

Please check the examination details below before entering your candidate information

Candidate surname

Other names

**Pearson BTEC  
Level 3  
Nationals  
Diploma**

Centre Number

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Learner Registration Number

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**Wednesday 23 January 2019**

Afternoon (Time: 50 minutes)

Paper Reference **31627H/1B**

**Applied Science**

**Unit 5: Principles and Applications of Science II**

**Biology**

**SECTION A: ORGANS AND SYSTEMS**

**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 exam is 120.
- The exam comprises three papers worth 40 marks each.  
Section A: Organs and systems (Biology).  
Section B: Properties and uses of substances (Chemistry).  
Section C: Thermal physics, materials and fluids (Physics).
- 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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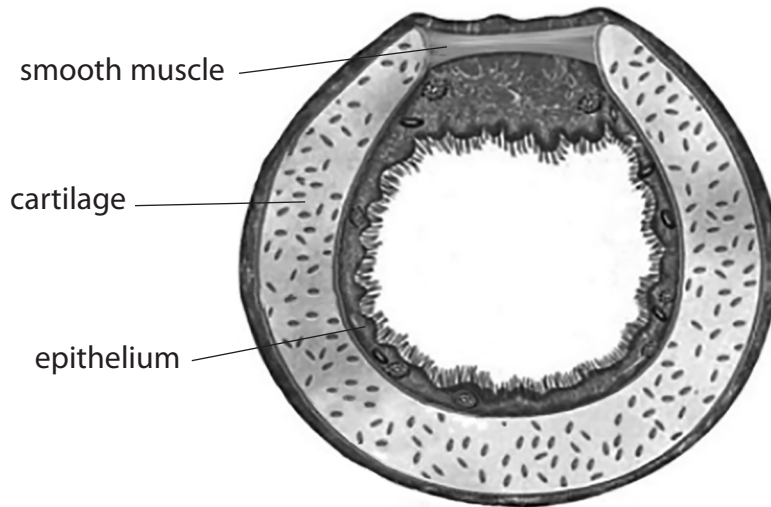


Pearson

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 Figure 1 shows a cross section of a trachea.



Source from: <https://www.rnursingschool.biz/unity-companies/the-lungs.html>

**Figure 1**

(a) State the function of the cartilage in the wall of the trachea.

(1)

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(b) Paragraph 1 describes the effect of using steroid inhalers.

People with breathing difficulties, such as asthma, may use steroid inhalers.

Breathing difficulties are caused when the smooth muscle in the walls of the airways contracts, causing the diameter of the airways to ..... **A**..... .

After using a steroid inhaler, the smooth muscle in the wall of the airways relaxes, causing the diameter of the airways to ..... **B**..... .

**Paragraph 1**

Identify the missing words **A** and **B** in Paragraph 1.

(2)

**A** .....

**B** .....

(c) Surfactant is a liquid containing phospholipids, cholesterol and proteins.

Surfactant is made in cells of the alveoli walls.

In the alveoli, cells secrete surfactant into the alveolar spaces.

State the function of surfactant.

