

B4- Organising animals and plants Exam Practice 1

Name:

Score:

Q1.

The heart pumps blood around the body.

- (a) Which structures prevent blood flowing the wrong way in the heart?

_____ (1)

- (b) Which blood vessels take blood away from the heart?

Tick (✓) **one** box.

Arteries

Capillaries

Veins

(1)

- (c) In the legs, blood in the arteries is different from blood in the veins.

What are **two** differences between blood in the arteries and blood in the veins in the legs?

Tick (✓) **two** boxes.

Blood in arteries has less carbon dioxide

Blood in arteries has less oxygen

Blood in arteries has less nitrogen

Blood in arteries has more carbon dioxide

Blood in arteries has more oxygen

Blood in arteries has more nitrogen

(2)

Heart rate is the number of times the heart contracts each minute.

- (d) People who exercise regularly have stronger heart muscle than people who do not exercise.

Resting heart rate is measured when the person is at rest.

How would long-term regular exercise affect resting heart rate?

Tick (✓) **one** box.

Resting heart rate would decrease

Resting heart rate would increase

Resting heart rate would stay the same

(1)

A student wore a heart monitor which measured his heart rate all the time.

The heart monitor recorded his lowest heart rate each day for five days.

The table below shows the results.

Day	Lowest heart rate in beats per minute
1	62
2	72
3	77
4	59
5	65
Mean	X

- (e) Calculate mean value **X** in the table.

X = _____ beats per minute (1)

(f) Suggest **one** possible reason for the higher heart rate on day 3.

_____ (1)

(g) Another student had a mean heart rate of 82 beats per minute in one day.
Calculate their total number of heart beats on that day.

Number of heart beats = _____ (3)

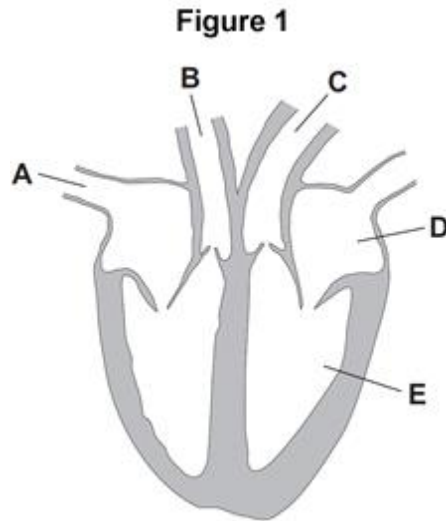
(Total 10 marks)

Q2.

The heart is part of the circulatory system.

- (a) (i) Name **one** substance transported by the blood in the circulatory system.
_____ (1)
- (ii) What is the main type of tissue in the heart wall?
_____ (1)

(b) **Figure 1** shows the human heart.



(i) Which blood vessel, **A**, **B** or **C**, takes blood to the lungs?

(1)

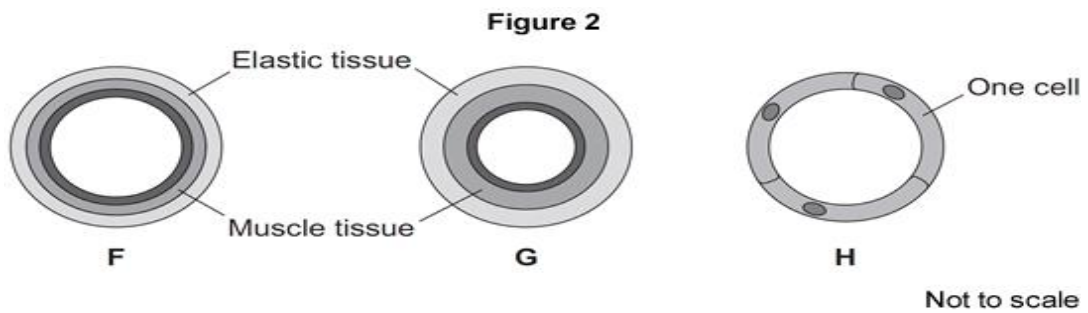
(ii) Name parts **D** and **E** shown in **Figure 1**.

D _____

E _____

(2)

(c) **Figure 2** shows three types of blood vessel, **F**, **G** and **H**.



