

EXERCISE PHYSIOLOGY

OCR AS AND GCE/A-LEVEL PHYSICAL EDUCATION



OCR AS and GCE/A-Level Physical Education

Anatomy & Physiology

For teaching from September 2016

The aim of this Teacher Resource File (TRF) is to provide time saving, high quality and reliable support for dedicated, hard working, busy, teachers of the OCR AS / GCE-A Level PE specification – the Anatomy & Physiology topic (one of three in the physiological component). It has been designed to mirror and support teaching and learning of the specification perfectly.

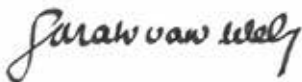
In the TRF you'll find quizzes, worksheets, fill-ins, match up games and many other 'masters' to photocopy and use in your classroom. Some will help learners with course organisation while others are ideal as warm up and plenary tasks. Some will be great class or homework activities to reinforce learning, while others are for making resources such as question cards that can be used year after year to underpin key knowledge and skills. Multi-choice exam style questions are also included – along with a couple of synoptic questions and further potential A&P /Ex Phys synoptic 'links'.

The file comprises nearly 230 pages! On pages 2-5 we've outlined a range of ideas for using the resources in your classroom. We're sure you'll be able to think of more! It's not expected that you'll use everything each year with each group but will select, develop and adapt items to suit your needs and your learners.

This Anatomy & Physiology TRF has been written by Sarah Powell who is a highly experienced teacher of A Level Physical Education having taught the course for over 12 years. She is also co-author of the new Hodder OCR A-level PE textbook and a very experienced examiner. Ali Woodward contributed the energy systems cards and bingo 'game'.

This is one of six TRFs in our range for the 'new spec'. The others are: Exercise Physiology, Biomechanics, Skill Acquisition, Sports Psychology and Socio-Cultural Studies. Information about all of these and our other resource, along with sample pages, can be found at **www.pefocus.com**

Ali and I hope that you and your students find this resource stimulating, engaging, and productive and wish you all the very best for an enjoyable and beneficial teaching and learning experience. Enjoy!



Sarah van Wely
PEfocus

Herewith the contents & supplementary ideas info with 'just a few' sample pages from the new A&P TRF – which comprises nearly 200 pages.

Hopefully it'll give you a realistic flavour of the final product – which we're sure you'll love.

*All tasks, quizzes and activities have answers.
Page numbers will be added to table of contents.*

Table of Contents

*Indicates GCE/A-Level





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Table of contents	
The OCR Anatomy & Physiology specification	
Revision checklists <i>For student files and reference / awareness of required knowledge and understanding</i>	
Outline scheme of work – based on 1hr sessions. For teacher reference / adaptation. Not endorsed by an examining body.	
Anatomy & Physiology glossary of key terms – teacher reference	
Topic by topic glossaries <ol style="list-style-type: none"> 1. Skeletal and muscular systems 2. Cardiovascular and respiratory systems 3. *Energy for Exercise 4. *Environmental effects 	
Topic by topic glossary blanks - student reference and on-going assimilation <ol style="list-style-type: none"> 1. Skeletal and muscular systems 2. Cardiovascular and respiratory systems 3. *Energy for Exercise 4. *Environmental effects 	
Command word chart <i>Student reference</i>	
Different levels of cognitive demand. <i>Aimed at developing thinking and evaluation skills – good for synoptic question preparation.</i> <i>Students consider a key idea and to develop it into something more critically evaluative by adding key information, explanations and critical evaluation where relevant</i>	
1: Skeletal and muscular systems + summary answers	
2: Cardiovascular and respiratory systems + summary answers	
3: *Energy for exercise + summary answers (GCE/A-Level only)	
4: *Environmental effects + summary answers (GCE/A-Level only)	

