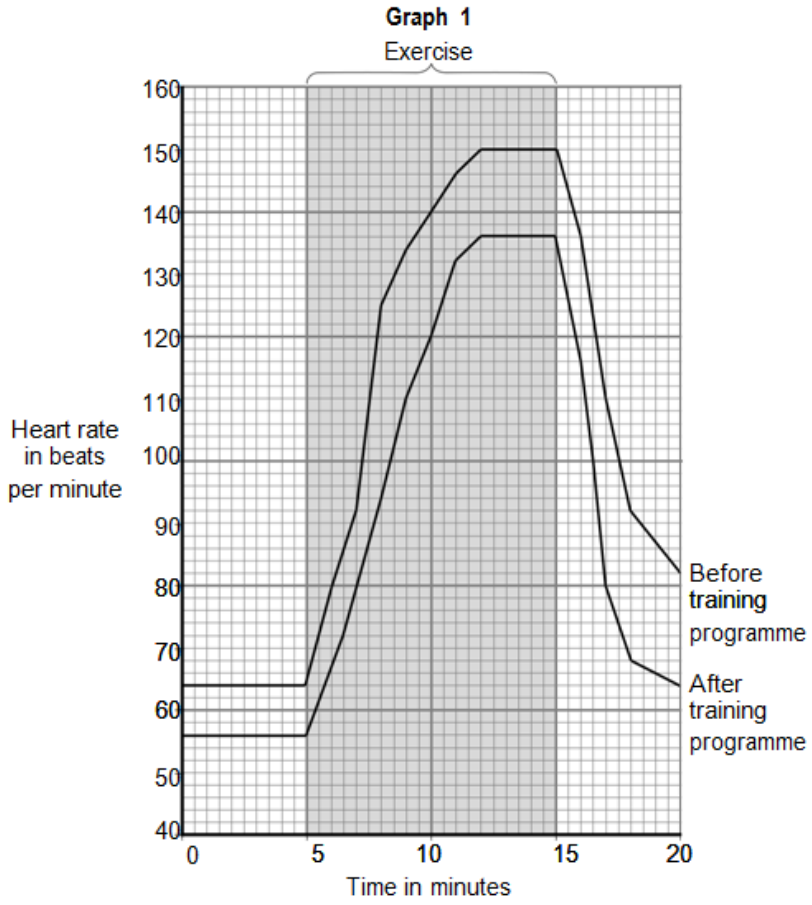
Respiration and Exercise 2 QP

Q:1 An athlete carried out a 6-month training programme.

Graph 1 shows the effect of the same amount of exercise on his heart rate before and after the training programme.



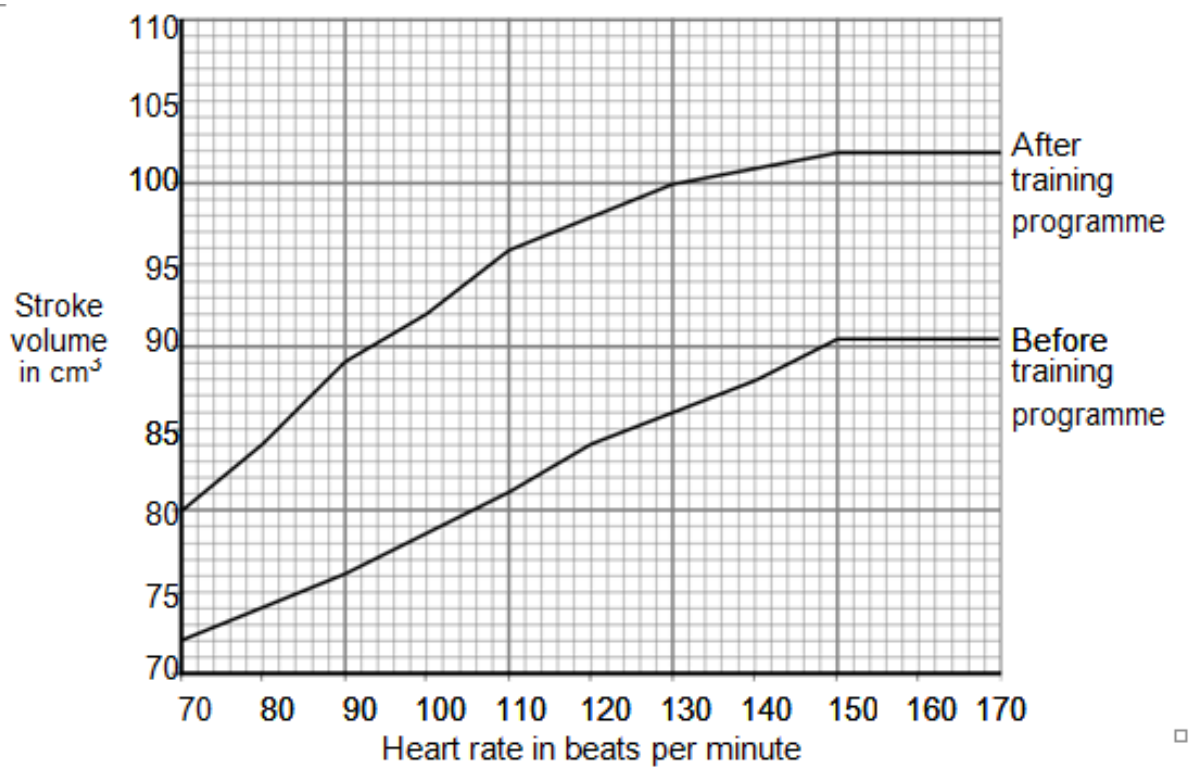
(a) (i) Use Graph 1 to find the heart rate of the trained athlete 5 minutes after the start of the exercise.

