

Level 1: remembering.

Frequently used task words: define, list, label, name.

Can the student recall or remember the information?



List the 3 types of muscle found in the human body.



This question is asking you to list three different muscle types found in the human body. No other information or explanation is required.

You don't need to write an explanatory paragraph. You don't even need to put the answer into a sentence.



1. Skeletal
2. Smooth
3. Cardiac

Level 2: understanding.

Frequently used task words: describe, explain, identify & example.

Can the student explain ideas or concepts?



Explain why skeletal muscle fibres appear striated.



This question is asking you to give an explanation, in your own words, of why skeletal muscle appears striated.

Questions at this level generally require a brief explanation that includes relevant terminology.



Skeletal muscle fibres contain two kinds of protein filaments—thick ones composed of the protein myosin and thin ones mainly composed of the protein actin. The organization of these filaments produces the characteristic alternating light and dark striations, or bands, of a skeletal muscle fibre.

Level 3: applying.

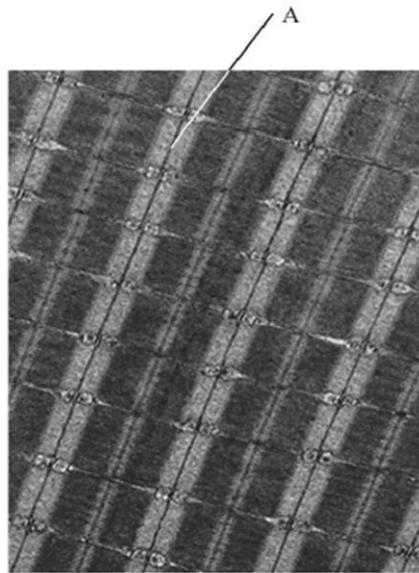
Frequently used task words: apply, illustrate, solve, use & demonstrate.

Can the student use information in a new way?

Q

The electron micrograph below shows a longitudinal section of a muscle fibre.

- State the number of myofibrils shown in the electron micrograph.
- Name the structure shown at A.



i

Part a of this question is asking you to apply your knowledge of muscle fibres to determine the number of myofibrils in the displayed electron micrograph.

Part b requires you to provide the name of the labelled structure.

Your knowledge of muscle structures should allow you to determine the correct answer even though the image is new to you.

A

- 10 myofibrils
- Z line/band

Level 4: analysing.

Frequently used task words: analyse, compare, contrast, examine.

Can the student distinguish between different parts?



All skeletal muscles are composed of a mixture of fast and slow twitch fibres. The table below summarises some of the differences between these types of fibre.

Fast twitch fibres	Slow twitch fibres
Fewer mitochondria	More mitochondria
Pale/white in colour	Red/brown in colour
Fewer capillaries	More capillaries
More glycolytic enzymes	Fewer glycolytic enzymes

Using the information in the table, suggest why slow twitch fibres are used more than fast twitch during aerobic exercise.



Questions at this level will often ask you to compare or contrast. These questions not only require you demonstrate your knowledge and understanding, but also highlight differences and similarities, or advantages and disadvantages.

In this case, you're being asked to compare fast and slow twitch muscle fibres and use this information to state why slow twitch fibres are used more in aerobic exercise.



1. Slow twitch fibres contain more mitochondria and therefore allow for greater aerobic respiration.
2. The red/brown colour of the slow twitch fibres suggests they are high in myoglobin and can store more oxygen – essential for aerobic exercise.
3. The larger amount of capillaries in slow twitch fibres allows for faster exchange of oxygen and carbon dioxide.
4. The large amount of glycolytic enzymes in fast twitch fibres indicates an increased ability to generate energy in anaerobic conditions through the transformation of glucose to lactate.

Level 5: evaluating.

Frequently used task words: justify, defend, argue, evaluate, assess

Can the student justify a stand or decision?

Q

People who have McArdle's disease produce less ATP than healthy people.

During exercise, how would this affect muscle contraction? Justify your answer.

i

This question is asking you to consider a specific situation and provide a justification for your answer.

It is not enough to simply state the result of a lack of ATP on muscle contraction – you need to support your answer with information on the biological processes behind the result.

A

A lack of ATP could decrease the ability of a person to maintain strong muscle contraction during exercise.

Because ATP is necessary for the detachment of myosin heads from actin, a lack of ATP would prevent continued contraction of the muscle and possibly lead to fatigue.

Level 6: creating.

Frequently used task words: create, design, develop, formulate, construct.

Can the student create a new product or point of view?

Q

You are asked to perform an experiment on a skeletal muscle to determine how the strength of electrical stimulus affects muscle contraction.

Write a hypothesis for this experiment.

i

Questions at this level will generally require you to use all of your knowledge and understanding of a specific field to develop something new. Critical thinking is essential when answering these questions. You may be able to create a hypothesis or experimental protocol quite easily but you need to be able to critically evaluate your own work to ensure you have considered all aspects and achieved the highest possible standard.

This question is asking you to create a hypothesis for an experiment. It requires you to make an educated assessment of the information you have been provided and, using your knowledge of skeletal muscles, create a suitable hypothesis. You should always endeavour to include technical terms to demonstrate your level of understanding of the topic.

A

No muscle contraction will occur until a threshold stimulus is achieved. As the strength of electrical stimulation is increased, the strength of contraction will increase until tetanic contraction is reached.