Key term card match: using the resource	
<i>-photocopy, (lamine) and cut cards into sets. Keep sets separate</i>	
<i>-one set per pair. Students match definition to correct explanation.</i>	
<i>-memory game</i>	
<i>-walk around or 'find partner' – warm up, cool down, 'change pace'</i>	
1: Skeletal and muscular system	
2: Cardiovascular system	
3: Respiratory system	
4: *Energy for exercise (GCE/A-Level only)	
Key term card match 1-2 answers	
Key term card match 3- *4 answers	
What am I describing? : using the resource	
<i>-photocopy, (lamine) and cut up into sets. (keep sets 1-4 separate).</i>	
<i>-play like the board game 'articulate' in pairs. Each pair has a number of cards face down. Player A turns over a card and by using excellent clues (this is the key to learning with this game) consisting of key words and accurate academic context tries to get Player B to say the word on the card</i>	
1: Skeletal and muscular system + possible clues	
2: Cardiovascular system + possible clues	
3: Respiratory system + possible clues	
4: *Energy for exercise and environmental effects + possible clues (GCE/A-Level only)	
Quick Quizzes – using the resource	
<i>quick and easy lesson starters, plenaries or homework tasks</i>	
1: Skeletal and muscular system + answers	
2: Cardiovascular system + answers	
3: Respiratory system + answers	
4: *Energy for exercise and environmental effects + answers (GCE/A-Level only)	

Cue cards – using the resource	
<i>-photocopy on to coloured card, (laminare) and cut up.</i>	
<i>-students can write answers/correct material on back in non-permanent pen</i>	
<i>-or cards can be used as revision/question cards.</i>	
1: Skeletal and muscular system + brief answers	
2: Cardiovascular system + brief answers	
3: Respiratory system + brief answers	
*4: Energy for exercise + brief answers (GCE/A-Level only)	
Fill in the blanks	
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2: Cardiovascular system + answers	
3: Respiratory system + answers	
* 4: Energy for exercise + answers (GCE/A-Level only)	
True or false/ Beat the teacher: using the resource	
1: Skeletal and muscular system + answers	
2: Cardiovascular system + answers	
3: Respiratory system + answers	
* 4: Environmental effects: altitude + answers (GCE/A-Level only)	
'Follow me'/ domino cards – using the resource	
<i>-photocopy, (laminare) & cut into sets (horizontal strips for dominoes). Keep sets separate.</i>	
<i>-depending on class size 'players' (pairs?) can have a set to link up/follow on in one long line (not strictly dominoes).</i>	
<i>-cards can be used as whole class 'follow me' activity. Share cards among group – one player starts by stating the right/shaded key word/phrase. Whoever has follow on/answer on LH of their card (unshaded) reads answer, THEN reads RH side of their card and so on....</i>	
1: Skeletal and muscular system: movement patterns + solution	
2: Cardiovascular system: HR, SV and CO + solution	
3: Respiratory system: mechanics of breathing + solution	
4: *Recovery (GCE/A-Level only) + solution	
Puzzles - Laminare and cut up pieces.	
<i>Solve by placing key term and descriptor together.</i>	
1: Skeletal and muscular system: role and function of muscles + solution	
2: Cardiovascular system: vascular structure and function + solution	
3: Respiratory system: breathing frequency, tidal volume and minute ventilation + solution	
* 4: ATP and Energy for exercise, energy systems + solution (GCE/A-Level)	

Quick crosswords <i>Starter/plenary/homework tasks.</i>	
1: Muscle fibre types + solution	
2: Cardiac cycle and conduction system + solution	
3: Respiratory system + solution	
* 4: Environmental effects + solution (GCE/A-Level only)	
Introductory or revision whole class activity lessons: <i>three tables with different activities on each.</i>	
1. Skeletal, muscular, cardiovascular and respiratory systems	
2.* Energy for exercise and environmental effects (GCE/A-Level only)	
Stretch and challenge tasks <i>quick fire questions and worksheet tasks to stretch & challenge</i>	
1: Skeletal and muscular system – with answers	
2: Cardiovascular system – with possible answers	
3: Respiratory system – with answers	
* 4: Energy for exercise – with answers (GCE/A-Level only)	
Multiple choice questions	
1: Skeletal and muscular systems	
2: Cardiovascular system	
3: Respiratory system	
*4: Energy for exercise (GCE/A-level only)	
5: Environmental effects (GCE/A-level only)	
Multiple choice questions answer grid	
Synoptic style exam questions – rationale and links grids	
Extended question + answer plan + mark scheme: using the resource	
<ul style="list-style-type: none"> • <i>group or individual lesson tasks</i> • <i>homework tasks</i> • <i>self or peer assessment</i> 	
1.(10 mark AS synoptic style question linking the AS A+P topic of skeletal and muscular systems with the AS Biomechanics topic of lever systems)	
2.(20 mark GCE/A-Level synoptic style question linking the A+P topic of cardiovascular and respiratory systems with the Ex Phys topic of high altitude and acclimatisation)	

