GCSE PHYSICAL EDUCATION
REVISION BOOKLET 2012
1.1 Healthy, active lifestyles

1.1.1 Reasons for taking part in activity

<table>
<thead>
<tr>
<th>SOCIAL</th>
<th>MENTAL</th>
<th>PHYSICAL</th>
</tr>
</thead>
</table>
|  - Make new friends  
  - Social mixing  
  - Meet current friends  
  - Develop teamwork + co-operation |  - Helps relieves stress/tension  
  - Help individual feel good  
  - Mental challenge (can I do it?) + competition  
  - Increase self-esteem + confidence  
  - Contribute to life enjoyment  
  - Aesthetic appreciation |  - Helps individual to feel good (serotonin levels)  
  - Enhances body shape: look good  
  - Feel good  
  - Helps individual to feel good (serotonin levels)  
  - Enhances body shape  
  - Contributes to good health and enjoyment of life |

REASONS FOR PARTICIPATING IN PHYSICAL ACTIVITY (see below for full list!)

- Helps individual to feel good (serotonin levels)
- Enhances body shape: look good  
  - Feel good
- Contributes to good health and enjoyment of life

Develops friendships and social mixing

Help relieves stress/tension & Stress related illness

BENEFITS OF SPORTING CLUBS & PARTICIPATION

Aesthetic appreciation

Physical Challenge

Co-operation

Competition
Influences on your Healthy Active Lifestyle 1.1.2

Opportunities to get involved or remain involved in Physical Activity

- **Leadership**
  - Qualities needed: Confidence, communication, knowledge, decisive, well-planned, integrity, passion

- **Officiating**
  - Qualities Needed: Courage, knowledge, fitness, integrity, communication, consistency

- **Volunteering**
  - Qualities Needed: Free time, knowledge, integrity, passion, energy, flexibility, selflessness

**Influences on taking part**

- **People:** family, friends, role models
- **Image:** fashion, media coverage
- **Cultural factors:** age, disability, gender, race
- **Health and Well being:** illness and health issues
- **Socio-economic:** cost, perceived status of activity
- **Resources:** availability, location, access, time

**Factors influencing taking part**

- **Cultural factors:** age, disability, gender, race
- **Health and Well being:** illness and health issues
- **Socio-economic:** cost, perceived status of activity
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1.1.2 SPORTS PARTICIPATION PYRAMID

**Foundation:**
- Base of the pyramid
- Learning basic skills to provide base for personal development and future participation
- E.g. Primary school PE lessons, TOP Play and multi-skills clubs

**Participation:**
- Begin to participate regularly in a specific activity for enjoyment
- Sports development helps promote this stage with school festivals and school/club links
- Sports clubs are important at this stage to help make the link to the Performance stage

**Performance:**
- Focus on a specific sport and technique to develop talent in sport
- Quality coaching is important at this stage to develop sporting skills and the talent
- Organised sports coaching weeks e.g. Youth games help promote this stage

**Excellence:**
- Peak of the pyramid, where individuals reach sporting excellence
- The pyramid narrows here as fewer people take part at this stage
- Sports Governing Bodies are responsible at this stage (county → regional → national)
1.1.2 Initiatives developed to provide opportunities for becoming, remaining involved in physical activity

Being involved in physical activity, whether as a performer, leader or official can have a positive impact on developing a healthy active lifestyle (physically, mentally + socially)

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Organiser</th>
<th>Details</th>
</tr>
</thead>
</table>
| PESSCL (used to be PESSYP) | Government Via Sport England + Youth Sports Trust (YST) | • Physical Education and School Sport & Club Links.  
• National Scheme  
• Increase take-up of sporting opportunities for 5 - 16 year olds  
• 8 areas: |
| TOP programme | YST | • Chances for those aged 18mths - 18yrs to be involved in physical activity  
• Could be as performers, leaders, officials and also as volunteers |
| TOP Link Sports Leaders Award | YST | • Aimed at 14 - 16yr olds  
• students who want to organise/run sports/dance festivals for partner primary/special school pupils.  
• Aim: to improve links between primary + secondary schools.  
• Aim: to recruit, train, deploy and support young sports leaders. |
| Sports Leaders Award | YST | • Train young people (14 - 16yr olds) as volunteers being leaders or officials for primary children |
| Start, Stay, Succeed | Sport England (G'ment Sports Council) | • Start: increase participation in sport (increase health of nation)  
• Stay: retain people in sport through network of clubs, coaches, facilities + competitive opportunities etc.  
• Succeed: create opportunities for talented performers to achieve success |
| Active Kids | Sainsbury’s Sainsbury’s | • Voucher programme  
• Collect vouchers + exchange for sports equipt. |
1.1.3 - Exercise and fitness as part of your healthy, active lifestyle

**KEY DEFINITIONS**

- **Health** - State of complete mental, physical and social well-being.
- **Fitness** - The ability to meet demands of the environment
- **Exercise** - Form of physical activity done primarily to improve one's health and physical fitness
- **Performance** - How well a task is completed
- **Healthy, Active lifestyle** - A lifestyle that contributes positively towards social, mental and physical well being and that includes regular physical exercise.

**PERFORMANCE KEY DEFINITIONS**

- **Health** – State of complete mental, physical and social well-being.
- **Fitness** – The ability to meet demands of the environment
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- **Performance** – How well a task is completed
- **Healthy, Active lifestyle** – A lifestyle that contributes positively towards social, mental and physical well being and that includes regular physical exercise.

**CARDIOVASCULAR FITNESS** - The ability to exercise the entire body for long periods of time. Describes the efficient of the heart, lungs + blood vessels to deliver oxygen to working muscles so physical work can be maintained.

