GCSE Physical Education

Component 1

Part 2

Revision Booklet

- Aerobic & anaerobic exercise
- Short term effects of exercise
- Lever systems
- Planes and axes of movement

Aerobic and Anaerobic Exercise

Topic Number	Description	Pre Revision	Post revision
1.3.1	**Energy:** • The use of glucose and oxygen to release energy aerobically with the production of carbon dioxide and water • The impact of insufficient oxygen on energy release • The by-product of anaerobic respiration (lactic acid)		
1.3.2	**Energy sources:** • fats as a fuel source for aerobic activity • carbohydrates as a fuel source for aerobic and anaerobic activity		

Areas of Strength	
Areas to revise	

Energy and Energy Sources

Energy production

Aerobic Exercise	Anaerobic Exercise
• Uses oxygen for energy production • Includes activities that are of a long duration • Includes activities that are of a moderate intensity	• Does not use oxygen for energy production • Include activities that are of a short duration • Includes activities that are of a high intensity
Examples Include	**Examples Include**
 Long Distance Cycling	 Shot Put
 Marathon Running	 Sprinting
 Triathlon	 Long Jump

Aerobic Energy Equation	Glucose + O_2 ⟶ CO_2 + H_2O + Heat + Energy
Glucose and oxygen are used to release energy aerobically. This process produces carbon dioxide, water and heat (as well as energy)	
Anaerobic Energy Equation	Glucose ⟶ lactic Acid + Energy
Lactic acid is produced as a waste product when carbohydrates are broken down without oxygen during anaerobic respiration	

Energy Sources

Energy sources are:

- Fats
- carbohydrates

Fats	Carbohydrates
• They are an energy source for aerobic activities • They require oxygen to break down the fat into energy (a type of glucose) • They are slow to break down • Once broken down they give large quantities of energy	• They are an energy source for both aerobic and anaerobic activities • Do not need oxygen to break down into glucose • Doesn't give as much energy as fats • Quicker to break down and release more energy than fats

Short Term Effects of Exercise

Topic Number	Description	Pre Revision	Post revision	
1.4.1	Short-term effects of physical activity and sport on: • Lactate accumulation • Muscle fatigue Explain the relevance of this to the player/performer			
1.4.2	Short-term effects of physical activity and sport on: • Heart rate • Stroke volume • Cardiac output Explain the importance of this to the player/performer			
1.4.3	Short-term effects of physical activity and sport on: • Depth and rate of breathing Explain the importance of this to the player/performer			
1.4.4	How the respiratory and cardiovascular systems work together to allow: participation in, and recovery from, physical activity and sport, oxygen intake into lungs, transfer to blood and transport to muscles, and removal of carbon dioxide			
1.4.5	Long-term effects of exercise on the body systems see 3.4.1 – 3.4.4			
1.4.6	Interpretation of graphical representations of heart rate, stroke volume and cardiac output values at rest and during exercise			

Areas of Strength	
Areas to revise	

Short term effects of exercise

Short term effects of exercise are the ways your body responds as it starts to exercise. These changes happen so that the body can meet the increased demands to the exercise undertaken

The Muscular System Short Term Effects	Cardiovascular System Short Term Effects	Respiratory Short Term Effects
• Muscle fatigue • Lactate accumulation • Oxygen deficit	• Increase in heart rate • Increase stroke volume • Increase Blood Pressure • Increase cardiac output • Vascular shunting occurs	• Increase depth of breathing • Increase rate of breathing • Increase gas exchange • Increase in tidal volume • Oxygen deficit

Muscular System

When we start to exercise there is a demand for energy. This energy can come through aerobic or anaerobic respiration

When we work anaerobically we get muscle fatigue and a build-up of lactic acid (waste product of anaerobic respiration). If we work anaerobically we do not have enough oxygen, this results in oxygen deficit. During recovery the oxygen is paid back it is used to:

- Replenish myoglobin stores with oxygen
- Remove lactic acid
- Allow energy stores in the muscle to be replenished

The Cardiovascular and Respiratory System Work Together

When we exercise the demand for oxygen and the removal of carbon dioxide increases.