Revision checklist 2

Cardiovascular and respiratory systems	✓
Cardiovascular system at rest: <ul style="list-style-type: none">❑ Heart rate, stroke volume and cardiac output❑ Cardiac cycle❑ Conduction system	
Cardiovascular system during exercise and recovery: <ul style="list-style-type: none">❑ Effects on heart rate, stroke volume and cardiac output❑ Redistribution of cardiac output❑ Venous return❑ Heart rate regulation and control	
Respiratory system at rest: <ul style="list-style-type: none">❑ Breathing frequency, tidal volume and minute ventilation❑ Mechanics of breathing❑ Gaseous exchange	
Respiratory system during exercise and recovery: <ul style="list-style-type: none">❑ Effects on breathing frequency, tidal volume and minute ventilation❑ Mechanics of breathing during exercise and recovery❑ Regulation of breathing and control❑ Effects on gaseous exchange	

Topic by topic glossary

4.*Environmental effects (GCE/A-Level only)

A	
Acclimatisation	The process of gradual adaptation to exercising in different environments (e.g. in the heat or at altitude) to minimise performance reducing effects.
Altitude	The height or elevation of an area above sea level. As altitude increases the partial pressure of O ₂ decreases, with a negative effect on performance.
B	
Barometric pressure	The pressure exerted by the earth's atmosphere at any given point. Sometimes referred to as atmospheric pressure
C	
Cardiovascular drift	Slight increase in heart rate during sustained steady-state activity which is associated with an increase in body temperature but no increase in workload.
D	
Dehydration	Loss of water in body tissues largely caused by sweating
H	
Humidity	The amount of water vapour in the atmospheric air
Hyperthermia	Significantly raised core body temperature
T	
Temperature regulation	The process of maintaining core temperature. Also known as thermoregulation

Different levels of cognitive demand/development Developing 'higher order' thinking and writing skills

- ❑ First (as always), read the exam question very carefully.
- ❑ Second, check the **command word**, the **subject** and **exactly what is being examined** about the subject.
- ❑ Then (if required by the command word) set off on the road to **critical evaluation**.

1. Know & understand	2. Apply	3. Evaluate
Identify Describe	Explain Give reasons for	Discuss Analyse Critically evaluate
Brainstorm	Write....develop	Develop further Think of alternatives
Think of points that relate directly to the exam question	Develop key points by saying why and how they are significant to the question Explain significance	Critically reflect on what you have written
List or 'spider diagram' your points/ideas	Give examples and evidence to support your points	Complete key points or paragraphs with alternative evidence / a different view
Each point can be used as the central theme of sentences or even paragraphs	Keep application relevant and stay focused on the exact requirements of the question	Sum up or make a relevant conclusion

From knowledge and understanding to critical evaluation and higher grades

3: *Energy for exercise (GCE/A-Level only)
Key term card match 4 – *Energy for exercise (GCE/A-Level only)

ATPase

An enzyme which initiates the breakdown of ATP

Coupled reaction

When products of one reaction are used in another reaction

Energy continuum

The relative contribution of each energy system to overall energy production depending on intensity and duration of activity

Quick Quiz 1 – Skeletal and muscular system

Fill in the missing blanks

Emboldened letters in answers will vertically spell **MOTOR UNIT**

1.	A nerve cell which conducts a nerve impulse to a group of muscle fibres.	M _ _ _ _ _ _ _ _ _
2.	The long projection extending from the cell body of the motor neuron.	_ _ O _
3.	A short term positive electrical charge inside the nerve and muscle cells which conducts the nerve impulse.	_ _ T _ _ _ _ _ _ _ _
4.	A muscle fibre type which has small motor neurons with few muscle fibres per neuron.	_ _ O _ _ _ _ _ _
5.	The law that states muscle stimulation is independent of the strength of a stimulus.	_ _ _ _ R _ _ _ _ _ _
SAMPLE MATERIAL		
6.	A motor unit consists of the motor neuron and its...	_ U _ _ _ _ _ _ _ _ _
7.	This is required for an action potential to cross the synaptic cleft.	N _ _ _ _ _ _ _ _ _ _ _ _ _
8.	A specific chemical produced and secreted by the neuron.	_ _ _ _ _ _ _ _ I _ _
9.	For a muscle fibre to contract the stimulus must be above a certain...	T _ _ _ _ _ _ _