**Examples**
- Playing 90 minutes in football matches
- Playing Cricket matches that could last for 3-5 days
- Running in a marathon

**MUSCULAR ENDURANCE** - The ability to use voluntary muscles many times (over a long period) without tiring.

**Examples**
- Long distance walking
- Long distance running
- Long distance swimming

**STRENGTH** - the ability to lift a maximum weight in one attempt

Muscular strength - The amount of force a muscle can exert against a resistance

**Examples**
- **DYNAMIC** - required to start and maintain movement of the body e.g. cycling or doing loads of press-ups
- **EXPLOSIVE** - required when a high amount of force has to be applied quickly e.g. shot putting
- **STATIC** - required when applying strength to a fixed static object e.g. pushing in a rugby scrum

**FLEXIBILITY** - The range of movement possible at a joint

**Examples**
- Hurdling in athletics
- Gymnastics - performing complex sequences
- Swimming

**HEALTH RELATED COMPONENTS**

**Body Composition** is defined as the percentage of body weight which is fat, muscle and bone.

**Extra information** Our body composition can have a significant bearing on the sports we are most able to play. Taking part in physical activities will change our body composition by decreasing the percentage of fat and increasing the percentage of muscle.
1.1.3 SKILL RELATED FITNESS

**SKILL COMPONENTS**

**BALANCE** – Ability to keep the body's centre of mass (gravity) above the base of support with reference to still (static), changing (dynamic) conditions of movement, shape and orientation.

Examples
- **STATIC** - holding a position without movement e.g. a handstand in gymnastics
- **DYNAMIC** - maintaining a position whilst moving e.g. cycling or surfing

**REACTION TIME** – The time it takes to respond to a stimulus (simple) or a variety of stimuli (choice).

Examples
- **SIMPLE** - responding to a signal e.g. sprint start to a gun
- **CHOICE** - responding to a variety of signals e.g. playing a shot in cricket depending on length of the ball pitched

**SPEED** – Fastest rate at which a person can complete a task or cover a distance

Examples
- Running fast - 100m sprint
- Throwing a cricket ball at the stumps to get a run out

**POWER** – Ability to perform strength performances quickly (power = strength x speed)

Examples
- Football - Goal keeper taking a goal kick
- Badminton - playing an overhead smash

**AGILITY** – Ability to change the position of the body quickly and still control the movement of the whole body.

Examples
- Football - dribbling past an opponent at speed
- Rugby - Running, avoiding opponents whilst in possession

**CO-ORDINATION** – Ability to use two or more parts of the body at the same time.

Examples
- Pole vaulting
- Basketball - lay up shot
- Tennis - player taking a serve

**Examples**
- Running fast – 100m sprint
- Throwing a cricket ball at the stumps to get a run out
Assessing personal readiness

Use a PARQ (Personal Activity Readiness Questionnaire) to assess you are ready to start an exercise programme.

It will ask you several standard questions including:

- Do you have any medical conditions?
- Are you taking any medication?
- Are you pregnant?

Assessing you fitness levels

<table>
<thead>
<tr>
<th>Test</th>
<th>Aspect of fitness tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooper's 12 minute run</td>
<td>Cardiovascular fitness</td>
</tr>
<tr>
<td>Hand grip test</td>
<td>Muscular strength</td>
</tr>
<tr>
<td>Sit and reach test</td>
<td>Flexibility</td>
</tr>
<tr>
<td>Harvard step test</td>
<td>Cardiovascular endurance</td>
</tr>
<tr>
<td>Illinois agility run</td>
<td>Agility</td>
</tr>
<tr>
<td>Standing stork test</td>
<td>Balance</td>
</tr>
<tr>
<td>Sergeant Jump</td>
<td>Power</td>
</tr>
<tr>
<td>Standing broad jump</td>
<td>Power</td>
</tr>
<tr>
<td>Ruler drop test</td>
<td>Reaction time</td>
</tr>
<tr>
<td>30 Metre sprint</td>
<td>Speed</td>
</tr>
<tr>
<td>3 ball juggle</td>
<td>Co-ordination</td>
</tr>
</tbody>
</table>

**Blue = HRE  Green = SRF**

Principles of Training:

Good training takes into account all of the principles and their effects on the body.

**RIPS R Principles**

- **REST AND RECOVERY** - Rest is the period of time set aside for your body to recover. Recovery is the time required for the body to repair damaged caused during competition
- **INDIVIDUAL NEEDS** - Whether training to compete or training for health, everyone has different personal needs. People vary in height, size, shape, fitness and preference. Therefore, even though they have the same goals they may not reach them by the same means.
- **PROGRESSIVE OVERLOAD** - Putting greater demands on the body by exercising This will improve fitness as long as the sessions are made more difficult each time by using the FIT principles. The point where exercise is demanding enough to have an effect on the body is called the 'threshold of training'.
- There 3 ways:
  - Frequency - number of sessions e.g. up to 3 per week
  - Intensity - increasing distances run, repetitions or weight
  - Time - length of training sessions
- **SPECIFICITY** - Understanding the needs of the game or event, e.g. a goalkeeper will include reaction work in their training. The pace of training should be consistent to the pace of the game. Also the actions should be the same in training as it is in match situations e.g. a swimmer needs to spend most of their time in the water.
- **REVERSIBILITY** - The body will increase in strength, tone and skill with exercise; however it also loses them without it. After injury or illness, an athlete can lose their strength and skill, up to 3x as fast as they gain it - *If you don't use it, You lose it!*
1.1.4 – Goal Setting

Gives people something to aim for - acts as a motivator.
Using SMART goal setting makes people’s aims/goals easier to achieve and they’re more likely to stick with them.

