



Revision Series 2024

BTEC Level 3 Sport
Unit 1: Anatomy and Physiology

◆ Notes pages ◆



The EverLearner

How to use this revision session and notes

- Complete this document when doing the live or on-demand revision shows.
- The imagery contained in the notes is designed for you to be able to study the core subject knowledge prior to the live session.
- During the live session, James will guide you through how to use that knowledge in your exam.
- Focus on the skills that James is presenting as much as the content. In most cases, students have a knowledge of the topic but struggle to respond to the command in the question. This is a focus of our revision.
- Complete the notes pages as extensively as possible and, if necessary, return to the show to complete it more than once in order to make the fullest notes possible.
- Have the National Mock Exam to hand and, ideally, your completed, marked version of it.
- Have the [exam infographics](#) to hand. These will be referred to throughout the show.

My ticklist:

- Notes pages
- Exam infographics
- Exam paper
- Exam mark scheme
- Exam model answers

During the live show, we will cover...

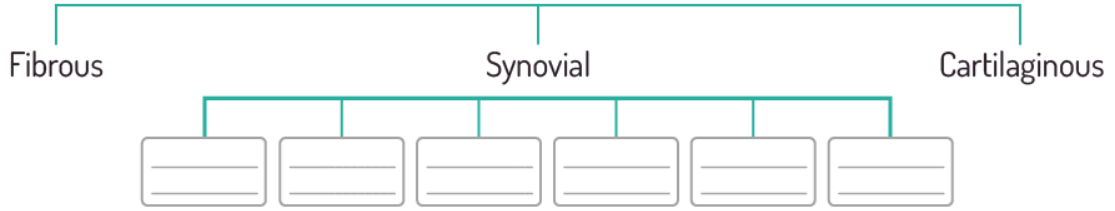
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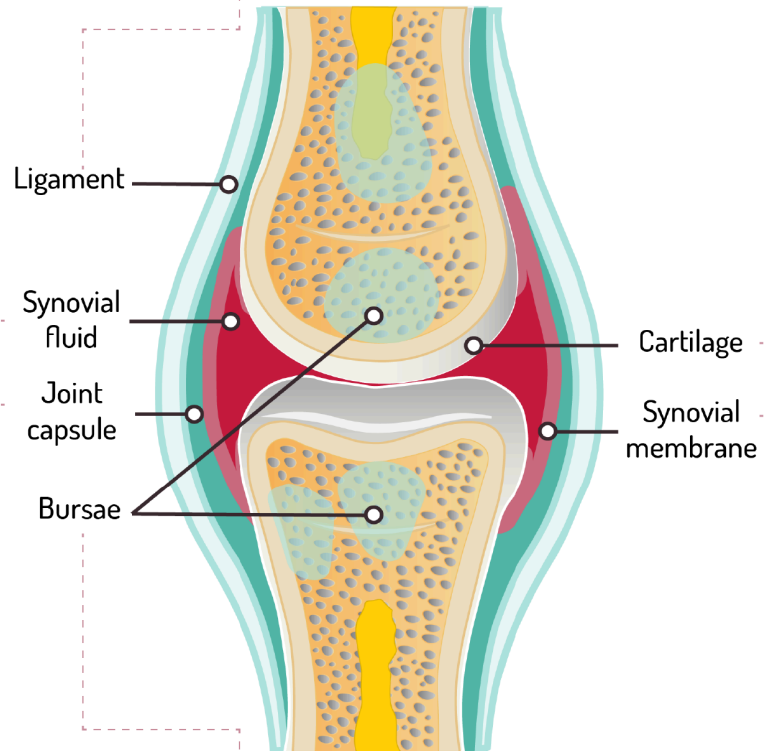
We will also cover a wide array of exam skills including command terms for shorter and longer questions as well as the extended writing requirements of the paper.

You may also find it useful to study our previous revision shows when different samples of content and skills have been developed.