Fill in the blanks 3: Respiratory system

Gaseous Exchange

Respiration and gaseous exchange are essential for aerobic athletes such as Mo Farah who require _____ to create energy for muscular contraction. At rest, oxygen _____ into the bloodstream where the haemoglobin has a high affinity for oxygen and associates with it up to 98% _____. At the internal site, the capillary blood has a _____ partial pressure (pp) of O₂ and muscle tissue a _____ ppO₂. As gases move down a pressure _____ from an area of high to low pressure, the oxygen diffuses into the muscle tissue.

As Mo Farah begins to perform the 10,000 race, the demand for oxygen increases and the _____ redirects the blood flow away from the organs to the working _____. During exercise, there are increases in:

- the _____ of blood and muscle tissue;
- the production of _____;
- and the production of CO₂.

CO₂ is converted into carbonic acid, and with lactic acid raises the _____ levels of the blood stream. This increases the _____ of O₂ from haemoglobin increasing the rate of diffusion. This is known as the _____ effect.

During exercise, the muscles use greater volumes of oxygen, _____ the ppO₂ in the muscles tissue and increasing the diffusion gradient. The increased supply of oxygen to muscle cells increases _____ supply and enables Mo Farah to exercise for longer at a higher intensity.

Word bank:

decreasing	lactic acid	gradient	Bohr	muscles
acidity	oxygen	high	temperature	saturation
diffuses	vascular shunt	energy	low	dissociation

True or false / Beat the teacher 1: Skeletal and muscular systems - answers

	Statement	T or F
1	The articulating bones in the ankle joint are the tibia, fibia and talus	F
2	The wrist is an example of a condyloid joint	T
3	The biceps femoris acts as the agonist for flexion of the elbow	F
4	The hip joint can perform flexion, extension, circumduction, rotation, abduction, adduction, horizontal flexion and horizontal extension	T
5	When performing a squat, on the downward phase the knee joint performs extension	F
6	Slow oxidative muscle fibres are rich in mitochondria	T
7	Fast glycolytic muscle fibres have a dense capillary network	F
8	A motor unit is another name for a motor neuron and the muscle fibres it stimulates	F
9	An example of a neurotransmitter is acetylcholine	T
10	An action potential is a positive electrical charge which conducts the nerve impulse	T

