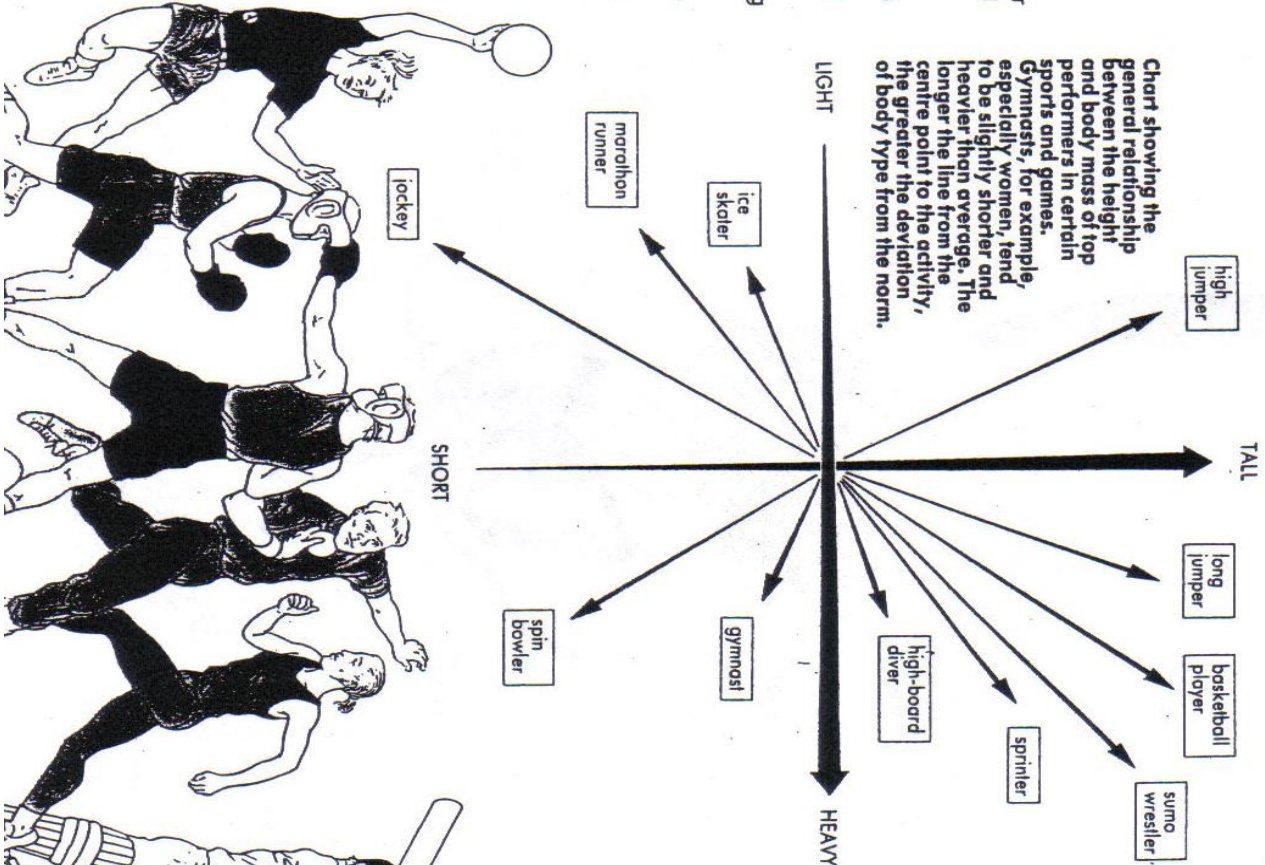
Sports science is a branch of biology that observes, measures and records the performance of athletes, swimmers and games-players. It is a fairly new, rather exciting subject, in which many young people are beginning to show a keen interest. One of its aims is to improve individual performances in sports and games by better training methods. Another is to find out how regular physical training affects the various organs of the body, such as the heart, lungs and muscles.

You may have heard your PE teachers talking about **physical fitness**, perhaps without fully understanding all that this term implies. For a sports scientist, it has a very precise meaning. There are five measurable components that make up physical fitness, all conveniently beginning with the letter **S**. They are **strength, stamina, suppleness, speed and skill**. Following the introduction of cross-curricular activities into the National Curriculum, in the future you should have more opportunities to study subjects such as sports science, which crosses the boundary between PE and Biology. Let's begin by looking more closely at the five S's which contribute to physical fitness.

