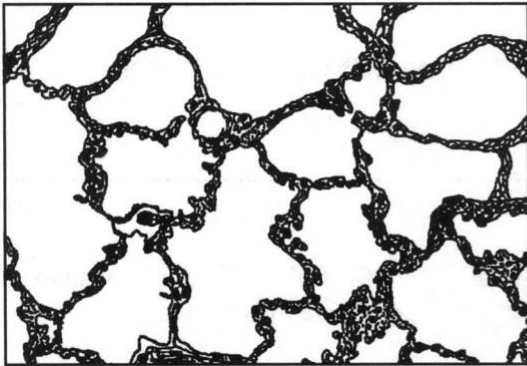


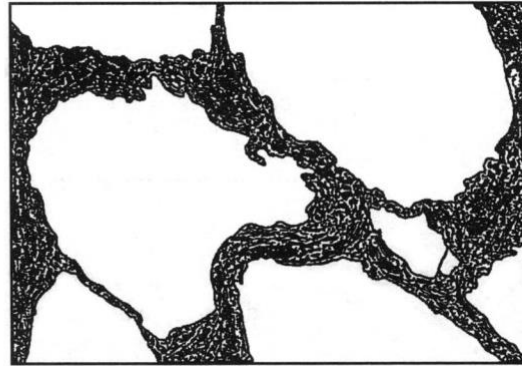
Exchange Surfaces

Q:1 Emphysema is a lung disease.

(a) The drawings show sections through the lung of a healthy person and through the lung of a person with emphysema. The drawings are drawn to the same scale.



Section through the lung of a
healthy person



Section through the lung of a
person with emphysema

Use information from the drawings to answer the questions.

What effect does emphysema have on:

(i) the thickness of the surface used for gas exchange

(1 mark)

(ii) the total area available for gas exchange?

(1 mark)

(b) Two men did the same amount of exercise.

One man was in good health. The other man had emphysema. The results are shown in the table.

	Man with good health	Man with emphysema
Oxygen entering blood in dm^3 per minute	2.1	1.1
Air flow into lungs in dm^3 per minute	90.7	46.0

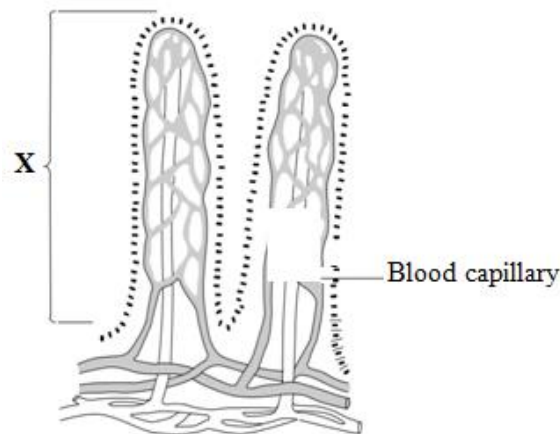
The man in good health was able to take more oxygen into his blood than the man with emphysema.

Calculate how much more oxygen was taken into the blood per minute by the man in good health. Show your working.

Answer = _____ dm^3 per minute

(2 marks)

Q:2 The diagram shows part of the lining of the small intestine.



(a) (i) Name structure X. Draw a ring around one answer.

alveolus thorax villus

(1 mark)

(a) (ii) Choose three ways in which structure X is adapted to help the absorption of soluble food.

Tick (☑) three boxes.

- It is ventilated.
- Its outer surface is one cell thick.
- It has a large surface area.
- It contains a layer of muscle.
- It has a good blood supply.
- Its cells contain haemoglobin.

(3 marks)

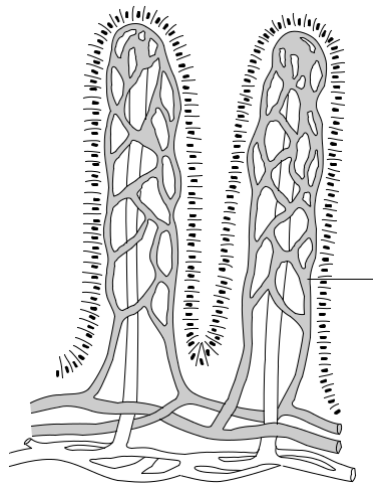
(b) Name the process by which soluble food enters the blood. Draw a ring around one answer.

diffusion fermentation transpiration

(1 mark)

Q:3 Villi are found in some parts of the digestive system. Diagram 1 shows two villi.

Diagram 1



(a) Draw a ring around the correct answer to complete each sentence.

muscle.

(a) (i) Structure A is a nerve.

capillary.

(1 mark)

dialysis.