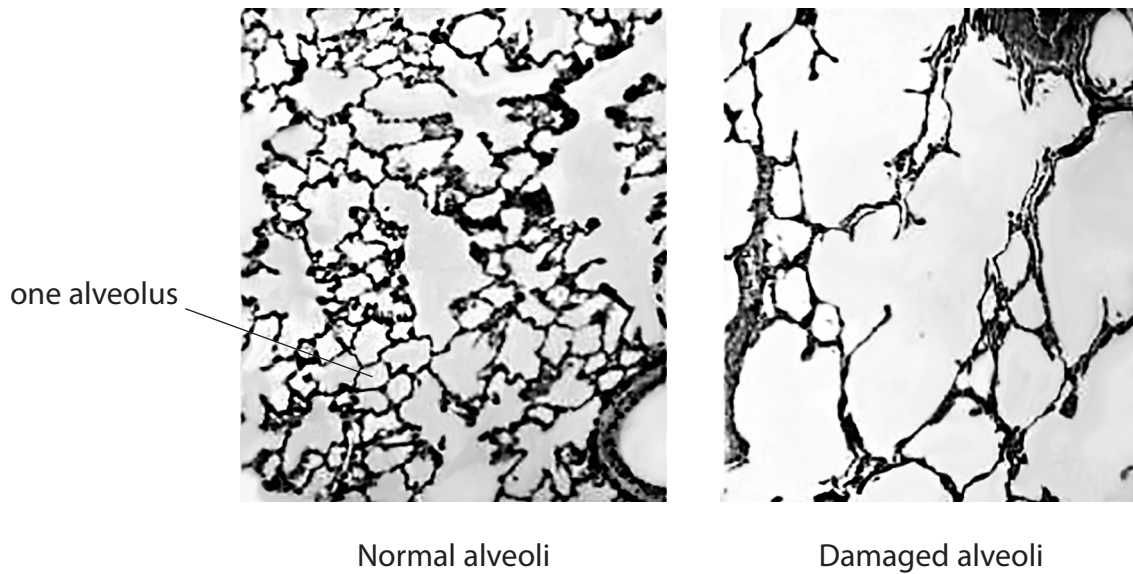
(1)

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(d) Figure 2 shows the cross sections of normal alveoli of a healthy person and damaged alveoli of a person with a respiratory disease, such as emphysema.



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**Figure 2**

Explain why a person with emphysema produces less ATP than a healthy person.

Use information from Figure 2 to support your answer.

(3)

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(e) The actual diameter of a healthy alveolus is 0.2 mm.

The observed diameter of the healthy alveolus, in another photomicrograph, is 10 mm.

Calculate the magnification of the image.

Show your working.

(2)

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**(Total for Question 1 = 9 marks)**





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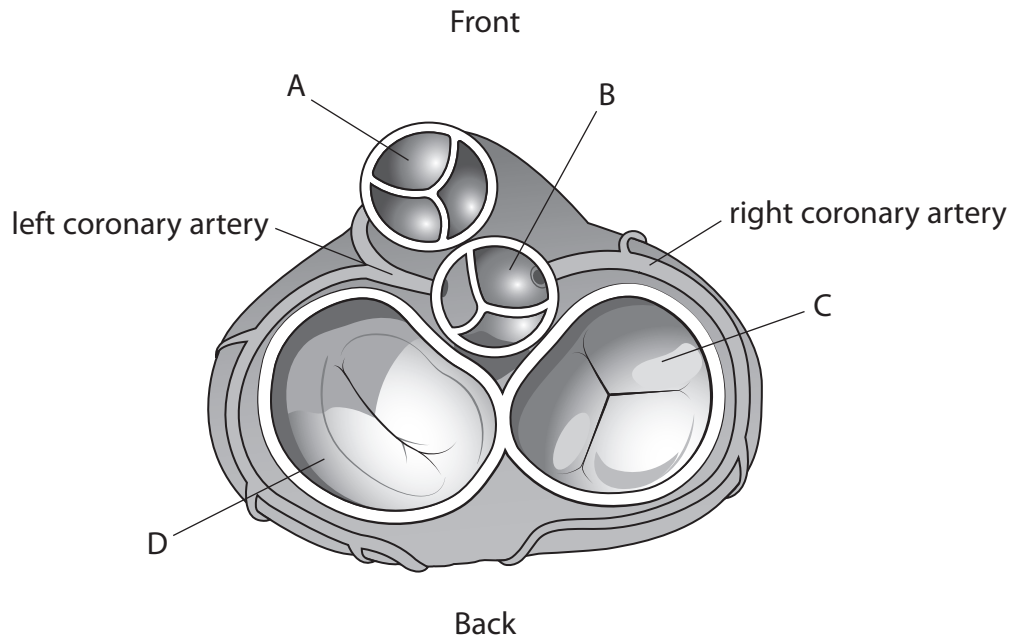
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2 Figure 3 shows a transverse (cross) section of a human heart, seen from above. The section shows the four heart valves.



© Asklepios Medical Atlas/Science Photo Library

**Figure 3**

(a) (i) Identify the aortic valve in Figure 3.