(i) What type of blood vessel is **F**?

Tick (✓) **one** box.

an artery

a capillary

a vein

(1)

(ii) A man needs to have a stent fitted to prevent a heart attack.

In which type of blood vessel would the stent be placed?

Tick (✓) **one** box.

an artery

a capillary

a vein

(1)

(iii) Explain how a stent helps to prevent a heart attack.

(2)

(Total 9 marks)

Q3.

The circulatory system transports substances such as glucose and oxygen around the body.

(a) Name **two** other substances that the circulatory system transports around the body.

1. _____

2. _____

(2)

(b) (i) Blood is a tissue. Blood contains red blood cells and white blood cells.

Name **two** other components of blood.

1. _____

2. _____

(2)

(ii) The heart is part of the circulatory system.

What type of tissue is the wall of the heart made of?

(c) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Every year, many patients need to have heart valve replacements.

The table gives information about two types of heart valve.

Living human heart valve	Cow tissue heart valve
<ul style="list-style-type: none">• It has been used for transplants for more than 12 years.• It can take many years to find a suitable human donor.• It is transplanted during an operation after a donor has been found.• During the operation, the patient's chest is opened and the old valve is removed before the new valve is transplanted.	<ul style="list-style-type: none">• It has been used since 2011.• It is made from the artery tissue of a cow.• It is attached to a stent and inserted inside the existing faulty valve.• A doctor inserts the stent into a blood vessel in the leg and pushes it through the blood vessel to the heart.

A patient needs a heart valve replacement. A doctor recommends the use of a cow tissue heart valve.

Give the advantages and disadvantages of using a cow tissue heart valve compared with using a living human heart valve.

Use information from the table and your own knowledge in your answer.

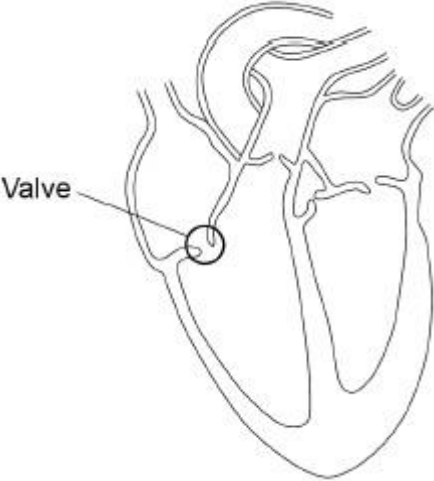
(6)
(Total 11 marks)

Combined Higher Exam Question:

Q1.

The figure below shows the internal structure of the human heart.

One of the heart valves is labelled.



Sometimes a valve in the heart can start to leak.

(a) Explain why a person with a leaking heart valve has difficulty exercising.

(4)

A patient with a leaking heart valve may have the valve replaced.

A study compared two different types of replacement heart valve:

- mechanical valves
- biological valves from pigs.

The data used in the study was collected from female patients aged 50–69.

The following table shows the data.

	Type of replacement heart valve	
	Mechanical	Biological
Number of patients given the valve	2852	1754
Number of patients who died from heart-related problems after valve replacement	180	178
Percentage of patients alive after 5 years	91	89
Percentage of patients needing a second valve replacement within 6 years	2.2	5.2
Percentage of patients who had a blood clot on the brain after surgery	5.8	0.1

- (b) Give **one** conclusion about the death of patients from heart-related problems after a valve replacement.

Include calculations to support your answer.

(3)

- (c) One risk of mechanical valves is that blood clots can form on the surface of the valve.

Name the component of the blood that starts the process of blood clotting.

(1)

- (d) Evaluate the use of mechanical replacement heart valves and biological replacement heart valves.

Use information from the table above and your own knowledge.

(6)

(Total 14 marks)

Q1.

(a) valve(s)

ignore names of valves

1

(b) arteries

1

(c) blood in arteries has less carbon dioxide

*do **not** accept if also ticked blood in arteries has more carbon dioxide*

1

blood in arteries has more oxygen

*do **not** accept if also ticked blood in arteries has less oxygen*

1

(d) resting heart rate would decrease

1

(e) 67

1

(f) any **one** from:
(the student)

- was (more) active
- was stressed / anxious / nervous
- slept less
- was ill
- drank (more) caffeine

allow did exercise

allow took drugs / alcohol

allow warm(er) weather

1

(g)

*an answer of 118 080 scores **3** marks*

82 × 60

or

4920

1

(beats per minute **or** beats per hour) × 24

allow incorrect value of beats per hour × 24 if working shown

1

if no other mark awarded, allow 24 x 60 for 1 mark

1

[10]

Q2.

