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**Sample assessment materials for first teaching  
September 2018**

Time: 1 hour 30 minutes

Paper Reference **21325L**

**Applied Human Biology**  
**Unit 1: Principles of Applied Human Biology**

**You will need:**

A calculator and a ruler.

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*

### Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 Digestion breaks down large molecules into smaller molecules.

(a) Which type of molecule is broken down into amino acids?

(1)

|                          |                       |
|--------------------------|-----------------------|
| <input type="checkbox"/> | <b>A</b> Carbohydrate |
| <input type="checkbox"/> | <b>B</b> Fibre        |
| <input type="checkbox"/> | <b>C</b> Lipid        |
| <input type="checkbox"/> | <b>D</b> Protein      |

Figure 1 shows a cross-section through the wall of the small intestine.

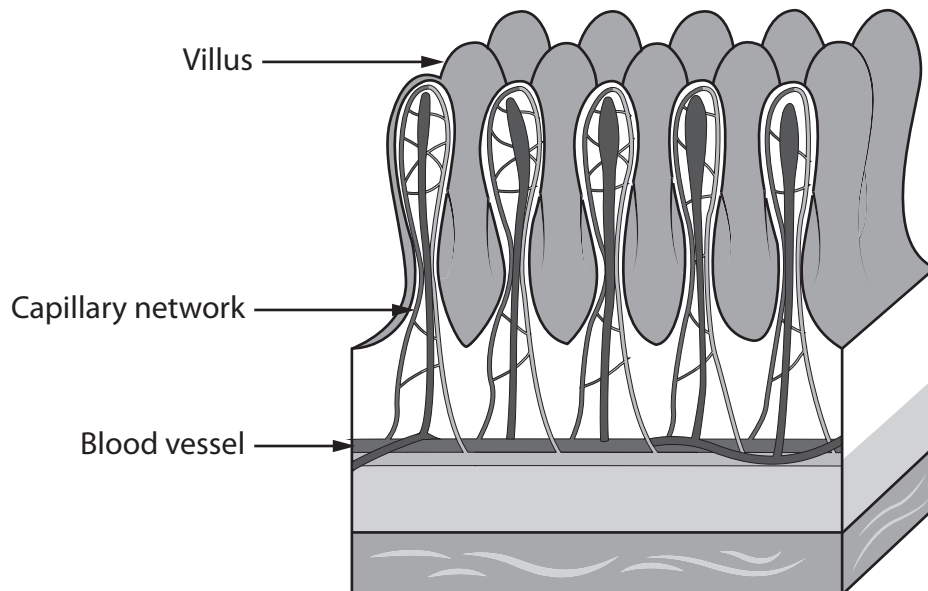


Figure 1

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(b) Each villus has a capillary network. The capillary network increases blood supply.

Explain **two other** ways the villi are adapted to make digestion more efficient.

(4)

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2 .....

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(c) Name a process by which substances, such as amino acids, move into the bloodstream from the small intestine.

(1)

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**(Total for Question 1 = 6 marks)**

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2 Tissues in the body respond to damage in a variety of ways.

(a) Damaged tissue can swell and bruise.

Explain how these **two** responses occur when tissue is damaged.

(4)

Swelling

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Bruising

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(b) A blood clot normally forms after a person cuts themselves.

(i) Which part of the blood contains the proteins that start the clotting process?

(1)

|                          |                           |
|--------------------------|---------------------------|
| <input type="checkbox"/> | <b>A</b> Plasma           |
| <input type="checkbox"/> | <b>B</b> Platelet         |
| <input type="checkbox"/> | <b>C</b> Red blood cell   |
| <input type="checkbox"/> | <b>D</b> White blood cell |

(ii) A blood clot will prevent blood loss.

Give **one other** reason why it is important that the body can form a blood clot after the skin has been broken.

(1)

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(Total for Question 2 = 6 marks)



3 The body regulates blood glucose concentration.

(a) Excess glucose is converted into a different molecule. This new molecule is stored in muscle and liver cells.

Which molecule is glucose converted into for storage?

