

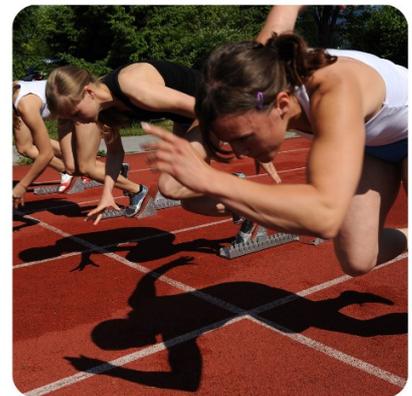
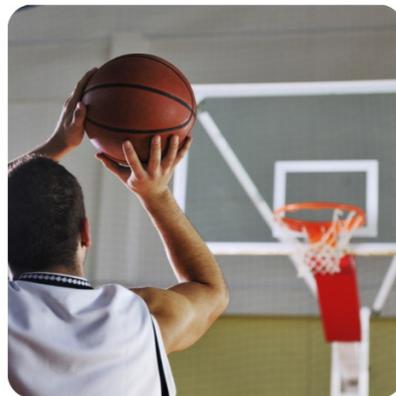


# Pupil Revision Booklet 1

## Applied Anatomy & Physiology/Skill Acquisition

Name \_\_\_\_\_

Class \_\_\_\_\_





<b>Topic</b>	<b>Description</b>	<b>Pupil comments – How confident do you feel on this topic?</b>
Energy Systems	Energy transfer during short duration/high intensity exercise. Energy transfer during long duration/lower intensity exercise. Impact of specialist training methods on energy systems.	
Impact of skill classification on structure of practice for learning	Types of practice	
Principles and theories of learning and performance	Stages of learning and how feedback differs between the different stages of learning. Learning plateau.	

## Unit: Energy Systems

### Anaerobic Energy Systems:

There are two anaerobic energy systems.

1. ATP-PC System
2. Anaerobic Glycolytic System (Lactic Acid System)

#### ATP-PC System:

ATP = Adenosine Triphosphate

PC = Phosphocreatine

This system can supply energy for \_\_\_\_\_ activity over a very short period of time – up to 10 seconds. Muscles have a store of phosphocreatine which can be readily broken down in creatine and \_\_\_\_\_. This breakdown results in one molecule of \_\_\_\_\_ being produced. Phosphocreatine is extremely limited, hence why a time limit of 10 seconds of intense exercise is present.

ATP phosphate maximal

#### Anaerobic Glycolytic System (Lactic Acid System):

This system can supply energy for \_\_\_\_\_ activity, up to a period of 3 minutes. This system results in the speeding up of the Krebs Cycle in order to produce energy at a \_\_\_\_\_ rate. However, the cells cannot keep up with the speed and as a result not enough pyruvate or \_\_\_\_\_ can be produced. Therefore, lactic acid is produced which causes pain and \_\_\_\_\_ in the muscles.

This energy system produces two molecules of ATP being produced.

oxygen submaximal faster fatigue

A shot putter is preparing their body for a throw. Explain which energy system will be used by the shot putter during their event.

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A 400m runner is preparing for a race. Explain which energy system will be used by the 400m runner during their event.



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**Energy Continuum of Physical Activity:**

The energy continuum is the sequence which covers the type of respiration required during exercise. It regulates which energy system will provide energy in any given activity.

Further to this it will also regulate which type of muscle fibre will be used during exercise. Remind yourself of the three types of muscle fibres:

Type I – Slow Twitch – Oxidative:

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Type IIa – Fast Twitch – Oxidative Glycolytic:

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Type IIx – Fast Twitch – Glycolytic:

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Complete the table below to show how the energy continuum works.

Energy System	Number of ATP	How long does it last	Example of sport/event	Muscle Fibre Used
Aerobic				
Glycolytic/Lactic Acid				
ATP-PC				

Pick two sports that you regularly take part in. How does the energy system/muscle fibres used differ between the two sports? Why?

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**Energy Transfer during anaerobic activity:**

The glycolytic/lactic acid system must produce energy rapidly for power/sprint activity. This rapid energy transfer will result in lactate being present.



