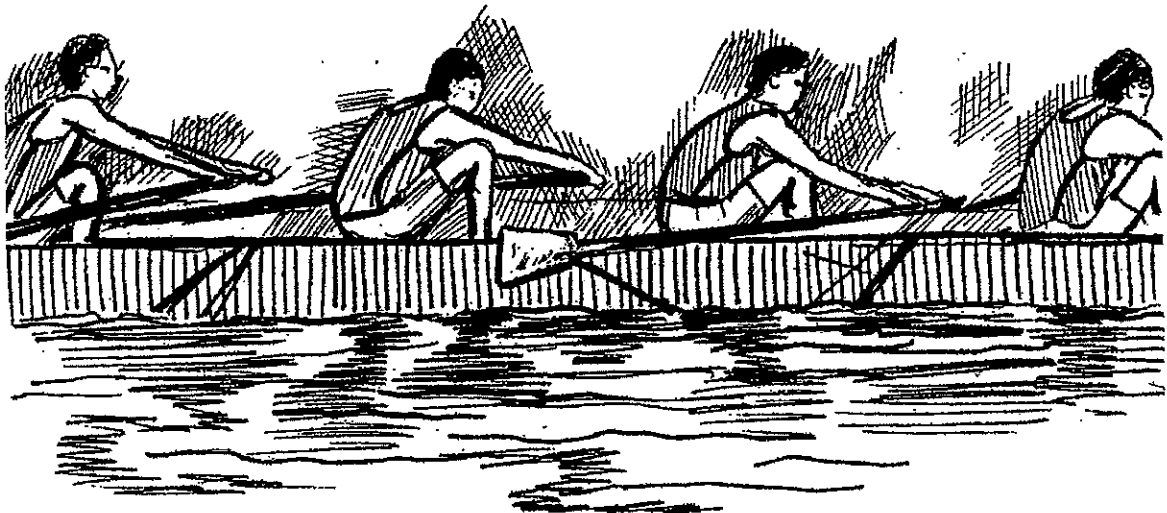


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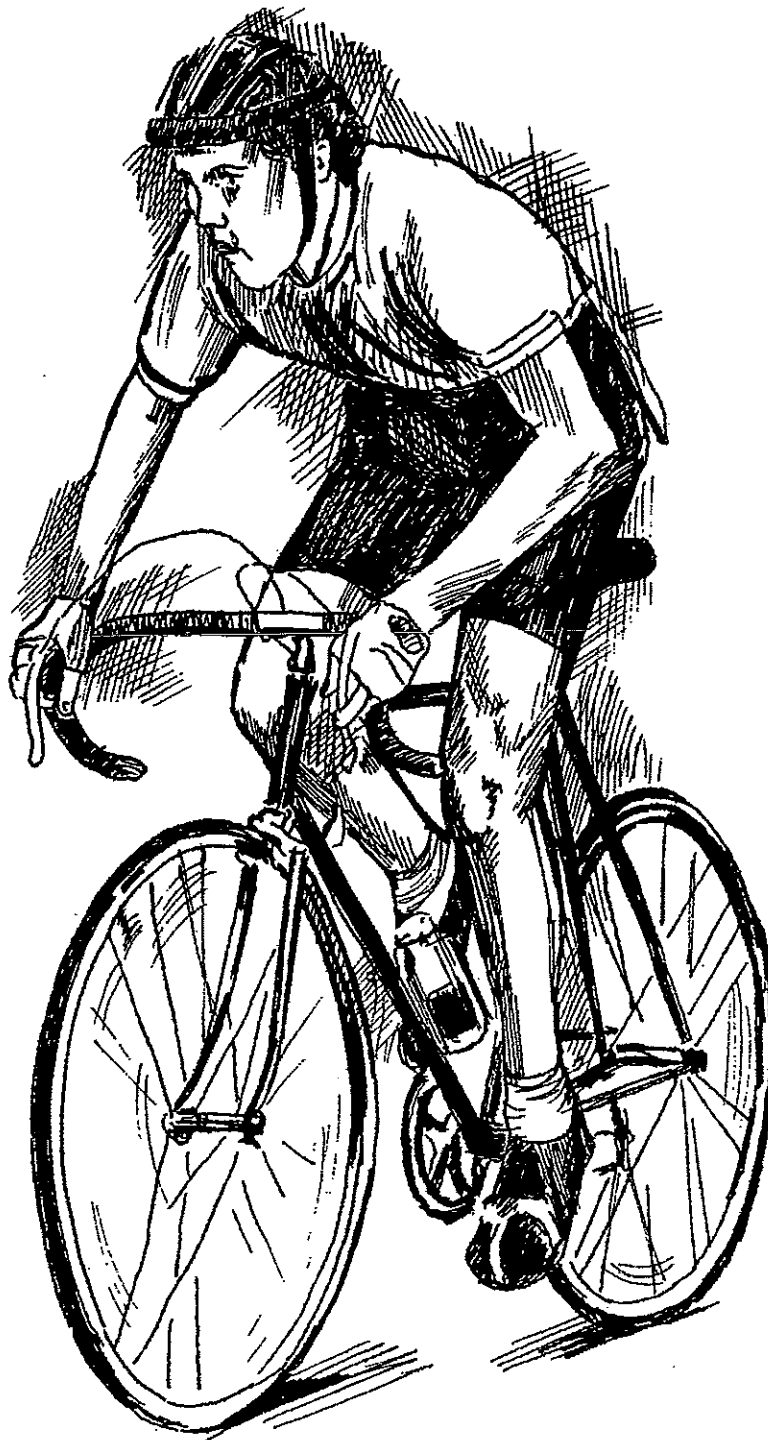


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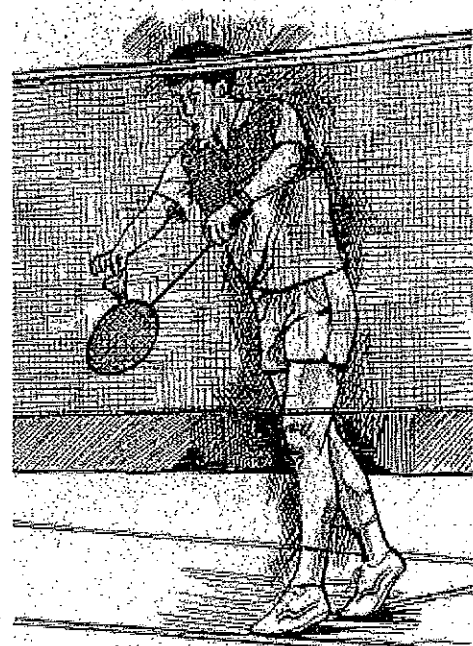
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SECTION 1
ACTIVITIES



TEAM ACTIVITIES/INDIVIDUAL ACTIVITIES

Look at the pictures of the two activities below. They are different because of the number of people involved.



The first picture shows a **team activity** – several people working together to achieve the end result. A team may only have two people in it as in badminton doubles or many people as in rugby.

The second picture shows one person playing against another so that they are on their own trying to win the game. This is an **individual activity**. An individual activity may also involve one person totally alone as in golf.

TASK

Complete the table below showing whether activities are 'team activities' or 'individual activities'.

Individual Activity	Totally alone	
	'On my own'	
Team Activity	2 team-mates	
	Many team-mates	

COMPETITIVE/NON-COMPETITIVE ACTIVITIES

Activities can also be **competitive** or **non-competitive**.

A **competitive** activity involves two or more people involved in a **contest** which each is trying to **win**. Individual and team activities can be competitive.

TASK

List below any competitive activities you can think of. Remember to say if they are team activities or individual activities.

Activity	Team	Individual

Competitive activities are either **directly competitive** or **indirectly competitive**.

If an activity is **directly competitive** your actions will have a direct effect on what your opponent is doing, eg if you play a variety of shots in badminton your opponent will have to move to return them and this could create a space for you to play a winning shot.

TASK

Choose any directly competitive activity and explain how your actions affected what your opponent was doing.

If an activity is **indirectly competitive** your performance will have no direct effect on your opponent's performance, eg running 100 metres.

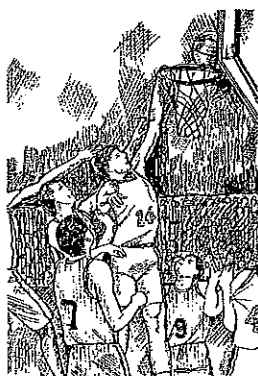
Activities which are **non-competitive** are done for either enjoyment, fitness or a sense of achievement. There is no winner in these activities as there is no contest.

TASK

List any non-competitive activities you can think of.

TASK

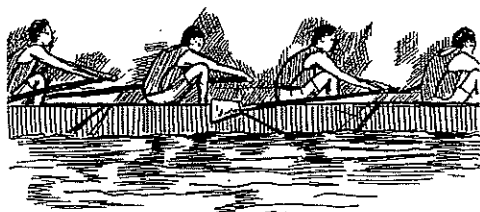
Look at the pictures below and say whether they are competitive or non-competitive and also whether they are individual or team activities.



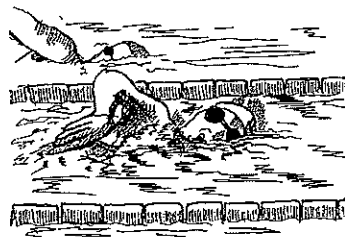
* Competitive/Non-competitive
Team/Individual



* Competitive/Non-competitive
Team/Individual



* Competitive/Non-competitive
Team/Individual



* Competitive/Non-competitive
Team/Individual

ROLES

For each of these types of activity people are required to take different **roles**.

A **role** is the part that the person plays in an activity eg judge, referee, coach, etc.

We will now consider the different roles and what each person does.

Player

This is the person who takes part in the activity.

Official

These are the people who are responsible for the activity taking place within the rules and makes sure the score, etc, is kept accurately.

There are many different officials. Some examples are shown below.

Referee : Timekeeper : Judge : Starter

TASK

Think of two **other** officials and fill in the chart below.

Official	Activity	Description of job

Coach

This is the person who works on the skill level and works out the tactics for the activity.

Supporter

In some activities it is useful to have someone who is able to hold you in position while you practice a skill, eg while learning a handstand. This person supports you.

Helper

Supporting is not the only way of helping someone. You may also feed the ball/shuttle to a partner to help them practise a skill or you may use a checklist to note down points about their performance so that they can find out what to improve.

Team-mate

Sometimes when you are practising you may work with someone as a member of the same team to practise a skill or tactic.

Opponent

In some situations you are required to act as an opponent so that the skill can be practised in a game-like situation.

TASK

Take each of the above roles and fill in the chart below explaining clearly how **you** fulfilled each role.

Role	Activity	How I fulfilled the role
Player		
Official		
Coach		
Supporter		
Helper		
Team-mate		
Opponent		

EQUIPMENT

The **equipment** you use for an activity can have an effect on how you perform.

Many athletes use spiked shoes which help them to run faster because the spikes grip the track. This **increases resistance**.

In some activities the participant wants to **decrease resistance**. Swimmers sometimes wear thin swimsuits which reduce the resistance and allows them to move through the water faster.

Much work has been done on the design of equipment and this has had an effect on the standard of performance possible. Tennis rackets are now much lighter while the power has been maintained. This is because of the material from which they are made.

Equipment can also prevent you performing well. If your trainers have poor soles you may find you slip on the floor and cannot control your movement when you want to change direction in a hurry eg moving back to the base position in badminton ready for the next shot.

TASK

Choose an activity where equipment helped your performance and explain how this happened.

Activity _____

Equipment _____

How the equipment helped your performance



Often certain equipment is used to ensure the **safety** of the performers.

Sometimes equipment is compulsory eg shin guards when playing in a competitive football match, while at other times the use of equipment is recommended eg wearing goggles when playing squash.

TASK

Choose two activities and name the piece of equipment which is used for safety, say whether it is compulsory or recommended and explain how it ensures safety.

Activity _____

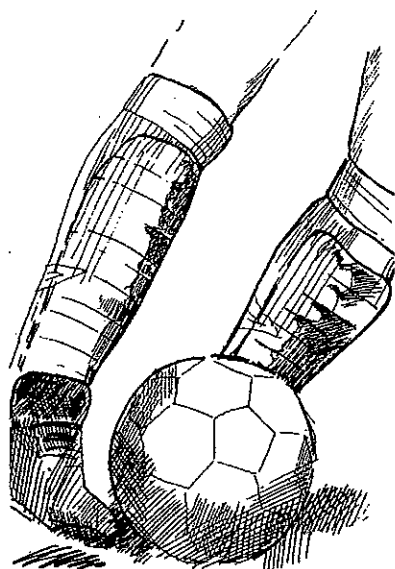
Equipment _____

How the equipment ensured your safety

Activity _____

Equipment _____

How the equipment ensured your safety



RULES

There are two different types of rules which affect the performance of the activity.

Formal Rules

These are the rules laid down by the governing body for the activity, eg

- you must serve diagonally across court in badminton,
- your feet must be in contact with the ground when you take a 'throw in' in football.

The rules which govern the activity can have a variety of effects on the activity.

Safety

Many rules ensure the safety of participants eg Rugby – a player cannot be tackled round the neck.

TASK

Name one activity and a rule. Say how this rule ensures the safety of the performers.

Activity _____

Rule _____

How it makes performance safe

Skills

Because of the rules you sometimes have to learn a certain skill, eg reverse stick in hockey because you are not allowed to play the ball with the round side of the stick.

TASK

Name one activity and a rule. Say how this rule makes you learn a certain skill.

Activity _____

Rule _____

Why you have to learn a skill

Restrictions

Some rules restrict the amount of movement allowed in the activity, eg

Basketball – You cannot take more than two steps while holding the ball

Athletics – You cannot move out of the circle when throwing the discus.

TASK

Name one activity and a rule. Say how this rule restricts movement.

Activity _____

Rule _____

How the rule restricts movement

Scoring

The rules often decide how points are awarded or goals scored, eg

Football – The ball must pass over the goal line, between the posts and under the crossbar of the opponents goal for a team to score.

TASK

Name one activity and a rule.

Say how this rule decides how a team/person scores.

Activity _____

Rule _____

How the rule decides scoring

Layout

The rules of the activity may decide the size and shape of the area for the activity to take place eg

Athletics (hurdling) – There will be a set number of hurdles in a lane with a set distance between each.

TASK

Name one activity and a rule. Say how this rule decides the layout for the activity.

Activity _____

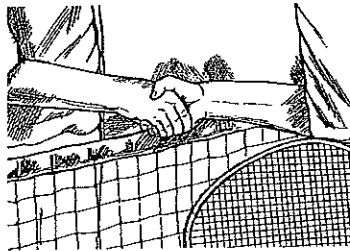
Rule _____

How the rule decides the layout

Informal Rules/Code of Conduct

These are the practices which are an accepted way of behaving during an activity though they do not appear in a rule book eg

Football – when a player is injured the opposing team kicks the ball out of play in order to allow the player to be treated.



TASK

Name two activities and an informal rule for each.

Activity _____

Informal Rule _____

Activity _____

Informal Rule _____

SCORING SYSTEMS

Objective/subjective scoring

Look at the two pictures below.



A

In picture 'A' the game of hockey is decided by the team scoring most goals. This is an example of **objective scoring**. There is no opinion involved.

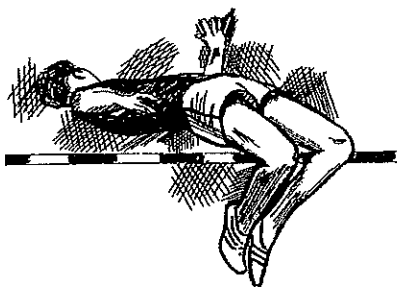


B

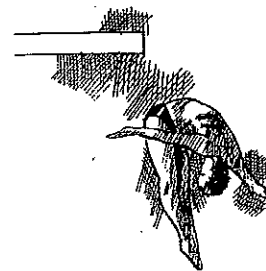
In picture 'B' the result will be decided by points being awarded by a panel of judges. This is an example of **subjective scoring** as the opinion of the judges is involved.

This allows us to see that objective scoring is based on fact while subjective scoring is based on opinion.

Look at the pictures below and label each according to the type of scoring involved.



Objective/Subjective



Objective/Subjective



Objective/Subjective



Objective/Subjective

Scoring Measurement

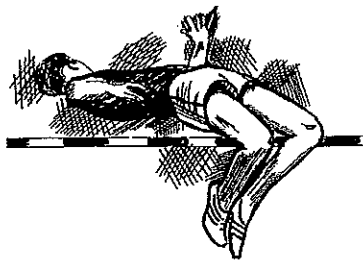
The result of an activity can be measured in many different ways.

The following can all be used to measure the result of an activity.

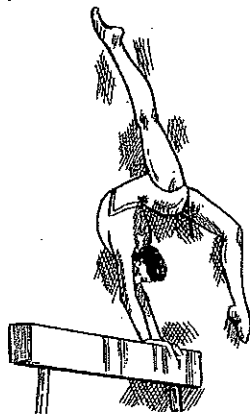
distance : goals : time : height : subjective points : objective points : runs : strokes : weight

TASK

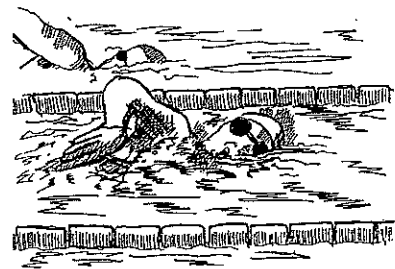
Look at the pictures below and say which of the above are used to measure the result in each activity.



(a)



(b)



(c)



(d)



(e)

Sometimes a high score is best and sometimes you need a low score to win.

TASK

Name two activities where you need a high score to win and two activities where you need a low score to win.

HIGH SCORE (1) (2)

LOW SCORE (1) (2)

TACTICS/STRATEGIES

If you are competing you are aiming to win. To do this you need to make the best use of your strengths and identify and exploit your opponent's weaknesses.

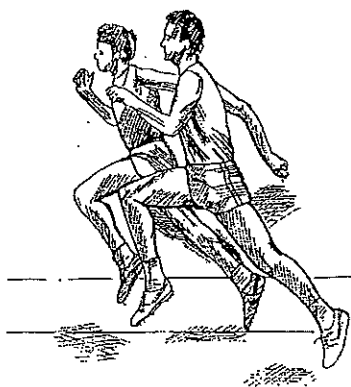
Often the competitors have a "game plan" worked out before the activity begins. This can be adapted at any time to cope with what is happening in the activity.

Here are some tactics which can be employed.

- 1 In target activities like bowling instead of bowling to hit the target the competitor may place a bowl to block their opponent's shot.
- 2 In badminton one player tries to move their opponent out of position to create room to play an attacking shot.
- 3 In a long distance race one competitor may tuck in behind a leader to protect themselves from the wind.
- 4 In an activity like high jump a competitor may choose to enter the competition at a later height so conserving their energy and putting pressure on their opponents.
- 5 In an activity which requires batting and fielding the team will place the players who are best at catching on the bases while those who can throw far will field deep (far out).
- 6 In a team game like football the team will try to have width and depth to their attack so as to give them many options when playing the ball.