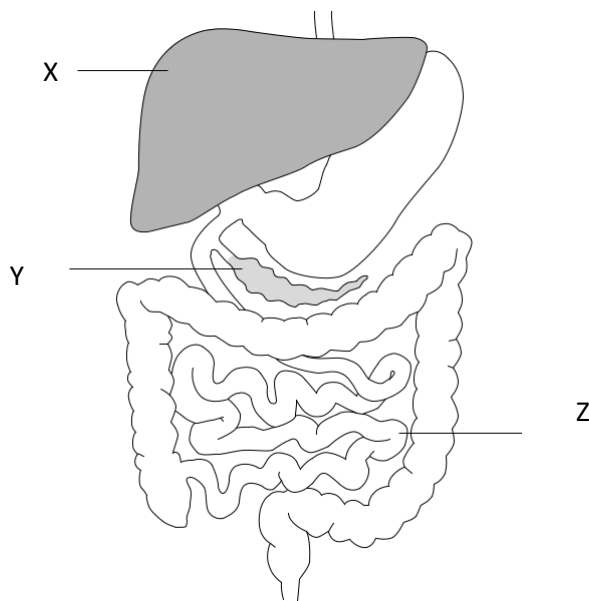
(a) (ii) The villi absorb the products of digestion by diffusion.

osmosis.

(1 mark)

(b) Diagram 2 shows the digestive system.

Diagram 2



(b) (i) In which part of the digestive system, X, Y or Z, are most villi found?

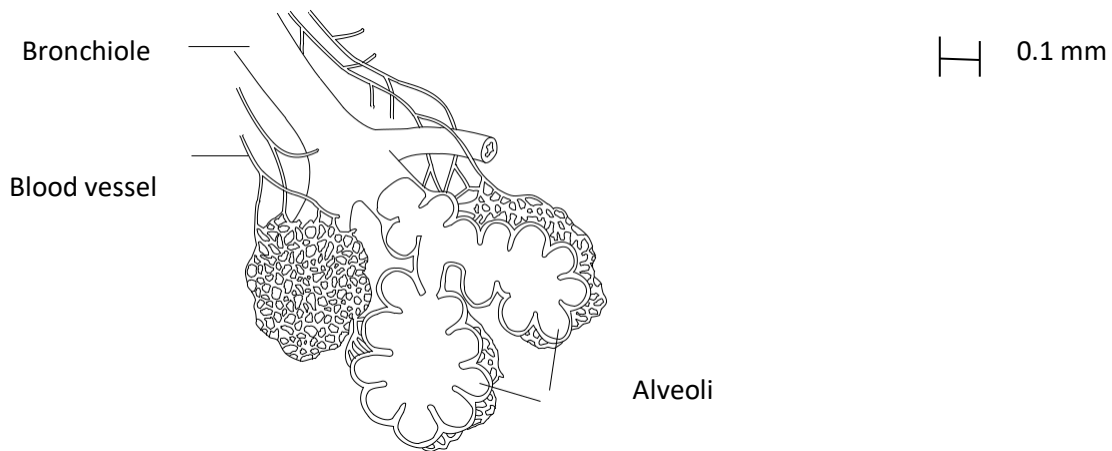
(1 mark)

(b) (ii) There are about 2000 villi in each cm² of this part of the digestive system. Why is it helpful to have lots of villi?

(1 mark)

Q:4 The human lung has about 80 million alveoli.

The diagram shows some alveoli in a human lung.



(a) Give three features of the alveoli that allow large amounts of oxygen to enter the blood.

1 _____

2 _____

3 _____

(3 marks)

(b) (i) Name the process by which oxygen passes from the air into the blood.

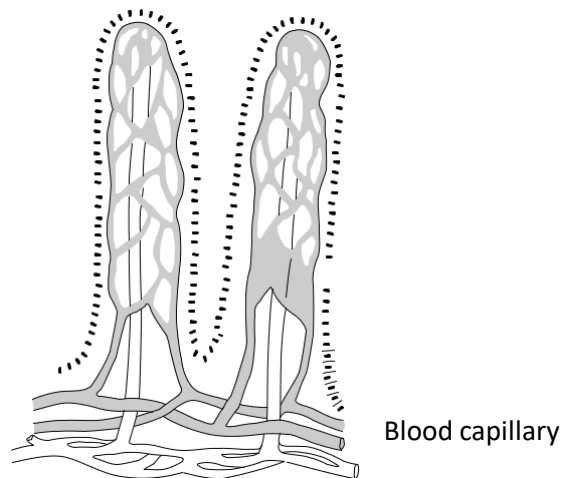
(1 mark)

(b) (ii) Breathing allows large amounts of oxygen to enter the blood. Explain how breathing does this.

(2 marks)

Q:5 Diagram 1 shows two villi in the small intestine of a healthy person.

Diagram 1



(a) Describe two features of the villi which help the small intestine to function.