Heart rate = _____ beats per minute

(1 mark)

The stroke volume of the heart is the volume of blood pumped out of the left side of the heart in one heart beat.

Graph 2 shows the relationship between the stroke volume and the heart rate before and after the athlete did the training programme.



(a) (ii) The cardiac output is defined as

cardiac output = heart rate × stroke volume

Calculate the cardiac output of the trained athlete 5 minutes after the start of the exercise. Use your answer to part (a)(i), and information from Graph 2.

Show clearly how you work out your answer.

_____

_____

Cardiac output = _____ cm3 blood per minute

(2 marks)

(b) Graph 1 shows that, for the same amount of exercise, the heart of the trained athlete was beating more slowly than it did before the training programme.

Use information from Graph 2 to explain why.

_____

_____

_____

_____

(2 marks)

(c) An increased cardiac output will provide more oxygen and more glucose to the working muscles.

Explain how this helps the athlete during exercise.

_____

_____

_____

_____

_____

_____

_____

_____

(4 marks)

Q:2 Muscles need energy during exercise.

Draw a ring around the correct answer in parts (a) and (b) to complete each sentence.

(a) (i) The substance stored in the muscles and used during exercise is

glycogen.

lactic acid.

protein.

(1 mark)

(a) (ii) The process that releases energy in muscles is

digestion.

respiration.

transpiration.

(1 mark)

(b) The table shows how much energy is used by two men of different masses when swimming at different speeds.

Speed of swimming in metres per minute	Energy used in kJ per hour	
	34 kg man	70 kg man
25	651	1155
50	1134	2103

(b) (i) When the 34 kg man swims at 50 metres per minute instead of at 25 metres per minute,

the extra energy he uses each hour is

36 kJ.

483 kJ.

948 kJ.

(1 mark)

(b) (ii) When swimming at 50 metres per minute, each man's heart rate is faster than when swimming at 25 metres per minute.

A faster heart rate helps to supply the muscles with more

carbon dioxide.
glycogen.
oxygen.

(1 mark)

(b) (iii) During the exercise the arteries supplying the muscles would

constrict.
dilate.
pump harder.

(1 mark)

(c) When a person starts to swim, the breathing rate increases.

Give one way in which this increase helps the swimmer.

_____

_____

(1 mark)

Q:3 Drinking after exercise to replace the water lost in sweat is called rehydration. Scientists at a Spanish university investigated rehydration after exercise.

- 24 students took part in the investigation.
- All the students ran on a treadmill in a temperature of 40°C until they were exhausted.
- 12 of the students were each given half a litre of beer to drink.
- The other 12 students were each given half a litre of tap water to drink.

- Both groups of students were then allowed to drink as much tap water as they wanted.

- The scientists measured how quickly each student rehydrated.

- The students who had been given beer rehydrated 'slightly better' than the ones given only water.

A newspaper reported the investigation.The headline was

The newspaper headline was not justified.

Explain why.

_____

_____

_____

_____

_____

_____

_____

_____

(3 marks)

Q:4 One factor that may affect body mass is metabolic rate.

(a) (i) What is meant by metabolic rate?

_____

_____

(1 mark)

(a) (ii) Metabolic rate is affected by the amount of activity a person does.

Give two other factors that may affect a person's metabolic rate.