TASK

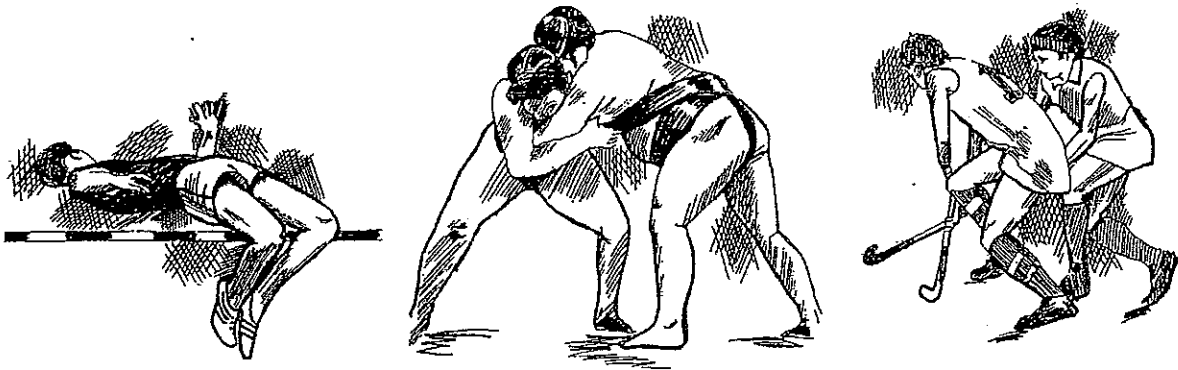
Name an activity which you have taken part in and describe the tactics you used to win the activity.



BODY TYPE

Not every body is the same shape. Each person is a mixture of endomorphy (how round the body is), mesomorphy (how muscular the body is) ectomorphy (how lean the body is).

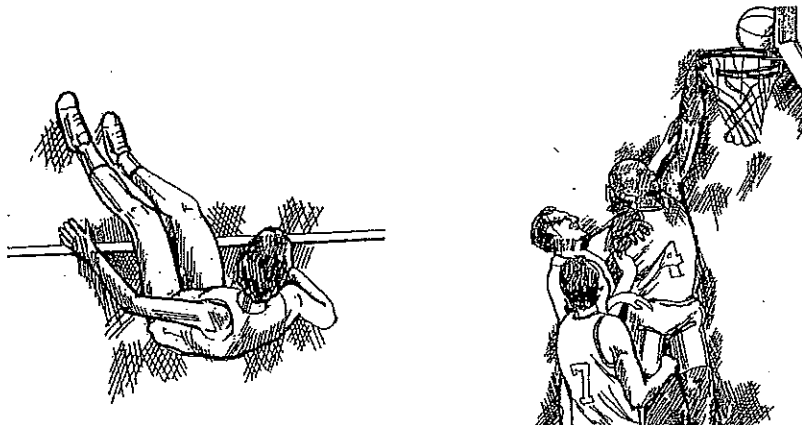
The classification of body types is known as somatotyping.



Different body types are suited to different activities.

TASK

Look at the pictures below and select which body type would be most suited to each activity.



PHYSICAL QUALITIES

The physical qualities a person has will have an effect on the activities they take part in.

Physical qualities include: height, strength, weight, shape, agility, good eye sight.

These qualities will also have an effect on the roles people take eg a referee needs good eyesight.

TASK

Fill in the table below to show the physical qualities needed to be successful in the activity/role given.

Activity/Role	Physical Quality
Rugby	
Judge in javelin competition	
High jumper	
Gymnastics	

PERSONAL QUALITIES

These are the qualities which are not able to be seen by looking at a person. However, they make the person who they are and have an effect on their performance in any given activity/role.

Personal qualities include: determination, motivation, leadership, concentration, consideration, fairness.

TASK

Fill in the table below to show the personal qualities needed to be successful in the activity/role given.

Activity/Role	Personal Quality
Spotter at a trampoline	
Gymnast learning a new skill	
Marathon runner having a bad race	
Captain of a hockey team	

ADAPTING ACTIVITIES

It is not always possible for young children to take part in the adult version of an activity. Sometimes the activities need to be adapted to allow children to take part successfully.

These adaptations can take various forms.

- 1 The **playing area** may be too large and may need to be made smaller so that the child can reach shots and will not get too tired trying to play on a full size area.
- 2 The **equipment** may be too big or heavy and smaller, lighter equipment can be used to allow the child to take part.
- 3 There may be too many complex **rules** for a child to understand. Only the basic rules may be used to allow the child to be able to take part.
- 4 The **scoring system** may be complicated and a simplified version may need to be used.
- 5 The **time** allocated to the activity may be too long for a child and a shorter time may be played.
- 6 The **number of players** involved in the adult version may be too high so a smaller number may take part so that the child will get more touches of the ball and will not feel left out.

Often more than one of these adaptations needs to be used to allow children to take part successfully.

TASK

Choose an activity and describe how you would adapt it to allow young children to take part.



SECTION 2
THE BODY IN ACTION

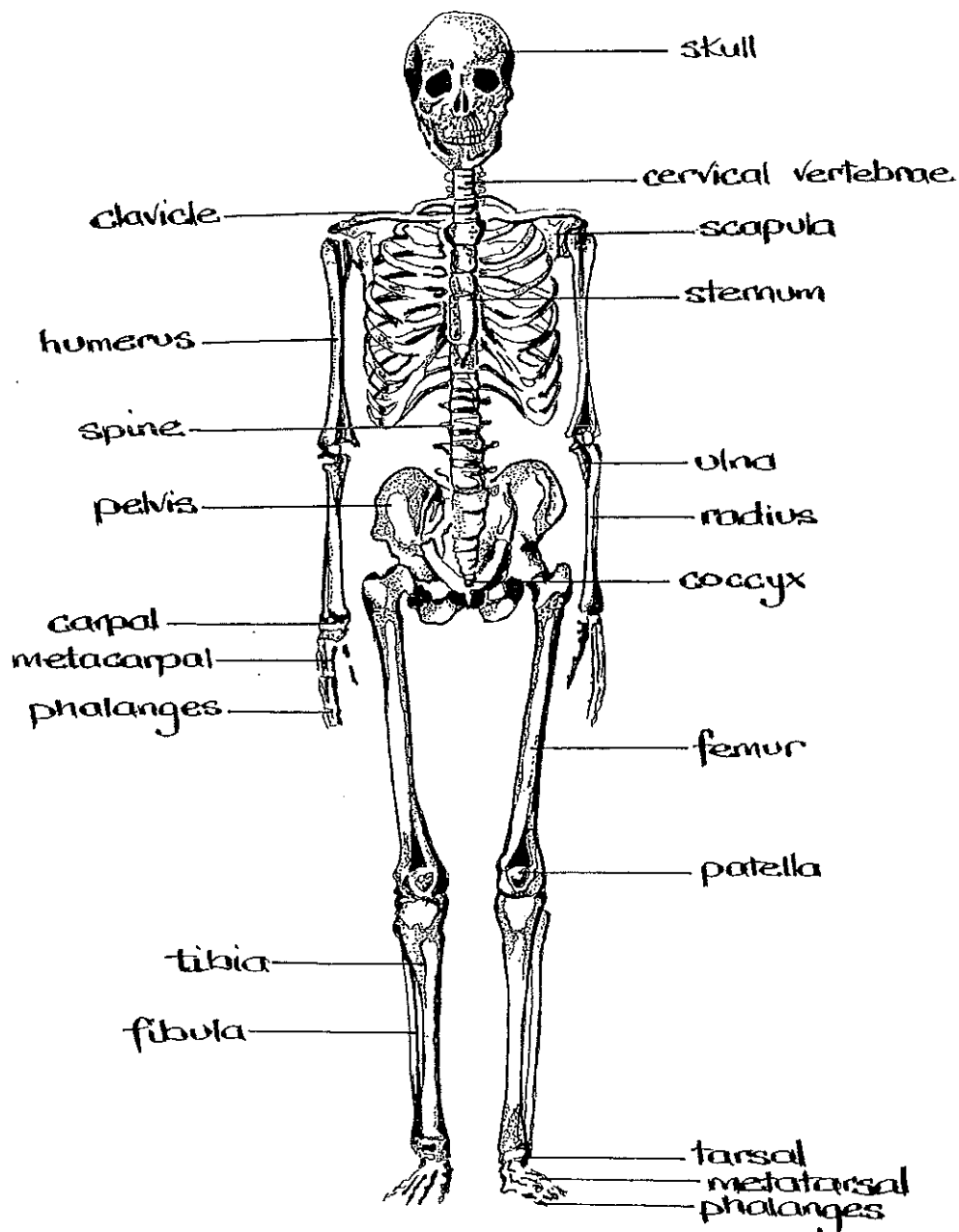


THE BODY

The Skeleton

The body is given a framework by the skeleton. The skeleton is made up of 206 bones. This gives:

- the shape of the body
- somewhere for the muscles to be attached
- protection for the internal organs, eg heart/lungs.



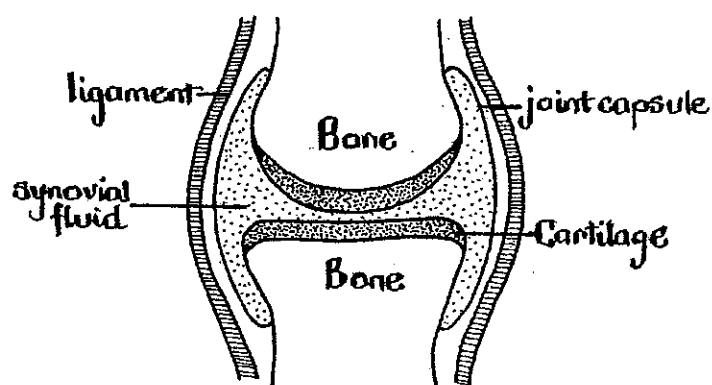
JOINTS

Anywhere that **two bones meet** is a **joint**. It is because we have joints that our body can move. Movement occurs at the joints with the help of muscles.

There are various kinds of joints. We have **fixed (immovable)** joints where there is no movement, **slightly movable** joints where a little movement occurs and **freely movable** joints where a lot of movement occurs.

The joints which affect our performance most in PE are the freely movable joints.

No matter where they are in the body they are made up in the same way.



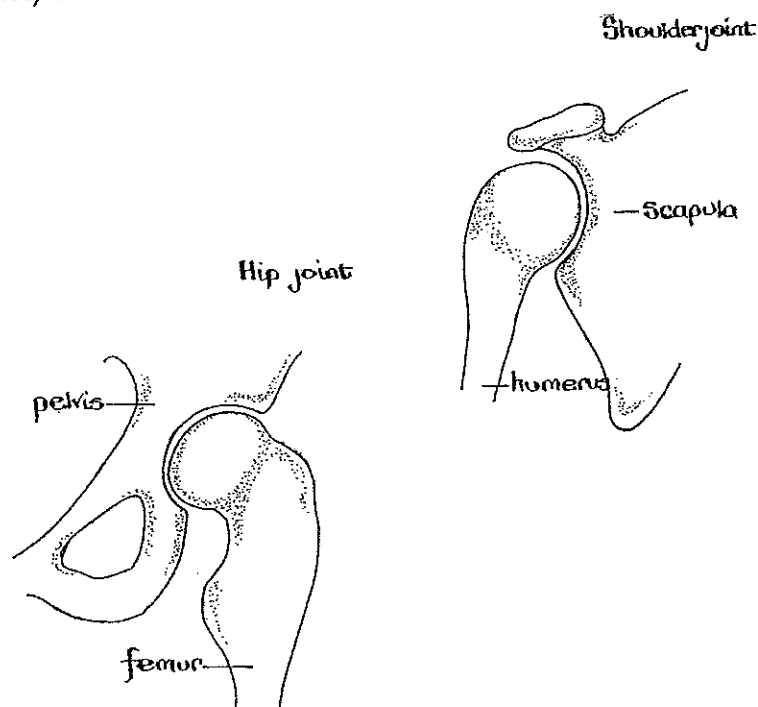
Within the category of freely movable joints we have different types in different areas of the body. The two main types we will look at are the Ball and Socket joint and the Hinge joint.

Ball and Socket Joint

This type of joint is only found at your hip and your shoulder. The rounded end of one bone (the ball) fits into a hollow (the socket) on the next bone.

This type of joint allows movement in a number of ways.

- 1 You can lift (flexion) or lower (extension) your arm/leg.
- 2 You can move your arm/leg away from the side of your body (abduction) and bring it back to the side of your body (adduction).
- 3 You can turn your arm in a full circle (rotation).

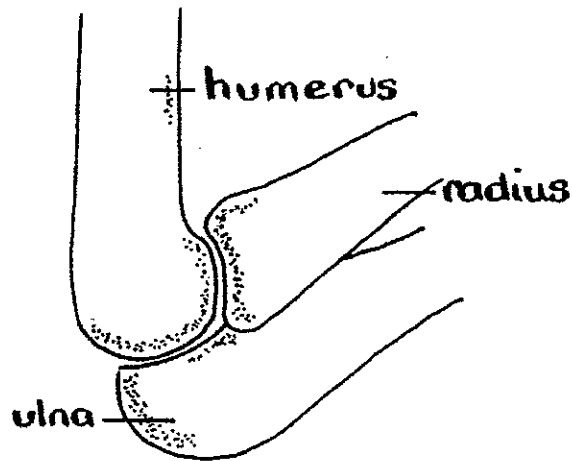


Hinge Joint

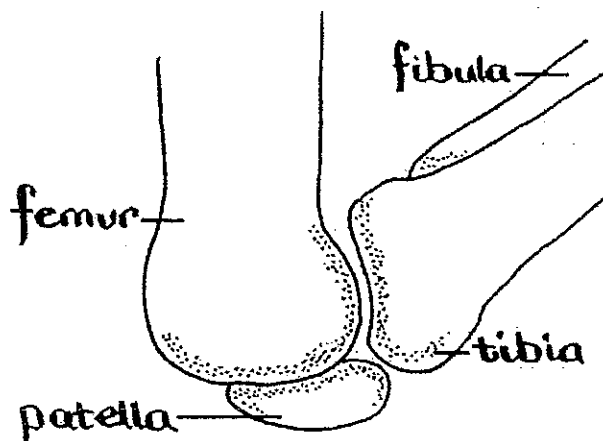
This type of joint is found at your knee and elbow as well as in your fingers and toes. It works like the hinge of a door.

It allows you to bend your arm/leg (flexion) and to straighten your arm/leg (extension).

Elbow joint



Knee joint



TASK

Fill in the chart below to show which types of freely movable joint are required for activities.

Joint	Activity
Hinge	
	Throwing a javelin
Ball and socket	

MUSCLES

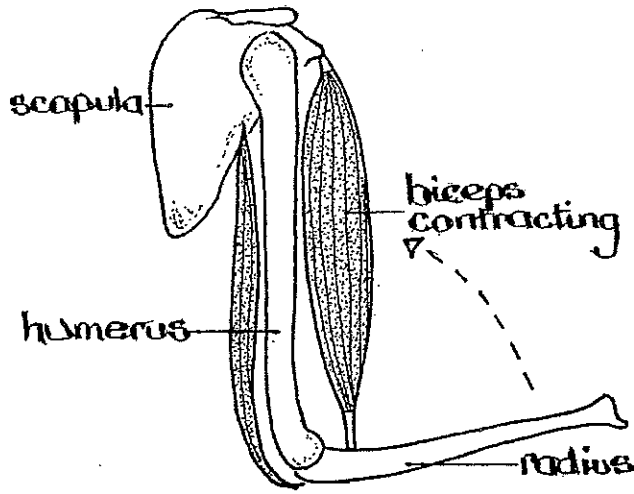
The muscles of the body allow movement at a joint. These muscles are known as skeletal muscles.

Each muscle is joined to a bone on either side of the joint which it is responsible for moving. The muscle is attached to the bone by a **tendon**. The tendon which is attached to the bone that does not move is known as the **origin**. The tendon which is attached to the bone that moves is known as the **insertion**.

Muscles always work in pairs. One muscle causes the movement and the other controls it.

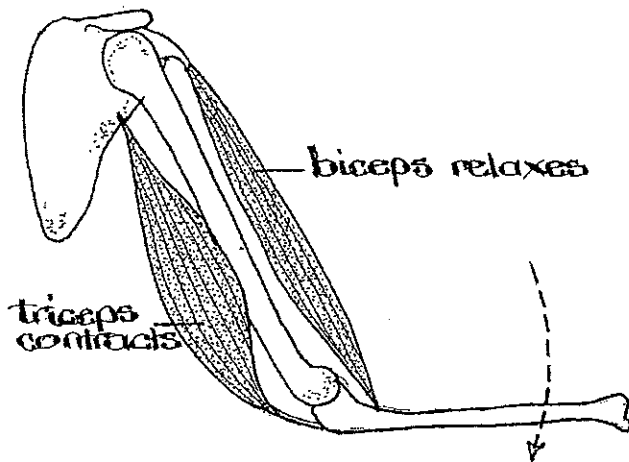
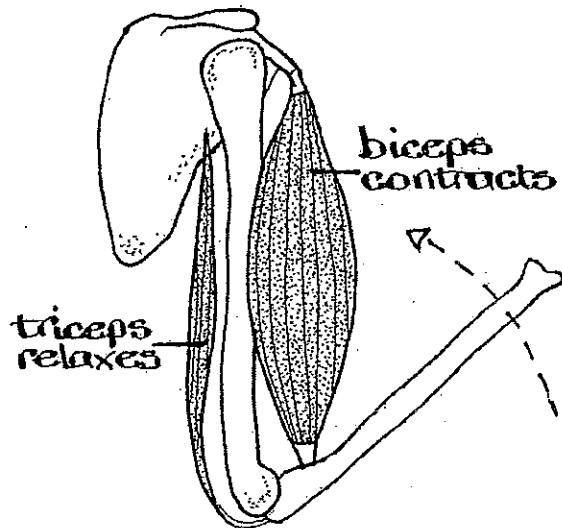
Muscles can only cause movement by pulling on the bone which it is to move. The muscle gets shorter (contracts). The bone which is moving gets nearer to the other bone. At the same time the muscle on the other side of the joint controls the movement by getting longer (relaxing).

This is shown on the next page in the diagrams of the arm bending and straightening.



1 The bicep begins to contract pulling the forearm towards the upper arm. The tricep gets longer controlling the movement.

2 The biceps continue to contract. The tricep is relaxing and controls the movement.



3 The tricep contracts. It pulls the upper arm downwards. The bicep relaxes controlling the action and the arm straightens.

TASK

Complete the chart below to show which muscles cause/control the action.

Action	Muscle causing action	Muscle controlling action
Kicking football	Front of thigh (quadriceps)	
Putting the shot		Front of upper arm (biceps)

The muscle which causes the movement to take place is called the **prime mover**. The muscle which controls the movement is called the **antagonist**.

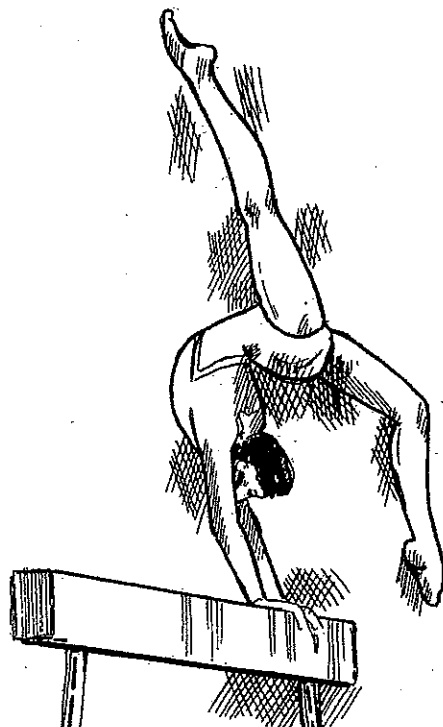
We have already seen that the muscles work by contracting (getting shorter). We now need to look at how the muscles contract to perform these actions.