STRENGTH

Weight-lifting, wrestling and boxing are obvious examples of sports where you need to be strong. Strength is related to the cross-sectional area of muscles. In general, the broader a muscle at its midpoint, the greater the force it can exert. When muscles are frequently worked to capacity, for instance to lift heavy loads, they respond by increasing in size and strength. By appropriate training, muscle size can be increased up to a point determined by the length of the muscle and the strength of the bones to which the muscle is attached.

Chart showing the general relationship between the height and body mass of top performers in certain sports and games. Gymnasts, for example, especially women, tend to be slightly shorter and heavier than average. The longer the line from the centre point to the activity, the greater the deviation of body type from the norm.



STAMINA

In activities such as long-distance running and cycling, muscles have to keep on working over a long period of time. This property of muscles, known as stamina or endurance, can also be improved by training. Aerobics, which combines continuous rhythmic exercise with music, provides an accessible and enjoyable way of building muscle endurance in both sexes.

SUPPLENESS

Suppleness, also called agility or flexibility, is important for many sports such as gymnastics, and can be increased by regularly making the full range of possible movements at each joint. Many of the rather difficult exercises practised in yoga can increase suppleness in a relatively short time.

However, because of the risk of injury, you should not attempt these exercises except under the guidance of an experienced teacher. Try instead a programme of bending and stretching exercises, from either a standing or lying position. Ask your PE teacher for advice and help.

SPEED

In almost all competitive sports, the fastest component of physical fitness which singles out winners from other competitors. More often than not, winning speeds are attained after much practice over many years.

SKILL

Many sports and games require special skills which need to be practised over and over again to be perfected. Spinning a cricket ball, for instance, does not depend so much on the size and strength of particular muscle groups, as on an unusual degree of co-ordination between muscle groups in different parts of the body. For anyone who wants to become skilled in a sport or game, the message is the same here as elsewhere in this section: keep on practising.

INDIVIDUAL DIFFERENCES

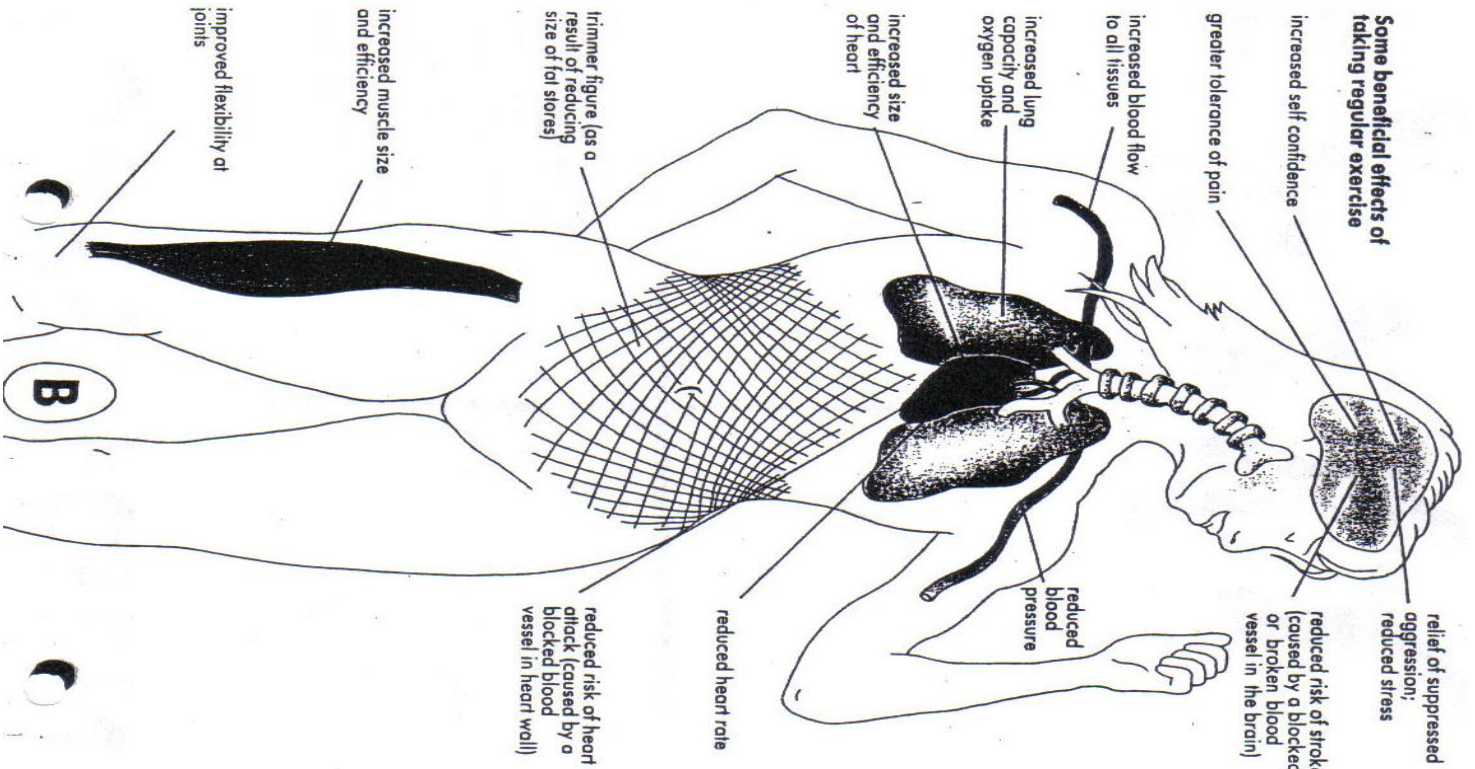
Individual differences such as height and body mass can matter a great deal if someone wants to become a top performer in any sport or game. Clearly there are exceptions to most rules, but in a particular sport, top performers of national and international class often conform closely to the same body type. The diagram on the front of the card shows the very general relationship that exists between body type and the sports and games in which people of those body types are most likely to excel! The important point to note is that there is something for everyone.