Topic 1: Joints

Classification of joints



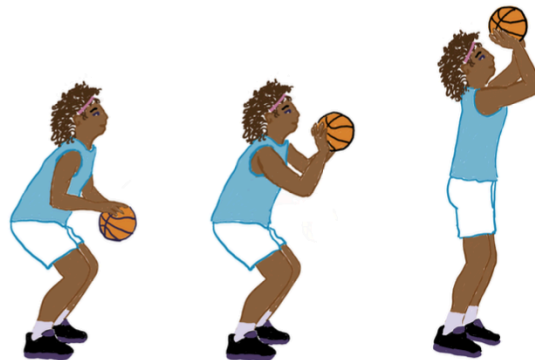


		
A - Upwards phase of bicep curl	B - Kicking a football (right leg)	C - Cartwheel

Joint	Type	Articulating bones	Types of movement	Sporting action
Elbow	Hinge	Radius, ulna, humerus	Flexion	A
			Extension	During the execution phase of a chest pass in netball
Knee	_____	_____ _____	_____ _____	_____ _____ _____
Hip	Ball-and-socket	Pelvis and femur	Flexion/extension	Flexion in the downwards phase of a squat
			Abduction / Adduction	B
			Horizontal abduction / Horizontal adduction	C
			Hyperextension	_____ _____ _____
Shoulder	_____	_____ _____	_____ _____	_____ _____ _____

Joint	Type	Articulating bones	Types of movement	Sporting action
Wrist	_____	_____	_____	_____
Ankle	_____	_____	_____	_____

5. Look closely at this image. Explain how movements at the knee **and** ankle allow the player to take a successful free throw.



During the preparation phase of the free throw, dorsiflexion occurs at the ankle joint due to the tibialis anterior contracting to keep the player in a stable position. As the player executes the shot, plantar flexion occurs at the ankle joint, with the gastrocnemius contracting as the player comes up on their toes to gain maximum height. Also during the execution phase, there is extension at the knee joint from the quadriceps contracting, which allows the player to straighten their legs as they take the shot, creating power in the legs.

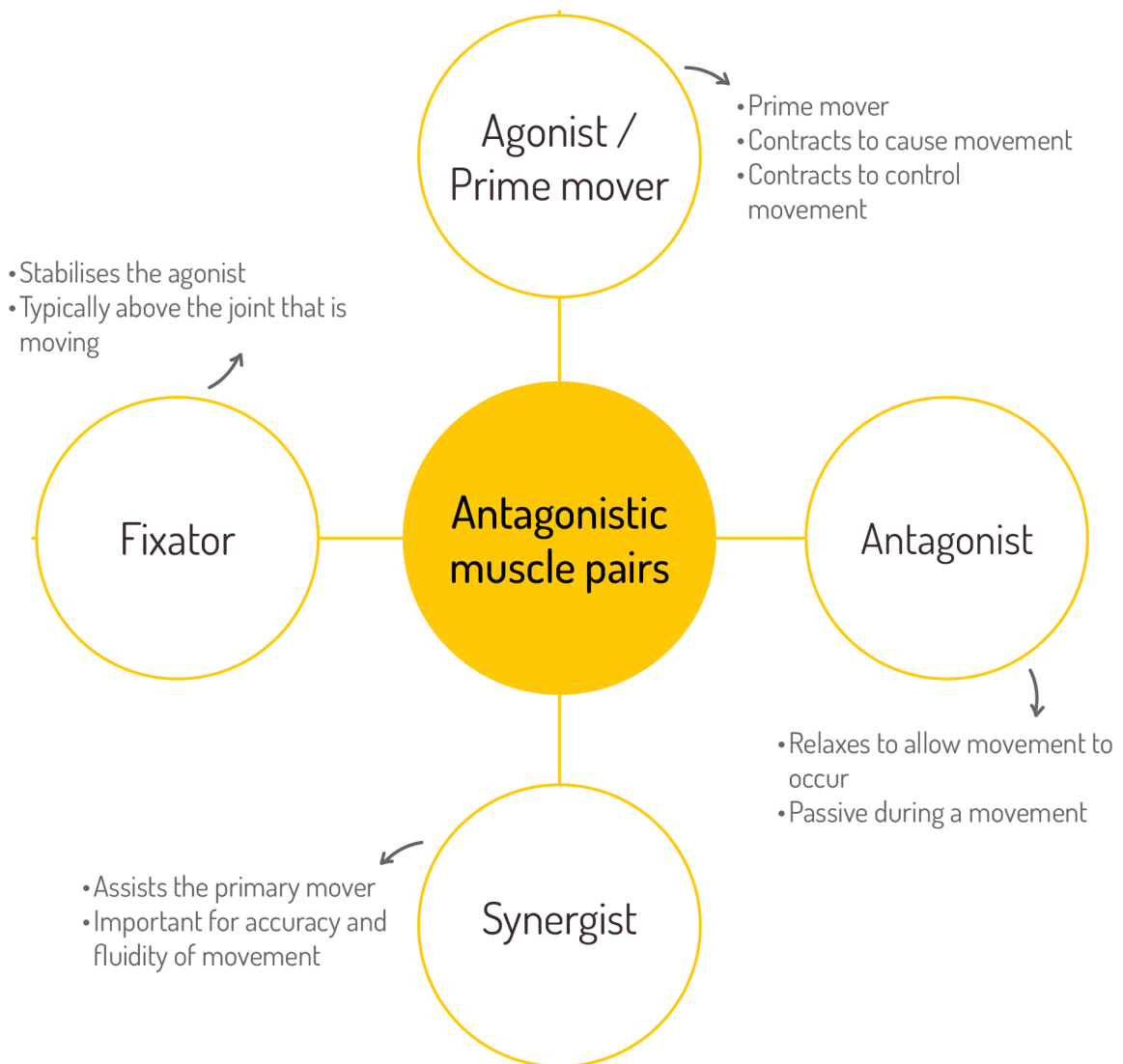
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Want to know more?