Isometric Contraction

Sometimes the muscles contract to hold the body still. **No movement** takes place, eg a handstand.

Isotonic Contraction

This occurs when **movement** is caused by the muscles working, eg shot putting.



CARDIO-RESPIRATORY SYSTEM

Your body needs a regular supply of oxygen so that it can work. The harder the work gets the more oxygen is required.

To supply this means that your heart and lungs have to work together.

Respiratory System

As you breathe air is drawn into your lungs. The oxygen is absorbed into the blood. The blood carries the oxygen to the parts of the body which require it so they can work.

As a result of this work the cells of your body produce a waste product – carbon dioxide. The blood absorbs this from the cells and carries it back to the lungs where you can breathe it out into the air.

TASK

Describe what happens to your rate of breathing as you work harder eg by running 800 metres.

As I run 800 metres my body is working harder and _____

Circulatory System

This is made up of the heart and blood vessels.

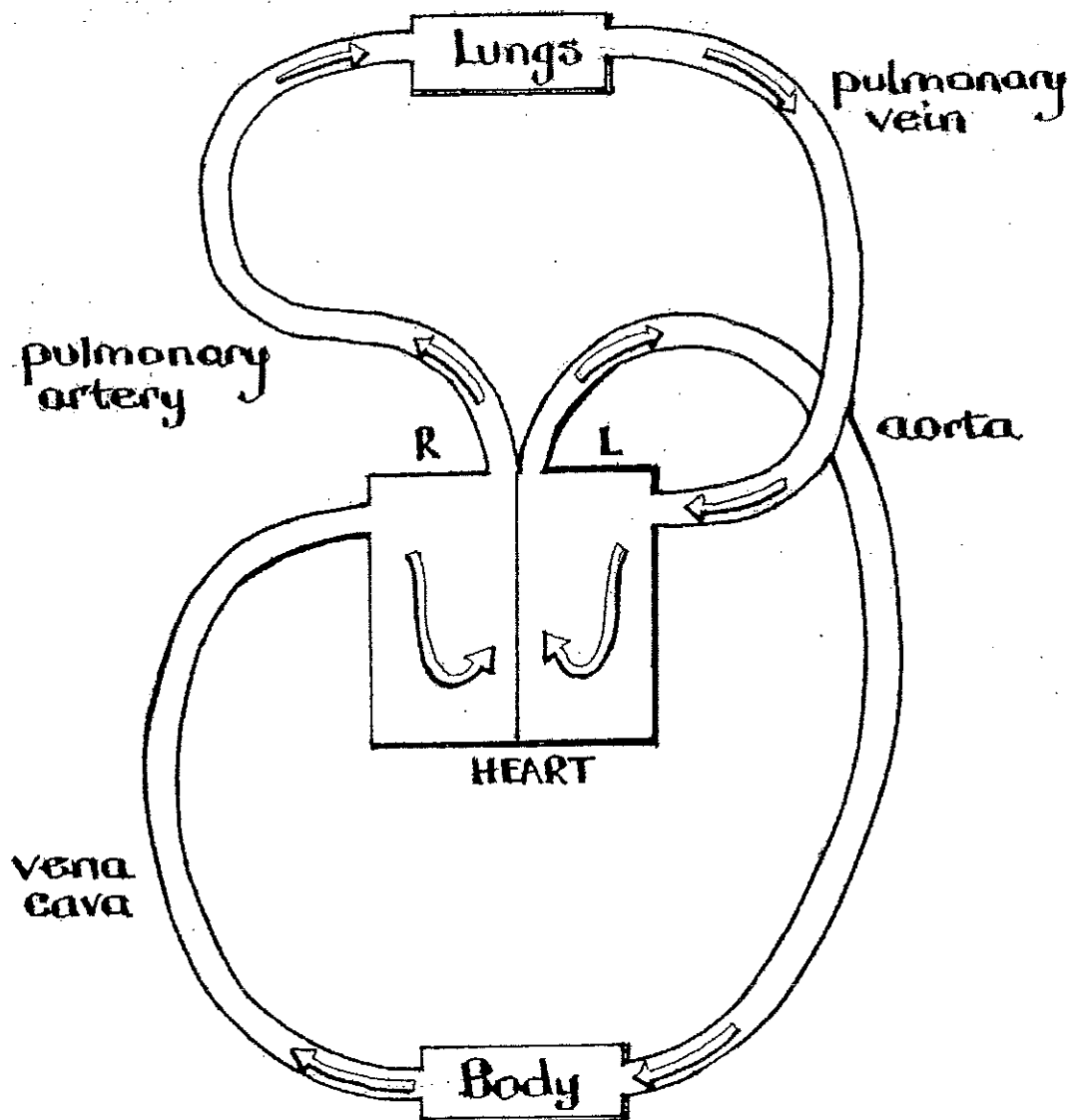
Through this system the blood flows continuously around the body.

The heart is the pump which sends the blood through the blood vessels.

The circulatory system is split into two halves.

- a The Pulmonary system which takes blood from the heart to the lungs where it collects oxygen and leaves carbon dioxide before returning to the heart.
- b The systematic circulation which takes the blood to the body where it leaves oxygen and collects carbon dioxide.

The diagram on the next page shows how these two systems work to supply the body with the oxygen it needs.



As your body works harder it needs more oxygen. The blood collects the extra oxygen from the lungs and carries it via the heart to the rest of the body. This means that the blood will need to travel from the heart faster to supply the body with oxygen.

TASK

If the body needs more oxygen how will the circulatory system be able to supply it?

As my body works harder I will get more oxygen because my heart will _____

FITNESS

What is fitness?

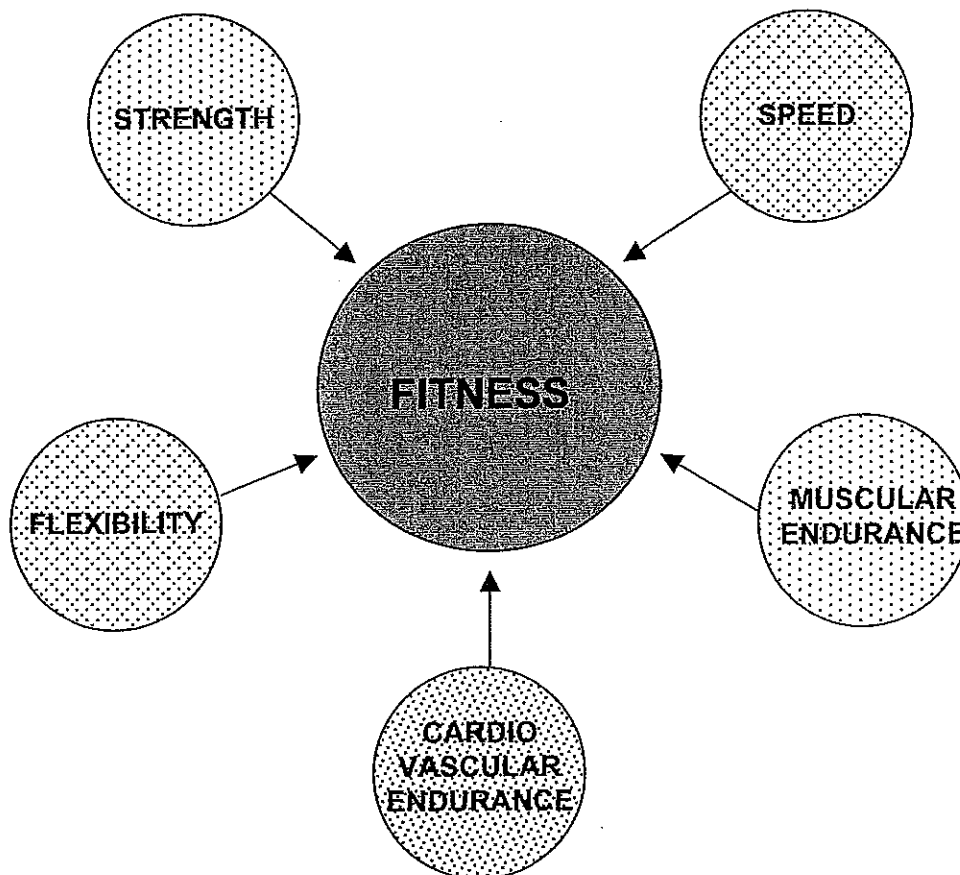
Fitness is what you need to take part in an activity at whichever level you choose.

It allows you to cope with the demands of the activity at your chosen level. The higher the level of your involvement, the higher the level of fitness you will require.

If you want to take part on a recreational level you do not need to be as fit as if you want to compete in your activity.

Different activities have different fitness requirements. A shot putter needs a lot of strength, while a marathon runner needs cardiovascular endurance.

Fitness is made up of a number of aspects as shown in the diagram below.



Aspects of Fitness

As shown in the diagram there are several aspects of fitness.

We will look at each of these individually.

Cardiovascular Endurance

This is also known as cardio-respiratory endurance.

This is needed to allow the heart and lungs to get oxygen to the muscles over a long period of time. This allows the body to work with oxygen – **aerobic** work.

Many activities require the whole body to keep working for a long time. The better the level of cardiovascular endurance the more able the person is to work at the same pace throughout the activity. If the level of cardiovascular endurance is poor they will tire quickly and their performance will drop.

TASK

List below three activities where cardiovascular endurance is important.

- 1 _____
- 2 _____
- 3 _____

Improving Cardiovascular Endurance

Cardiovascular endurance can be improved by training. The aim of training is to make the heart and lungs more efficient. That is the heart will send more blood (and therefore more oxygen) round the body with every beat and the lungs will take in more air (containing oxygen) with every breath.

This will allow the muscles to get the oxygen they need when they are working. It also allows the muscles to work longer without getting tired.

In order to improve the cardiovascular endurance you need to regularly work the heart and lungs in a more demanding way.

To do this you need to find out your **Training Zone**.

The maximum pulse is 220 beats per minute, minus your age. It is very difficult to work at your maximum so a training zone of 60% to 85% is advised.

The training zone for a 16 year old would work out as follows:

Maximum $220 - 16 = 204$

60% of 204 = 122

85% of 204 = 173

The training zone is from 122 – 173 beats per minute.

TASK

Now work out **your** training zone.

Maximum $220 - \text{your age ()} =$

60% of =

85% of =

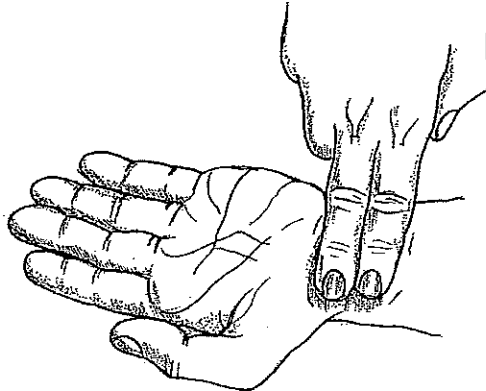
My training zone is from to beats per minute.

To improve cardiovascular fitness you need to work hard enough that your heart rate is kept within your training zone for 20 minutes.

Taking your pulse

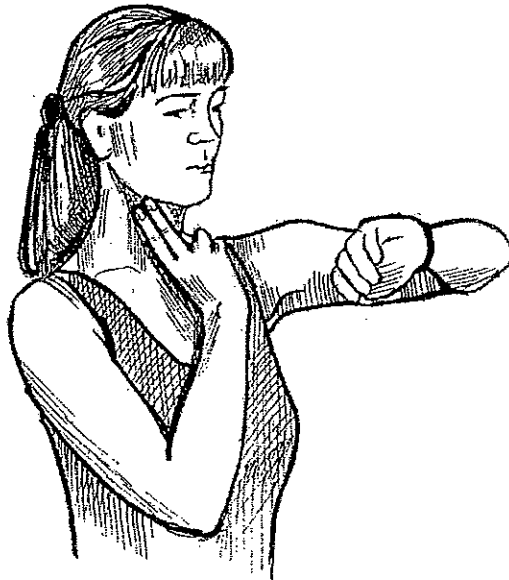
At your wrist

Place two fingers on your wrist in line with your thumb. Move them until you find a pulse.



At your neck

Place two fingers at the side of your neck just below your ear and jaw bone. Move them until you find a pulse.



Ask a friend to time for you.

Count the number of beats in 6 seconds.

Multiply by 10.

This gives you your heart rate.

My resting heart rate is _____.

Improving cardiovascular endurance

There are three main ways of training to improve cardiovascular endurance.

- 1 Long continuous running – the athlete runs over a long distance at a steady pace. This can be made more demanding by increasing the distance or by running faster over the same distance.
- 2 Varied pace running (fartlek training) – this involves a steady pace run over a long distance during which short burst of fast running, sprinting or jogging are included.
- 3 Interval training – this involves a set number of runs over a distance with a short rest in between each eg 8 x 200 metres in 36 secs with 45 secs rest.

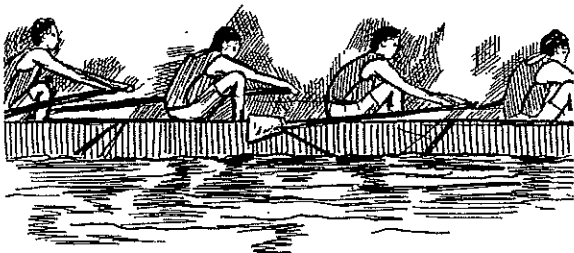
This kind of session can also be set up to run for a set time with a set time rest eg run 30 secs rest 30 secs. The session could also be run 200 metres, jog 200 metres.

Improving cardiovascular endurance will allow you to work harder and for a longer time without getting tired. This will help your standard of performance to remain high for a longer period of time.

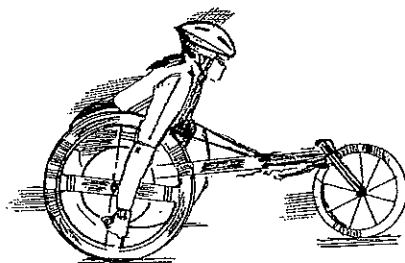
Muscular endurance

This is needed to allow a group of muscles to work over a period of time.

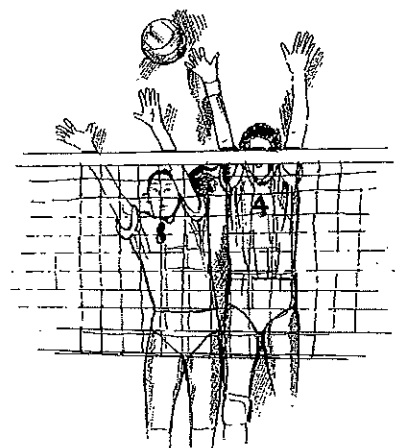
Some activities require a group of muscles to work continuously.



Rower's arms



Wheelchair athlete's arms



Volleyball player's legs

TASK

List two other activities where one group of muscles has to work continuously for a period of time.

- 1 _____
- 2 _____

Improving muscular endurance

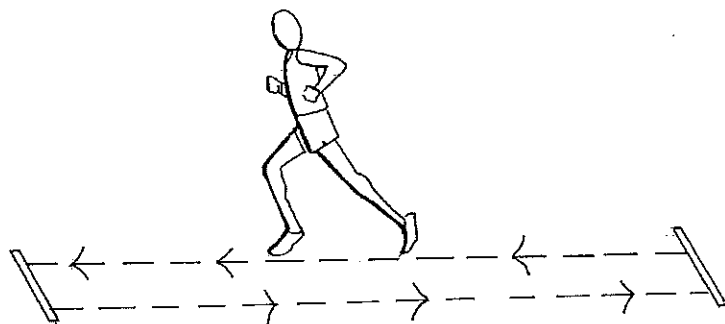
To improve muscular endurance you need to make the muscle group work more often or harder than usual.

There are two popular ways of improving muscular endurance.

- 1 Circuit training – the circuit has 6 to 10 stations. At each station an exercise appropriate to the muscle groups used in the activity is undertaken. The resistance in these exercises is usually body weight.

Examples of circuit exercises are shown below.

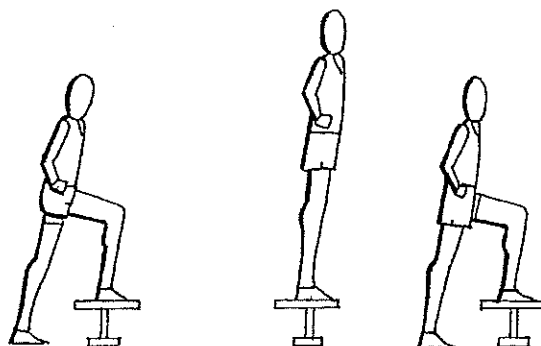
Shuttle run



Shuttle runs –
This exercise works the heart and lungs.

Step-ups

Step ups –
This exercise works the quadriceps.

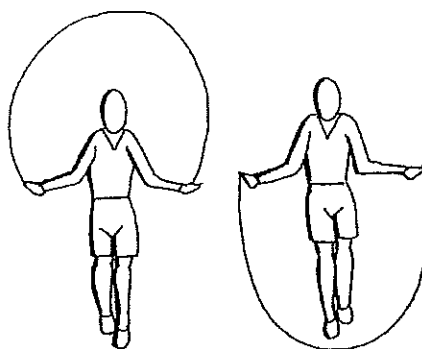


Squat thrusts



Squat thrusts –
This exercise works the quadriceps.

skipping



Skipping –
This exercise works a variety of muscle groups.

tricep dips



Tricep dips –
This exercise works the triceps.

Circuits can be arranged in two ways.

Time

A set time is spent on each exercise with a set rest between exercises.

Number

The maximum number of repetitions which you can do of each exercise is noted.

You complete the circuit three times doing half your maximum number on each circuit.

- 2 Weight training – this is usually done with fixed weights. The exercises appropriate to the activity are chosen and the circuits can be set up in a similar way to circuit training. In weight training you would note the maximum weight you could lift for each exercise and then lift 50% of that for 10-12 repetitions at each exercise.

Strength

This is needed to allow the muscle or groups of muscles to make a one off explosive effort.

Some activities require a one off effort and then the muscles can rest before they are asked to work again.

Strength is needed when any heavy weight needs to be carried, lifted, thrown or held.



TASK

List two other activities where the muscles are required to make a single effort and can rest before they are asked to work again.

- 1 _____
- 2 _____

Improving strength

To improve strength you need to make the muscle work against a resistance (heavy weight). This may be the performers own body weight or an additional weight.

As the muscle becomes stronger it is possible to increase the weight being moved. This allows the muscle to continue gaining strength.

When working for a specific activity it is necessary to identify the area of the body where increased strength is required and to work on improving strength in the appropriate muscles eg shot putt requires strong arms to push the shot putt away from the neck and long jump requires strong legs to push away from the take off board.



TASK

Identify which area of the body requires strength to be developed to help improve performance in the pictures below.



The most common method of training to improve strength is weight training.

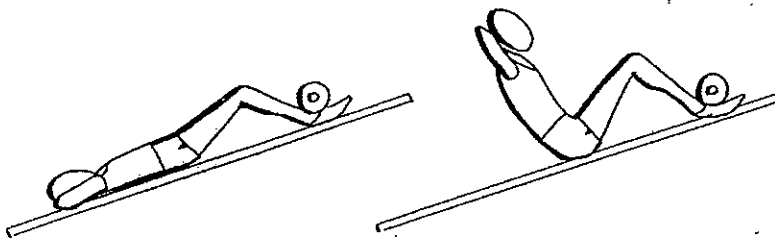
Weight training

The exercises will be selected to work groups of muscles where increased strength is required. Often the exercises are similar to the actions involved in the activity.