1 _____

_____

2 _____

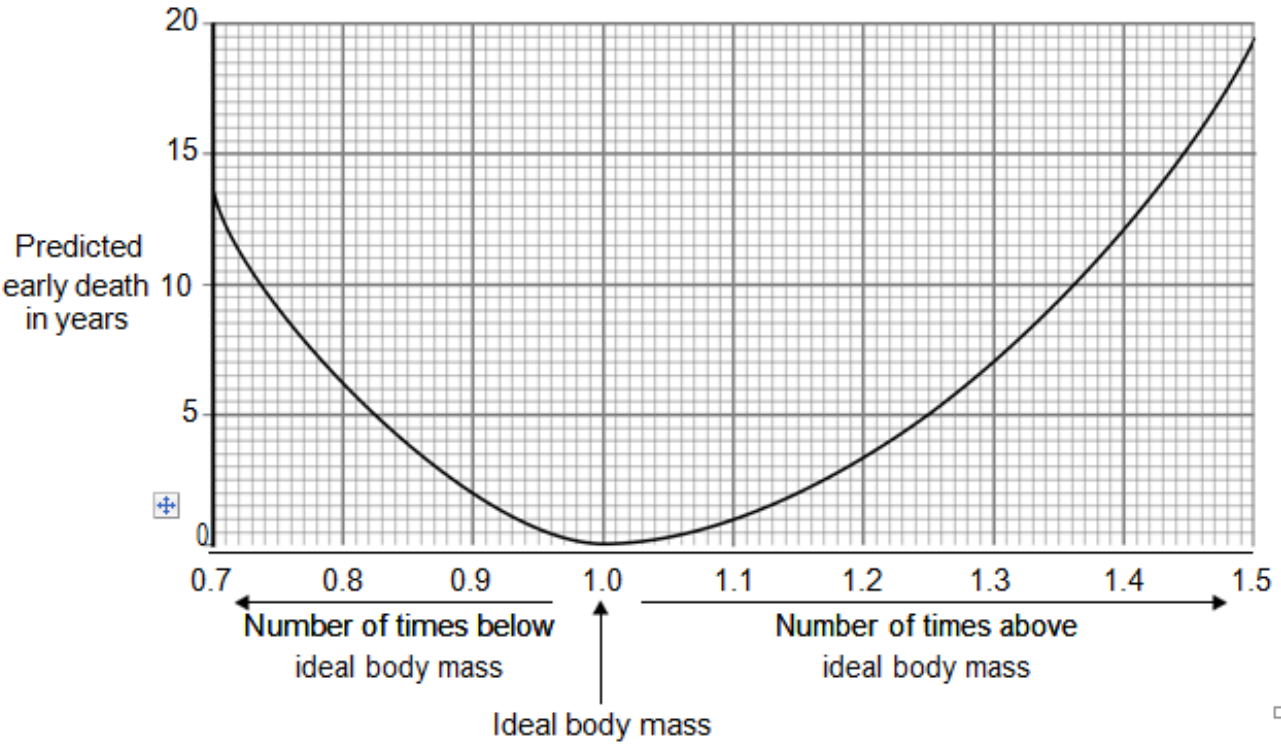
_____

(2 marks)

(b) Predicted early death is the number of years that a person will die before the mean age of death for the whole population. The predicted early death of a person is affected by their body mass.

Scientists have calculated the effect of body mass on predicted early death.

The graph shows the results of the scientists' calculations.



The number of times above or below ideal body mass is given by the equation:

$$\frac{\text{Actual body mass}}{\text{Ideal body mass}}$$

In the UK the mean age of death for women is 82.

A woman has a body mass of 70 kg. The woman's ideal body mass is 56 kg.

(b) (i) Use the information from the graph to predict the age of this woman when she dies.

_____

_____

_____

Age at death = ... years

(2 marks)

(b) (ii) The woman could live longer by changing her lifestyle.

Give two changes she should make.