**SPECIFIC** - Knowing exactly what the goal is e.g. I want to run 100m further in my Cooper’s Run test.

**MEASURABLE** - will be easy to know when the goal is achieved e.g. improving you Illinois Agility Run score by 1.2 seconds

**ACHIEVABLE** - running an extra 100m after 6 weeks training is achievable, running a marathon would not be

**REALISTIC** - goal is ok to achieve in reality not just in theory i.e. you have the right amount of time and resources to achieve the goal

**TIME-BOUND** - The goal needs to have an end point e.g. your PEP lasted for 6 weeks
### 1.1.4 - METHODS OF TRAINING

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
<th>Benefit/element of fitness to be trained</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CIRCUIT</strong></td>
<td>Has between 8 - 15 stations in it. Each station has a specific exercise to do. A short rest is allowed between each station. Work:rest ratio Repeat whole circuit after approx. 2mins rest</td>
<td>Can combine muscular strength, endurance, agility, coordination, power, cardiovascular fitness within one session. Can tailor exercises to individuals. Range of exercises makes it interesting. Includes both aerobic + anaerobic. Can have skills focus. Useful for variety of sports, depending on focus.</td>
</tr>
<tr>
<td><strong>WEIGHT</strong></td>
<td>Done in a gym using free weights to use progressive resistance. High reps + low weight = muscular endurance Low reps + high weight = muscular strength</td>
<td>Useful for strength events: athletics, speed + jumping events. Increase muscle strength, muscular endurance, increase speed, increase muscle size, rehabilitate after illness.</td>
</tr>
<tr>
<td><strong>INTERVAL</strong></td>
<td>Mixing periods of hard exercise and rest periods (these could be walking, jogging or stopping). Set distances or set time to work. Rest time should be at least 30secs. 1 rep = 1 work + 1 rest cycle 1 set = repeating the reps 4, 5 or 6 times for eg.</td>
<td>Similarity to games activities e.g. Rugby and Football Can be done in variety of activities Repeated sprints = anaerobic Reps of pulse at near max and then recover will improve CV Fitness.</td>
</tr>
<tr>
<td><strong>CONTINUOUS</strong></td>
<td>Exercising aerobically at a constant rate doing activities like running or cycling, with no rests. Session usually lasts 15 – 20mins.</td>
<td>Cheap. Can be done individually or in a group. Can be done in a wide range of activities swim/cycle/run as well as inside on machines. Useful for endurance events e.g. marathon</td>
</tr>
<tr>
<td><strong>FARTLEK</strong></td>
<td>Swedish for ‘speed play’. Changing speed, distances + times of exercise in same session. Difference between Fartlek &amp; Interval training is takes place on VARYING TERRAIN, CAN INCLUDE HILLS. Also VARYING Sprint LENGTHS</td>
<td>Suited to most games. Rest periods can be included Can include repetitions e.g. up same hill several times Can take place anywhere safe to do so.</td>
</tr>
<tr>
<td><strong>CROSS</strong></td>
<td>Uses a combination of different training methods</td>
<td>Variety of training = prevents boredom. Weather is not a factor - very versatile. Can rest certain muscle groups Can train individually or with different groups of people - adds interest + increases social circles. Useful for variety of sports, depending on MoT chosen but certainly games players will benefit</td>
</tr>
</tbody>
</table>

### AEROBIC and ANAEROBIC ACTIVITY

**Aerobic** – with oxygen
- Lower intensity
- Endurance activities - Marathon
- MoT: Continuous, circuit, fartlek, cross

**Anaerobic** – without oxygen
- Higher intensity
- Short distance activities - Sprinting
- MoT: interval, fartlek, circuit, cross, weight
1.1.4
THE EXERCISE SESSION

1. Warm-Up:
   Cardiovascular pulse raiser (5 – 15mins)
   Dynamic stretching
   Specific skills practice (batting, shooting, catching)

   **Benefits:**
   Prevents injury; improves performance; practise skills before performance; prepare psychologically for the event

2. Main Activity:
   Usually a training session (one of MoT) e.g. skill circuit for hockey player
   Could be a match, weight loss or rehab session

   **Benefits:**
   Always raises HR above normal.
   Improve element of fitness
   Allow performer to work at peak performance level

3. Cool Down:
   CV pulse reducer (5 – 10mins)
   Static stretching (5 – 15mins)
   Relaxation exercises (10 – 15mins)

   **Benefits:**
   Gradually returns body to normal resting HR + temp.
   Disperses lactic acid which prevents stiffness and muscle soreness
   Helps relieve stress
1.1.4 TRAINING TERMINOLOGY

Measuring Heart Rate - Radial or carotid pulse or heart rate monitor
Resting Heart Rate - HR at rest! best taken first thing in the morning.
Working Heart Rate - measurement of HR during or immediately after exercise (accurate guide to how hard you work i.e. intensity of the session)
Recovery Rate - time taken to return HR to resting after training

Recovery Rate Graph
The faster your HR returns to its pre-exercise state, the fitter you are
Series I = Recovery rate before 6-week PEP; Series II = Recovery Rate after 6-week PEP.

Maximum Heart Rate - 220-your age
Lower Training Threshold - 60% of your maximum heart rate (MHR)
Upper Training Threshold - 80% of your MHR
Target Zone - Working between the lower and upper training thresholds i.e. between 60-80% of your MHR
**1.1.5 - YOUR PERSONAL HEALTH & WELLBEING**