You would note the maximum you could lift on each exercise and then lift 75% of your maximum for 4-6 repetitions at each exercise.

Examples of weight training exercises are shown below.

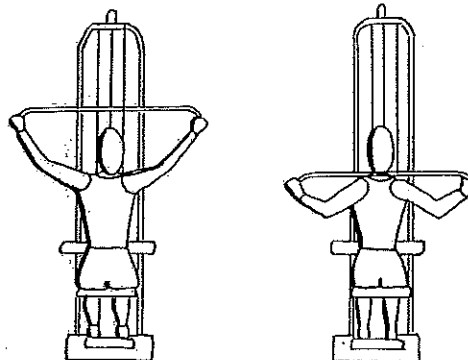
Inclined sit-ups



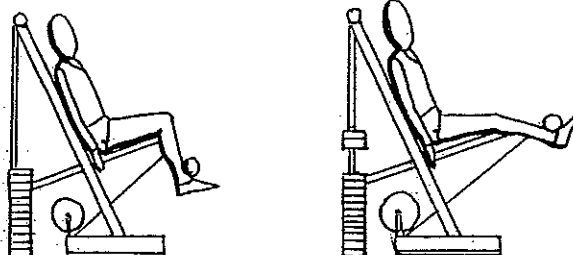
Inclined sit ups work the abdominal muscles.

pull-downs

Pull downs work the muscles behind the shoulders.



Leg extensions



Leg extensions work the quadriceps muscles.

Speed

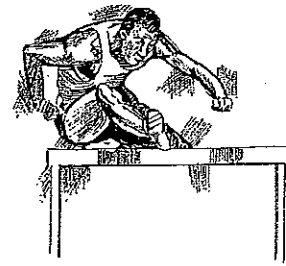
Speed is needed either to move the whole body over a distance very quickly or to move a part of the body very quickly. Many activities require the whole body or part of the body to move fast.



whole body



part of the body (arm)



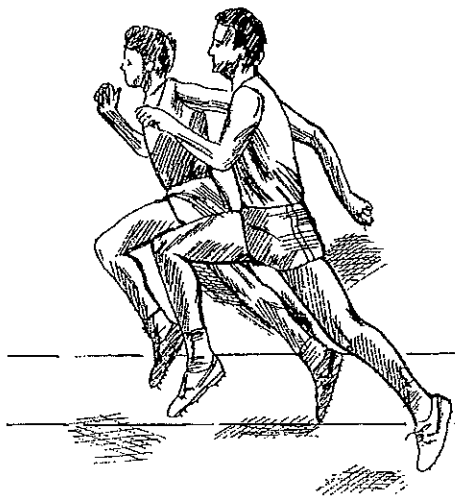
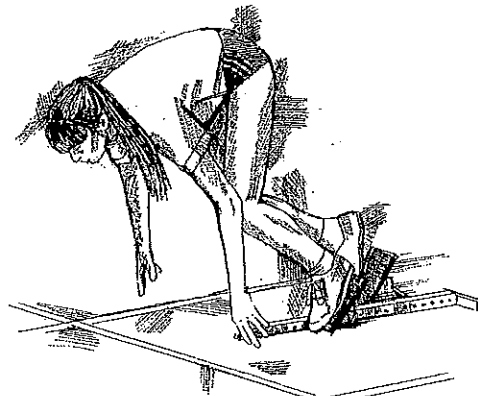
whole body

A sprinter requires the whole body to move fast to win the race. A footballer needs to move their whole body fast to get to the ball first. A volleyball player needs to move fast to be in position to play the ball.

A javelin thrower needs to move their arm fast to throw the javelin further. A football player moves their leg fast to kick the ball harder. A badminton player moves their arm fast to smash the shuttle.

Reaction time

In different activities the participant is required to react to a stimulus. This may be a sound, eg a starting pistol, or it may be a visual sign, eg the flight of a shuttle. The time it takes to react to the cue is known as reaction time.



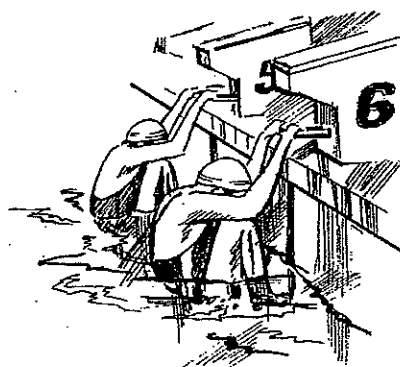
Colin Jackson and Linford Christie both had the catch phrase "Go on the B of bang."

TASK

Explain what you think this saying means.

TASK

Say what each of the participants in the following sports would react to.



It is important to react quickly to the stimulus so that you get an advantage in a race. In a game if you react quickly you should be in a good position to receive a pass or play the ball successfully.

You can improve your reaction time by practising the action required, eg sprint starts, movement from the ready position to play the shuttle in badminton.

Running speed

This is dependant on your stride length, frequency of your stride, strength of your muscles and the endurance of your muscles.

Improving speed

Training for speed involves the muscles working fast over short spells eg sprints across a badminton court when trying to improve speed for badminton.

It will also include work to strengthen the muscles so that they can move fast without injury. Especially important for throwing events and similar actions.

Flexibility exercises also need to be included so that the muscles allow a greater range of movement perhaps giving a longer stride length.

By working at near maximum speed over extended periods of time the muscles will learn to cope with the build up of lactic acid and will be able to work longer at higher speeds without getting tired.

TASK

Name three activities and say why speed is important in each.

Activity _____

Speed is important because _____

Activity _____

Speed is important because _____

Activity _____

Speed is important because _____

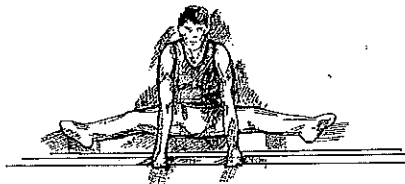
Flexibility

This is the range of movement at a joint. Many activities require good flexibility. Good flexibility also helps to prevent injury as the muscles are able to work without being strained.

Good flexibility also makes performance in activities better.



Good shoulder flexibility allows this swimmer to reach further into the water and have a bigger stroke.



Good hip and spine flexibility allows this gymnast to adopt this position.



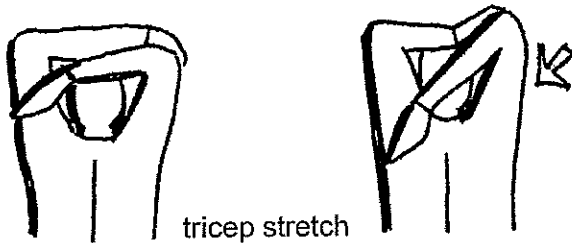
Good shoulder flexibility allows this softball player to take the bat further back so that the ball will be hit harder.

Improving flexibility

It is necessary to select a number of stretching exercises which stretch the muscles across the appropriate joint(s) for the activity.

Each stretch would be repeated about 10 times holding the position for about 10 seconds each time. Over a period of time the muscles would gain elasticity and would be able to stretch further without pain.

Some examples of stretching exercises are shown on the next page.



TASK

Name two activities where improved flexibility would help performance.

State the joint(s) involved and the effect improved flexibility would have.

Activity _____

Joint _____

Effect on performance _____

Activity _____

Joint _____

Effect on performance _____

PRINCIPLES OF TRAINING

There are certain principles of training which must be considered when organising a training programme.

These are:

- **Intensity** – this is how hard you work eg number of repetitions and/or weight being lifted. You need to make sure you are working hard enough to gain an improvement in the aspect of fitness involved. Too little work will result in no improvement.
- **Frequency** – this is how often you work. You need to decide how often you are going to train per week.
- **Duration** – this is the length of each training session.
- **Specificity** – this makes sure that the programme of work is going to improve the appropriate aspects of fitness for your activity and works the correct muscle groups.
- **Progressive overload** – this is the means by which you make your body work harder so that your fitness level will keep improving. This may be done by increasing the weight lifted, the number of repetitions done of any exercise or the distance run.
- **Reversibility** – this is the loss of fitness when you stop training. This means that if you interrupt your training for any reason eg injury you cannot restart at the level of work you were at. You need to go back to a previous stage.

TASK

Choose an activity and fill in the section below to show how the principles of training can be applied to training for that activity.

Activity _____

Intensity _____

Frequency _____

Duration _____

Specificity _____

Progressive overload _____

THE TRAINING SESSION

Training sessions may vary from one activity to another but there are basic principles which should be applied.

Warm up

This is absolutely essential in order to prepare your body for the work to come in the session. It increases the flow of blood to the muscles which allows them to work better and helps to prevent injury. It raises the heart rate in preparation for further work.

This will include two and sometimes three parts depending on the activity.

- 1 Jogging – this will raise your heart rate and send more blood to the muscles.
- 2 Stretching – this will stretch the muscles allowing them to move more easily. It will also help to improve the flexibility of a joint.
- 3 For some activities it is also necessary to practice the actions which are included in the activity.

Fitness work

This is the part of the session when you work on the aspects of fitness which are appropriate to the activity.

Skills work

This is the part of the session where work is done on improving the skills and techniques involved in the activity.

Game situation

This is the part of the session when the skills, etc, which have been worked on during the skills part of the session are put into practice. This will not necessarily be a full sided game but may be a small sided or conditioned games to allow for the use of the skills being practised.

Warm down

This part of the session gradually brings the body back to a 'resting state' after a period of activity. It will include light jogging and stretching and will return the heart rate to resting and remove the waste products of exercise (lactic acid) from the muscles, helping to prevent stiffness in the muscles.

TASK

Choose an activity and make up a training session for that activity under the headings given.

Warm up _____

Fitness work _____

Skills work _____

Game situation _____

Warm down _____

FITNESS TESTING

In order to assess your level of fitness it is necessary to go through a series of tests designed to test various aspects of fitness.

These are used to give you an idea of your strengths and weaknesses and to monitor progress during your fitness training programme.

Results of fitness tests should be used to develop your training programme. As your results improve you know that your programme is working and you can see which areas you need to make more difficult to maintain improvement.

Fitness tests should not be confused with methods of training.

Methods of training are used to develop the aspects of fitness highlighted as a result of the fitness tests.

Examples of fitness tests and the aspect of fitness they test are given below.

Cardiovascular Endurance	12 minute run test 20 metre shuttle run test
Muscular Endurance	Press ups Sit ups
Speed	5 metre shuttle run test
Strength	Standing broad jump Vertical jump Grip strength dynamometer Back strength dynamometer
Flexibility	Sit and reach test Shoulder lift test

TASK

You will undertake the tests described in the next section of the book recording your results in the appropriate spaces.

Cardiovascular fitness**1 12 minute run test**

This test requires you to run round a circuit for 12 minutes.

At the end of the test the distance you ran in the 12 minutes will be noted.

Advice:

- do not start too fast
- keep a steady pace this makes it easier to keep going
- be determined to complete the time

Date

Distance run

2 20 metre shuttle run test

This test takes place over a 20 metre track. You need a partner to count for you.

You are required to run from one end of the 20 metres to the other. The aim is to reach the far end at the 'bleep'.

This test is arranged in stages. Each stage gets faster than the one before.

You are to try to keep within the 'bleeps' for as long as possible. If you miss two 'bleeps' in succession you retire.

Your partner will keep a note of the stage and number of runs within the stage you are at.

The result sheet will give you the V02 Max for you.

This gives an indication of how efficiently your body uses the oxygen you breathe in.

Advice:

- do not start too fast
- keep to the bleeps
- be determined to last as long as possible

Date

Stage : Run

V02 Max

Muscular Endurance

1 Sit ups

This test is done in pairs.

Sit-ups

One person lies on his/her back with their knees bent and feet flat on the floor. Their arms should be crossed on their chest. Their partner holds their feet on the floor.



A sit up is completed by sitting up until the elbows touch the thighs and lying back until the middle of the back touches the mat.

The number of sit ups done in one minute is counted by your partner and recorded below.

Date

Number of sit ups

Details of percentile norms for ages 13-16 are given on page 53. Check where you are on the scale for your age.

2 Press ups

This test is done in pairs.

One person lies on his/her front with their hands under their shoulders. Straighten the arms into a press up position.

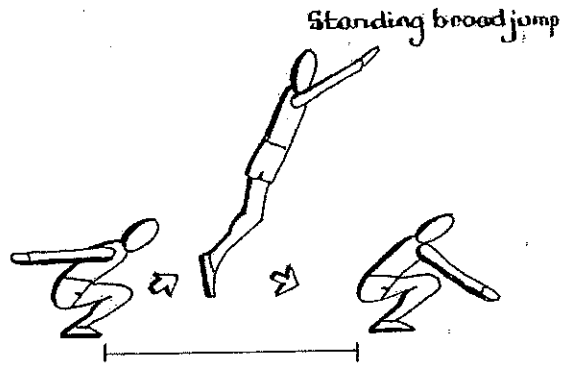
A press up is completed by bending the arms at a right angle and straightening them again.

The number of press ups done in one minute is counted by your partner and recorded below.

If you cannot manage full press ups then from the press up position drop the knees to the ground and continue as the rest of the test.

Date

Number of press ups

Strength**1 Standing broad jump**

Stand with both feet behind the take off mark. Bend your knees and with the help of swinging your arms jump up and forward to land as far forward on the mat as possible. Keep your feet where you land and read off the distance to the back of the furthest back heel.

Do the test twice and record your best result below.

Date

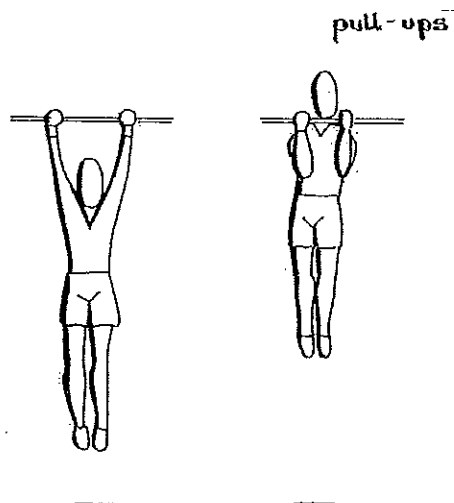
Result cms

Details of percentile norms for ages 13-16 are given on page 54. Check where you are on the scale for your age.

2 Pull ups (boys)

The bar is set at a level that allows you to hang with your arms and legs straight and clear of the floor. Grip the bar with your palms towards you.

From the hanging position pull your body up until your chin is above the bar, then lower to the hanging position. This action should be repeated as often as possible. Your body should not swing and your legs lifted during the test.



Record the number of pull ups you manage below

Date

Number of pull ups

Details of percentile norms for ages 13-16 are given on page 55. Check where you are on the scale for your age.

3 Bent arm hang (girls)

The bar is set at approximately standing height. Grip the bar with your palms towards you. The starting position is hanging with your arms bent so that your chin is above the bar. This position is held as long as possible.

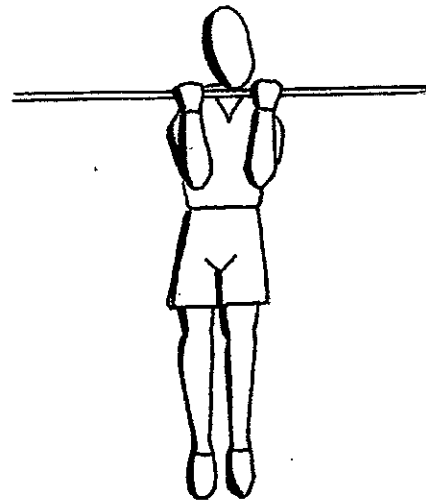
The stopwatch is started as soon as you are in the hanging position and stopped when your chin drops below the fingers.

Record the time below.

Date

Time

Details of percentile norms for ages 13-16 are given on page 55. Check where you are on the scale for your age.



Speed

1 10 metre shuttle run test

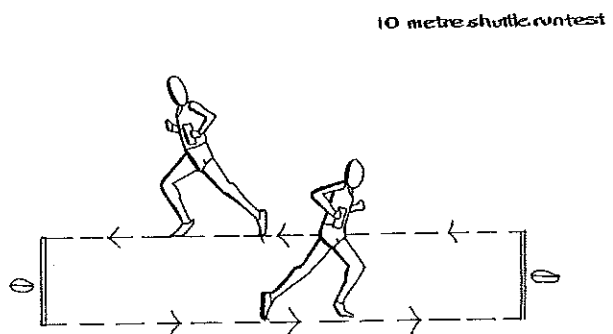
Two parallel lines are marked on the floor 10 metres apart. Two bean bags should be placed just behind one of the lines. The test starts behind the other line. On the signal "Are you ready? Go." you sprint across, pick up one bean bag, sprint back and **place** it over line. You then turn and sprint to collect the other bean bag **placing** it just over the starting line. The run is timed from the command go until the second bean bag is placed over the starting line.

Record your time below.

Date

Time

Details of percentile norms for ages 13-16 are given on page 56. Check where you are on the scale for your age.



SIT AND REACH

2 ~~50-metre-sprint test~~

Sit on the floor with your feet flat against the sit and reach box. Your legs should be straight.

Reach forward slowly pushing the marker forward as far as possible.

Do not bounce.

Record your score below.

Date

Distance

~~50-metre-sprint test~~**1** ~~Sit and reach test~~
50 m SPRINT.

From a sprint start you should sprint as fast as possible to a finishing line 50 metres away.

Your time for this sprint is recorded below.

Date

Time

Details of percentile norms for ages 13-16 are given on page 57. Check where you are on the scale for your age.