(1)

|                          |                   |
|--------------------------|-------------------|
| <input type="checkbox"/> | <b>A</b> glucagon |
| <input type="checkbox"/> | <b>B</b> glycogen |
| <input type="checkbox"/> | <b>C</b> insulin  |
| <input type="checkbox"/> | <b>D</b> starch   |

(b) Cellular atrophy can happen when blood glucose levels are too high for a long time. Cellular atrophy particularly affects the legs and feet.

State **one** possible result of cellular atrophy in the legs and feet.

(1)

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(c) Explain how a person with type 1 diabetes can control their blood sugar levels after a meal and how their body would respond.

(6)

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S 6 3 1 8 7 A 0 5 1 9

(d) An overweight patient visiting their doctor is concerned about the risk of developing type 2 diabetes.

Give **two** ways this patient could reduce their risk of developing type 2 diabetes.

(2)

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**(Total for Question 3 = 10 marks)**

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4 Figure 2 shows the cyclical variation in a patient's arterial pressure for two cardiac cycles.

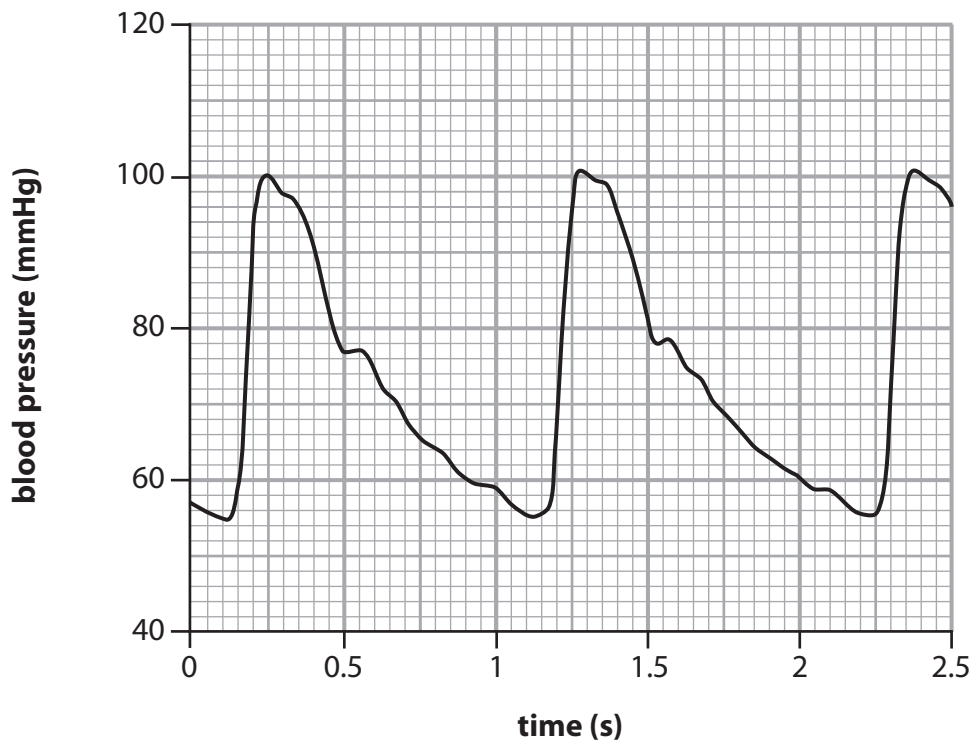


Figure 2

(a) (i) Describe the changes in arterial pressure shown in Figure 2.

(3)

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(ii) Calculate the heart rate of the patient in Figure 2 in beats per minute (bpm). (2)

..... bpm

(b) Blood pressure can be recorded with a single measurement at the doctor's surgery.

It is also possible for a patient to wear a blood pressure monitor at home, so that blood pressure can be measured many times in 24 hours.

(i) Give **one** advantage of a patient wearing a blood pressure monitor at home. (1)

(ii) Which value represents blood pressure within the ideal range for an 18-year-old male? (1)

|                          |                       |
|--------------------------|-----------------------|
| <input type="checkbox"/> | <b>A</b> 80/55 mmHg   |
| <input type="checkbox"/> | <b>B</b> 120/80 mmHg  |
| <input type="checkbox"/> | <b>C</b> 145/90 mmHg  |
| <input type="checkbox"/> | <b>D</b> 150/100 mmHg |

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(c) A person with low blood pressure is at risk of developing pressure sores.