Oxygen and carbon dioxide travel into and out of the body through the respiratory system, this is done by an increase in **breathing rate** and **breathing depth**. As oxygen and carbon dioxide are move in and out of the body quickly **Gas exchange** also increases.

Both oxygen and carbon dioxide are carried in the blood. In order for the oxygen to be transported to the working muscles quickly and for carbon dioxide to be removed from the body **heart rate** is increased.

Because oxygen is needed for the working muscles, **vascular shunting** occurs

An increase in heart rate raises **blood pressure**, both **stroke volume** and **cardiac output** also increase.

Cardiac output = Stroke Volume x Heart Rate

Stroke volume = Amount of blood pumped from the heart in 1 beat
Heart rate = Amount of time the heart beats per minute
Cardiac output = Amount of blood pumped from the heart in 1 minute

Lever Systems

Topic Number	Description	Pre Revision	Post revision
2.1.1	• First Class Levers • Second Class Levers • Third Class Levers Their use in physical activity and sport		
2.1.2	Mechanical advantage and disadvantage (in relation to loads, efforts and range of movement) of the body's lever systems and the impact on sporting performance		

Areas of Strength	
Areas to revise	

Lever Systems

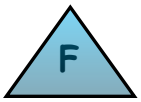
Lever systems help you to move. They can increase the amount you can lift or the speed in which you can move something. You need to be able to:

- Draw the three classes of lever
- Describe the lever
- Give examples in sport

Key words

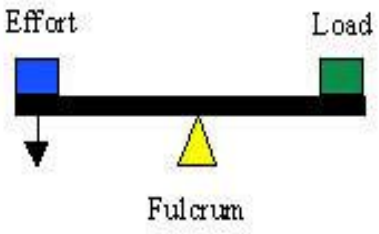
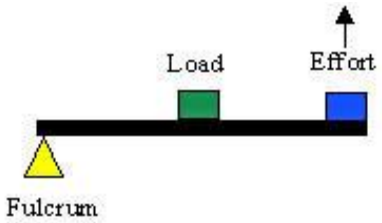
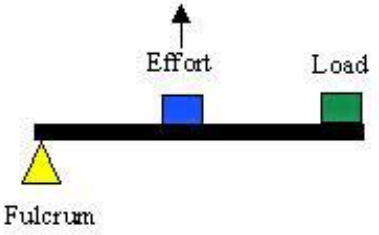
Lever = is a bone and is shown as a straight line

Fulcrum = is a pivot or joint and is shown as a triangle



Effort = is a force provided by muscles as is shown by an arrow

Load = is the weight of the body that is being moved it is shown as a square

Lever	Description	Sporting Examples
Lever 1 	**The fulcrum is between the effort and the load**	Heading the ball  **Fulcrum** = neck joint **Load** = Ball **Effort** = neck muscles
Lever 2 	**The load is between the effort and the fulcrum**	Calf raise  **Fulcrum** = neck joint **Load** = Ball **Effort** = neck muscles
Lever 3 	**The effort is between the load and the fulcrum**	Bicep curl  **Fulcrum** = elbow joint **Load** = weight **Effort** = biceps

Mechanical advantages and disadvantages

Levers have two main functions:

- To move a load faster and further than is possible without a lever
- To move a heavier load that can be moved without a lever

Lever	Advantage	Disadvantage
2nd class	Provide force to lift heavy loads	Small range of movement and cannon move a load quickly
This is due to the load being closer to the fulcrum than the effort		
3rd class	Provides speed and a wide range of movement	Greater force needed to move the load
This is due to the effort closer to the fulcrum than the load		

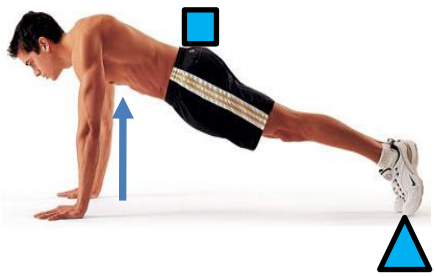
Identifying lever systems

Each lever system can be identified by the component in the middle:

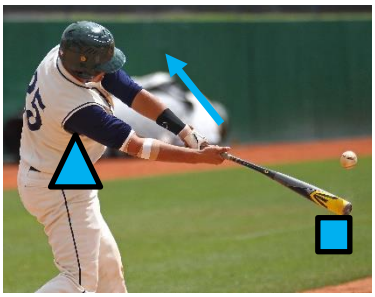
One	Two	Three
F	L	E
(fulcrum)	(load)	(effort)

If you can remember the component in the middle you will be able to recognise the lever

Effort = Biceps
Load = water
Fulcrum = hand/oars
1st class lever
(fulcrum in the middle)



Effort = Triceps
Load = Body weight
Fulcrum = Feet
2nd class lever
(load in the middle)



Effort = muscles
Load = bat/ball
Fulcrum = shoulders
3rd class lever
(effort in the middle)

Planes and Axes of Movement

Topic Number	Description	Pre Revision	Post revision
2.2.1	Movement patterns using body planes and axes: • Sagittal plane • Frontal plane • Transverse plane and • Frontal axes • Sagittal axes • Vertical axes apply to physical activities and sporting actions		
2.2.2	Movement in the sagittal plane about the frontal axis when performing front and back tucked or pike somersaults		
2.2.3	Movement in the frontal plane about the sagittal axis when performing cartwheels		
2.2.4	Movement in the transverse plane about the vertical axis when performing a full twist jump in trampolining		

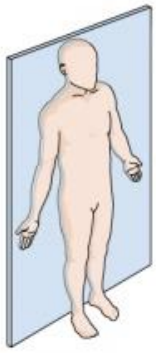
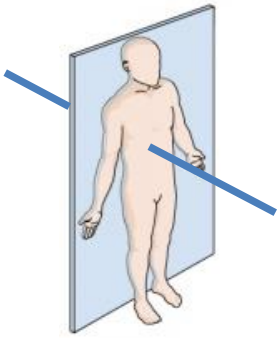
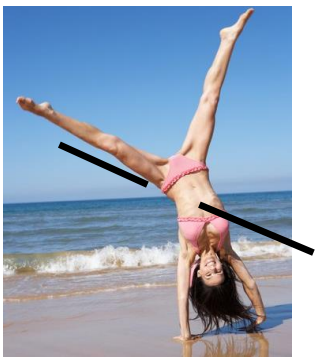
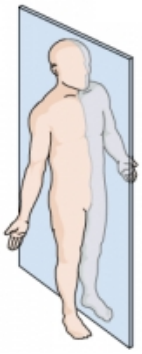
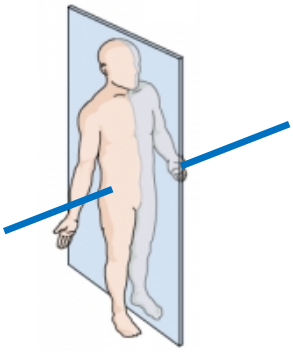
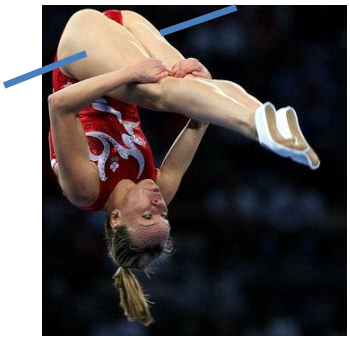
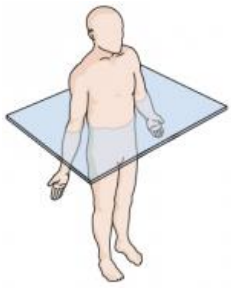
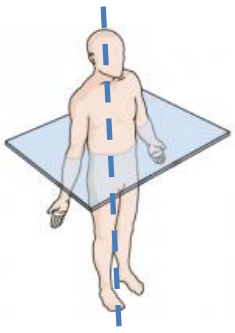
Areas of Strength	
Areas to revise	