Percentile Norm Tables

Percentile norms for sit ups - boys

Age \ %-ile	13 years	14 years	15 years	16 years
90	54	54	55	59
80	50	51	50	53
70	46	48	48	50
60	44	45	46	47
50	41	42	44	45
40	39	40	41	42
30	36	38	39	39
20	33	35	36	35
10	29	31	31	30

Percentile norms for sit ups - girls

Age \ %-ile	13 years	14 years	15 years	16 years
90	48	48	50	50
80	43	43	45	45
70	40	40	41	41
60	37	38	40	40
50	35	35	37	37
40	33	33	33	34
30	31	31	31	31
20	27	28	28	28
10	23	24	25	25

Percentile norms for standing broad jump - boys

Age \ %-ile	13 years	14 years	15 years	16 years
90	211	228	239	244
80	201	218	228	234
70	193	208	221	228
60	188	201	210	221
50	183	193	206	216
40	175	188	200	208
30	168	180	193	200
20	157	170	183	190
10	147	157	170	175

Percentile norms for standing broad jump - girls

Age \ %-ile	13 years	14 years	15 years	16 years
90	188	190	193	194
80	180	183	183	185
70	173	173	175	180
60	160	161	162	165
50	152	155	156	160
40	152	155	156	160
30	147	150	151	153
20	137	142	143	145
10	127	128	129	131

Percentile norms for pull ups – boys

Age \ %-ile	13 years	14 years	15 years	16 years
90	9	11	12	13
80	7	9	10	11
70	6	7	8	9
60	4	6	7	8
50	3	5	6	7
40	2	4	5	6
30	2	3	4	5
20	0	1	2	4
10	0	0	1	2

Percentile norms for bent arm hang – girls

Age \ %-ile	13 years	14 years	15 years	16 years
90	28	31	34	30
80	19	21	23	21
70	14	16	15	16
60	10	11	10	10
50	8	9	7	7
40	5	6	5	5
30	2	2	4	4
20	2	2	2	2
10	0	0	0	0

Percentile norms for 10 metre shuttle run – boys

Age \ %-ile	13 years	14 years	15 years	16 years
90	9.3	9.0	8.8	8.7
80	9.6	9.3	9.1	9.0
70	9.9	9.5	9.3	9.1
60	10.1	9.7	9.5	9.3
50	10.2	9.9	9.7	9.5
40	10.4	10.1	9.8	9.7
30	10.7	10.3	10.1	9.8
20	11.0	10.7	10.4	10.1
10	11.4	11.3	11.0	10.8

Percentile norms for 10 metre shuttle run – girls

Age \ %-ile	13 years	14 years	15 years	16 years
90	10.0	9.9	9.9	9.8
80	10.4	10.3	10.1	10.1
70	10.6	10.5	10.4	10.4
60	10.9	10.8	10.7	10.6
50	11.2	11.1	11.0	10.9
40	11.4	11.3	11.2	11.1
30	11.7	11.6	11.5	11.4
20	12.1	12.0	11.9	11.8
10	12.8	12.7	12.6	12.5

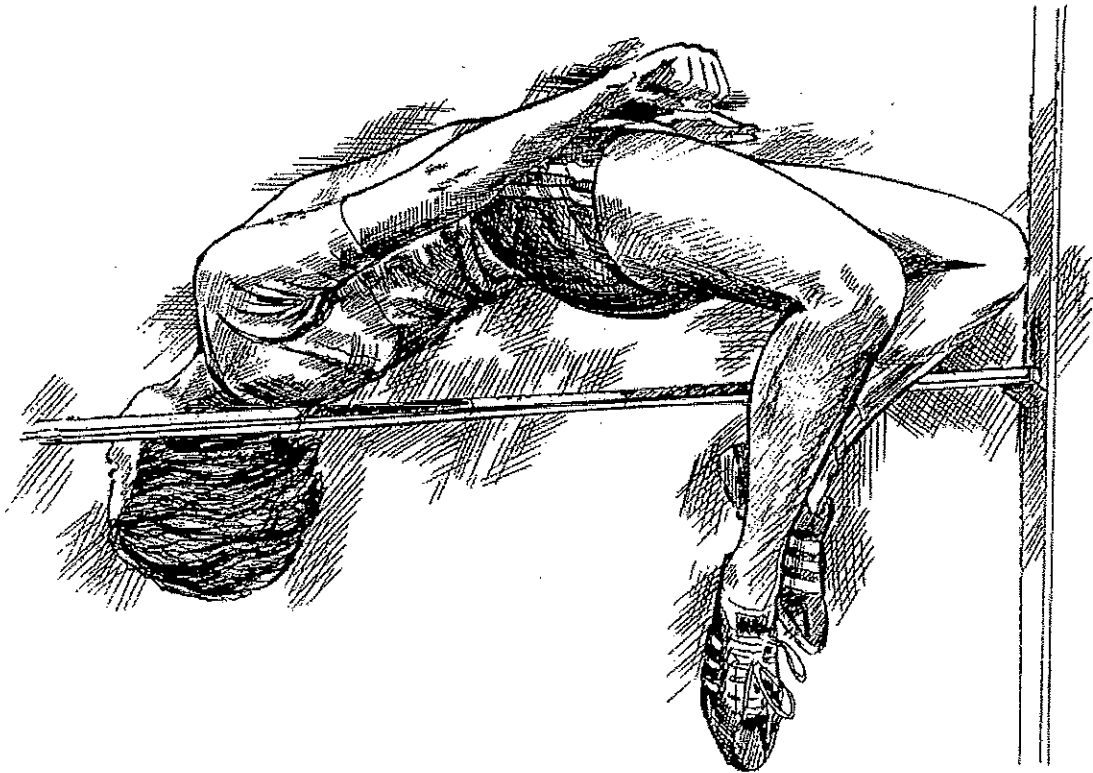
Percentile norms for 50 metre sprint – boys

Age \ %-ile	13 years	14 years	15 years	16 years
90	7.1	6.8	6.5	6.5
80	7.4	7.1	6.8	6.8
70	7.6	7.4	7.1	7.1
60	7.9	7.6	7.3	7.2
50	8.2	7.8	7.5	7.3
40	8.5	8.1	7.7	7.5
30	8.7	8.4	8.0	7.6
20	9.3	9.0	8.4	8.0
10	9.8	9.6	8.7	8.4

Percentile norms for 50 metre sprint – girls

Age \ %-ile	13 years	14 years	15 years	16 years
90	7.5	7.4	7.5	7.6
80	7.8	7.7	7.8	7.9
70	8.1	8.0	8.1	8.2
60	8.4	8.2	8.3	8.4
50	8.7	8.5	8.5	8.6
40	9.0	8.7	8.7	8.8
30	9.3	9.0	8.9	9.0
20	10.0	9.8	9.5	9.5
10	10.9	10.5	10.0	10.1

SECTION 3
SKILLS AND TECHNIQUES



This section will look at skills and techniques and how they are learned and developed.

SKILLS

These are the 'tools' which we need to take part in the activity.

They also give information about the purpose of the action.

Examples of skills are – passing (to get the ball from one team mate to another), shooting (to try to score a goal/point in to a set area).

TASK

List as many skills as you can think of for the following

Basketball _____

Hockey _____

Volleyball _____

Badminton _____

TECHNIQUES

The technique is the way in which the skill is performed eg

Basketball passing (chest pass, bounce pass)

 Shooting (lay up shot, set shot, jump shot)

The technique is often selected because of the situation the player finds themselves in eg if there is space at the side of the basket it is possible to use a lay up shot, but if the player is having to shoot from further back a set shot might be used.

TASK

For the following **skills** list as many **techniques** as possible.

Hockey : passing _____

Badminton : clear _____

Volleyball : passing _____

DESCRIBING SKILLS

When we try to describe a skill it should be broken down into three areas, Preparation, Action, Recovery.

Preparation – this is what happens in order to allow the action to take place.

Action – this describes the actual action.

Recovery – this is what happens after the action to allow the player to be ready for the next shot.

An example is given below.



Badminton – Overhead clear

Preparation – the player moves towards the back of the court pointing his free hand at the shuttle. The racquet is taken back high behind the head.

Action – the racquet is swung forward to contact the shuttle above the head.

Recovery – the racquet follows through in the direction of the shuttle and the player moves back to the ready position in the centre of the court.

TASK

Choose an activity and a skill from that activity. Describe that skill under the headings preparation, action and recovery.

Activity _____

Skill _____

Preparation _____

Action _____

Recovery _____

LEARNING SKILLS

There are different ways in which skills can be taught. Some skills are easier taught one way than another. It can also be easier to learn in different ways depending on the skill.

Whole-part-whole

If a skill has many parts to it the whole skill can be tried and the parts which need to be practised can then be isolated.

This allows the learner to concentrate on one part of the skill at a time.

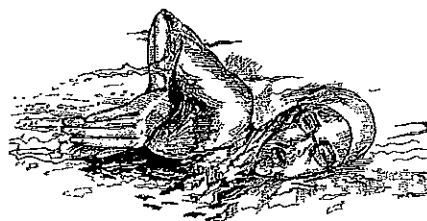
Once the part of the skill has been learned then it can be tried in the full stroke.

If there are many parts to be practised then this process can be repeated until all the parts have been learned and the whole skill can be performed successfully.

An example of whole-part-whole is learning front crawl.

Whole – the learner tries the full stroke and the teacher selects the parts to be practised.

Part – the teacher sets the learner practices to improve the elbow position in the arm action eg bringing the fingers to the armpit on each stroke. When the practice has been achieved the action is replaced into the whole stroke.



Whole – the learner tries the whole stroke with the improved leg action.

TASK

Select a skill which you have learnt through whole-part-whole learning and describe the stage under the headings below.

Whole

Part

Whole

Gradual build-up

Some skills can be learned by a series of easy stages.

Each stage is dependent on mastering the stage before.

This allows the learner to concentrate on one part of a skill before moving on to the next.

An example of gradual build-up is learning the lay up shot in basketball.

- Stage 1 Learning the shot from one step and shoot (last step).
- Stage 2 Learning the shot with two steps and shoot (last two steps).
- Stage 3 Learning the shot with one dribble, two steps and shoot.
- Stage 4 Dribble two steps and shoot.

Following the learning of the shot on its own opposition can be added.

TASK

Choose a skill which you have learned by gradual build-up and describe the stages below.

Stage 1 _____

Stage 2 _____

Stage 3 _____

Stage 4 _____

Stage 5 _____

Stage 6 _____

You may not need all 6 stages to describe how you learned your skill.

PRACTISING SKILLS

Once you have learned a new skill you need to practise it so that it becomes automatic and you do not need to think about it in a game.

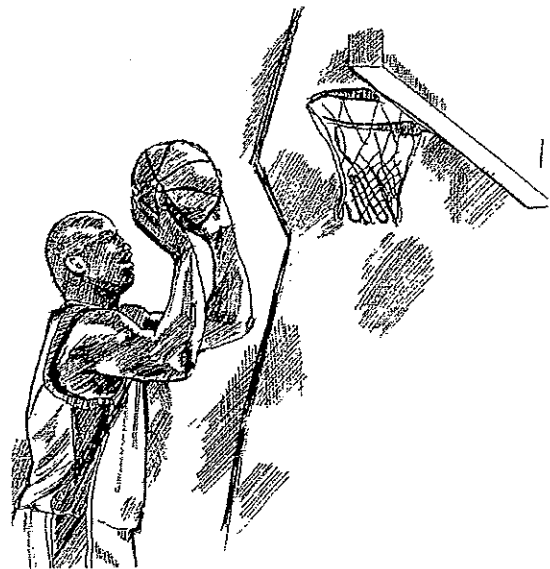
As you become better at the skill you will be more able to use it under pressure and your performance will improve.

Once the skill is automatic the performer can begin to think ahead to the next action after the skill is played and their contribution to the game will be more useful.

When practising skills a player will use a series of drills which concentrate on the skill.

These drills may become gradually more difficult so that the skill is being practised in more game-like conditions.

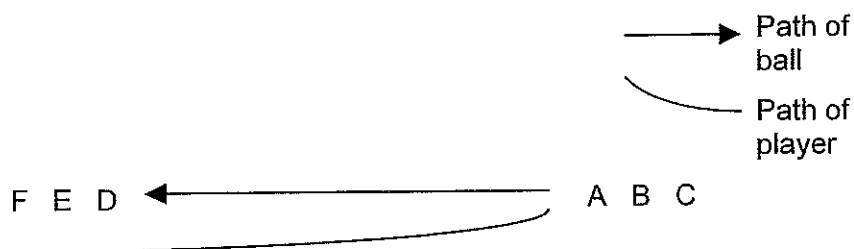
This player will have practised the shot so that he can perform it successfully under pressure.



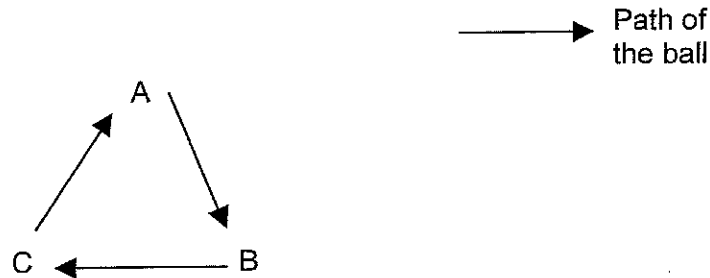
A group of pupils are working on learning and improving their push pass in hockey.

They may go through the following set of drills gradually moving to a game-like situation.

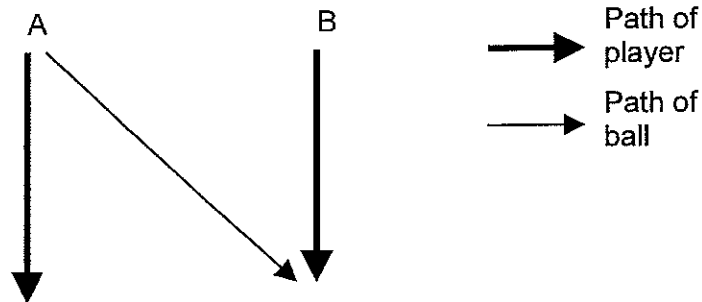
Drill 1



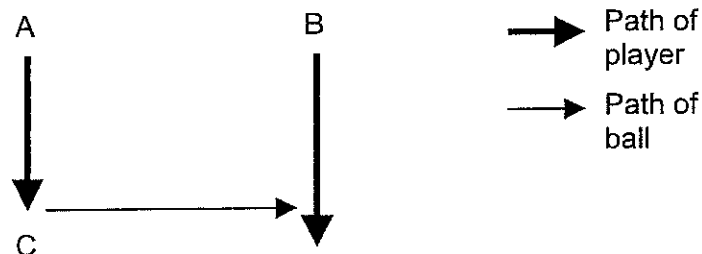
Player A plays the ball to player D and runs to the end of the opposite line. Player D plays the ball to player B and runs to the end of the opposite line. The ball should be pushed accurately and at the correct speed.

Drill 2

The ball is played with a push pass round the triangle. The player now has to turn to play the ball. This can be made more difficult by playing the ball round in the opposite direction.

Drill 3

The pupils would be passing the ball back and forward between them so learning to pass and control the ball on the move.

Drill 4

Player A dribbles forward. Player C, an opponent, approaches and A passes the ball to player B who collects it and dribbles on.

The pupils are learning to time their pass to avoid being tackled and to be aware of where to pass to in a game-like situation.

Each practice drill requires a little more control than the previous one and requires the ability to perform the previous drill in order to have success with the new drill.

If practice sessions are too long problems can occur.

- Tiredness – this leads to a drop in the level of performance. This can be avoided by making sure the sessions are not too long or are broken into short sections with rest periods.
- Boredom – this leads to a loss of concentration and the level of performance drops. To avoid this, again practice sessions should be carefully timed and a variety of practices used.

When you are learning skills and practising skills there are **personal qualities** which need to be developed in order for you to be more successful.

Personal qualities have already been talked about in Section 1 page 19.

Here we will look at how they affect your ability to learn or practise skills.

Motivation	You must be keen and enthusiastic to learn or improve the skill.
Concentration	You must keep your mind on the task you are working on. You will not learn if you are thinking about something else.
Application	When you are learning a skill it will not just happen, you need to try to produce what you have seen (demonstration) or heard (explanation). You need to be accurate in your work.
Determination	If the skill is difficult or you are having difficulty you must not give up. With practice you will achieve the skill.
Co-operation	You may need the help of others to learn.

TASK

Choose an activity and a skill from that activity. Describe a drill you used to practise that skill.

Activity _____ Skill _____

FEEDBACK

When learning or practising skills the performer is helped by receiving feedback about their performance.

What is feedback?

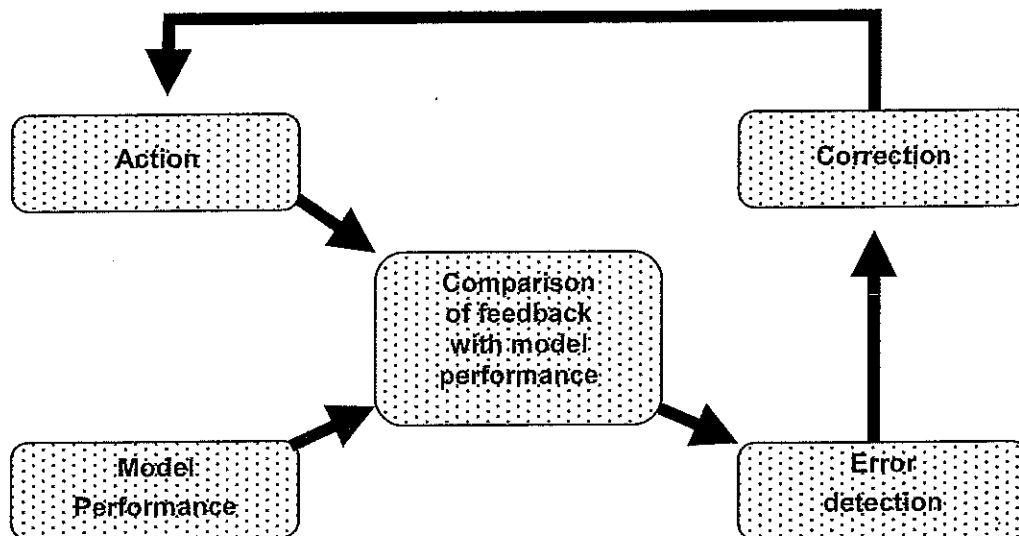
It is information received by the performer about their performance.

How is this done?

Feedback can be **external**.

This can be given in several ways.

- 1 **Visual** – Demonstration (to show either the correct action or the fault). Video to show the performer's action and/or compare it to a model performance. A partner may show what is required to improve the performance.



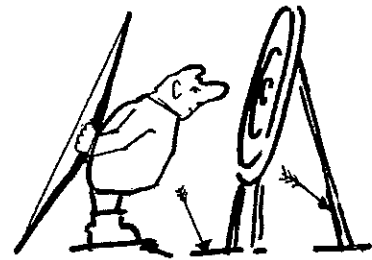
- 2 **Verbal** – The teacher or partner can tell you the good points and those which require further work to improve the performance.
- 3 **Written** – A partner may mark on a checklist those points which are good and those which need improvement.

Feedback can be **internal**.

The action feels right.



Feedback can be from **knowledge of results** eg the number of baskets scored out of 10 shots in basketball.



MECHANICAL PRINCIPLES

These are the facts which affect how we perform skills.

Stability

How stable the body is depends on the following.

- 1 Your base (the part(s)) of your body which are supporting your weight.

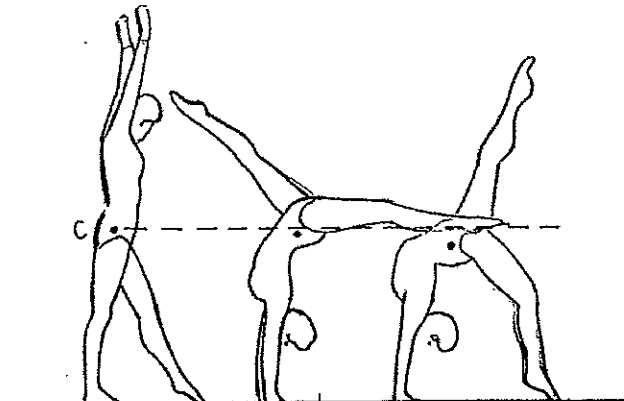
A large base is more stable than a small base. It is easier to balance on two feet with your feet apart than on one foot.

The shape of the base is also important. It is easier to perform a headstand with your head and hands making a triangular base than making a straight line.

Therefore, we see that it is the area of the base which is important.

- 2 Centre of gravity. This is found just above the level of the hips. Its position varies as the shape of the body changes.

Shows the position of the centre of gravity.



To keep the body stable it is necessary to keep the centre of gravity inside the base. The nearer to the centre of the base it is, the more stable the body will be.

The lower your centre of gravity is, the more stable your position.

To make your body more stable you should consider:

- 1 lowering the centre of gravity
- 2 making the area of your base larger
- 3 keeping your centre of gravity as close to the centre of your base as possible
- 4 if there is an oncoming force (eg strong wind), leaning in to that force will help keep the body stable.