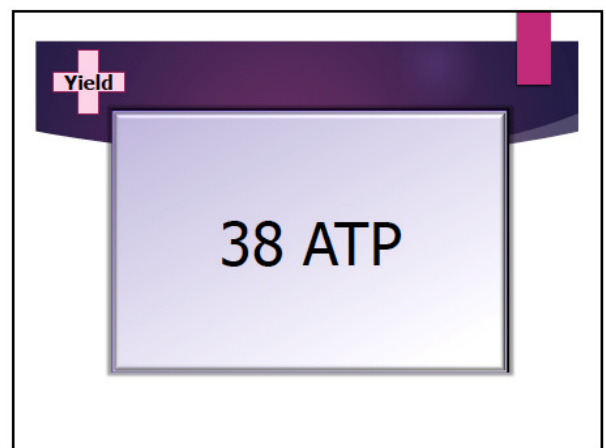
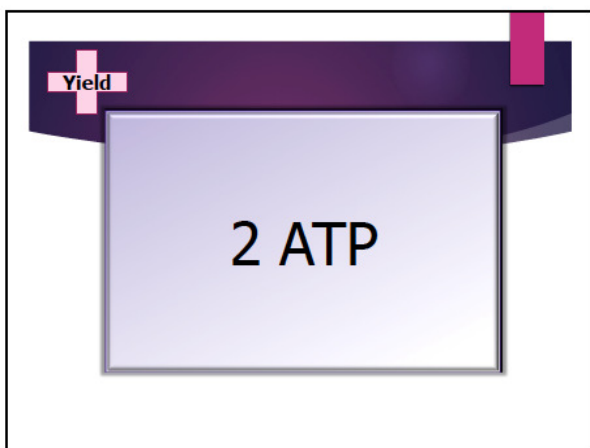
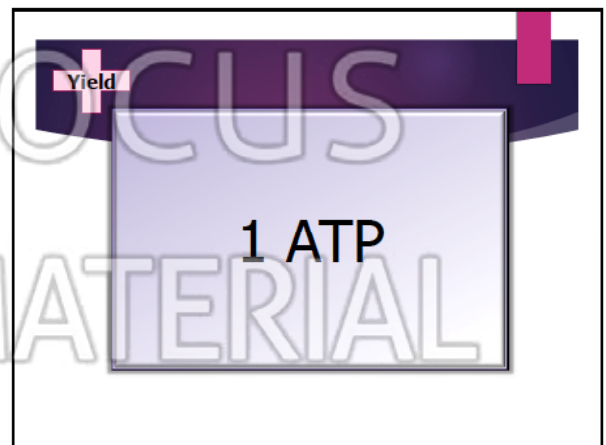
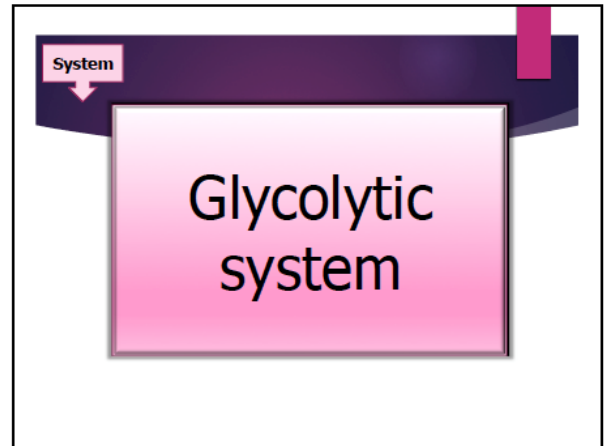
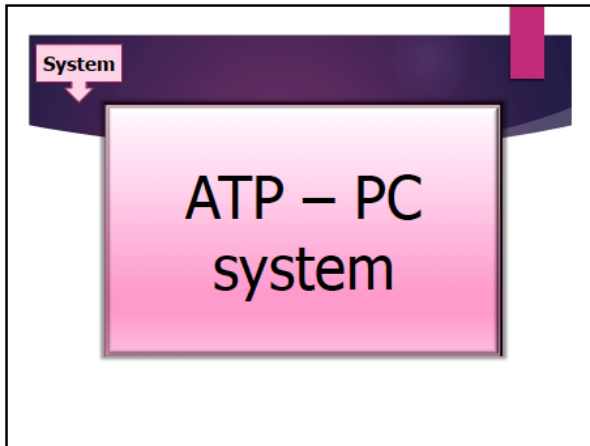
Identify and correct what is wrong / too vague (TV) in the following paragraphs:

The knee is a hinge joint where the femur, tibia and **patella** bones articulate. Reinforced by many strong ligaments, which connect **museles bone** to bone, it is a stable joint which performs a limited range of **movement (TV) – flexion and extension**. The major muscle groups which move the knee joint are the quadriceps **(TV) such as the rectus femoris**, and hamstrings **(TV) such as the biceps femoris**.