Watch the FREE tutorials "Types of joints" and "Movement patterns" on [TheEverLearner.com](https://www.theeverlearner.com)

Topic 2: Antagonistic muscle pairs





Position 1

Position 2

Antagonistic pair	Joint movement	Agonist muscle
A	B	C

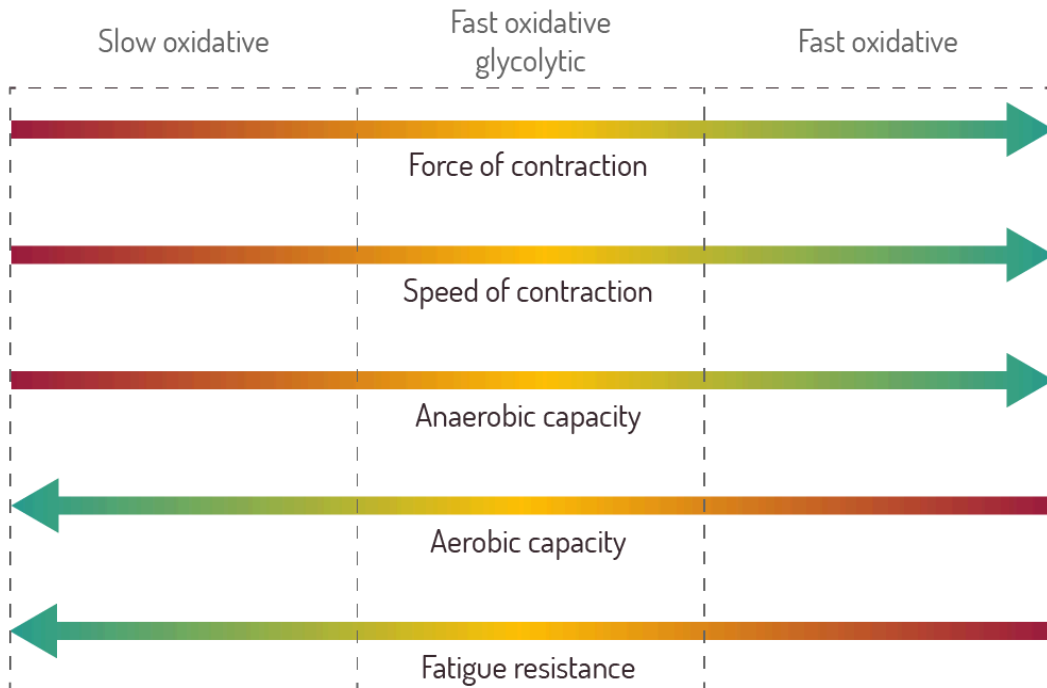
		
A - Upwards phase of bicep curl	B - Kicking a football (right leg)	C - Cartwheel

Sporting action	Joint	Movement	Agonist	Antagonist	Synergist	Fixator
A	Elbow - hinge	Flexion	Biceps brachii	Triceps brachii	_____	Rhomboid major
B	Ankle - hinge	Plantarflexion	Gastrocnemius	Tibialis anterior	_____	_____
C	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____