Stability is necessary when

- 1 performing balancing actions in gymnastics
- 2 performing striking actions
- 3 catching a ball.

TASK

Choose an activity and a skill from that activity which required you to be stable and describe how you achieved that stability.

Activity _____

Skill _____

I achieved stability in this skill by _____

TRANSFER OF WEIGHT

This is the movement of weight from one body part to another.

This can be seen in different ways.

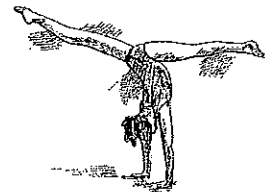
- 1 Throwing – stepping into a throwing action adds power to the throw.



- 2 Catching – stepping back as the ball is caught and drawing the hands in absorbs the force of the throw.



- 3 Striking – transferring the weight from the back foot to the front foot as an object is struck will add power to the striking action.



- 4 Gymnastics – the weight is transferred from one body part to another to perform gymnastics actions eg handstand: the weight is transferred from the feet to the hands and back to the feet.

TASK

Complete the following table to show how weight was transferred.

Activity	Transfer of weight	
	From	To
Gymnastics Headstand	Feet	
Hockey Push pass		Front foot
Shot Putt	Back foot	
Football Throw in		

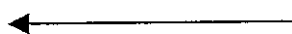
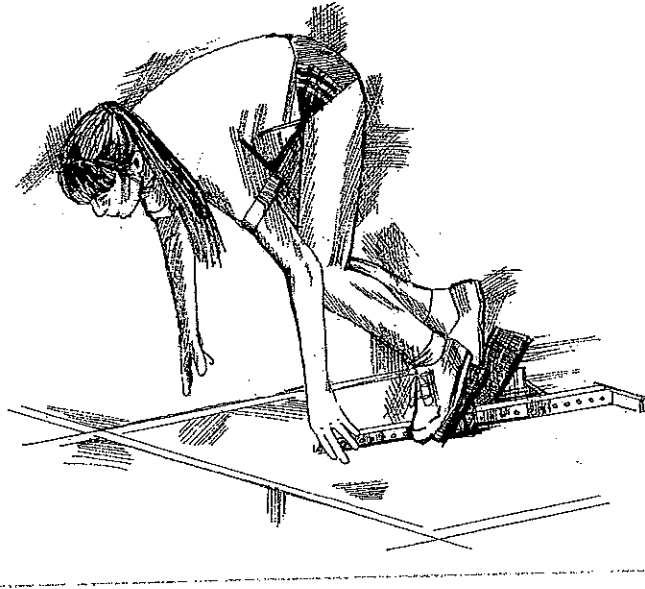
FORCE

Newton's third Law of Motion states that

"for every action there is an equal and opposite reaction"

In PE this means that if a force is applied in one direction the body will move in the opposite direction.

eg sprint start – the athlete pushes back against the blocks and will move forward.



Resultant
direction of
movement



Direction of force
applied

Front crawl – swimmer pushes back against the water with his hand and moves forward through the water.



Apart from the forces which we apply in order to make the body move there are other forces which have an effect on our performance.

Friction

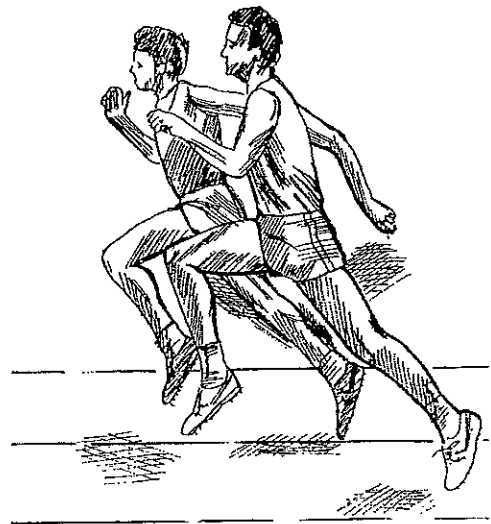
This is caused when two surfaces rub together.

This creates resistance.

In physical activity resistance can be an advantage or a disadvantage.

Advantage

These sprinters will be wearing spiked shoes which will give a better grip on the track. This increases the resistance and allows them to apply more force backwards. This will cause them to move forward faster.



TASK

Name two other activities where increasing resistance is an advantage and describe why this is the case.

Activity

Resistance is increased by _____

This is an advantage because _____

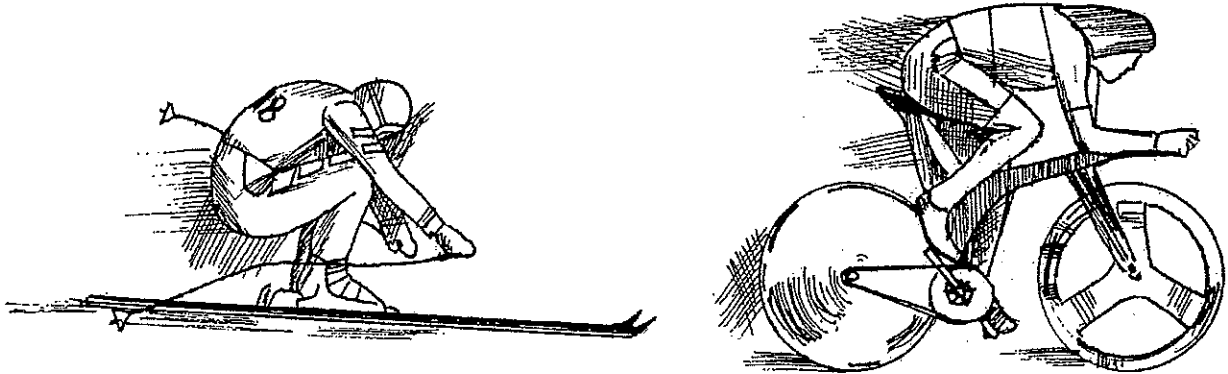
Activity

Resistance is increased by _____

This is an advantage because _____

Disadvantage

In some activities the participants have to reduce the amount of resistance.



Both the mountain biker and skier shown are keeping a low body position to reduce the resistance (drag) which acts against them. The skier's close fitting clothes also help to reduce resistance.

Swimmers have to overcome the **resistance of the water** which they have to move through.

This is done by maintaining a streamlined body position. This allows the water to pass over the body with little interruption.

Many **outdoor activities** have to overcome the **resistance of wind**.

Body position, clothing and tactics can all be used to overcome resistance.

TASK

For each of the above select an activity and describe how you could use these to overcome the resistance in that activity.

eg

Activity *Football*

Resistance *Wind*

Tactics *To overcome the resistance of the wind I would play the ball low so that the wind did not catch it and it would be more likely to reach the player I was passing to.*

Activity _____

Resistance _____

Body position/shape _____

Activity _____

Resistance _____

Clothing _____

Activity _____

Resistance _____

Tactics _____



friction could have helped here!!

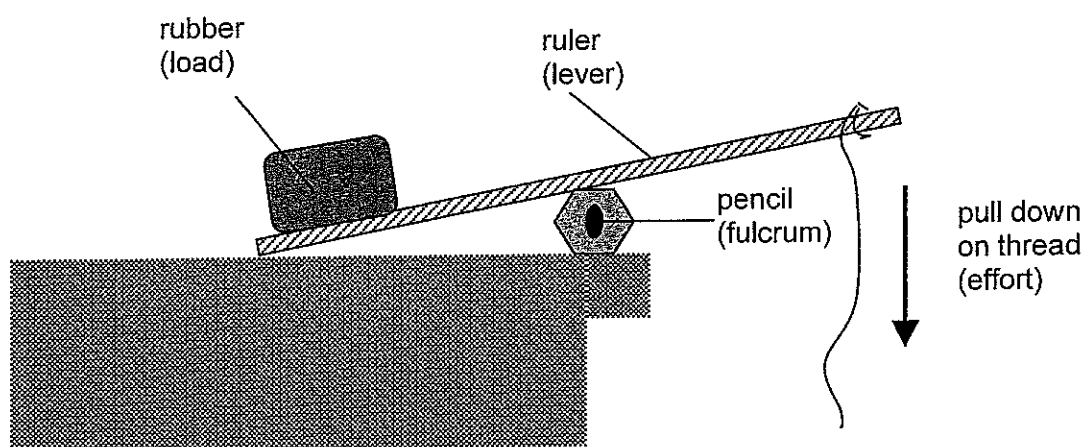
LEVERS

Levers are used to help move loads. They are used in a similar way in the body.

Here is a simple lever you can make to help you to understand the different part of a lever.

You will need a pencil, ruler, rubber and piece of thread.

Set them up as in the diagram below.



What happens when you pull down on the thread?

Answer _____

In your body the:

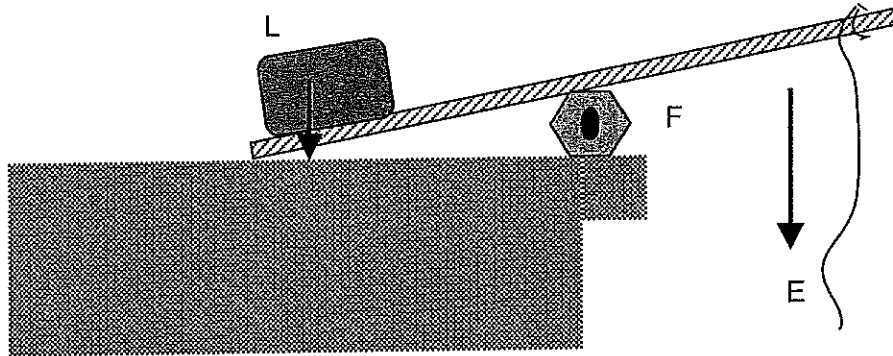
- **Lever** is a **bone** but it is not straight like the ruler.
- **Fulcrum** is usually a **joint**.
- **Load** is the weight of the **part of the body** being moved plus any additional weight, eg badminton racquet.
- **Effort** is supplied by the **muscle** contracting and pulling on the tendon.

There are three different types of levers which are identified by the way in which they are set up.

There are examples of each in the body.

First-class levers

In all first-class levers the fulcrum is between the effort and the load trying to lift it.



L = load : F = fulcrum : E = effort

An example of this type of lever working in the body the action of raising your head.

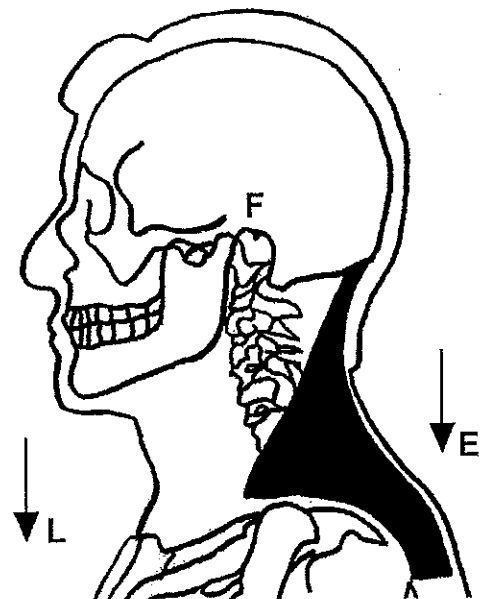
The **lever** is your skull.

The **fulcrum** is the **joint** between your **skull** and the **top of your spine**.

The **load** is the **weight of the head**.

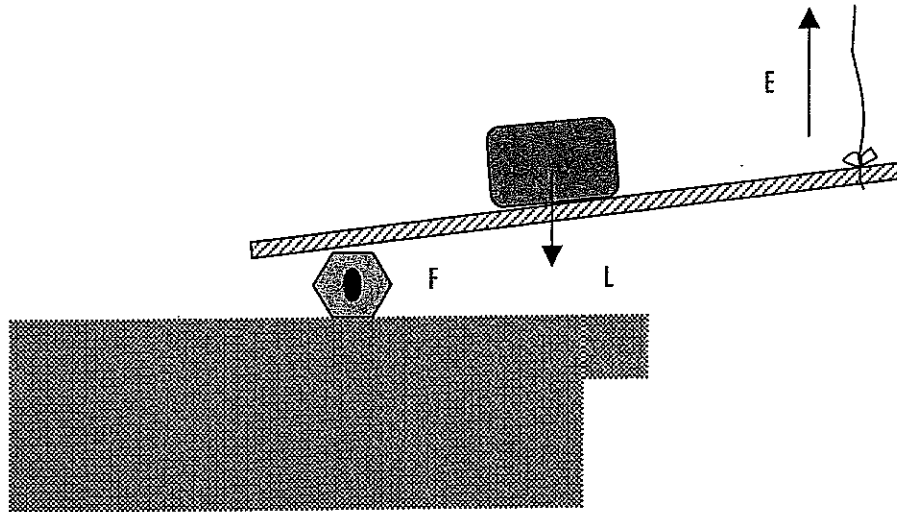
The **effort** is provided by the **muscle at the back of the neck**.

With the head forward the muscle contracts (effort) and pulls the head (load) up.



Second-class levers

In all second-class levers the load is between the fulcrum and the effort.



L = load : F = fulcrum : E = effort

An example of a second-class lever working in the body is the action of standing on your toes.

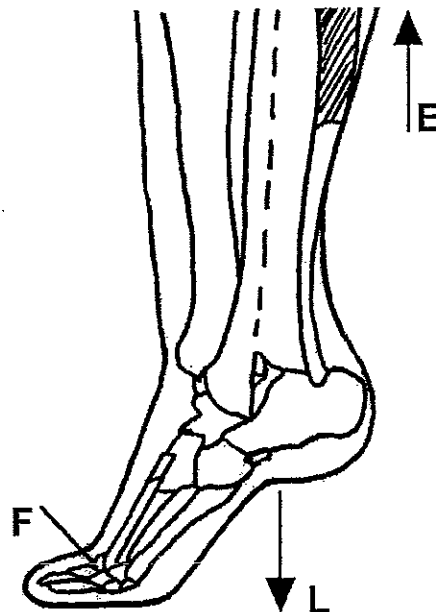
The **lever** is the **heel**.

The **fulcrum** is where the **toes contact the ground**.

The **load** is the **weight of your body**.

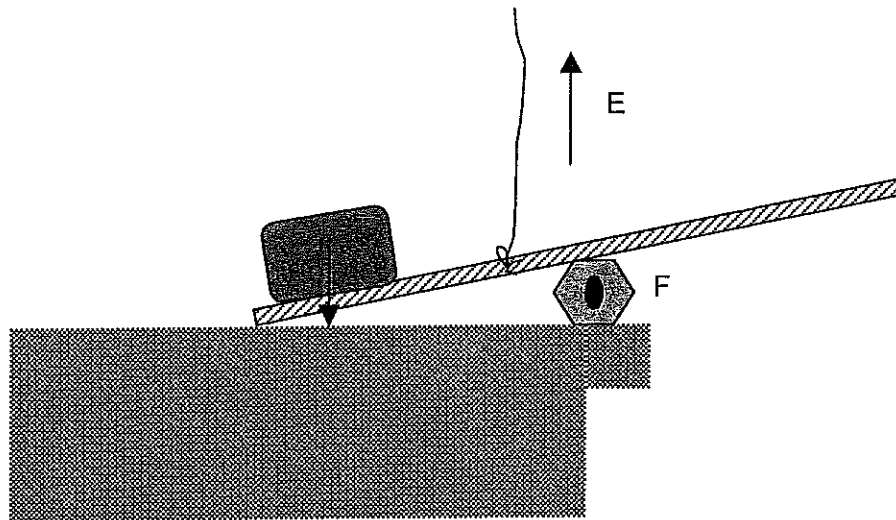
The **effort** is supplied by the **calf muscle** which pulls on the Achilles tendon by which it is attached to the heel bone.

When the calf muscle contracts (effort) it pulls the heel up so raising the body (load) on to the toes.



Third-class levers

In all third-class levers the effort is between the load and the fulcrum.



L = load : F = fulcrum : E = effort

An example of a third-class lever working in the body is the action of bending your elbow.

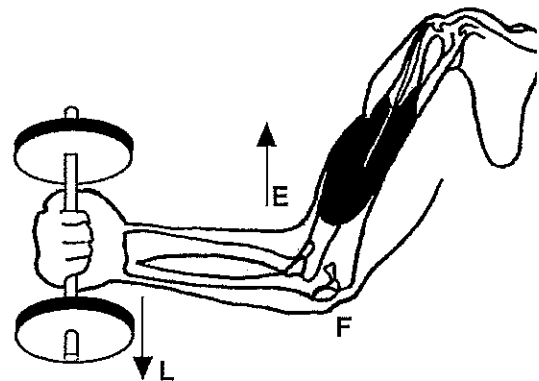
The **lever** is provided by the **radius and ulna** (bones in the lower arm).

The **fulcrum** is the **elbow joint**.

The **load** is the **weight of the lower arm**.

The **effort** is provided by the **biceps muscle contracting** and pulling on the bones of the lower arm.

When the biceps muscle contracts (effort) it pulls on the radius and ulna (load) so raising the lower arm.



This is the most efficient of all levers and is the most common in the body.

TASK

Identify one other area in the body where a third class lever works and fill in the table below.

Lever	
Fulcrum	
Load	
Effort	

The longer the lever the faster the speed at the end of it.

This means that if the end of the long lever strikes an object, it will travel faster and therefore further.

This is put into practice by golfers.

The driver is the longest club.

It gives the longest hit because it impacts with the ball fast.

The driver is used to tee off as the ball needs to travel from the tee as close to the green as possible.

Discus throwers use the same principle when they release the discus with a straight arm so that it will travel fast and far.

TASK

List two other activities where a long lever helps to improve the performance. Explain why each is true.

Activity

A long lever helps to improve performance because _____

Activity

A long lever helps to improve performance because _____

SECTION 4
THE FACTS IN ACTION



This part of the book will look at how the facts and principles which we have looked at can be put into practice in the activities you will take part in.

It will be split into the different activities and will highlight different parts of your course as applicable.

The sections will be

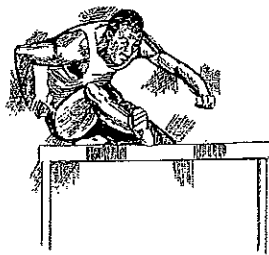
Gymnastics



Swimming



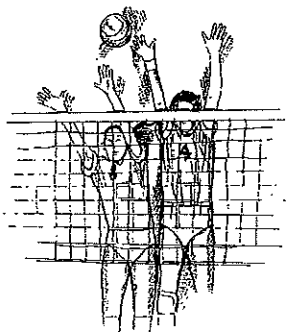
Athletics



Hockey



Volleyball



Badminton



Basketball



Gymnastics

Gymnastics is an **individual activity**. If individual scores are added together to give a team score then it becomes a **team activity**.

When you are taking part in gymnastics you may adopt various **roles** eg you may be involved as a performer or a supporter.

TASK

Choose one occasion when you were involved in **supporting** another person and explain exactly what you did.