(1)

- A
- B
- C
- D

(ii) Describe the function of the bicuspid valve.

(2)

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(b) Figure 4 shows a longitudinal section of a human heart.

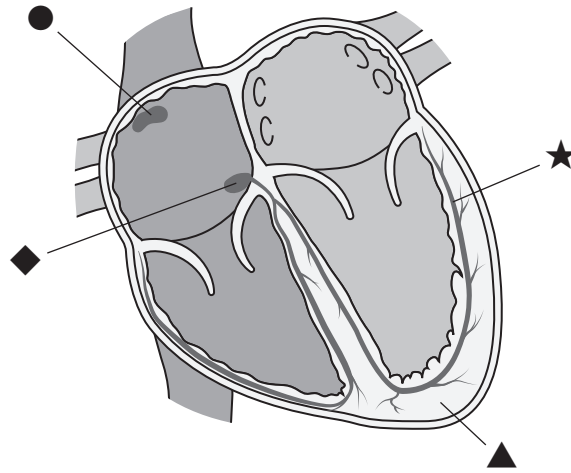


Figure 4

Identify the atrioventricular node (AVN) in Figure 4.

(1)

- A ●
- B ▲
- C ◆
- D ★

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(c) The fibrous layer separating the atria from the ventricles does not conduct electrical impulses.

Describe how the electrical impulses spread from ● to ▲ in Figure 4.

(3)

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(d) Cigarette smoke contains many harmful chemicals, such as nicotine.

When a smoker inhales cigarette smoke into their lungs, these chemicals may be absorbed into the blood.

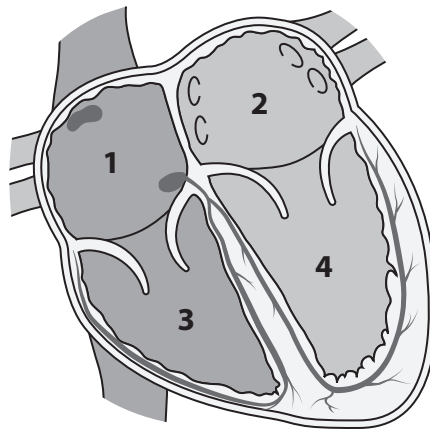


Figure 5

Identify the heart chamber in Figure 5 that would first receive nicotine from the lungs.

(1)

- A 1
- B 2
- C 3
- D 4



(e) Figure 6 shows the changes in blood pressure throughout the circulatory system.