Want to know more? Watch the FREE tutorial "Roles of muscles" on [TheEverLearner.com](https://www.theeverlearner.com)

Topic 3: Fibre types



Slow twitch (Type I)		Fast oxidative glycolytic (Type IIa)		Fast glycolytic (Type IIx)	
Structural	Functional	Structural	Functional	Structural	Functional
Small muscle fibre diameter	_____	Large muscle fibre diameter	_____	Large muscle fibre diameter	_____
Small motor neurone size	_____	Large motor neurone size	_____	Large motor neurone size	_____
Red in colour	_____	Reddish in colour	_____	White in colour	_____
High mitochondrial density	_____	Low mitochondrial density	_____	Low mitochondrial density	_____
High myoglobin content	_____	Low myoglobin content	_____	Low myoglobin content	_____
High capillary density	_____	High glycogen stores	_____	High glycogen stores	_____
Low myosin ATPase	_____	Medium PC stores	_____	High PC stores	_____

Slow twitch (Type I)		Fast oxidative glycolytic (Type IIa)		Fast glycolytic (Type IIx)	
Structural	Functional	Structural	Functional	Structural	Functional
Low PC stores	_____	Low capillary density	_____	Low capillary density	_____
_____	_____	High myosin/ATPase	_____	High myosin/ATPase	_____

Athlete	% of muscle fibres sampled from the biopsy		
	Type I slow oxidative	Type IIa fast oxidative glycolytic	Type IIx fast glycolytic
Sandra	20	60	20
Milo	9	14	77
Yan	60	19	11
Clinton	30	51	19

Athlete	Sporting activity most suited to	Justification	Sporting activity least suited to	Justification
Sandra	_____	_____	_____	_____
Milo	_____	_____	_____	_____
Yan	_____	_____	_____	_____
Clinton	_____	_____	_____	_____



Want to know more? Watch the FREE tutorial "Muscle fibre types" on [TheEverLearner.com](https://www.theeverlearner.com)

Topic 4: Responses of the muscular system to a single sport or exercise session

9. Describe **two** responses of the muscular system to a single exercise session.

Response 1: During a single exercise session, the muscles will receive an increased blood supply in order to get sufficient oxygen to keep exercising.

Response 2 A single exercise session also leads to an increase in muscle pliability.

Marks: **[2]**

Response	
Description	Explanation
Increased blood supply to muscle to deliver more oxygen	Muscles receive sufficient oxygen so that the performer can continue to exercise and perform for longer. Remove more CO ₂ from the muscle.
Increased muscle temperature	_____
_____	Muscles can stretch further. Reduced risk of injuries such as muscle strains and tears.
Increased speed and strength of contraction	_____
_____	Leads to muscle fatigue during high-intensity exercise. Only able to sustain intensity for short periods. Need to allow sufficient recovery time.
Microtears (resistance exercise)	_____

Explain two responses of the muscular system to a single exercise session. (2 marks)



Want to know more?

Watch the tutorial "Short-term muscular responses to exercise" on [TheEverLearner.com](https://www.theeverlearner.com) (subscribers only).

Topic 5: Lung volumes

Minute ventilation = Tidal volume x Breathing rate

Lung volumes during exercise

Lung volume	Description	Response to exercise
Tidal volume	Amount of air inspired and expired per breath	_____
Residual volume	_____	Remains the same
Vital capacity	_____	_____
Minute ventilation	_____	_____
Total lung volume	_____	_____

Tennis player	Tidal volume at rest (litres per minute)	Tidal volume during a long rally (litres per minute)
Player A	0.4	2.8
Player B	0.6	3.4
Player C	0.5	3.1
Player D	0.4	2.4

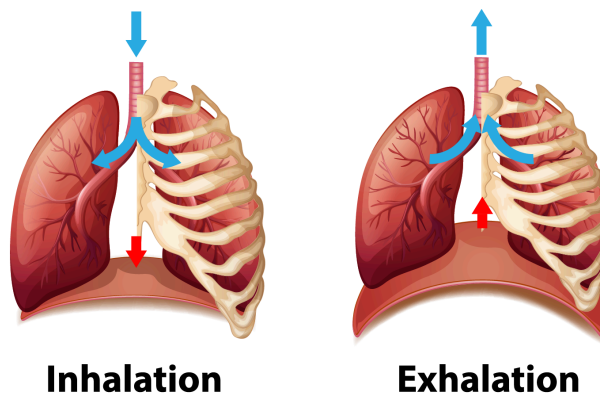
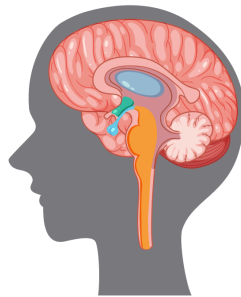
Select one of the players from the table above. Analyse the changes in tidal volume and how this will impact on performance.