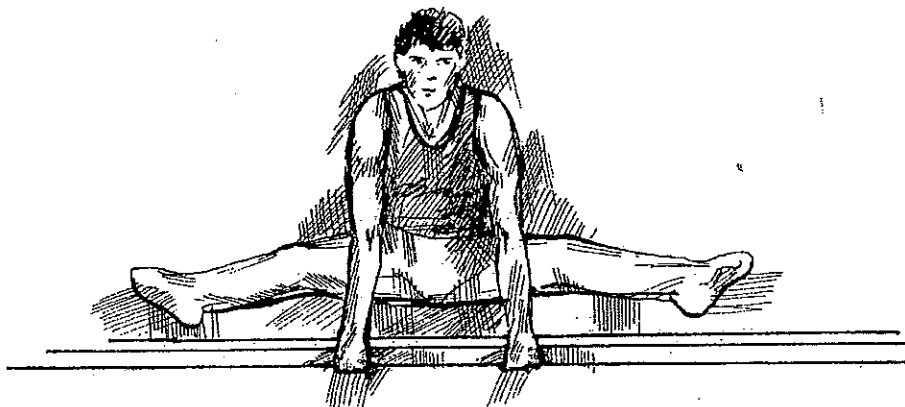
During your gymnastics you will have used mats to help to ensure your **safety**.

TASK

Describe how mats were used to ensure your safety on one occasion.

When gymnasts are taking part in competition the judges watch the performance and give points according to their opinion.

This is _____ scoring.
(fill in the blank)



Gymnasts require to work on improving certain aspects of fitness.

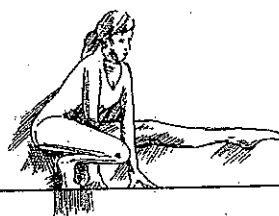
Flexibility

TASK

Look at these two gymnasts. In which area of the body do these gymnasts require flexibility?



Answer



Strength

Gymnasts also need to improve their strength. This is needed to allow the gymnasts to support their body weight and to have enough muscle tension to hold balance positions.

TASK

Look at this gymnast performing a balance.

In which group of muscles does he require strength in?



Answer

There are many **skills** to be learned in gymnastics. Some of these skills depend on you being able to perform a more basic skill, eg a dive forward roll depends on you being able to perform a forward roll.

TASK

Complete the table below to show a more advanced skill and the basic skill it depends on.

Basic skill	Advanced skill
Forward roll	Dive forward roll

Often a gymnast has to hold a balanced position. To do this it is important that the **centre of gravity** in the body is over the base.

It is more difficult to balance over a small base than a large base.

TASK

Select one balance which you have learned and describe the base for this balance and how you kept your centre of gravity over the base.

Base _____

I kept my centre of gravity over the base by _____

During gymnastics you are constantly **transferring your weight** from one part of the body to another.

Sometimes it is obvious eg from your feet to your hands when performing a handstand.

You are also transferring your weight when you are performing a forward roll.

TASK

Perform a forward roll and note down in the correct order the parts of the body which support the weight, however briefly.

If you are performing any gymnastic action which involves lifting your weight off the floor or apparatus you will require to apply **force** in the opposite direction.

TASK

Look at the gymnast opposite and say in which direction force was applied.

Answer



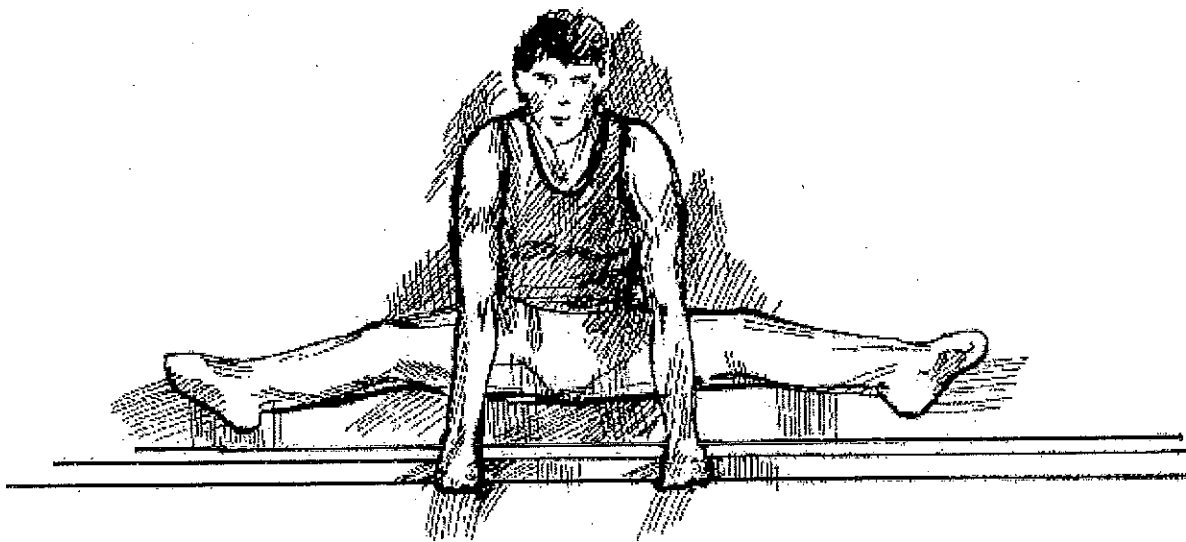
It is also helpful in some gymnastic actions to increase the **resistance**.

The gymnast shown is working on the bars.

They have applied chalk to their hands before performing.

Why do you think this will help their performance?

Answer



Swimming

Swimming can be an **individual and a team activity**. You may be involved in swimming and a race against other swimmers or you may be involved in being part of a relay team which makes it a team activity.

There are opportunities to adopt a variety of **roles** in swimming. You can obviously be a performer but you can also be an official or a coach.

TASK

List below all the **officials** you can think of who are needed to run a swimming gala.

Swimmers want to reduce the **resistance (drag)** which they experience swimming through water. Wearing very thin costumes helps to do this.

What else could the swimmers do to make their body slide through the water more easily?

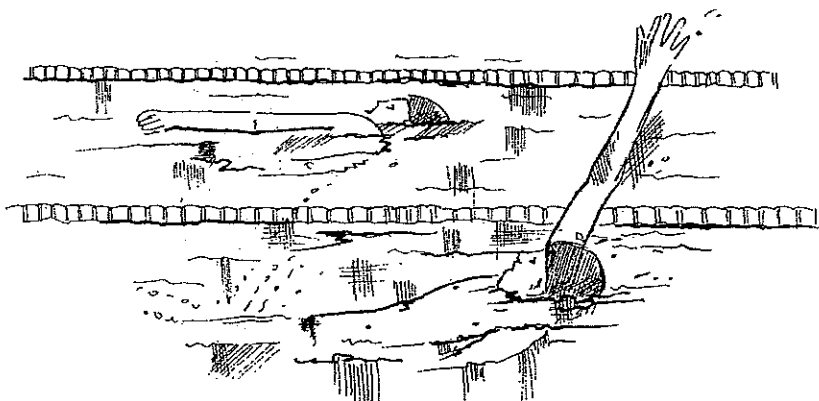
Answer

Each of the strokes has its own **rules** which apply to starting, turning and finishing as well as how the stroke is swum.

These are the formal rules of the activity.

TASK

Choose a stroke and describe the rules regarding this stroke under the headings on the next page.



Stroke _____

Starting _____

Turning _____

Finishing _____

There are also accepted practices which form a **code of conduct** for the activity.

Swimmers shake hands at the end of a race. This is one part of a code of conduct.

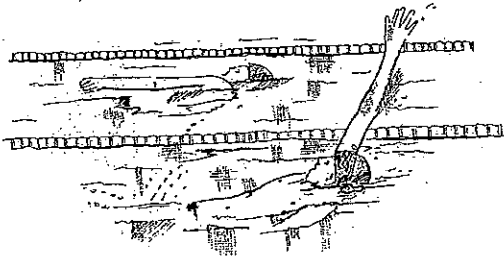
The winner of a swimming event is the swimmer who reaches the finish first. They will have the quickest time.

This is an example of scoring.

Swimmers need to work on improving various aspects of fitness.

Flexibility

Increasing flexibility in the shoulders allows this swimmer to have a high elbow recovery and his fingers can enter the water first.

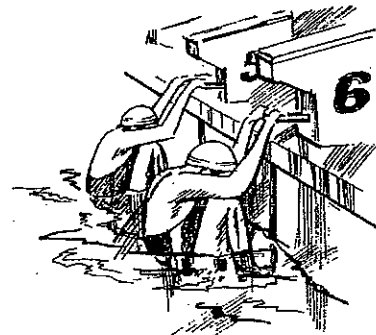


Muscular Endurance

Increasing the endurance in a group of muscles allows them to keep working for a prolonged period of time without tiring. These swimmers will be able to use their arms at a consistently high level if they improve their muscular endurance.

Strength

Strong legs will allow these swimmers to push away from the wall and gain a good start to their race.



There are different **techniques** which can be used when starting a swimming event.

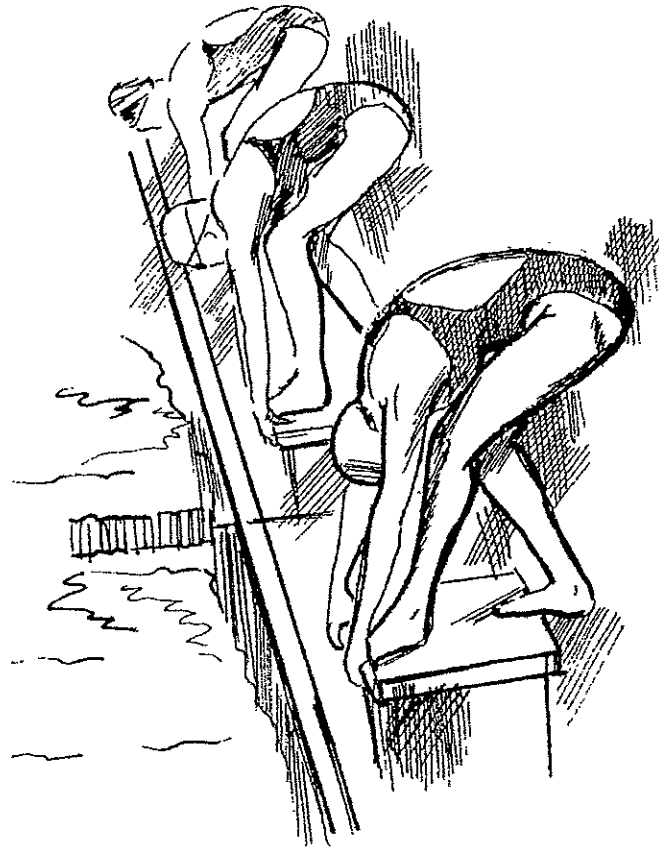
The swimmers may use a **basic shallow dive** but to gain more power in the start they would use a **grab start** or the start shown here which is called a **track start**.

Because the legs are bent it allows the swimmers to apply a lot of force backwards and they travel into the water faster.

When you have learned skills in swimming you will have used two methods of learning.

Whole – part – whole

Learning a stroke you may have tried the whole stroke. Then the teacher will have given you practices for part of the stroke so that you could improve that part. You would then try to put the improved action into the whole stroke again.



TASK

Choose one stroke and describe the stages you went through when learning the stroke.

Stroke _____

Whole _____

Part _____

Whole _____

Progressive stages

Learning a tumble turn for front crawl is usually done through a series of stages.

- Stage 1 Learning a forward roll in the water (shallow/deep).
- Stage 2 Learning a forward roll close to the wall and pushing off from the wall on the back.
- Stage 3 Swimming breast stroke towards the wall and doing a somersault, pushing off from the wall on the back.
- Stage 4 Swimming breast stroke towards the wall and doing a somersault, pushing off and turning onto the front.
- Stage 5 Swimming front crawl towards the wall, pulling one hand back after the other and doing a somersault. Push off and turn on to the front.

A swimmer has to apply **force** in the opposite direction to that he/she wants to travel in.

For that reason it is important to make sure that the skills is performed correctly.

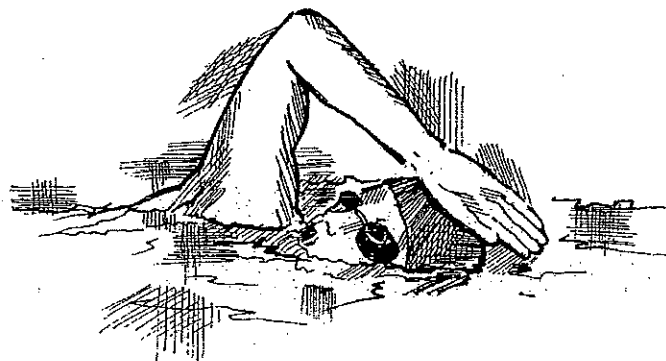
A front crawl swimmer is aiming to pull the arm backwards close to the body so that they force is applied almost directly backwards and the swimmer will travel forwards. Similarly, in back crawl the swimmer tries to pull from behind the head towards the feet so that they will travel straight backwards through the water.

TASK

Describe how a breast stroke swimmer can make sure they apply force backwards to allow them to move forward.

Apart from wearing a thin costume, swimmers have to find other ways of reducing the **resistance** of the water (drag) when they are swimming.

They try to adopt a _____ body position.
(fill in the blank)

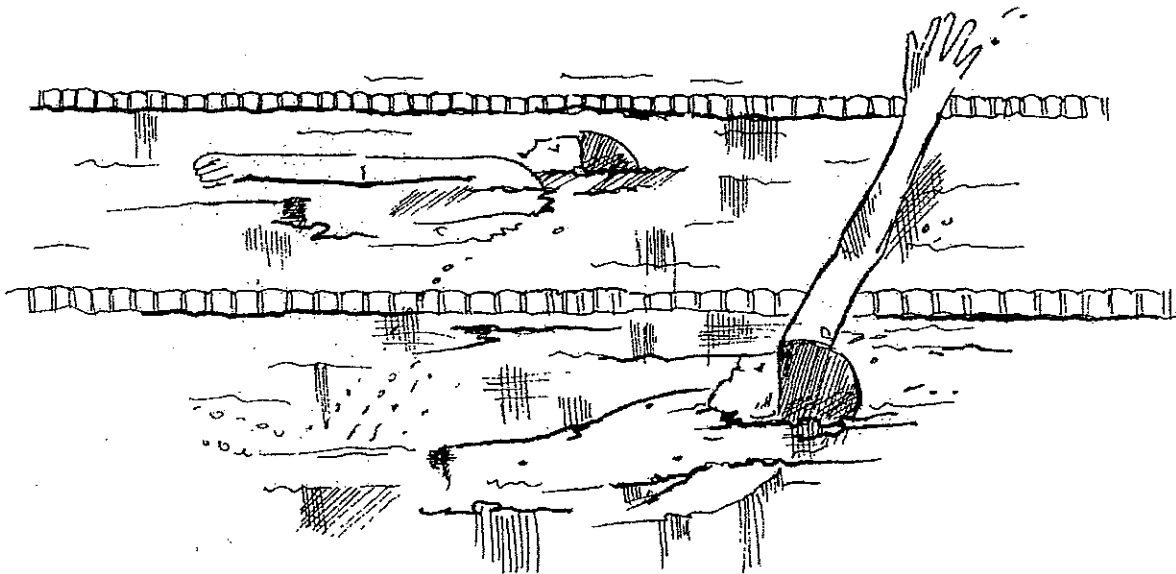


TASK

Choose one stroke and describe how the swimmer keeps a streamlined position for that stroke.

Stroke _____

Description _____



Athletics

Athletics can be an **individual** or **team** activity. You can take part in individual events or you can be part of a relay team.

Athletics gives the opportunity for people to adopt a wide variety of **roles** because there are so many events involved. You may choose to be a **performer** or you may choose to be one of the many **officials** which are needed to run an athletics meeting.

TASK

Complete the table below to show what each of these officials does.

Official	Description of task
Timekeeper	
Track judge	
No throw judge	
Starter	
Field judge	
Marksman	

Athletes usually wear spiked shoes to give them a better grip on the ground.

How will this help their performance?

Answer _____



There are many **rules** involved in athletics. Each event has its own rules governing where you run, how you throw or where you jump from.

TASK

For each of the rules listed describe how the rule affects the event in the way stated.

Event 100 metre hurdles

Rule The runners must stay in lanes

Layout

Event Discus

Rule The thrower must leave the back half of the circle after throwing

Safety

Event Long jump

Rule The jumper must take off on or behind the take off board

Skill

Event Shot putt

Rule The thrower may not touch the ground outside the circle during the throw.

Movement



In athletics we see different ways of winning an event. Sometimes time is recorded, sometimes height and sometimes length.

TASK

For each of these events write down how the result is decided.

100 metres _____

Shot putt _____

Pole vault _____

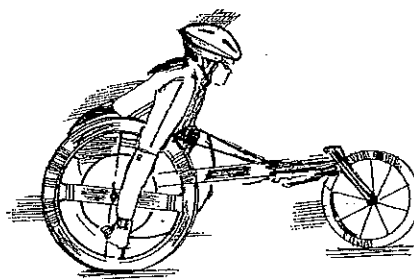
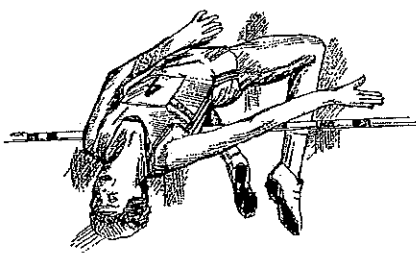
Hurdles _____

These are all types of _____ scoring.
(fill in the blank)

The **fitness** that an athlete will need to improve will depend upon the event they are training for. Each event has its own requirements. The training for a shot putter will be very different from a sprinter or for a middle distance runner.

TASK

For each of the athletes shown below identify the aspects of fitness they would require to improve.



Many of the skills in athletics are **learned by stages**.

This allows you to be able to perform a basic version of the skill before another stage is added on.

TASK

Describe the stages which you used to learn the javelin. (Stages 2 and 4 have been done for you.)

Stage 1 _____

Stage 2 Step and throw

Stage 3 _____

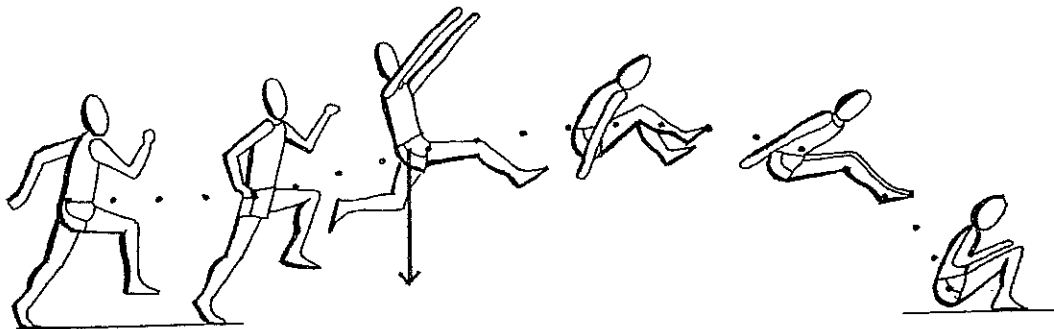
Stage 4 Run up and throw

The **centre of gravity** is important in athletics.

If you are running it is important to keep the body tall as this will keep the centre of gravity higher and you will not be as heavy on the ground. This allows you to run faster.

In any jumping event it is the centre of gravity which needs to be kept off the ground. This is why you need to jump off the take off board in long jump.

The diagram below shows the pathway of the centre of gravity when you long jump.

