Here are just a few sample slides – we hope you love them!
Both teacher and student slides are included (the latter will be supplied as PDF file for photocopying)

OCR Physical Education
AS / A-Level Biomechanics
PowerPoint Summaries

This resource has been written by Claire Miller for PEfocus and has been designed to support teaching and learning of the 'new' OCR AS and GCE/A-Level PE specification for teaching from September 2016.

All content mirrors the OCR biomechanics specification perfectly.

The resource comprises:

- ✓59 full colour / fully animated teacher slides
- ✓Student slides as PDFs – with gaps to fill
- ✓Teacher slides as PDFs – with 'answers'

This resource can be used to present new work, for summing up topic areas and for consolidation at the end of the course.

We really hope that you and your learners will find it both engaging and helpful.

Student slides

The aim of this resource is to build a bank of knowledge that can be used throughout the course as well as at the end for review.

A favoured layout is to print two slides per A3 sheet; many students find the large visual style manageable, engaging and valuable as a supplement to other notes and resources.

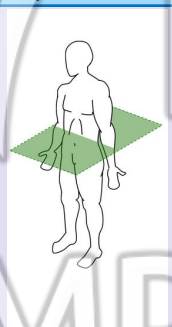
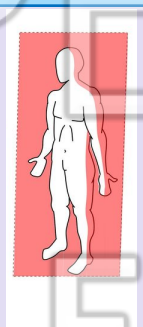
On print-outs, fill in the blanks as you work your way through the slides

Planes of movement, Functional roles of muscles: An Overview

Planes of movement

3

You need to know …

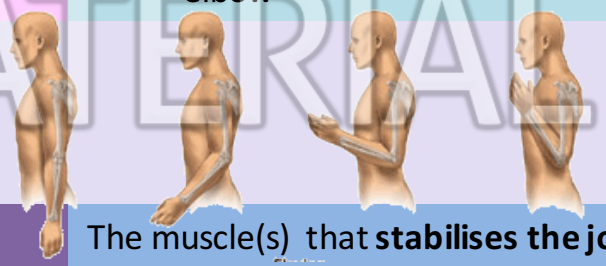
Names	Sagittal	Transverse	Frontal
Position	Divides body right &left 	Divides body top &bottom 	Divides body front & back 
Body Movement	Forwards & backwards. **Example:** somersault.	Rotational. **Example:** turn / spin.	Right & left lateral. **Example:** cartwheel.
Joint Movement	Flexion & extension	Rotation	Abduction & adduction
	Dorsi flexion & plantar flexion	Horizontal flexion & horizontal extension	

Functional roles of muscles

3

You need to know …

Agonist	The **muscle responsible for the movement** at a joint
Example	The biceps brachii during flexion of the elbow
Antagonist	The muscle **that lengthens or relaxes** as the agonist contracts. It has an action opposite to that of the agonist.
Example	The triceps brachii during flexion of the elbow
Fixator	The muscle(s) that **stabilises the joint** where the **origin of the agonist sits**. It helps the agonist function efficiently.
Example	The rotator cuff muscles (guardians of the shoulder joint), or the deltoid during flexion of the elbow.

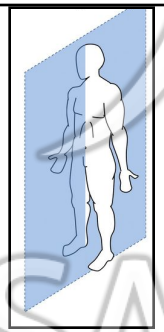
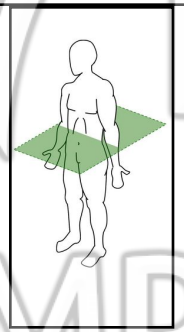
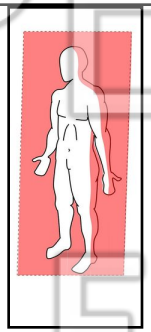


Planes of movement, Functional roles of muscles: An Overview

Planes of movement

You need to know … 3

Fill in the gaps

Names	_____	_____	_____
Position	Divides body _____&_____ 	Divides body _____&_____ 	Divides body _____&_____ 
Body Movement	Forwards & backwards. **Example:** _____	Rotational. **Example:** _____	Right & left lateral. **Example:** _____
Joint Movement	_____ & _____	Rotation	_____ & _____
	D_____ flexion & P_____ flexion	H_____ flexion & H_____ extension	