Planes and axes of movement

We move in planes around axes. You need to be able to identify and describe the three different body planes and axes

- A plane is an imaginary line that movement direction occurs in
- An axis is a line about which the body or body part can turn

Imagine being chopped in half (plane) and stuck back together with a spear (axis). When you turn the spear, movement occurs

Plane of movement	Axes of movement	Sporting example
		
Frontal Plane Separates the front and the back of the body	**Sagittal axis** Goes from the front to the back of the body	**Cartwheel** The only movements are Abduction and adduction
		
Sagittal Plane Separates the left and the right side of the body	**Frontal axis** Goes from one side to the other side of the body	**Somersault** The only movements are flexion and extension
		
Transverse Plane Separates the top and the bottom of the body	**Vertical axis** Goes from the top of the body to the bottom of the body	**Full twist (diving)** The only movements are rotating and twisting

Apply your Knowledge

- Aerobic & anaerobic exercise
- Short term effects of exercise
- Lever systems
- Planes and axes of movement

1. Give three examples of both aerobic and anaerobic sports or activities? (6 marks)

Aerobic	Anaerobic
_____	_____
_____	_____
_____	_____

2. In the space below write down the aerobic energy equation? (2 marks)

3. Explain the difference between fats and carbohydrates as an energy source in physical activity? (4 marks)

_____

_____

_____

_____

_____

4. The picture below shows two rowers at the end of a race. Their voluntary muscles are tired due to a build-up of lactic acid. What is lactic acid and how is it produced? (4 marks)

_____

_____

_____

_____

_____

_____

_____

5. Name 3 short term effects of exercise on the cardiovascular system? (3 marks)

_____

_____

6. Explain why both the depth and rate of breathing increase when we start to exercise? (5 marks)

_____

_____

_____

_____

_____

_____

7. Explain the equation below? (3 marks)

Cardiac Output = Stroke Volume x Heart Rate

_____

_____

_____

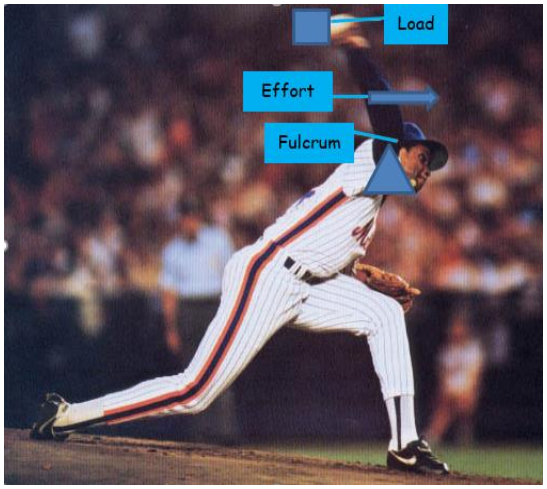
_____

8. Draw a first-class lever in the space provided and give a sporting example of its use in sport? (3 marks)

Sporting example:

_____

9. Name and describe the lever stem in the diagram? (3 marks)



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_____

10. What three components that make up the cardiovascular system? (1 mark)

_____

11. The picture shows a bicep curl which is an example of a third-class lever. Identify the fulcrum, load and effort (2 marks)

_____

_____

_____

12. What are the mechanical advantages and disadvantages of a third-class lever system? (4 marks)

_____

_____

_____

_____

13. Name the plane of movement in the diagram below, draw the axis that allows the body to move and give a sporting example using this axis of movement? (4 marks)

Plane of Movement:

_____

Sporting Example:

_____

14. Below is a trampolinist performing a somersault name the plane of movement and the axes of movement? (2 marks)

_____

_____

_____

_____

_____

15. Explain the mechanical disadvantage of the lever system in the ankle when performing a lay-up shot? (3 marks)

_____

_____

_____

16. What movement can occur at a vertical axis? (1 mark)

_____

Self-Assessment

- You are now going to use your revision notes to mark your work
- Fill in any incorrect answers in Green pen
- Give yourself a score

/50

Post it

Write a short post it note about your knowledge at this stage of component 1 and what you need to do to improve!