**BALANCED DIET** – Daily intake of food containing right amounts and types of nutrients

<table>
<thead>
<tr>
<th>Element</th>
<th>Function</th>
<th>Foods found in</th>
<th>Aid to Sportsperson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td>Ready source of energy</td>
<td>Fruit, cakes, beer, sweets, granulated sugar and bread, pasta rice, potatoes.</td>
<td>Ready source of energy when muscles need it. Athletes training hard use carbohydrates quickly so diet should be high in this food type.</td>
</tr>
<tr>
<td></td>
<td>Store of energy as Glycogen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proteins</td>
<td>Growth and Repair of tissues, enzymes and hormones</td>
<td>Meat, fish, pulses (chick peas, lentils and beans), nuts, eggs and poultry</td>
<td>Builds muscle and repairs tissue within body. Essential after injury to heal quickly. Sportspeople who have large muscles need extra protein.</td>
</tr>
<tr>
<td>Fats</td>
<td>Source of energy (slow release)</td>
<td>Milk, cheese, butter, oils, chocolate, fatty meats, soya beans and corn.</td>
<td>Increase size and weight of body beneficial to performers with extra bulk e.g. Shot putter. Excess weight can inhibit performance though.</td>
</tr>
<tr>
<td></td>
<td>Can be stored in body</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamins</td>
<td>Helps general health - vision, skin condition, forming of red blood cells and clotting, good condition of bones and teeth</td>
<td>Fruit - vitamin C, Liver, carrots - Vitamin A, Whole grain, nuts - Vit B1, Vegetable oil - Vitamin E</td>
<td>General health is important to perform well. When training hard vitamins from B group are used up more so need replenishing.</td>
</tr>
<tr>
<td>Minerals</td>
<td>Calcium helps growth of bones, Iron helps making red blood cells and the way blood is carried by haemoglobin.</td>
<td>Milk and salt water fish (iodine), red meat, liver and green vegetables (iron), cheese and cereal.</td>
<td>Increase oxygen carrying capacity to working muscles. Iodine aids growth, essential for athlete's energy production. Iron helps produce red blood cells so carry more oxygen around body preventing fatigue. Calcium helps blood to clot, aiding recovery and strengthens bones and muscles.</td>
</tr>
<tr>
<td>Fibre</td>
<td>Helps Digestion. There are 2 types.</td>
<td>Leaves, seed cases, cereals and whole grains.</td>
<td>Less Cholesterol in the body makes the heart more efficient. By keeping digestive system functioning regularly the body retains less waste</td>
</tr>
<tr>
<td></td>
<td>Insoluble - adds bulk to food so moves through digestive system</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soluble - helps reduce cholesterol, keeping heart healthy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>Two-thirds of the body is water</td>
<td>Fluids and foods</td>
<td>Water allows blood to flow more easily - important when exercising as the body demands more oxygen, nutrients, heat control and waste removal.</td>
</tr>
<tr>
<td></td>
<td>Need to replenish water which is lost in urine, sweat and condensation when we breathe</td>
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</tbody>
</table>

**1.1.5 Link between diet, exercise, work and rest**

DIET – essential part of providing energy needed to work, exercise + also repair tissues. Must consider Energy balance (calories in vs calories out)

EXERCISE – can provide fitness necessary to enjoy life + work

WORK – can provide finance, motivation + opportunity

REST – maintains balance between work and exercise ("all work and no play makes jack a dull boy") + provides chance for tissue repair to occur
### 1.1.5 Timing of Dietary Intake

**Carbo-loading** – system used mostly by **marathon runners** to make max use of energy resources.

- Early part of week before event $\rightarrow$ high protein (muscle repair after high intensity sessions)
- Later in week $\rightarrow$ high levels of carbohydrates (turn into glycogen stores).
  
  Happens ‘easily’ in the body because of the ‘starving’ state the body was in during early part of the week
- Immediately after race $\rightarrow$ take on carbs (isotonic drinks) to restock

**BLOOD FLOW DURING EXERCISE** – blood shunts to working muscles

- Less blood available to digest food in gut
- Causes cramps/discomfort
- Exercise session should wait until 2-3 hrs after eating
### 1.2.1 Physical activity and your healthy mind and body

#### Definitions

**Overweight** - having weight excess than normal, harmless unless accompanied with over fatness

**Over Fat** - person having more fat than recommended for gender and age

**Obese** - term used to describe people who are very over fat

**Underweight** - weighing less than normal, healthy or required

**Anorexic** - describes someone who has anorexia, which is a prolonged eating disorder due to loss of appetite.

#### Weight’s impact on performance

- Different weights are desirable for different activities
- Some athletes can be deliberately overweight due to the extra muscle mass they need to be successful in their activity e.g. weight lifters
- Each sport will dictate a different **optimum weight** for success (e.g. basketballer vs shot putter)
- Within each sport, different positions will require different optimum weights (e.g. prop vs kicker in rugby)

#### Factors affecting optimum weight

- **Height**: taller people are usually, though not always, heavier
- **Gender**: men tend to have more muscle and larger bones
- **Bone structure**: ‘frame size’ can vary from person to person
- **Muscle girth**: muscle girth increases with training so will vary from person to person
- **Genetics**: body weight and shape are largely passed on through genes

**NB.** Body composition = % of body weight that is fat, muscle and bone (so all 3 will affect a person’s weight)

### What are the different somatotypes?

<table>
<thead>
<tr>
<th>Ectomorph</th>
<th>Mesomorph</th>
<th>Endomorph</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slightly built, delicate body</td>
<td>‘Athletic Build’</td>
<td>Round/ ‘pear drop’ shape</td>
</tr>
<tr>
<td>Narrow shoulders and hips</td>
<td>Muscular, large trunk</td>
<td>Narrow shoulders and broad hips</td>
</tr>
<tr>
<td>Lean, fragile</td>
<td>Broad shoulders, narrow hips</td>
<td>Carry weight around waist and on hips and upper thighs</td>
</tr>
<tr>
<td>Excel in long distances</td>
<td>Strength/sudden burst events</td>
<td>Power events</td>
</tr>
<tr>
<td><em>E.G. Marathon Runner</em></td>
<td><em>E.G. 100m Sprinter</em></td>
<td><em>E.G. Sumo wrestler</em></td>
</tr>
</tbody>
</table>