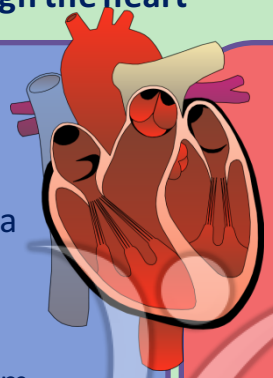
Functional roles of muscles

You need to know … 3

Agonist	The **muscle responsible for the** _____ at a joint
Example	The _____ _____ during flexion of the elbow
Antagonist	The muscle **that** _____ **or relaxes** as the agonist contracts. It has an action opposite to that of the _____.
Example	The _____ _____ during flexion of the elbow
Fixator	The muscle(s) that _____ **the joint** where the _____ **of the agonist sits**. It helps the agonist function efficiently.
Example	The rotator cuff muscles (guardians of the shoulder joint), or the _____ during flexion of the elbow.

Cardiovascular system at rest

Blood flow through the heart



Right hand side

Vena cava

Right atrium

Pulmonary Circulation

Pulmonary semilunar valve

Pulmonary artery

Lungs

Left hand side

Pulmonary veins

Left atrium

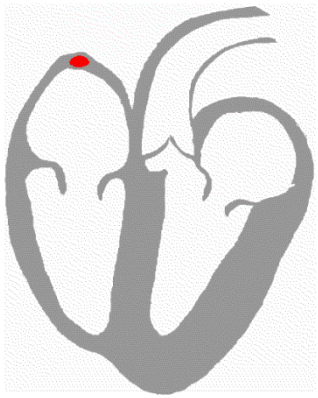
Systemic Circulation

Aortic semilunar valve

Aorta

Body tissues

The conduction system



Definition

Specialised bundles of tissue that transmit the electrical impulse through the heart causing a coordinated contraction.

Consisting of 4 features:

1. **SA node**
In wall of right atrium. Sends impulse across both atria causing atrial systole.

2. **AV node**
In middle wall of heart between atria and ventricles. Receives impulse from SA node, delays it for a moment to allow for atrial systole to finish and sends it down the bundles of His.

3. **Bundles of His**
In middle wall of heart. Transmit impulse to the bottom of the right and left side of heart.

4. **Purkinje fibres**
In walls of ventricles. Cause impulse to penetrate into ventricle walls causing ventricular systole.

Cardiovascular system at rest

Blood flow through the heart

Fill in the gaps

Right hand side

Vena cava

↓

_____ _____

↓

Tricuspid valve

↓

_____ _____

↓

Pulmonary semilunar valve

↓

_____ _____

↓

Lungs

P_____ Circulation

Left hand side

_____ _____

↓

Left atrium

↓

_____ _____

↓

Left ventricle

↓

_____ _____

_____

↓

Aorta

↓

Body tissues

S_____ Circulation

The conduction system

Definition

Write a definition of the conduction system in the box.

Consisting of 4 features:

Fill in the gaps

1. ____ _____

In wall of right atrium. Sends impulse across both atria causing atrial systole.

2. AV node

In middle wall of heart between _____ and _____. Receives impulse from _____ _____, delays it for a moment to allow for atrial systole to finish and sends it down the _____ _____ _____.

3. _____ _____ _____.

In middle wall of heart. Transmit impulse to the bottom of the right and left side of heart.

4. Purkinje fibres

In walls of ventricles. Cause impulse to penetrate into _____ walls causing ventricular _____ .

7.1

Respiratory system at rest

KEY WORDS

Respiration

Definition

the processes involved in supplying the body with O_2 and disposing of CO_2.

You need to know **3** processes.

1. Mechanics of breathing. (slide 7.2)
the movement of air into (inspiration) and out of (expiration) the lungs.

2. External respiration. (slide 7.3)
gaseous exchange of O_2 & CO_2 that occurs at the lungs between the alveoli and the blood.

3. Internal respiration. (slide 7.3)
gaseous exchange of O_2 & CO_2 that occurs at the muscles between the blood and the muscles.

In between processes 2 & 3, the respiratory system relies on the cardiovascular system to transport oxygen from the lungs to the muscles, and CO_2 from the muscles to the lungs.