This risk is greatly increased if the patient has to stay in bed for a long time, for example because of an illness.

Explain the cause of pressure sores when a person has to stay in bed for a long time.

(3)

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**(Total for Question 4 = 10 marks)**

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5 Many conditions are caused by genetic information.

(a) Some of these conditions, such as Down's syndrome, can be screened for before a baby is born.

Explain the cause of Down's syndrome.

(3)

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(b) Some genetic conditions can be traced through a family. This is done using a genetic pedigree diagram.

Figure 3 shows a genetic pedigree diagram for the inheritance of sickle cell anaemia. Sickle cell anaemia is a disease that affects red blood cells.

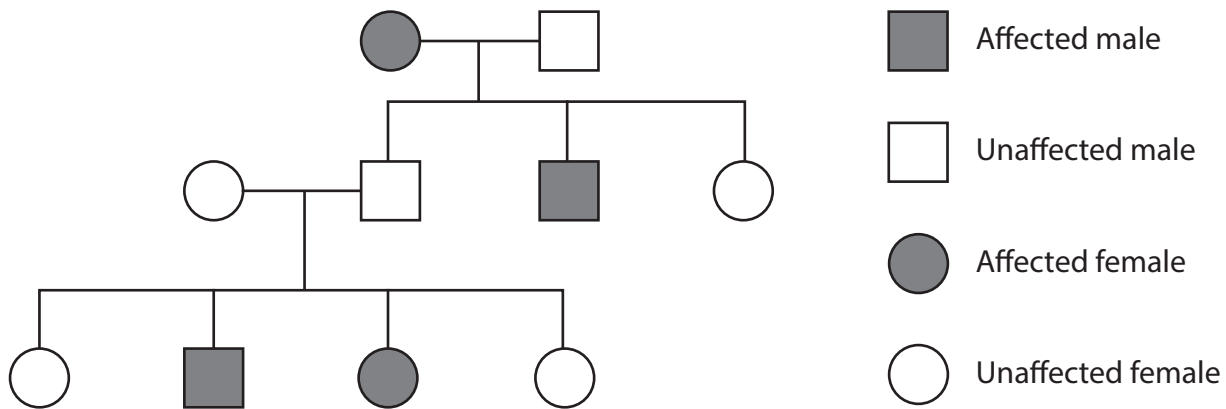


Figure 3

(i) Explain how Figure 3 shows that sickle cell anaemia is caused by a recessive gene.

(3)

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(ii) A person wants to be tested to see if they carry the allele for sickle cell anaemia.

Give **one** way that a DNA sample could be taken from a person.

(1)

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(c) Haemophilia is a sex-linked recessive genetic disorder.

(i) Complete the Punnett square to show the potential genotypes of the offspring of the parents shown.

(1)

|        |       | mother |       |
|--------|-------|--------|-------|
|        |       | $X^H$  | $X^h$ |
| father | $X^H$ |        |       |
|        | Y     |        |       |

$X^H$  – X chromosome with no haemophilia allele

$X^h$  – X chromosome with haemophilia allele

(ii) Give the ratio of **affected to unaffected** phenotypes from this genetic cross.

(1)

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(iii) Explain why fathers do not pass the allele for haemophilia onto their sons.

(2)

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(Total for Question 5 = 11 marks)

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6 A person's temperature is taken when they are being monitored in hospital.

(a) (i) State **two** reasons why a person's temperature is monitored.

(2)

1 .....

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(ii) Which part of the brain detects changes in internal body temperature?

(1)

|                          |                          |
|--------------------------|--------------------------|
| <input type="checkbox"/> | <b>A</b> Cerebellum      |
| <input type="checkbox"/> | <b>B</b> Hippocampus     |
| <input type="checkbox"/> | <b>C</b> Hypothalamus    |
| <input type="checkbox"/> | <b>D</b> Pituitary gland |



(b) The body maintains a constant internal temperature.

In conditions of extreme temperatures, a person's body may be damaged.