### Risk assessment & preventing injuries

<table>
<thead>
<tr>
<th>Method of minimising risk</th>
<th>Why it helps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Warm Up</strong></td>
<td>• Warming up muscles gradually helps prevent injury - increases blood flow to working muscles to prepared for action, focuses mind on activity</td>
</tr>
<tr>
<td><strong>Cool Down</strong></td>
<td>• Prevents injury by increasing flexibility for next performance</td>
</tr>
<tr>
<td></td>
<td>• Disperses lactic acid - prevent soreness and aches and also stiffness which limits movement which can lead to injury</td>
</tr>
<tr>
<td><strong>Checking equipment + facilities</strong></td>
<td>• Facilities need to be safe and secure</td>
</tr>
<tr>
<td></td>
<td>• E.g. pitch clean + lines visible</td>
</tr>
<tr>
<td></td>
<td>• Equipment needs to be in a good condition</td>
</tr>
<tr>
<td></td>
<td>• E.g. trampoline bed, springs, pads etc all ok.</td>
</tr>
<tr>
<td><strong>Protective equipment + clothing</strong></td>
<td>• Some sports have protective equipt, built into rules e.g. horse riding and sailing</td>
</tr>
<tr>
<td></td>
<td>• Clothing must be safe and may vary depending on position</td>
</tr>
<tr>
<td></td>
<td>• Jewellery should be removed - can get caught or injures others</td>
</tr>
<tr>
<td></td>
<td>• Footwear - grip better (sprinter), extra protection/support for feet (hockey)</td>
</tr>
<tr>
<td><strong>Balanced competition</strong></td>
<td>• Weight (boxing), gender (rugby), age (netball), handicap (golf)</td>
</tr>
<tr>
<td><strong>Playing to the rules of competition</strong></td>
<td>• Help ensure safety and allow game to flow → fair play</td>
</tr>
<tr>
<td></td>
<td>• E.g. professional fouls</td>
</tr>
<tr>
<td><strong>Physical readiness</strong></td>
<td>• Physical Activity Readiness Questionnaire (PARQ) completed before exercise commences</td>
</tr>
<tr>
<td></td>
<td>• Should highlight any problems + help guide person to appropriate sport + how often to take part</td>
</tr>
</tbody>
</table>
### PERFORMANCE ENHANCING DRUGS (socially unacceptable)

These drugs are banned by the International Olympic Committee (IOC)

<table>
<thead>
<tr>
<th>B.A.D.S.N.A.P.</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beta Blockers</strong>&lt;br&gt;(Snooker)</td>
<td>• Drugs designed to control heart rate&lt;br&gt;• Lower heart rate, steady shaking hands and reduce anxiety&lt;br&gt;• Banned in sports where it may be an advantage - Snooker, shooting</td>
<td>• Can reduce HR to a dangerous level…&lt;br&gt;• Can lead to cardiac arrest!</td>
</tr>
<tr>
<td><strong>Alcohol</strong>&lt;br&gt;(shooting, archery)</td>
<td>• Calms nerves</td>
<td>• Impairs judgments&lt;br&gt;• Reactions affected - delay in reacting cause an accident (skiing)</td>
</tr>
<tr>
<td><strong>Diuretics</strong>&lt;br&gt;(jockey, boxer)</td>
<td>• Elevate rate of urine production&lt;br&gt;• Weight loss - important if competing in a certain weight division&lt;br&gt;• Can mask traces of other drugs in body</td>
<td>• Cause cramp and dehydration&lt;br&gt;• Dehydration → dizziness, headaches, nausea&lt;br&gt;• Long-term dehydration → kidney problems</td>
</tr>
<tr>
<td><strong>Stimulants</strong>&lt;br&gt;(boxer)</td>
<td>• Effect on Central Nervous System so…&lt;br&gt;• Speeds up reactions and increases aggression&lt;br&gt;• Make you feel less pain</td>
<td>• They're addictive + Feeling less pain can make athlete train too hard&lt;br&gt;• Lead to high blood pressure, increased HR, irregular heart beat&lt;br&gt;• Insomnia, irritability</td>
</tr>
<tr>
<td><strong>Narcotic Analgesics</strong>&lt;br&gt;(dancer)</td>
<td>• Reduce pain - so injuries and fatigue doesn't affect performance&lt;br&gt;• Marijuana (archery) - Calms nerves&lt;br&gt;• Local Anesthetics Reduce pain but maybe allowed for medical purposes&lt;br&gt;•</td>
<td>• Loss of concentration, balance, coordination&lt;br&gt;• Feeling less pain can make athlete train too hard → damage body further&lt;br&gt;• Lead to constipation and low blood pressure&lt;br&gt;• Emotional effects e.g. hallucinations (morphine)</td>
</tr>
<tr>
<td><strong>Anabolic Steroids</strong>&lt;br&gt;(shot putter)</td>
<td>• Mimic testosterone (male hormone) + promote bone + muscle growth&lt;br&gt;• Increase Muscle size&lt;br&gt;• Allow athletes to train harder</td>
<td>• High blood pressure, heart disease, infertility, cancer, liver disease…death&lt;br&gt;• Women may facial and body hair, and their voices may deepen&lt;br&gt;• Increase risk of muscle injury</td>
</tr>
<tr>
<td><strong>Peptide Hormones</strong>&lt;br&gt;(marathon runner)</td>
<td>• Drugs that cause other hormones to be produced&lt;br&gt;• Increase muscle growth&lt;br&gt;• Increase number of Red Blood Cells&lt;br&gt;• Assist recovery from training (improves lactic acid removal and decreases O₂ debt quicker)&lt;br&gt;• EPO - allows more oxygen carrying capacity due increase of red blood cells</td>
<td>• Cause strokes and abnormal growth&lt;br&gt;• EPO thickens the blood → harder for blood to pass through capillaries → increase risk of heart attack/stroke</td>
</tr>
</tbody>
</table>

**SO WHY ATHLETES CHOOSE TO USE THEM, IN SPITE OF THE RISKS?**

- Enhance or improve performance e.g. last chance to get Olympic gold medal
- Encouraged to do so by their coaches or fellow athletes
- Level the playing field
- Financial reward (during relatively short professional career)
1.2.2 - THE CARDIOVASCULAR SYSTEM DURING EXERCISE