Match the definitions given below to the key terms.

Lactate Accumulation –

Lactate Threshold –

OBLA - Onset of blood lactate accumulation –

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| <p>The point during exercise at which lactic acid quickly accumulates in the blood</p> <p>The increase of lactate as a result of anaerobic activity</p> <p>The point at which blood lactate levels go above 4 millimoles per litre</p> |
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The factors affecting the rate of lactate accumulation are given below. For each factor, explain how this affects lactate accumulation.

**Intensity of exercise**

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**Fitness of performer**

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**Vo2 Max of a performer**

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**Performer's OBLA**

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Find a partner and discuss which of the two of you would accumulate lactate faster during a 400m sprint. Explain your conclusions below.

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**Energy Transfer during aerobic activity:**

Oxygen consumption during exercise can be split into two categories.

Maximal Oxygen Deficit – When a performer lacks oxygen due to the intensity of the activity and anaerobic respiration occurs.

Submaximal Oxygen Deficit – When a performer lacks oxygen after exercising aerobically for a long period of time.

Explain what type of oxygen deficit would be present in a marathon runner towards the end of a race.

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Explain what type of oxygen deficit would be present in a javelin thrower.

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**Oxygen consumption during recovery:**

After taking part in exercise a performer will continue to breathe heavily for some time. This is because **EPOC** is taking place.

EPOC stands for excess post-exercise oxygen consumption. It is the **volume of oxygen consumed in recovery above the resting rate.**

EPOC occurs for several reasons:

- To repay the oxygen debt and begin to break down lactic acid
- To resynthesise ATP levels
- To resaturate myoglobin with oxygen

EPOC usually takes 2-3 minutes.

A 5000m runner has just completed a race. Explain how EPOC will aid her recovery.

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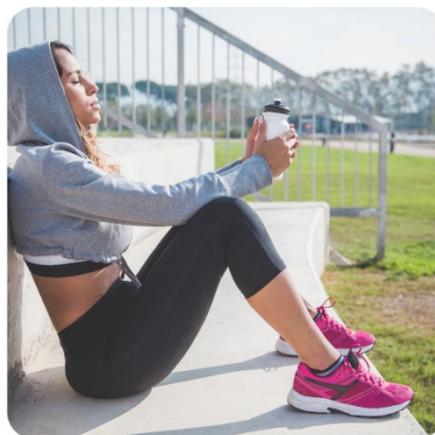
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### Impact of Specialist Training Methods on Energy Systems

There are four **specialist** training methods that you need to understand. Match the descriptions given below to the correct training method in the table.

<b>Specialist Training Methods</b>	<b>Description</b>	<b>Who should use it?</b>	<b>Which energy system is used during this training?</b>
Altitude Training			
High Intensity Interval Training (HIIT)			
Plyometrics			
Speed Agility Quickness			

**Descriptions:**

Uses bounding and jumping exercises to create muscular strength and power.

Alternates short periods of high intensity exercise, with periods of recovery.

Carried out at more than 2000m above sea level. Due to a low level of oxygen being present, the body will produce more red blood cells.

Includes the use of ladders and utilises short periods of intense exercise.



Which specialist training method would be most suitable for you and your sport? Which energy system will be improved during training?

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Discuss the specialist training methods that could be used by a cyclist and which energy system this training method will help to improve.

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## Energy Systems Exam Questions

1. A 400m runner is told that EPOC is occurring following a race. Explain what is meant by EPOC and describe three reasons why EPOC occurs. **(4 marks)**

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2. Explain what is meant by lactate threshold and OBLA. **(2 marks)**

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3. Evaluate the specialist training methods that could be used by a high jumper and which energy system this training method will help to improve. **(3 marks)**

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**Unit: Types of Practice**

**Massed practice** is where a skill is practiced until it is learned, without taking a break. This is usually for athletes who are **fit and experienced**.



**Distributed practice** is where the skill is practiced over several sessions or with rest breaks. This is usually for players of **low ability or fitness**.

**Variable practice** involves practicing the skill in a variety of situations so that it can be adapted within matches. **Open skills** are often learned through **variable practice**. This may mean changing the situation for each training session.