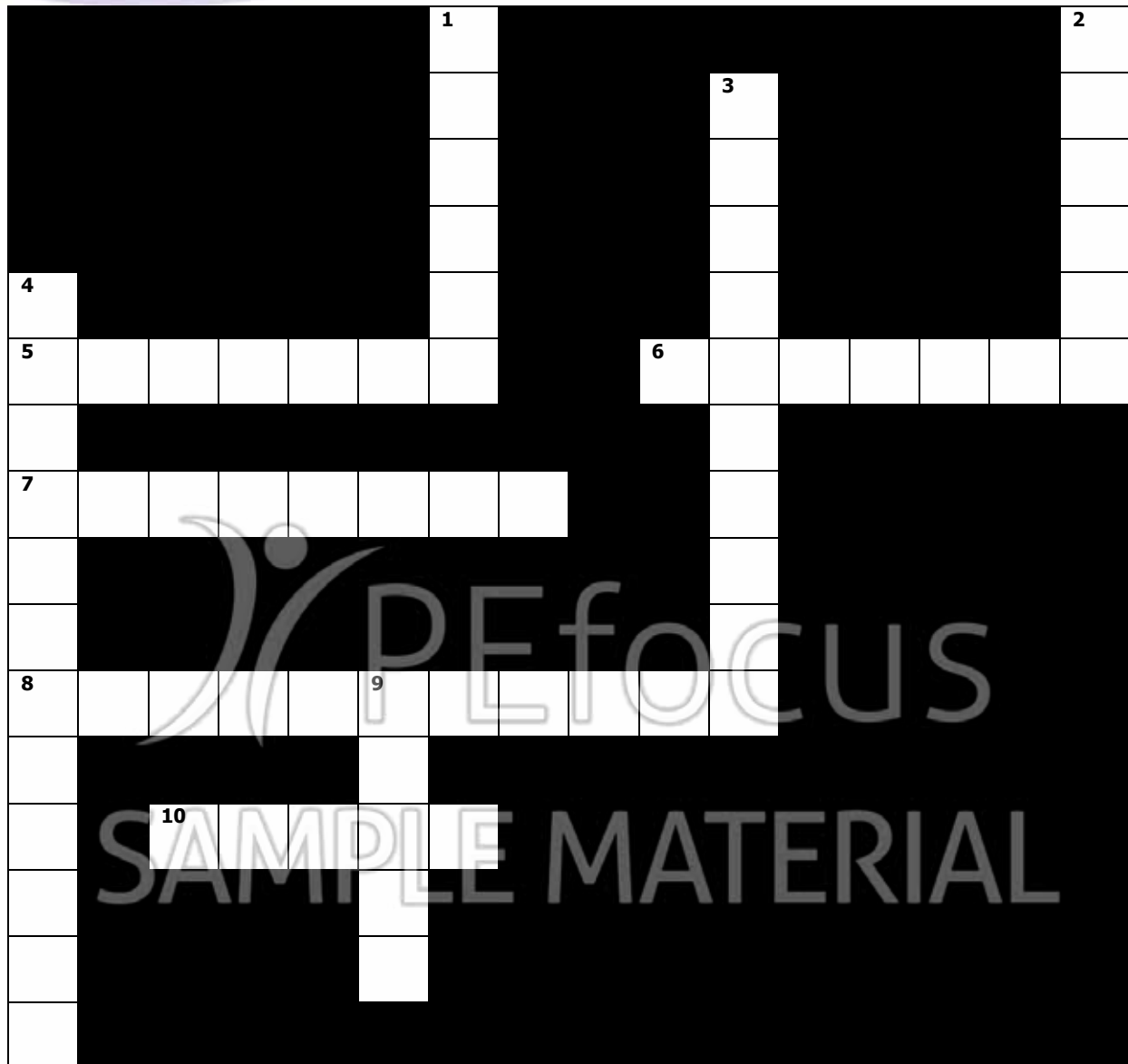
Slow oxidative muscle fibres have a specific structure **(TV) such as, high capillary, mitochondria and myoglobin density**, which allows them to resist fatigue and have a high **anaerobic aerobic** capacity. They are the **only predominant** muscle fibre found in long distance athletes **(TV) such as a marathon runner or triathlete**.

A motor unit is a motor **unit neuron** and the muscle fibres it stimulates. A nerve impulse is passed down the tail **(TV) axon** of a motor neuron to a **(TV) group of** muscle fibres. It has to jump a gap, **(TV) known as the synaptic cleft** to be able to stimulate the muscle fibres to contract **(TV) aided by a neurotransmitter**. The muscle fibres either all contract together or don't contract at all **(TV) this is known as the 'all or none law'**.

Key feature revision cards: Energy systems and ATP resynthesis (GCE/A-Level only)



Quick crossword 2: Cardiac cycle & conduction system



Across		Down	
5	Blood passes through this moving from atria to ventricle	1	The impulse passing from the SA node to here create atrial systole
6	These kind of fibres spread the impulse through the ventricle walls	2	This generates the electrical impulse
7	The relaxation phase	3	This system controls the cardiac cycle
8	This phase is known as systole	4	The events which occur during one heart beat
10	More correctly known as the cardiac muscle or myocardium	9	These fill with blood during the relaxation phase

Multiple choice questions 1-5: Answer grid

	Q1	Q2	Q3	Q4
Skeletal and muscular systems	d	b	c	d
Cardiovascular system	c	d	a	a
Respiratory system	b	b	c	d
Energy for exercise	c	a	c	b
Environmental effects	d	b	c	b

SAMPLE MATERIAL