**KEY TERMS**
- **Heart Rate (HR)** - the amount of beats per minute
- **Stroke Volume (SV)** - the amount of blood pumped by heart in one beat
- **Cardiac Output (CO)** - the amount of blood pumped by the heart per minute
  \[
  CO = SV \times HR
  \]

**WHAT ARE ARTERIES, VEINS & CAPILLARIES?**

**Arteries:**
- Thick, flexible vessel walls
- Has a pulse. No valves
- Work under high pressure
- Transports blood away from heart (OXYGENATED)
- Narrow lumen

**Veins:**
- Thin walls
- Valves present; prevents backflow. No pulse
- Pulsating muscles close to veins prevent backflow - 'skeletal pump'
- Work under low pressure
- Transports blood towards the heart (DEOXYGENATED)
- Wide lumen

**Capillaries:**
- Smallest of all vessels - walls one cell thick
- They are 'semi-permeable' - substances pass through
- At one end - they feed muscles, organs and body tissue with oxygen and nutrients
- At other end - carbon dioxide and waste products pass into veins to be removed
- They bring blood within reach of every cell

**Diagram of the heart**

The flow of blood

**Immediate Effects of Exercise**
- Heart Rate increases
- Cardiac Output & Stroke Volume increases
- Blood Pressure increases
- Increase of Blood to working muscles - blood shunting
- Vasodilation
- Lactic acid builds up + muscles ache
- Body temp increases

**Effects of Regular Training**
- Bigger & Stronger heart
- Lower Resting Heart Rate
- Increased Cardiac Output & Stroke Volume
- Lower systolic + diastolic Blood Pressures
- More Blood Vessels - Capillarisation
- Faster recovery rate

**Long Term Benefits**
- Helps prevent coronary heart disease
- Helps prevent Type 2 diabetes
- Helps prevent Cardiovascular Disease
- Helps prevent Obesity
- Healthy veins & arteries - more elastic
- Increases ratio of HDL: LDL

**Diagram of the heart**

Labels for extra info!

**THE FLOW OF BLOOD**
(for info + extra understanding!)

De-oxygenated blood returns to the heart through the large veins called vena cavae

Blood enters right atrium and passes through the tricuspid valve into right ventricle

It is then pumped through the semi-lunar valve into pulmonary artery and into lungs where it loses carbon dioxide and picks up fresh oxygen

Oxygenated blood returns to heart from lungs through the pulmonary vein into left atrium

It passes through bicuspid valve and into the left ventricle

It is pumped through semi-lunar valve into aorta and out to rest of body through arteries
The Effect of lifestyle on the cardiovascular system

**REST**
- the period of time allotted for recovery
  - Essential to recovery
  - Allows body to adapt: heart grow in size + thickness, capillarisation
  - E.g. 2 days training + 1 day rest + 3 days training

**Stress**
- Builds up over time
- Increases BP
- Increases HR

**Factors with a negative effect on the Cardiovascular system**
- High cholesterol (e.g. due to diet high in animal fats)
  - Ratio of HDL:LDL is key
  - LDL - blockages

**Sedentary Lifestyle**
- Lack of exercise (hypokinetic disease)
  - Increases obesity risk

**Recreational Drugs**
- Alcohol, Nicotine
  - Releases
  - Raise BP
  - Lowers HDL
KEY TERMS
- Oxygen debt - Shortfall of oxygen to the body after maximal effort/anaerobic exercise, resulting in deep and shallow breathing e.g. at end of 400m race
- Vital Capacity - The maximum amount of air that can be forcibly exhaled after breathing in as much as possible
- Tidal Volume - Amount of air breathed in or out at rest

MECHANISM OF BREATHING
(For info/extra understanding!)
Lungs are not muscles therefore can’t move on their own accord. They are helped by the diaphragm and intercostal muscles between the ribs.

When we breathe in - Inspiration - the following happens...
- Our diaphragm pulls down
- Our intercostal muscles contract
- Air pressure is reduced
- Air is sucked through the tubes into lungs
- Our chest expands

When we breathe in - Expiration - the following happens...
- Our diaphragm relaxes
- Our intercostal muscles relax
- Our chest becomes smaller
- Pressure increases on the lungs
- Air is forced out

What is Lactic Acid?
- Lactic acid is a by-product of exercise. A build up of this can inhibit performance and cause pain, discomfort and fatigue.
- Lactic acid occurs in the anaerobic system because without the presence of oxygen, pyruvic acid turns to lactic acid.
- Cooling down properly with stretching helps the lactic acid be removed and prevents aching muscles after the exercise.

AEROBIC and ANAEROBIC ACTIVITY
AEROBIC - with oxygen
- Lower intensity
- Endurance activities - Marathon

ANAEROBIC - without oxygen
- Higher intensity
- Short distance activities - Sprinting

DAMAGE BY SMOKING/NICOTINE
IMPAIRS GASEOUS EXCHANGE
- Damages lungs
- Makes alveoli less stretchy i.e. less efficient
- More difficult to O₂ in and CO₂ out
- Hearts have to work harder → athlete feels more tired

THE RESPIRATORY SYSTEM
The function of the respiratory system is:
- To get oxygen into the body
- To remove carbon dioxide out of the body
Oxygen is used by the body to release energy and carbon dioxide is released so it doesn’t build up and poison the body.

Immediate Effects of Exercise | Effects of Regular Training
--- | ---
✔ Breathing deepens | ✔ Improved efficiency of lungs → more efficient delivery of O₂ and removal of CO₂
✔ Breathing quickens | ✔ More alveoli
✔ Oxygen Debt (result from anaerobic exercise) | ✔ Improved VO₂max
✔ Increase in tidal volume | ✔ Increased vital capacity

Increased tidal volume
✔ Faster recovery rate
How are muscles classified?