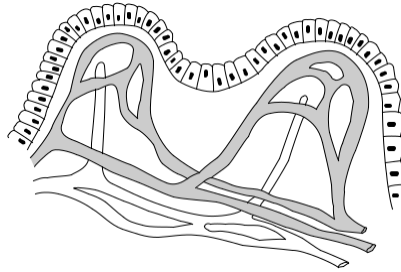
1 _____

2 _____

(2 marks)

(b) Diagram 2 shows two villi in the small intestine of a person with coeliac disease.

Diagram 2



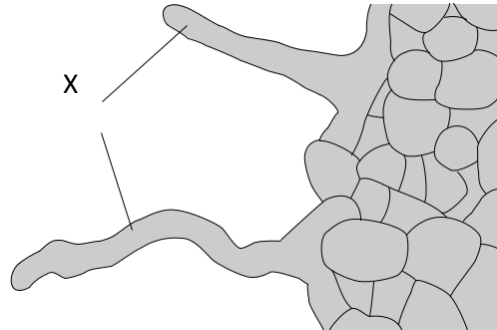
(b)(i) How do the villi of the person with coeliac disease differ from those of a healthy person?

(1 mark)

(b)(ii) Suggest how this difference might affect how well the small intestine functions.

(1 mark)

Q:6 The diagram shows part of a plant root. A large number of structures like the ones labelled X grow out of the surface of the root.



(a) (i) What is the name of structure X? Draw a ring around one answer.

root hair stoma villus

(1 mark)

(a) (ii) Name two substances which structure X absorbs from the soil.

1 _____

2 _____

(2 marks)

(b) The substances in (a)(ii) are transported from the roots to the leaves.

Carbon dioxide also enters the leaves.

Draw a ring round the correct answer to complete each sentence.

alveoli.

(b) (i) Carbon dioxide enters leaves through stomata.

villi.

(1 mark)

active transport.

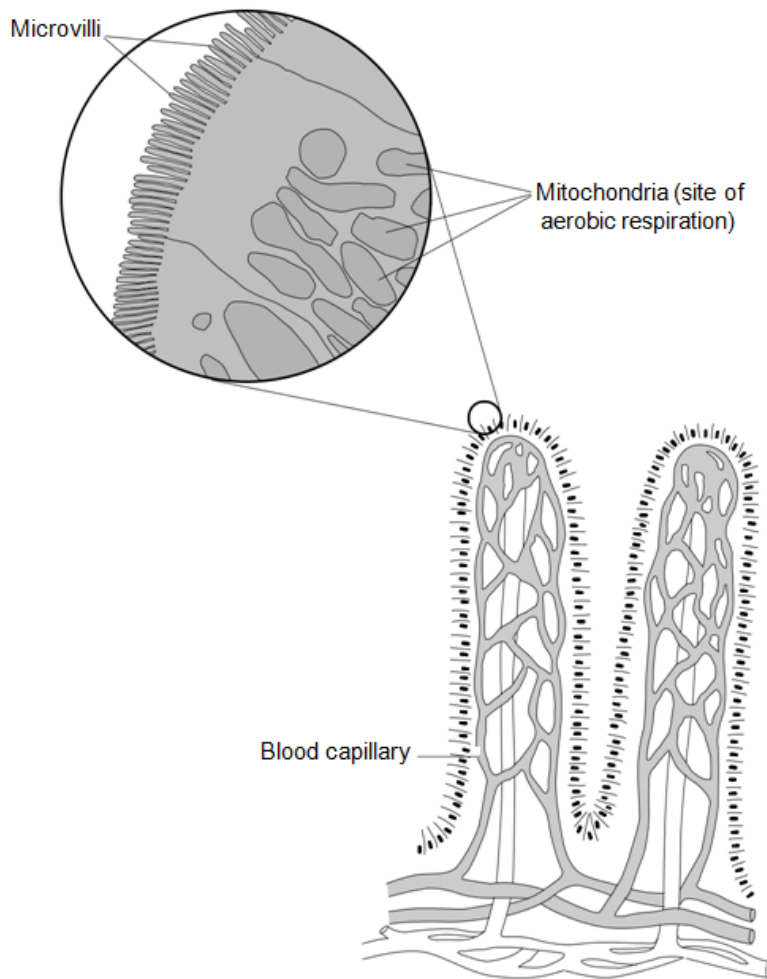
(b) (ii) Carbon dioxide enters leaf cells by diffusion.

reabsorption.

(1 mark)

Q:7 The villi of the small intestine absorb the products of digestion.

The diagram shows two villi. It also shows parts of some of the surface cells of a villus, as seen with an electron microscope.



Describe and explain how the villi are adapted to maximise the rate of absorption of the products of digestion.

(5 marks)

TOTAL MARKS=33