Want to know more?

Watch the tutorial "Lung volumes" on [TheEverLearner.com](https://www.theeverlearner.com) (subscribers only).

Topic 6: Control of breathing



14. Explain how breathing rate is controlled during exercise.

During exercise, breathing rate is controlled through neural and chemical control.

Chemoreceptors detect a change in partial pressure of gases and send a signal to the medulla oblongata.

Messages are then relayed to the respiratory muscles and the diaphragm and intercostal muscles contract with more force, allowing more oxygen to enter the lungs and more carbon dioxide to be removed.

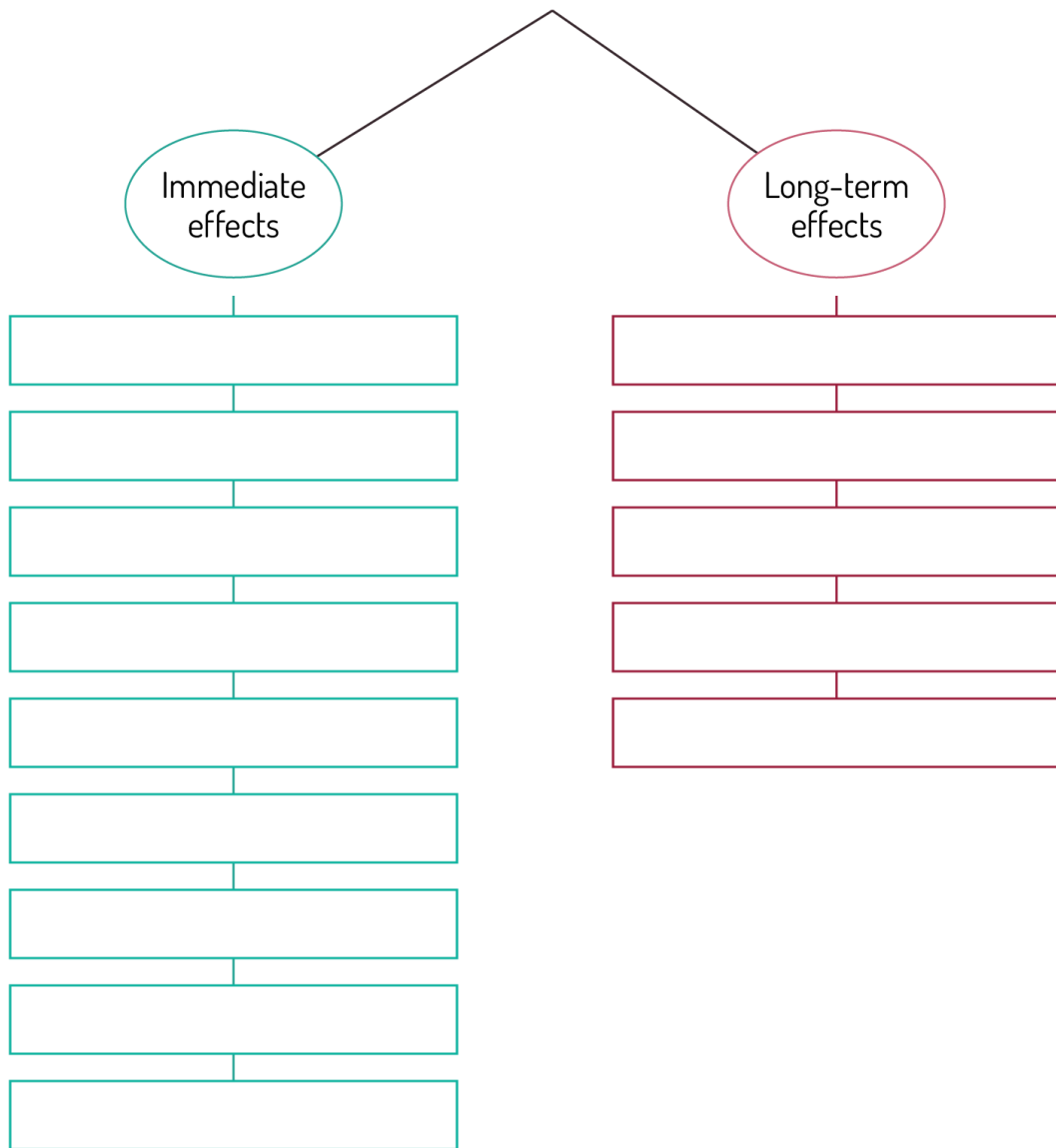
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Want to know more?