1 _____

_____

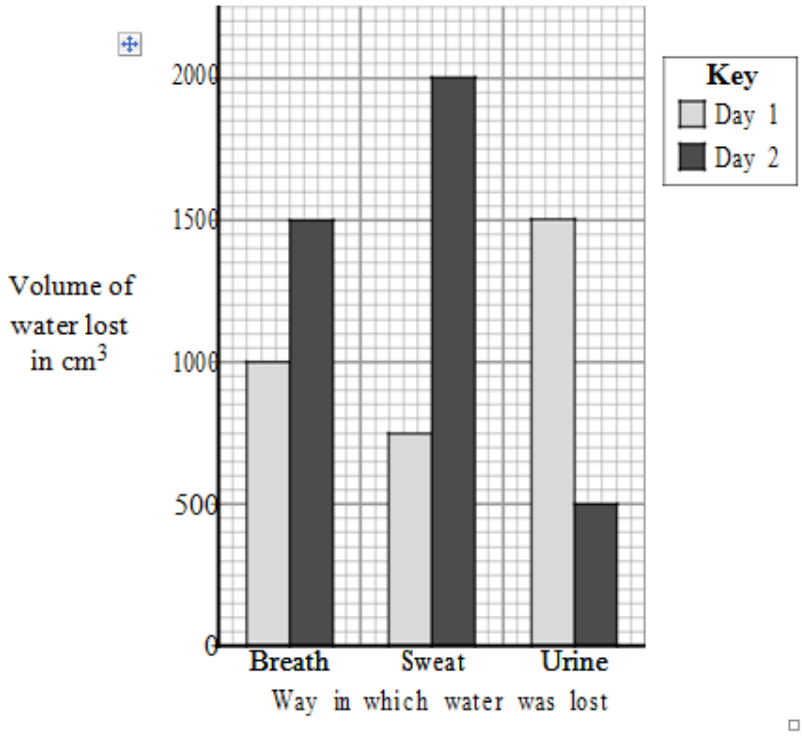
2 _____

_____

(2 marks)

Q:5 The bar chart shows the amount of water lost from the body of a student on two different days.

The student ate the same amount of food and drank the same amount of liquid on the two days. The temperature of the surroundings was similar on the two days.



(a) The total volume of water lost on day 1 was 3250 cm3.

How much water was lost on day 2? Show all your working.

_____

_____ cm3

(2 marks)

(b) The student did much more exercise on one of the days than on the other. On which day did he do more exercise?

Day _____

Give two reasons for your answer.

1_____

_____

2 _____

_____

(2 marks)

(c) **(i)** Which one of these is a chemical reaction that produces water in the body?

Put a tick ( ) in the box next to your choice.

Breathing ☐

Osmosis ☐

Respiration ☐

Sweating ☐

(1 mark)

(ii) How does sweating help the body?

_____

_____

(1 mark)

(iii) If the body loses more water than it gains, it becomes dehydrated. The concentration of the solution surrounding the body cells increases. This causes the cells to lose water.

By which process do cells lose water?

Put a tick ( ) in the box next to your choice.

Breathing ☐

Osmosis ☐

Respiration ☐

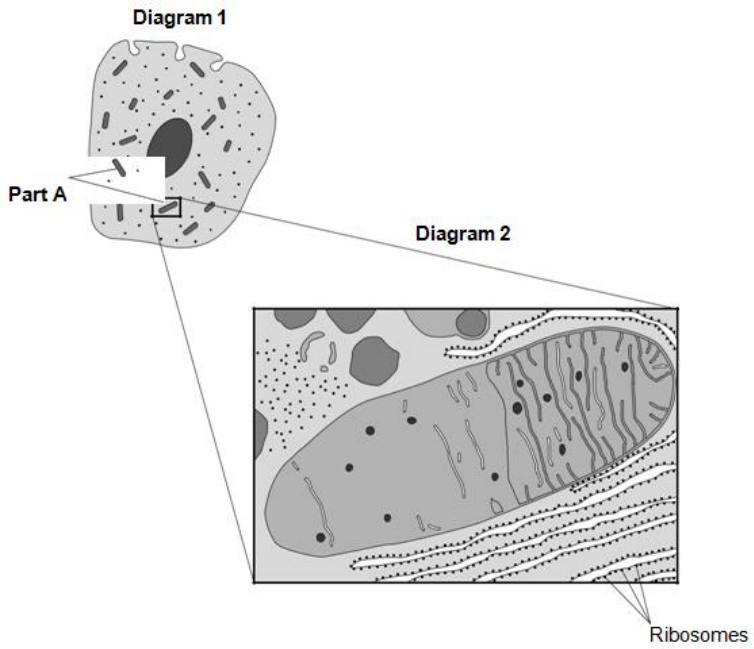
Sweating ☐

(1 mark)

Q:6 Diagram 1 shows a cell from the pancreas.

Diagram 2 shows part of the cell seen under an electron microscope.

Diagram 1



Part A is where most of the reactions of aerobic respiration happen.

(a) (i) Name part A.

_____ **(1 mark)**

(a) (ii) Complete the equation for aerobic respiration.

glucose + oxygen ⟶ _____ + _____ (+ energy)

(2 marks)

(a) (iii) Part A uses oxygen.

Explain how oxygen passes from the blood to part A.

_____

(3 marks)

(b) The pancreas cell makes enzymes.

Enzymes are proteins.

Describe how the ribosomes and part A help the cell to make enzymes.

(3 marks)

TOTAL MARKS=41