Muscle

Question Paper 1

Level	International A Level
Subject	Biology
Exam Board	Edexcel
Topic	Respiration, Muscle and Internal Environment
Sub-Topic	Muscle
Booklet	Question paper 1

Time Allowed: **41 minutes**

Score: **/34**

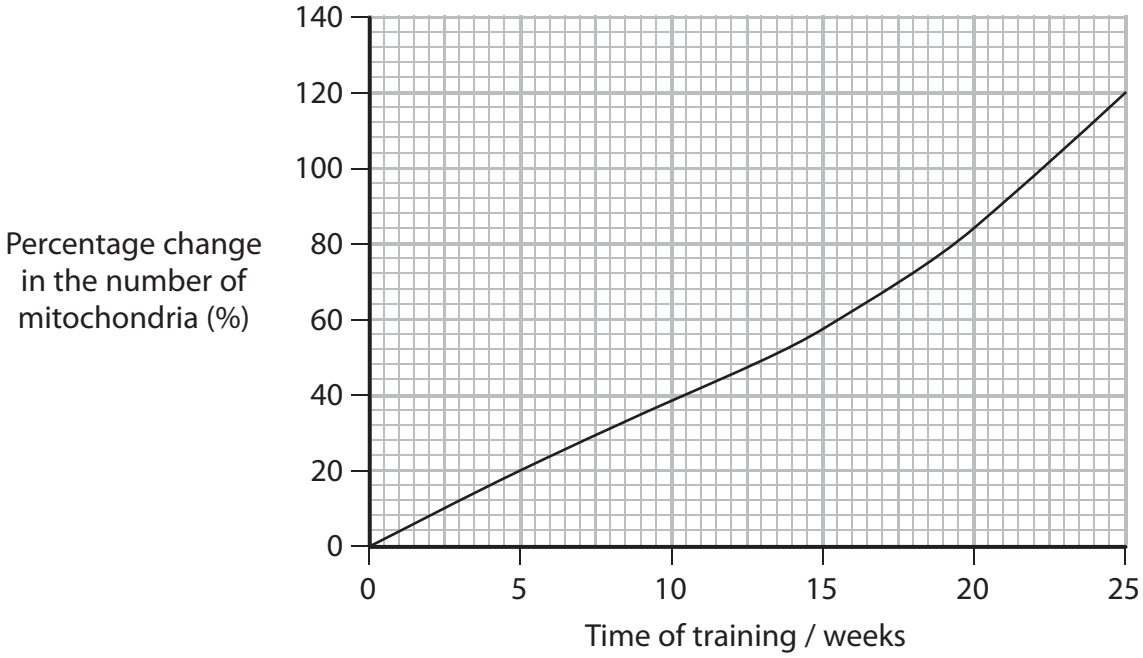
Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

1 Endurance training changes the number and size of mitochondria in muscle tissue.

The graph below shows the percentage change in the number of mitochondria found in muscle tissue during 25 weeks of endurance training.



(a) Use the graph to describe the changes in the number of mitochondria in muscle tissue during this 25 week training period.

(2)

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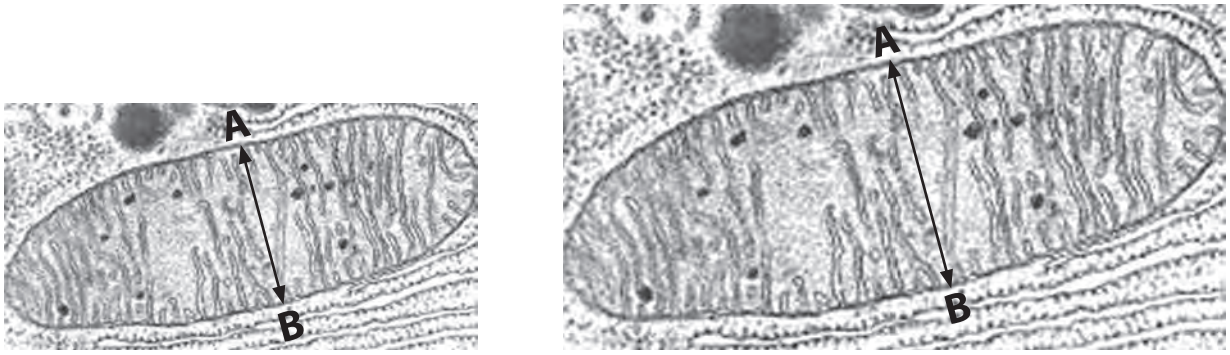
(b) The electron micrographs below show a typical mitochondrion in muscle before and after training.

Before training **After training**



Magnification ×10 000

(i) The width of each mitochondrion is shown by the line A to B.

Calculate the percentage change in the width of the mitochondrion after training. Show your working.

(2)

Answer ..... %

*(ii) An increase in the width of mitochondria increases the surface area of membranes inside mitochondria.