- **Skeletal (Voluntary)** - most common. They attach to the skeleton, give a person's shape - Biceps/Triceps
- **Smooth (Involuntary)** - work automatically and are not controlled - found in intestines, blood vessels and urinary organs.
- **Cardiac (Involuntary)** - Heart muscle works automatically and beats rhythmically.

What is muscle tone?
Some muscle fibres contract whilst others relax. These contractions tighten the muscles but aren't strong to cause movement. Different fibres contract at different times to prevent fatigue. This called Muscle tone and is very important for good posture.

Muscle tone - Voluntary muscles in a state of very slight tension ready and waiting to be used.

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Movement</th>
<th>E.g.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deltoid</td>
<td>Moves arms in all directions at shoulder</td>
<td>Tennis serve, cricket bowl</td>
</tr>
<tr>
<td>Trapezius</td>
<td>Rotates shoulder backwards</td>
<td>Rowing</td>
</tr>
<tr>
<td>Latissimus Dorsi</td>
<td>Rotates arm @ shoulder</td>
<td>Butterfly</td>
</tr>
<tr>
<td>Pectorals</td>
<td>Adduct arm @ shoulder</td>
<td>Forehand in tennis</td>
</tr>
<tr>
<td>Abdominals</td>
<td>Flex trunk</td>
<td>Pull body down in hurdles</td>
</tr>
<tr>
<td>Biceps</td>
<td>Flex arm @ elbow</td>
<td>Chin-up</td>
</tr>
<tr>
<td>Triceps</td>
<td>Extend arm @ elbow</td>
<td>Press-up, javelin release</td>
</tr>
<tr>
<td>Gluteals</td>
<td>Extend leg @ hips</td>
<td>Pulling back leg before kicking ball</td>
</tr>
<tr>
<td>Quadriceps</td>
<td>Extend leg @ knee</td>
<td>Take off on LT, kick ball</td>
</tr>
<tr>
<td>Hamstrings</td>
<td>Flex leg @ knee</td>
<td>Bending on landing from vault</td>
</tr>
<tr>
<td>Gastrocnemius</td>
<td>Pointing toes</td>
<td>Front crawl, pushing onto toes in run</td>
</tr>
</tbody>
</table>

How do muscles work together?

**Antagonistic Pairs**: Muscles working together to provide movement. E.g. Flexion of the arm, biceps contracts and triceps relax. To extend the arm, the triceps contract and the biceps relax.

- **Agonist (Prime mover)** - contracting muscle causing movement
- **Antagonist** - relaxing muscle that assists prime mover
- **Origin** - the end of muscle that is attached to a fixed bone
- **Insertion** - point where a tendon attaches muscle to bone where there is movement
- **Flexibility** - a joint's ability to move through its full range

Another example is the hamstrings & quadriceps.

Role of Muscular System during exercise

- Muscles are connected to bone to be the driving force behind your movement
- Due to contraction + relaxation (lengthening) of muscles
- Happens voluntarily to bring about movement. These are the ones we can train so they can work harder for longer or to improve their flexibility so performing with them becomes easier and more effective.
### 1.2.4 - MUSCLES AND MUSCLE ACTION

**TYPES OF CONTRACTION**

- **Isotonic Contraction** - In this contraction, the muscle changes length and so something moves. *E.g. Bicep Curl*
- **Isometric Contraction** - In this contraction, the muscle stays the same length and so nothing moves. *E.g. the Wall Sit* *Used less frequently in sports*

**FAST TWITCH OR SLOW TWITCH?**

**FAST TWITCH**
- Used in explosive activities
- Contract quickly
- Produce powerful action
- Limited Oxygen supply
- White in colour
  - *e.g. speed events, throwing & jumping*

**SLOW TWITCH**
- Used in endurance activities
- Contract slowly
- Long Lasting
- Good oxygen supply
- Red in colour
  - *e.g. long distance running, cycling & swimming*

### Immediate Effects of Exercise vs. Effects of Regular Training

<table>
<thead>
<tr>
<th>Immediate Effects of Exercise</th>
<th>Effects of Regular Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Requirement for <em>extra fuel</em> (<em>glucose + O₂</em>)</td>
<td>✓ Can cope better with lactic acid - takes longer to build up</td>
</tr>
<tr>
<td>✓ <em>Lactic acid</em> produced if not enough <em>O₂</em></td>
<td>✓ <em>Hypertrophy</em> (increased size of muscles)</td>
</tr>
<tr>
<td>✓ <em>Muscle stiffness/soreness/cramp</em></td>
<td>✓ <em>Increased strength</em></td>
</tr>
<tr>
<td>✓ <em>Muscle start to fatigue...eventually can no longer perform the movement</em></td>
<td>✓ <em>Increased power</em> (<em>power = strength x speed</em>)</td>
</tr>
</tbody>
</table>

### POTENTIAL FOR INJURIES

Includes:
- Sprains (muscle)
- Strains (joints)
- Muscle atrophy (muscle wastage due to inactivity)
- Minor injuries - cuts, grazes and bruises

### TREATMENT FOR MUSCULAR INJURIES - R.I.C.E

**REST** - Rest the injured part to prevent further injury

**ICE** - Apply ice or a cold compress to reduce blood flow, pain and swelling

**COMPRESSION** - Compress the injury to reduce bleeding and swelling

**ELEVATION** - Elevate the injured part to reduce bleeding, swelling and throbbing

NB: Cuts/grazes - treat with antiseptic wipe then bandage
1.2.5 - THE SKELETAL SYSTEM

WHAT ARE THE FUNCTIONS OF THE SKELETON?

During movement:
1. Protection - Ribs protect heart and lungs, Cranium protects brain, vertebral column protects spinal cord
2. Support - firm, rigid and keep us upright
3. Movement - Skeleton has 'anchor points' to which muscles attach and act as levers. Long bones help create the leverage to apply the force.