Discuss how the body responds to high and low external temperatures to maintain a constant internal temperature.

(9)

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**(Total for Question 6 = 12 marks)**

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7 The blood provides tissues in the body with oxygen, which is used for aerobic respiration.

Respiration has several stages. The first stage is glycolysis, which does not need oxygen.

(a) Identify the molecules **W**, **X**, **Y** and **Z** in Figure 4.

(4)

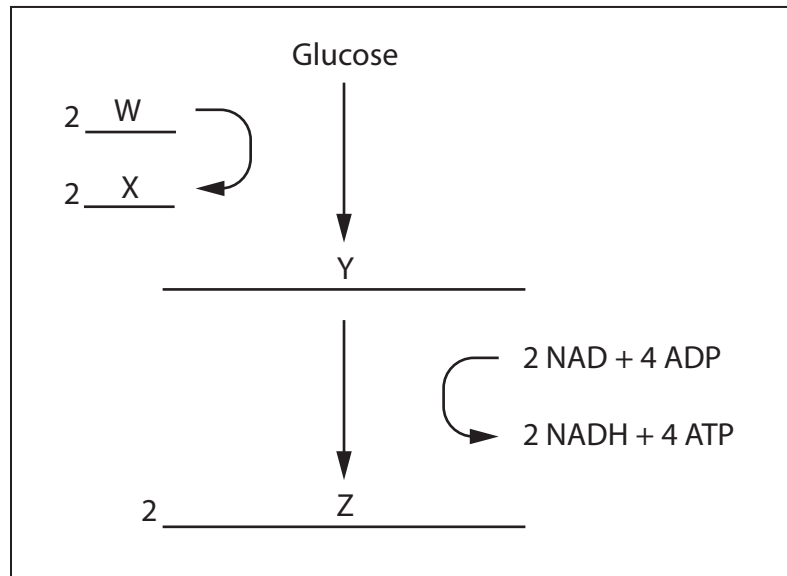


Figure 4

W

X

Y

Z



S 6 3 1 8 7 A 0 1 5 1 9

(b) Ischemia is when a tissue does not receive an adequate supply of blood.

(i) Explain what happens if the heart tissue suffers from reduced blood flow from the coronary arteries.

(3)

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(ii) Identify the term used to describe a **complete** absence of oxygen in tissues.

(1)

|                          |             |
|--------------------------|-------------|
| <input type="checkbox"/> | A Anoxemia  |
| <input type="checkbox"/> | B Anoxia    |
| <input type="checkbox"/> | C Hypoxia   |
| <input type="checkbox"/> | D Hypoxemia |

(c) When there is reduced blood flow to the nervous system, nerve damage can occur.

Explain **two** tests that can be used to show a patient has nerve damage.

(4)

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**(Total for Question 7 = 12 marks)**

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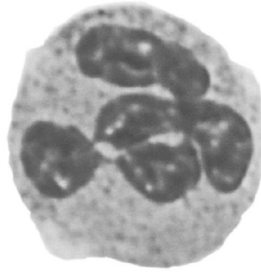
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8 The immune system contains many different types of cell.

Figure 5 shows a specialised cell found in the immune system.



(Source: © toeytoey/ Shutterstock)

**Figure 5**

(a) Identify the type of cell shown in Figure 5.

(1)

|                          |                     |
|--------------------------|---------------------|
| <input type="checkbox"/> | <b>A</b> Basophil   |
| <input type="checkbox"/> | <b>B</b> Lymphocyte |
| <input type="checkbox"/> | <b>C</b> Monocyte   |
| <input type="checkbox"/> | <b>D</b> Neutrophil |

(b) Describe the process of phagocytosis.

(3)

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(c) Whooping cough is a disease caused by a bacterium.

Pregnant women can be vaccinated against whooping cough in the later stages of pregnancy.

Babies can also be given a vaccination for whooping cough at the age of eight weeks old.

Evaluate the processes of natural passive immunity and artificial active immunity and the effect of each process on a baby exposed to whooping cough.

(9)

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**(Total for Question 8 = 13 marks)**

**TOTAL FOR PAPER = 80 MARKS**