How is O_2 transported in the blood?

1. combined with haemoglobin as oxyhaemoglobin.
2. dissolved in blood plasma.

How is CO_2 transported in the blood?

1. combined with haemoglobin as carbaminohaemoglobin.
2. dissolved in blood plasma.
3. dissolved in water as carbonic acid.

Passage of air into the lungs

nose → pharynx → larynx → trachea → bronchi → alveoli

Anatomy of the respiratory system

7.1

Respiratory system at rest

PEfocus

KEY WORDS

Respiration	
Definition	

Fill in the definition and the gaps

You need to know 3 processes.

1. **(slide 7.2)**
the movement of air into (inspiration) and out of (expiration) the lungs.

2. **(slide 7.3)**
gaseous exchange of O_2 & CO_2 that occurs at the lungs between the alveoli and the blood.

3. **(slide 7.3)**
gaseous exchange of O_2 & CO_2 that occurs at the muscles between the blood and the muscles.

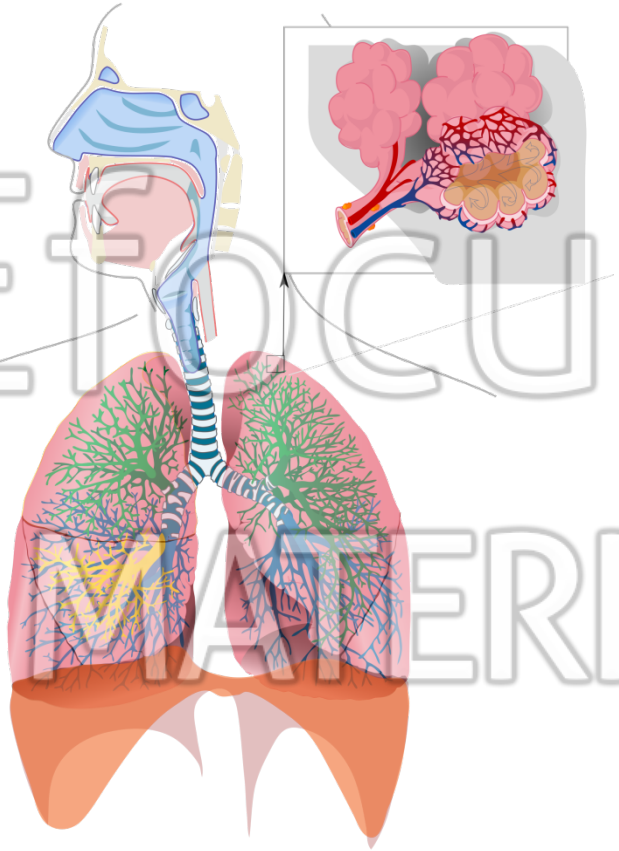
In between processes 2 & 3, the respiratory system relies on the cardiovascular system to transport _____ from the lungs to the muscles, and _____ from the muscles to the lungs.

How is O_2 transported in the blood?

1. combined with _____
2. as _____.
3. dissolved in _____ _____.

How is CO_2 transported in the blood?

1. combined with _____
2. as _____.
3. dissolved in _____ _____.
4. dissolved in water as _____ _____.



Draw line linking Key word to structure

Passage of air into the lungs

nose
↓
pharynx
↓
larynx
↓
trachea
↓
bronchi
↓
alveoli

Anatomy of the respiratory system

*GCE/A-level only

9.1

Adenosine Triphosphate (ATP) and energy transfer

PEfocus

The breakdown and resynthesis of ATP is a reversible reaction.

ATP

- What is the definition?
  - the only usable form of energy for muscular contraction.
  - the energy currency of the body.
- What is its structure?
  - Adenosine – P – P – P (high energy bond)
- Where is it stored?
  - in the muscle cell.
- What enzyme breaks it down?
  - ATPase
- What's left when ATP is broken down?
  - ADP + P + Energy → used for muscular contraction.
- What type of reaction is this?
  - Exothermic
- How is it resynthesised?
  - ADP + P + Energy → ATP
  - Energy: released from the breakdown of fuels. e.g. PC, glycogen, fats.
- What type of reaction is this?
  - Endothermic

KEY WORDS

Definition	Enzyme	Adenosine diphosphate	Exothermic	Endothermic
	A catalyst that speeds up the rate of a chemical reaction.	**ADP** The compound formed when the terminal phosphate bond is removed from ATP.	A reaction that gives out energy. e.g. the breakdown of ATP.	A reaction that takes in energy. e.g. the resynthesis of ATP.