Watch the tutorial "Respiratory control" on [TheEverLearner.com](https://www.theeverlearner.com) (subscribers only).

Effects of altitude on the respiratory system



Evaluate the effects of training at altitude on the respiratory system of:

- a. an athlete training for a marathon;
- b. a 10,000m runner;
- c. a triathlete; or
- d. a long-distance cyclist

(choose one and provide an answer)



Want to know more?

Watch the tutorials "Asthma" and "Altitude training" on [TheEverLearner.com](https://www.theeverlearner.com) (subscribers only).

Topic 8: Responses of the cardiovascular system to a single sport or exercise session

Response	
Description	Explanation
Anticipatory increase in heart rate prior to exercise	Due to the release of adrenaline, stimulates SA node to increase heart rate.
Increased heart rate	<hr/> <hr/> <hr/>
<hr/>	More blood can be delivered to working muscles; therefore, more oxygen is taken up by muscles and more carbon dioxide is removed. This leads to an increased blood pressure.
Increased blood pressure	<hr/> <hr/> <hr/>
<hr/>	Blood is directed towards skeletal muscle and away from other non-essential organs. This happens through vasodilation of arteries towards working muscles (which increases blood flow) and vasoconstriction of arteries towards other organs (which restricts blood flow).

18. Explain how blood flow is redirected in response to exercise.

Blood flow is redirected during exercise via the vascular shunt mechanism. Blood is shunted towards skeletal muscle and away from other organs in the body. This process occurs through the vasodilation of arterioles towards the working muscles, which increases blood flow. The arterioles towards other organs in the body vasoconstrict, restricting blood flow to these areas.

Marks: **[4]**



Want to know more?

Watch the tutorial "Short-term cardiovascular responses to exercise" on [TheEverLearner.com](https://www.theeverlearner.com) (subscribers only).

Topic 9: The ATP-PC (alactic) system in exercise and sports performance

Overview of energy systems			
Factor	ATP-PC (alactic)	Lactate	Aerobic
Intensity	Very high/maximal (anaerobic)	High (anaerobic)	Moderate
Duration	Up to 10s	Up to 120s	Up to 2 hours
Recovery period	50% recovery in 30s 100% recovery in 2-3 mins	5 minutes	No recovery - repay oxygen deficit created by anaerobic work

ATP - PC System



ATP/PC System	
Fuel source	
Controlling enzyme	
Yield	
By products	
Type of reaction	