THE IMPORTANCE OF EXERCISE

Not many people who read this card will become top performers in any sport or game. Everyone, though, will gain some benefits to their general health from taking regular physical exercise. Some of these benefits are shown in the diagram on the right.

Thousands of years ago, when our distant ancestors were hunter-gatherers roaming great distances to catch their food, they needed strength, stamina and skill to catch the animals they ate. Today these same skills are developed and tested in sports and games. Sports science is the scientific study of these enduring human activities.

Some beneficial effects of taking regular exercise



QUESTIONS

- 1 Try to distinguish between the terms **sportsman/woman**, **games-player** and **athlete**. In what sense do they all have similar aims and objectives?
- 2 People may inherit physical features from their parents which contribute to their success in athletics, sports or games. What advantageous physical features would you hope to inherit if you wanted to become any **four** of the following: goalkeeper (football), centre forward (hockey), batsman (cricket), tennis player, high-board diver, long-distance runner, wrestler, gymnast, jockey, speed swimmer, high jumper?
- 3 Write an essay on the following sayings, relating them to sporting activities: (a) Practice makes perfect, (b) Nothing succeeds like success.
- 4 List the skills required by a top-ranking (a) netball centre forward, (b) winger in Rugby Union football, (c) slip-fielder in cricket, (d) archer.
- 5 Name three sports or games in which it is an advantage to be tall. Are you able to name a team game in which physical stature is of little or no importance?
- 6 Design a questionnaire to find out more about the sports and games in which members of your class take part. Your questionnaire should contain a section on proficiency, to discover if the skill level of those questioned is basic, average, above average, good or excellent. Set out your results using tables, charts and graphs where possible.

Sports Science Questions

From the worksheets above, answer the questions below,

1. Define the term Sports Science.
2. List the five S's in relation to Physical Fitness.
3. Name 3 sports where strength is important.
4. Define the term Stamina.
5. Name 2 sports where stamina/Endurance is important.
6. Give the 2 other names that suppleness can be called.
7. How can you increase Suppleness.
8. Name 2 activities where Suppleness is important.
9. Define the term Speed.
10. How can you improve Skill.
11. For each heading below give 1 benefit of exercise.
 - a. Brain
 - b. Heart
 - c. Lungs
 - d. Blood Vessels
 - e. Muscles
 - f. Skeleton