The body can only store a very limited supply of ATP – enough for 2-3 seconds of muscular contraction. So, it has 3 methods of continually resynthesising ATP called the energy systems.

*GCE/A-level only

9.1

Adenosine Triphosphate (ATP) and energy transfer

PEfocus

The breakdown and resynthesis of ATP is a _____ reaction.

released from the breakdown of fuels.

e.g. __, _____, _____.

high energy bond

answer the questions in the empty boxes.

ATP

What is the definition?

What type of reaction is this?

What is its structure?

How is it resynthesised?

Where is it stored?

What type of reaction is this?

What's left when ATP is broken down?

What enzyme breaks it down?

used for m_____ c_____.

fill in the empty boxes and gaps

KEY WORDS

	Adenosine diphosphate	Exothermic	Endothermic	
Definition	A catalyst that speeds up the rate of a chemical reaction.		e.g. the breakdown of _____.	e.g. the _____ of ATP.

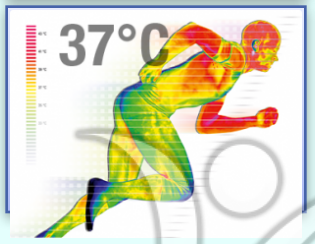
The body can only store a very limited supply of ATP – enough for _____ seconds of muscular contraction. So, it has 3 methods of continually resynthesising ATP called the _____ _____.

*GCE/A-level only

11.4

Exercise in the heat

KEY WORDS

Core body temperature	Thermoregulation	Hypothalamus	Thermoreceptors	Heat acclimatisation
Definition		the process that allows the body to maintain its core body temperature.	the region of the brain responsible for controlling body temperature.	sensory receptors that detect changes in core body temperature and send the information to the hypothalamus.	the process in which the body adjusts gradually to a change in environmental temperature.

Remember! slide 9.1

The energy needed for muscular contraction comes from the breakdown of ATP in an exothermic reaction, which gives out heat energy.

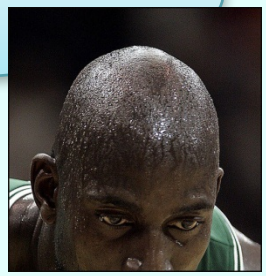
ATP breakdown in the human body is very inefficient. 20% of the energy released is used for muscular contraction and 80% of the energy released is heat energy.

When the rate of ATP breakdown increases during exercise, the increase in heat produced will increase core body temperature.

This heat imbalance is detected by thermoreceptors that inform the hypothalamus in the brain. A process called thermoregulation occurs that removes heat from the body until a steady state is reached where heat loss = heat production.

the hypothalamus activates **two** defense mechanisms.

1. Evaporative techniques (sweating)



2. Non-evaporative techniques (cooling of blood at the skin)

*GCE/A-level only 11.4

Exercise in the heat

KEY WORDS

Definition

	Thermoregulation		Thermoreceptors	
the normal temperature of the human body at rest = _____ degrees celsius.		the region of the brain responsible for controlling body temperature.		the process in which the body adjusts gradually to a change in environmental temperature.

Fill in the empty boxes

Remember! slide 9.1

The energy needed for muscular contraction comes from the breakdown of _____ in an exothermic reaction, which gives out heat energy.

_____ breakdown in the human body is very inefficient. 20% of the energy released is used for m_____ c_____ and 80% of the energy released is heat energy.

When the rate of _____ breakdown increases during exercise, the increase in heat produced will _____ core body temperature.

Fill in the gaps.

This heat imbalance is detected by _____ that inform the _____ in the brain. A process called _____ occurs that removes heat from the body until a steady state is reached where _____ _____ = _____ _____ .

the hypothalamus activates **two** defense mechanisms.

1. _____ techniques (sweating)

2. _____ techniques (cooling of blood at the skin)