ATP/PC System Evaluation	
Strengths	Weaknesses

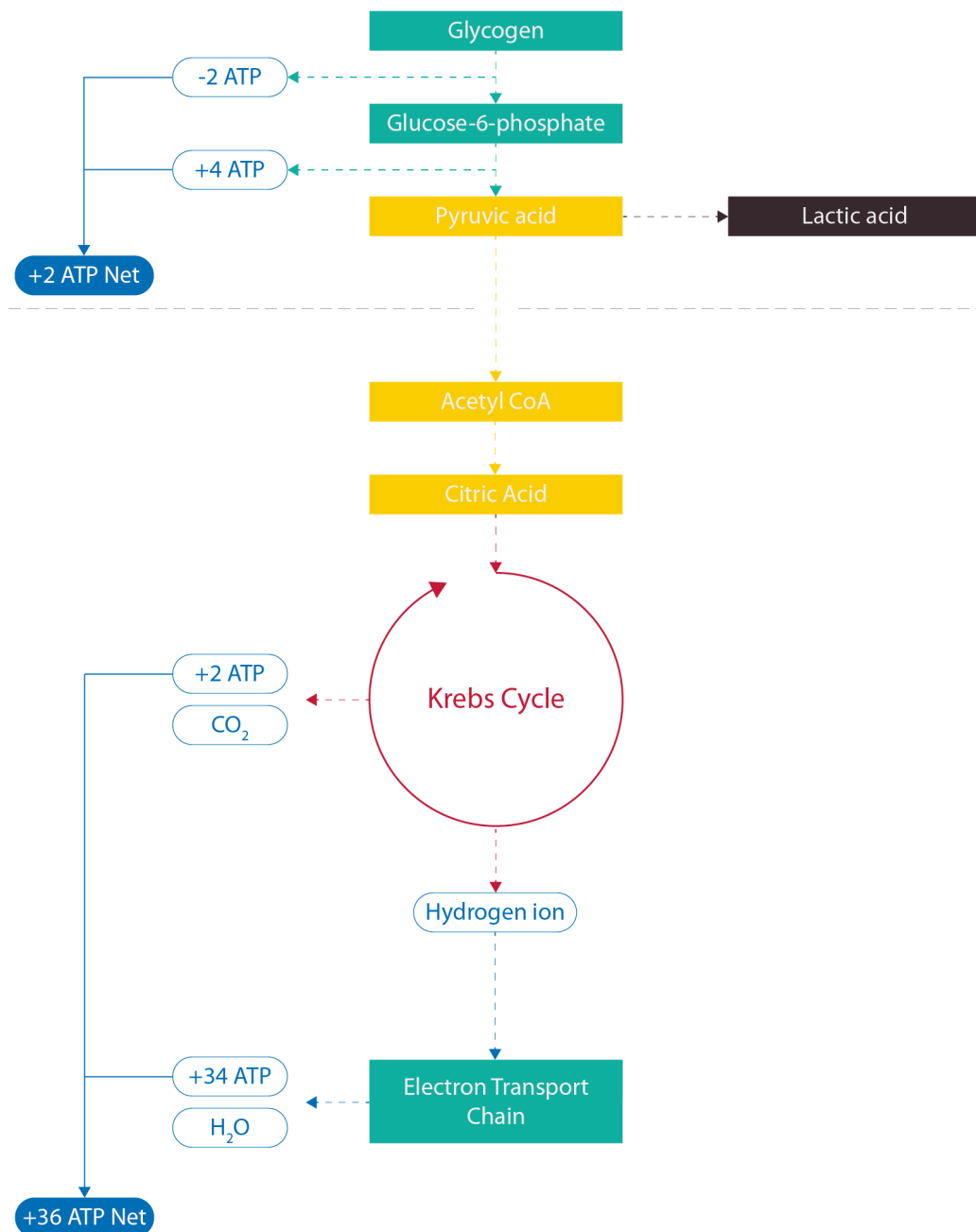


Want to know more?

Watch the tutorials "ATP-PC System" and "ATP-PC system analysis" on [TheEverLearner.com](https://www.theeverlearner.com) (subscribers only).

Topic 10: The aerobic system in exercise and sports performance

Aerobic System



Aerobic system evaluation	
Strengths	Weaknesses

Aerobic system	
Fuel source	
Controlling enzyme	
Yield	
By products	
Type of reaction	

Energy systems			
Movement example	Intensity	Duration	Predominant energy system (contributing the majority of the energy to the performance)
Javelin throw	Very high	Short (<10s)	Anaerobic
1500m running	Moderate	Long (in the region of 5 minutes)	Aerobic
Basketball full-court defence	High	Short (<3 minutes)	Anaerobic
Open-water swimming	Moderate / Low	Long (up to 2 hours)	Aerobic

23. Evaluate the use of the aerobic energy system for the long jump.

The aerobic system is used for low-intensity work, usually between three minutes and two hours in duration. However, the long-jump is an event that is short in duration and involves high-intensity, explosive movements. As a result, the aerobic system cannot power the intense movements involved in long jump and would be used mainly by endurance athletes. Although the aerobic system is not useful for executing a jump, it could be argued that the aerobic system is used during recovery between jumps and through the duration of a whole competition. A long jumper would most likely prioritise training their lactate system and ATP-PC system over the training of their aerobic system.

Marks: **[6]**

Analyse / Evaluate the use of the ATP-PC / lactate / aerobic system for the long jump / 800m / a triathlon.

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Want to know more?

Watch the tutorial "Aerobic system" on [TheEverLearner.com](https://www.theeverlearner.com) (subscribers only).