At other times:
4. Shape - gives framework - basketball player long, thin skeleton - jockeys small, thin skeleton
5. Blood Production - red and white blood cells are produced in the long bones.

HOW ARE BONES CLASSIFIED? For info!
1. Long bones - Humorous, Femur
2. Short bones - Carpals and Tarsals.
3. Flat bones - Cranium, Scapula and Sternum
4. Irregular bones - Patella and Vertebrae. (odd shaped bones)

THE DEVELOPMENT OF BONES - For info!
Bones start off as cartilage and then become bone by the process of Ossification.
Bones have a tough outer layer called the Periosteum. As development continues there are 3 centres of ossification: in the diaphysis (middle) and epiphyses (end).

Ossification - The development of bone from cartilage. It occurs throughout childhood until adulthood.

Effects of Regular Training On the Skeletal System

- Increased bone density
- Thus increased bone strength
- Ligaments become stronger
- Tendons become stronger
- Increase joint flexibility
- Helps prevent osteoporosis (where bone density weakens and bones become weak and thus break easily)
- Weight bearing exercises have positive effect in preventing osteoporosis (e.g. skipping, brisk walking, running, yoga) NB too much while still growing can hinder development
IN WHAT WAYS DO JOINTS MOVE?

1. **Flexion**: decreasing the angle at a joint.
2. **Extension**: increasing the angle at a joint.
3. **Adduction**: movement of a limb towards the body.
4. **Abduction**: movement of a limb away from the body.
5. **Rotation**: movement of a limb in a circular or part circular direction.

THE STRUCTURE OF JOINTS

**JOINT** = place where 2 bones meet
**CARTILAGE** = prevents rubbing/friction between bones
**SYNOVIAL FLUID** - lubricates joint
**LIGAMENTS** - keep joint together
**TENDONS** - help create movement by connecting to muscles

WHAT TYPES OF JOINTS ARE THERE?

1. **Synovial joints or Freely Moveable** - e.g. Knee/hip
   (For info only:)
2. **Fixed (fibrous) joints** - Skull
3. **Slightly moveable (cartilaginous) joints** - Vertebrae

SYNOVIAL JOINT

**Example** - The Knee (HINGE)

Labels are just for info!

WHAT ARE TENDONS, LIGAMENTS & CARTILAGE?

**TENDONS**
- Attach muscle to bone
- Strong, non-elastic connective tissue
- Joint stability

**LIGAMENTS**
- Attach bone to bone
- Very strong elastic fibres
- Joint stability

**CARTILAGE**
- Covers joints to allow bones to rub smoothly
- Acts as shock absorber
- Produces synovial fluid

Gastrocnemius

TENDON (Achilles)

**WHAT TYPES OF SYNOVIAL JOINTS ARE THERE?**

1. **Ball and Socket** - movement in all directions and rotation - Hip, Shoulder (hurdling)
2. **Hinge** - movement Flexion and Extension only - Knee or Elbow (javelin throw, kick ball)
   (For info only:)
3. **Pivot** - only rotation at Atlas and Axis at top of the spine
4. **Gliding** - Little bit of movement in all directions - tarsals and carpals
5. **Condyloid** - movement forwards and backwards, left to right - in the wrists
BONE & JOINT INJURIES

RECOGNITION
- Recent blow or fall
- Snapping sound
- Difficulty moving limb
- Pain worse when moving
- Deformity - limb unusual shape
- Swelling, bruising
- Signs of shock

ACTION
- Keep him/her still & comfortable
- Support injured part
- Bandage injured part to their body/limb
- Reassure him/her
- Send for medical help

FRACTURES - break in the bone. There are two types:
1. Simple (closed) fracture - bone stays under the skin
2. Compound (open) fracture - Bone breaks through the skin
3. Greenstick fracture - like a simple fracture but bone is only partly broken
4. Stress fracture - Small cracks in the bone. 'Overuse' injury often caused by running too much in a hard surface

*All fractures are serious and need URGENT medical attention*

STRESS FRACTURES - We need to:
- Get immediate rest
- Keep fit doing over activities
- Check running and footwear for problems

DISLOCATIONS - Bone at a joint is forced out of its normal position.
Also could be possible ligament damage around the joint. Could be caused by strong force wrenching the bone e.g. rugby tackle. All dislocations should be treated as a fracture.

TENNIS + GOLFER'S ELBOW
- Due to overuse of TENDONS at elbow

TENNIS ELBOW RECOGNITION
- Pain on outside of elbow
- Using wrong-sized grip of racket

GOLFER'S ELBOW RECOGNITION
- Pain on inside of elbow

SPRAINS
- Sprain = damaged ligament e.g. twisted ankle

CAUSES
- Tearing of ligaments holding bones of joint together
- E.g. Joint was inverted (turned inwards), falling awkwardly, colliding with another player.

TREATMENT FOR INJURIES
REST
- Stop playing/training
ICE
- Limits swelling
- Allows healing to take place faster
- Provides pain relief
COMPRESSION
- Restricts swelling
ELEVATION
- Raising injury - reduces swelling

TORN CARTILAGE
- Tearing connective elastic substance joining muscle to bone

RECOGNITION
- E.g. knee: pain on inside of knee
- Athlete falls to the ground
- Joint is likely to be bent

DIET & THE SKELETAL SYSTEM
Effect of Calcium
- Helps bones grow
- Increases their density
- E.g. milk, cheese, yogurt (choose low-fat!)

Effect of Vitamin D
- Helps with absorption of calcium
- Essential to growth + maintenance of healthy bones
- Made when skin is exposed to sunlight

This revision guide should NOT be your only resource if you want to achieve MAXIMUM MARKS...use your class notes, your textbook and course outline too. Good Luck!