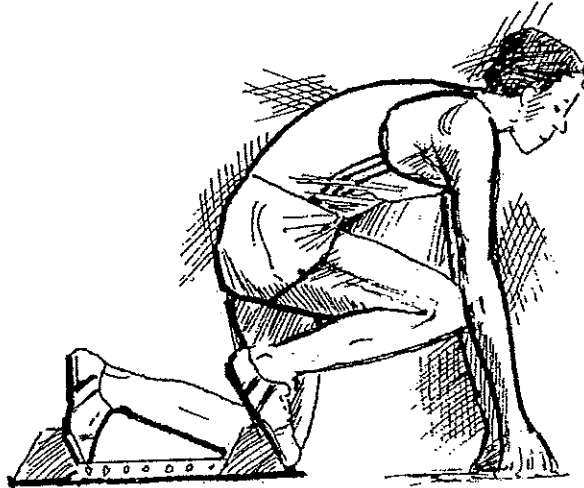


- Shows the pathway of the centre of gravity.
- ↓ Shows the direction of the force acting on the body.

In any throwing event in athletics it is easy to see **transfer of weight** from one part of the body to another.

As you step into any throw you transfer weight from the back foot to the front foot. Doing this adds power to the throw and the object travels faster and therefore further.

The athlete shown here is at the start of a race. He will apply **force** to the blocks when he starts.



In what direction will the force be applied and what will the result be?

The force will be applied _____

The result will be that _____

(complete the sentences)

A **long lever** means that the speed at the end of the lever is faster.

Discus throwers make use of this fact. When they turn across the circle and release the discus their throwing arm is straight so making the hand travel fast and the discus will be released fast.

What effect will this have on the throw?

Answer _____

Hockey

Hockey is a **team** game. There are several people working together to win a game against another team. It is a **competitive** activity, the purpose of the game is to win.

A full size hockey team has eleven players.

As in all activities you may choose the **role** of a performer or you may be an umpire (referee).

The game of hockey is governed by the **rules** as laid down in the rule book.

The rules state that the ball may only be played with the flat side of the stick.

How does that affect your performance?

Answer _____

When you are playing a game of hockey you are trying to make the best use of your teams' strengths and exploit the opponents weaknesses. This is using **tactics/strategies**.

If you have a player who is very fast off the ball you may play the ball forward to them so that they collect it near the corner flag and can cross it into the circle for another team mate to take a shot at goal.

This would take advantage of your team's speed.

In order for a team to succeed they need to have certain **personal qualities** as well as the physical ability to play the game.

The captain has to be able to **motivate** their team and show **leadership**.

The players have to be able to **co-operate** with each other.

The team need to be able to **concentrate** on the game.

When young people start playing hockey the size of the pitch would be too large. It is possible to **adapt the game** so that they would play on a smaller pitch so that they could reach the ball and would not be too tired to play well.

The rules may also have to be made simpler so that they can be understood.

TASK

Suggest two other ways in which the game of hockey may be adapted to suit young players.

1 _____

2 _____

Hockey players need to improve several **aspects of fitness**.

In order to take part in a game of hockey and play at a high standard for the full game the players need to improve their **cardiovascular endurance**.

TASK

Describe the effect that improving each of the following aspects of fitness would have on the hockey players performance.

Strength _____

Speed _____



When working on improving the game of hockey a **training session** would be split into various sections.

For each of the sections below suggest what the players might do.

Warm up

1 _____

2 _____

3 _____

Fitness work

1 _____

2 _____

Skills work

1 _____

2 _____

Game situation

1 _____

Warm down

1 _____

2 _____

There are many **skills** to be learned in order to improve performance in a game of hockey.

The better the skill level of the members of the team the more likely they are to win the game.

Depending on the situation the player is in they may have to use a particular **technique** eg if a player is marked closely they may be able to flick the ball over an opponent's stick where a push pass would not have worked.

This is an example of using one passing technique instead of another.

TASK

List as many techniques of passing as you can think of.

Each skill that you perform can be **described** under the headings preparation, action or recovery.

TASK

Describe the push pass under the headings below.

Preparation _____

Action _____

Recovery _____

When you are learning or improving skills you use drills.

These are designed to allow you to concentrate on the skill or part of the skill being worked on.

The drills may start off simply and become more game like as you become better at the skill.

TASK

Select one skill which you have learned in hockey and describe a drill you used to practise that skill.

Skill _____

Drill _____

The coach/teacher will usually give you different practices for the same skill to save you becoming bored and losing concentration.

When you are trying to pass the ball or shoot in hockey you need to consider the amount of **force** you want to apply to the ball.

If the ball is to travel a good distance then you will need to apply more force to the pass. This is done partly by stepping into the pass (**transferring weight** from back foot to front foot).

Volleyball

Volleyball is a **team** game. A group of players work together to try to win the game. It is a **competitive** activity. The purpose of the game is to win.

A full size volleyball game is 6-a-side but there are competitions involving 2, 3 or 4-a-side games.

As with other activities you can adopt various **roles**. You may be a performer or you may be involved as an official.

Volleyball requires several **officials**:-

Referee – sits on a stand above the net and controls the game.

Umpire – at the net at ground level and watches the rotation of the teams and watches for foot faults at the net.

Linesmen – watch the lines for the ball being out of play.

Scorekeeper – keeps the score.

The **equipment** volleyball players wear helps to ensure their **safety**.

Volleyball players usually wear long sleeve tops to protect their wrists from the speed of the ball when they are playing underarm passes. They also wear knee pads as they often have to dive on to the ground to prevent the ball touching the ground allowing the other team to score.

The game of volleyball is governed by the rules of the Volleyball Association.

TASK

Write down two rules of volleyball which you have used in your games.

1 _____

2 _____

The game of volleyball is decided by one team reaching 15 points first.

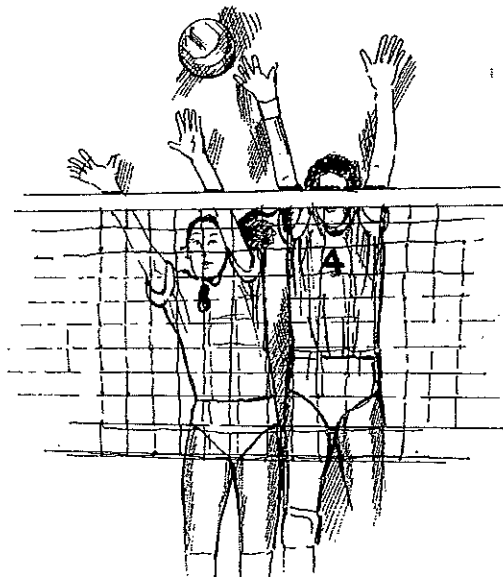
The points awarded in volleyball are **objective** points as they are awarded for winning a rally. They are based on fact.

There are several **aspects of fitness** which need to be worked on by volleyball players.

Volleyball players need to have a good level of **local muscular endurance** so that they can move in the 'ready position' (knees bent/arms bent in front of the body) throughout the game. This is very demanding on the leg muscles.

They also need to be able to jump and spike or block at the net consistently through the game. If their legs tire they will not perform as well as at the end of the game as near the beginning.

These players are blocking a shot. Apart from endurance to be able to perform this action throughout the game, what other aspect of fitness will help them to jump and reach above the net?



Answer _____

Volleyball players need to be able to move at **speed** to be in position to play the ball before the pass reaches them.

Often if a ball is travelling fast towards the floor they have to be agile to get down under the ball and play it before it touches the floor.

The **skills** which are required to play volleyball are quite different to those required for any other game.

At no time during the game is the ball caught or thrown. It is played off the hands or arms.

TASK

One of the skills involved is passing.

What two **techniques** of passing are used?

1 _____

2 _____

Most skills in volleyball are learned through **gradual build up**.

This allows the skill to be learned in a basic way before it is made more difficult eg the overhead pass could be learned by stages.

TASK

Complete the table below to show possible stages of learning an overhead pass.

- 1 Throwing from and catching the ball in the overhead pass position. The ball is thrown and caught by yourself.
- 2 *Working with a partner* _____

- 3 Partner feeds the ball high over your head and you try to play it back to the feeder who catches it.
- 4 *Working with my partner we try to* _____

- 5 We then try to play the overhead pass as the last touch in a one versus one game.

There are many drills which can be used to learn or practise the skills of volleyball.

The above drills were varied so that the players did not become tired working for too long without a break or bored working on the same drill.

Badminton

Badminton can be played as singles or doubles. If you are playing doubles you are taking part in a **team** activity while singles is obviously an **individual** activity.

Badminton is a **competitive** activity as the aim of the game is to win.

As with other activities badminton gives a chance to adopt various **roles**. You can be a player or you could be a coach or an official.

TASK

List the officials you can think of that are needed for a badminton match.

-
-

The **equipment** you wear and use in badminton can affect your performance.

TASK

In a game of badminton you are required to make many quick changes of direction.

What two things will you need to ensure about your trainers if you are going to perform well?

1

2

The condition and weight of your racquet may also affect your play.

If the racquet has a worn grip it may slip in your hand preventing you from playing a good stroke.

Some people find that a racquet is too heavy for them and they do not play as well as they might.

Badminton is governed by **rules** of the Badminton Association.

These rules give guidance on serving, playing the shuttle, court size, when the shuttle is in or out of play and where the players are allowed to stand.

TASK

For each of the situations below say what the umpire's decision would be.

- 1 The serving player has his/her foot on the short service line while serving.
Allowed / Disallowed *
- 2 The shuttle lands in the quarter of the court directly opposite the server.
Allowed / Disallowed *
- 3 The shuttle touches the net during the rally and goes over landing in the opponent's court.
Allowed / Disallowed *
- 4 The shuttle is going out of play but the opponent returns it to fall in the server's court.
Allowed / Disallowed *
- 5 During a game of doubles the shuttle brushes against one partner's racquet before being returned by the other partner.
Allowed / Disallowed *

* Delete as appropriate

The game of badminton is decided by one player reaching the winning score first.

The rules of badminton state that in:

- Women's singles this is 11 points
- Men's single this is 15 points
- Doubles this is 15 points.

If the game is being drawn there is the option to 'set'.

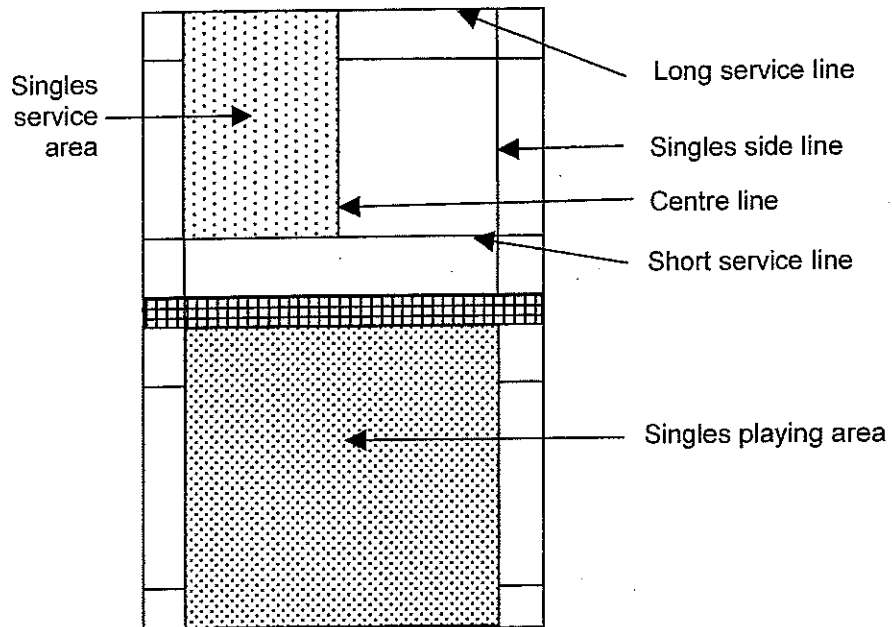
In women's singles if the game is at 9-9 the receiver may choose to play to 11 or to 'set'. If he/she chooses to set, the score goes back to 0-0 and the winner will be the first to 3 points. At 10-10 if the receiver chooses to set the winner will be the player who first gains 2 points.

In men's singles or in doubles the option to 'set' can be taken at 13-13 or 14-14. Again the score goes back to love-all (0-0) and the winner this time is the player(s) to reach 5 points from 13-13 or 3 points from 14-14.

The rules give you information about the playing area for singles and doubles.

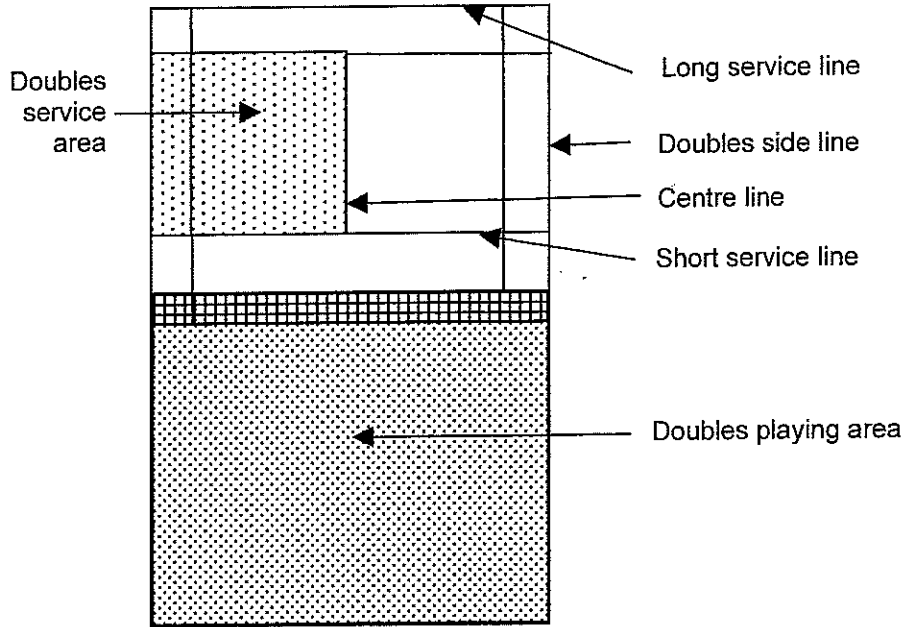
The court for **singles** is as shown below.

Highlighted are the areas which service can be received in and the playing area after service.



The court for **doubles** service and playing area is different and is shown on the diagram below.

Highlighted are the areas which service can be received in and the playing area after service.



Badminton players need to work to several **aspects of fitness** to be successful in their game.

TASK

For each of the aspects of fitness below, suggest why improving it could improve the player's performance.

Speed _____

Strength _____

Flexibility _____

Muscular Endurance _____

There are many **skills** involved in the game of badminton. Depending on the placing of the shuttle you may use a particular **technique** to play the shuttle.

eg

Skill – clear

Technique – forehand overhead clear

This would be used when the shuttle is high on your forehand side.

Skill – clear

Technique – backhand overhead clear

This would be used when the shuttle is high on your backhand side.

Skill – clear

Technique – underarm clear (forehand/backhand)

This would be used when the shuttle is low on your forehand/backhand side.

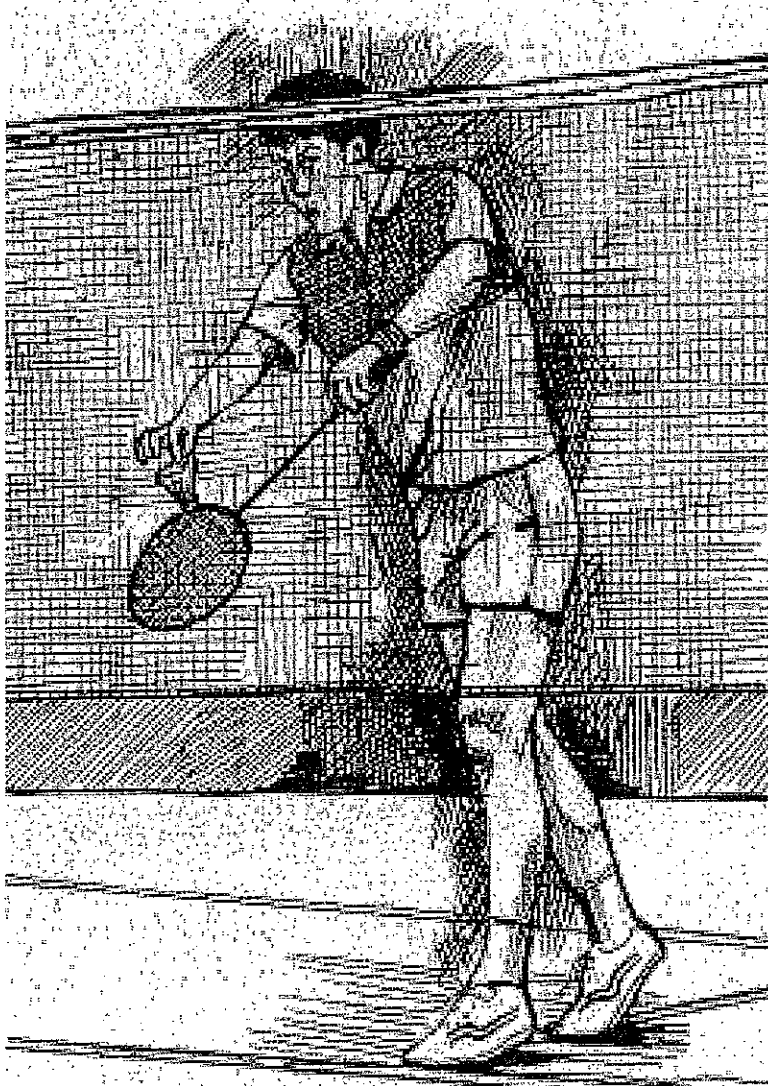
When learning skills it is important to receive **feedback** about how well you are performing.

By using the following drill when learning a low serve you receive feedback from **knowledge of results**.

Low serve drill:

- 1 Stand facing your partner on opposite side of the net.
- 2 Your partner lays their racquet on the ground with the racquet head close to the short service line.
- 3 You serve the shuttle over aiming to get it close to the net and to land on your partner's racquet head.

You can see the path of the shuttle and you see if it reached its target area.



Basketball

Basketball is a **team** activity in which a group of players are trying to win the game. It is a competitive activity.

The maximum number allowed on court at any one time is 5. Though a team will also have subs available.

TASK

Describe what the job of the following officials would be.

Referees _____

Scoreboard operator _____

Timekeeper _____

Basketball is governed by the **rules** set out by the Basketball Association.

These rules give guidance on player movement, time allowed for certain actions, ball in or out of play.

TASK

Describe 3 rules you have learned playing basketball.

1 _____

2 _____

3 _____

The game of basketball is decided by the team who has scored most points at full time (2 points awarded for a basket, 1 for a penalty shot and 3 for a basket scored from outwith the 3 point line).

There are many **strategies** that a basketball team can work together to practise. These can be used depending upon the actions of the other team.

It may be possible for the defending team to receive the ball following a shot at basket and work together to create a fast break allowing them a shot at basket themselves.

Young children may find the playing area too large, the ball too heavy and the basket too high.

TASK

Describe how you would **adapt the game** to allow young children to participate successfully under the headings below.

Court too large _____

Ball too heavy _____

Basket too high _____

Basketball players need to develop several **aspects of fitness** if they are going to play successfully throughout the game.

If they are going to be able to keep running and performing without their standard of play dropping they will need to develop their cardiovascular endurance.

TASK

Describe how developing local muscular endurance in the legs has an effect on the players performance.

The **skills** involved in basketball can be played using varying **techniques** depending on the situation.

TASK

For each of the skills below list as many techniques as you can.

Shooting

Passing

You learned the lay up shot through **gradual build up**. You went through a series of stages until you could perform the whole skill.

TASK

Describe the stages you went through to learn the lay up shot.

Stage 1

State 2

Stage 3

Stage 4

Stage 5