**Mental Practice** is when a performer imagines themselves taking part in a particular skill prior to a performance. It can help create **confidence** and reduce **anxiety**. It is easier for an elite performer to use as they know how a skill should look and feel. For example a footballer may imagine the striking of the ball before taking a free-kick.



Skill	Massed or Distributed Practice?	Is variable Practice required? Why?	Is mental practice required? Why?
A beginner learning archery			
A professional footballer learning a new free-kick technique			
A professional hockey player learning a new dribbling technique			
A beginner learning to putt in golf			



What are the advantages and disadvantages of each type of practice?

<b>Type of Practice</b>	<b>Advantages</b>	<b>Disadvantages</b>
<b>Massed</b>		
<b>Distributed</b>		
<b>Variable</b>		
<b>Mental</b>		







**Unit: Stages of Learning**

All skills are learned. There are three stages of learning.

<b><u>Stage of Learning</u></b>	<b><u>Type of Performer</u></b>	<b><u>Description</u></b>	<b><u>Type of Feedback Required</u></b>
<b>The Cognitive Stage</b>	Novice/Beginner	-Performer lacks mental image  -Observational learning  -Requires instruction	Extrinsic Feedback
<b>The Associative Stage</b>	Mediocre Performer	-Trial and error used to improve performance  -Movements become smoother	Both Extrinsic/Intrinsic Feedback
<b>The Autonomous Stage</b>	Expert/Elite Performer	-Skill is habitual  -High level of consistency  -Decisions made quickly	Intrinsic Feedback

Have a go at completing a set of 'keepy uppys' with a football. Explain which stage of learning you are currently at for this skill.

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Have a go at completing a cartwheel. Explain which stage of learning you are currently at for this skill.

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Have a go at bowling a cricket ball. Explain which stage of learning you are currently at for this skill.



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Complete the table below using three skills of your choice. (different to those shown above).

Sport	Skill	Stage of Learning	Why I am at this level
		Cognitive Stage	
		Associative Stage	
		Autonomous Stage	

**Feedback:**

Feedback in sport is vital for keeping performers **motivated**.

Use the descriptions below to complete the **description column** in the table. Try to explain why each type of feedback will/won't be useful at the cognitive or associative stages of learning?

Type of Feedback	Description	Useful at the cognitive stage of learning?	Useful at the autonomous stage of learning?
Intrinsic			
Extrinsic			
Knowledge of Performance			
Knowledge of Results			
Positive			
Negative			

Information about what was good – praise & encouragement

Gives an indication of whether the skill has been successful – concerned with outcome

Error correction and information about what is going wrong

Comes from the performer themselves, as they think about how they performed

Gives reasons why the skill was successful or not – concerned with technique

Comes from an outside source e.g. coach/teacher



**Learning Plateau:**

Plateau can be defined as 'a period of no improvement in performance'. Plateau can occur at various times within the learning stages.

**Cognitive Stage** – At this stage, rate of learning can be slow due to the performer not being comfortable with the skill

**Associative Stage** – At this stage, learning will take place at a rapid rate as the performer begins to master the skill

**Autonomous Stage** – At this stage, plateau can occur whereby the performer finds it difficult to improve any further

Pick one of the following skills. Start a stopwatch and keep going practising the skill until you feel that you have reached a learning plateau.



Did you have previous experience within this skill? What stage of learning did you start at?

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What stage of learning did you get to before you reached plateau? \_\_\_\_\_

Why do you think plateau occurred?

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**Stages of Learning Exam Questions**

1. Which one of the following types of feedback is concerned with technique rather than outcome?  
**(1 mark)**

- A Intrinsic Feedback
- B Extrinsic Feedback
- C Knowledge of Performance
- D Knowledge of Results

2. Which of the following is the 'second stage of learning where motor programmes are developed'?  
**(1 mark)**

- A Cognitive Stage of Learning
- B Initial Stage of Learning
- C Autonomous Stage of Learning
- D Associative Stage of Learning

3. Explain what is meant by the following types of feedback and using examples, state how each may affect the performance of an U9 netball team.

Positive: **(3 marks)**

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Negative: **(3 marks)**

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