Explain how an increase in the surface area of these membranes will affect the synthesis of ATP in the muscle tissue of an athlete.

(6)

(Total for Question 1 = 10 marks)

2 The anterior cruciate ligament helps to keep the knee joint stable.

(a) (i) Place a cross in the box ☒ next to the name of the structure to which the anterior cruciate ligament is attached.

(1)

☒ **A** bone

☒ **B** cartilage

☒ **C** muscle

☒ **D** tendon

(ii) Place a cross in the box ☒ next to the statement that explains why ligaments are effective at keeping the knee joint stable.

(1)

☒ **A** they contain collagen making them elastic

☒ **B** they contain collagen making them inelastic

☒ **C** they contain myosin making them elastic

☒ **D** they contain myosin making them inelastic

(b) Each year in the UK there are about 30 anterior cruciate ligament injuries for every 100 000 people.

Assuming the population in the UK is 65 000 000, calculate the number of anterior cruciate ligament injuries per year.

Show your working.

(2)

Answer .....

(c) A surgeon can use keyhole surgery when repairing a torn cruciate ligament. The torn ligament is repaired by grafting (attaching) new tissue.

The repair often uses tissue from the patient (autograft) or from a donor (allograft).

The table below shows the failure rate of each type of repair carried out by one surgeon.

Type of graft	**Failure rate (%)**
Autograft	0.7
Allograft	9.7

(i) Using the information in the table, compare the failure rates of these types of graft. Suggest explanations for the difference.

(3)

(ii) Suggest what additional information would be needed to increase the confidence in a conclusion drawn from these results.

(2)

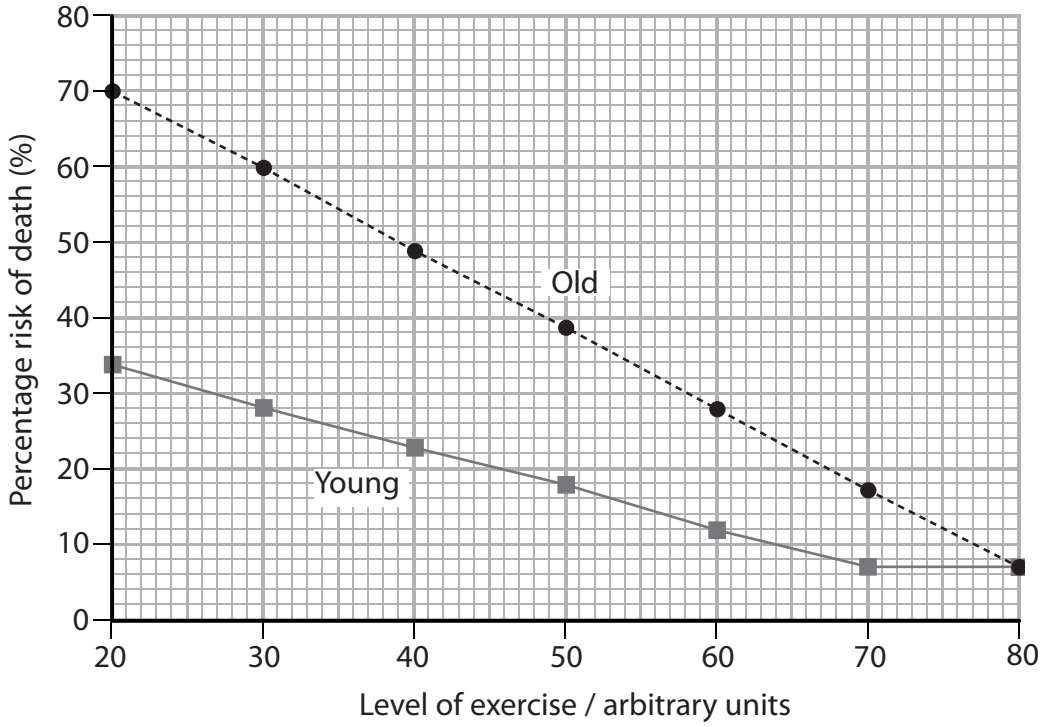
(iii) Give **two** advantages of using keyhole surgery to repair torn ligaments compared with other types of surgery.

(2)

(Total for Question 2 = 11 marks)

3 Exercise is important for human health.

The graph below shows how level of exercise changes the risk of death in young and old people.



(a) Use the information in the graph to describe the effect of level of exercise on the percentage risk of death.

(3)

(b) State the effect of exercise on each of the following.

(i) The risk of having diabetes and being obese.

(1)

(ii) The immune system.

(1)

(c) Exercise has an effect on the risk of having coronary heart disease (CHD).
In people with CHD the heart muscle cells receive less oxygen.

*(i) Describe how heart muscle cells make ATP when less oxygen is available.

(6)

(ii) A person will suffer a pain called angina if heart muscle cells receive less oxygen.

Suggest how lack of oxygen in heart muscle cells can cause angina.

(2)

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(Total for Question 3 = 13 marks)