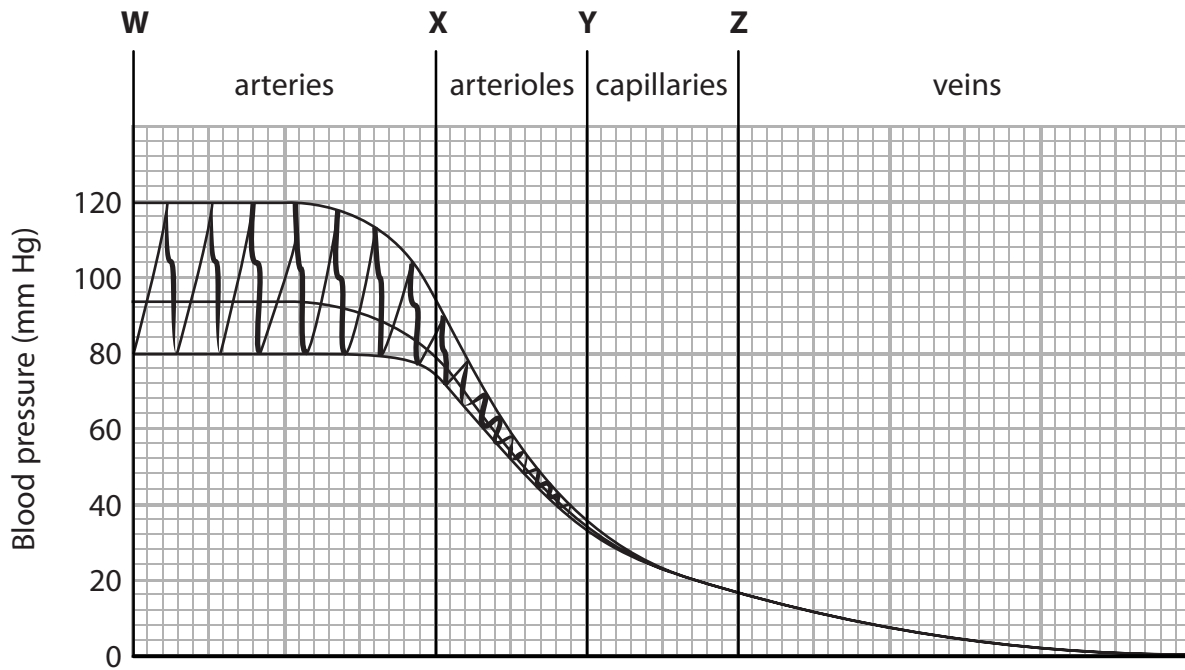


Figure 6

(i) Explain **two** changes in arterial blood pressure, shown between points **W** and **X**, in Figure 6.

(4)

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- (ii) Calculate, using information in Figure 6, the percentage decrease in blood pressure in the capillaries from point **Y** to point **Z**.

Show your working.

(3)

..... %

**(Total for Question 2 = 15 marks)**



3 Figure 7 shows how sodium ions and chloride ions move into and out of the ciliated epithelial cells lining the bronchi of the lungs.

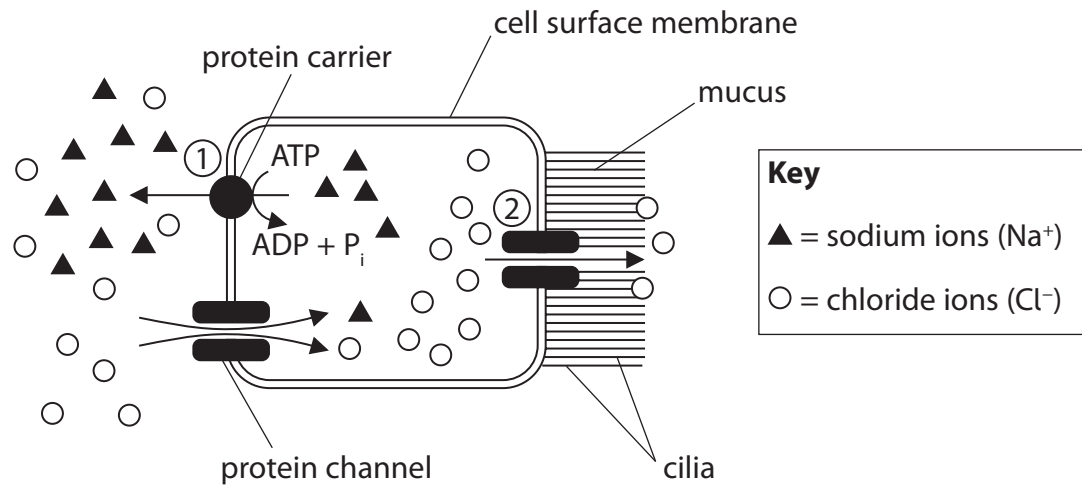


Figure 7

(a) Name the process by which sodium ions leave the ciliated epithelial cell at point 1 in Figure 7.

(1)

- A active transport
- B exocytosis
- C facilitated diffusion
- D osmosis

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4 The kidneys are organs of excretion and osmoregulation.

(a) (i) Explain the importance of **excretion**.

(2)

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(ii) Explain the importance of **osmoregulation**.

(2)

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(b) A person has kidney failure when many of their kidney nephrons are damaged.

Renal dialysis (haemodialysis) is one way to treat kidney failure.

Discuss the advantages and disadvantages of renal dialysis in treating kidney failure.

(6)

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(Total for Question 4 = 10 marks)

**TOTAL FOR SECTION A = 40 MARKS**