- (a) (i) any **one** from:
- glucose
 - oxygen
 - carbon dioxide
 - urea
 - water
- allow hormones*
allow named example of a product of digestion
- 1
- (ii) (cardiac) muscle
allow muscular
- 1
- (b) (i) **B**
- 1
- (ii) **D** atrium / atria
ignore references to left or right
- 1
- E** ventricle(s)
ignore references to left or right
- 1
- (c) (i) a vein
- 1
- (ii) an artery
- 1
- (iii) keeps artery open / wider
allow ecf from part cii
- 1
- (so) blood / oxygen can pass through (to the heart muscle)
- 1

[9]

Q3.

- (a) any **two** from:
- carbon dioxide / CO₂
 - urea
 - protein
 - water / H₂O
 - hormones / insulin.
- ignore food / waste / alcohol / drugs / enzymes*

ignore glucose and oxygen
*allow **two** correct hormones for 2 marks*
*allow **two** correct food components for 2 marks*
allow antibodies
allow antitoxins

2

(b) (i) plasma

1

platelets

1

(ii) (cardiac) muscle

allow muscular

1

(c) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking Guidance and apply a 'best-fit' approach to the marking.

0 marks

No relevant content

Level 1 (1–2 marks)

There is a description of at least one advantage of the cow tissue valve

or

a description of at least one disadvantage of the cow tissue valve.

Level 2 (3–4 marks)

There is a description of at least one advantage of the cow tissue valve

and

at least one disadvantage of the cow tissue valve.

Level 3 (5–6 marks)

There is a description of the advantages and disadvantages of the cow tissue valve

or

a description of several advantages of the cow tissue valve and at least one disadvantage.

Examples of the points made in the response

Advantages of cow tissue valve:

- abundant supply of cows
- so shorter waiting time
- *ignore can take many years to find a suitable human donor*
- no need for tissue typing
- quicker operation
- less invasive **or** shorter recovery time
- cheaper operation costs
- less operation / anaesthetic risks.

Disadvantages of cow tissue valve:

- made from cow so possible objections on religious grounds
ignore ethical arguments
- new procedure so could be unknown risks
allow possible transfer of disease from cow
- risks of using a stent eg. blood clots, stent breaking or valve tearing
- not proven as a long term treatment
- may be rejected
ignore information copied directly from the table without value added.

6

[11]

Combined Higher Question Mark Scheme

Q1.

- (a) **Level 2:** Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.

3-4

Level 1: Relevant points (reasons/causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

1-2

No relevant content

0

Indicative content:

- backflow can occur **or** some blood flows backwards
- less blood leaves the heart **or** less blood is pumped around the body **or** some blood stays in the heart (instead of being pumped out) **or** reduced blood pressure **or** reduced flow rate
- less oxygen supplied to muscles / cells
- (so) less aerobic respiration
- (so) less energy released
- (so) less (efficient) muscle contraction
- anaerobic respiration takes place
- less (efficient) removal of lactic acid **or** lactic acid builds up **or** oxygen debt occurs
- (lactic acid building up) causes muscle fatigue
- less (efficient) removal of carbon dioxide (from blood)

a **level 2** response should refer to both respiration **and** the effects on exercise

(b)

ignore raw numbers from the table

(deaths mechanical valve =) 6% / 6.31136%
allow correctly rounded value

1

(deaths biological valve =) 10% / 10.14823%
allow correctly rounded value

1

(therefore a) higher proportion / percentage of patients die with biological valve

or

patients are more likely to die with biological valve

*do **not** accept more patients die with a biological valve*

*allow **2** marks for ratio mechanical : biological = 1:1.6 **or** 1:1.7 **or** correctly calculated value*

*allow **3** marks for deaths with biological valves = 4% / 3.83687% higher **or** correctly rounded value*

or

patients are 1.6 / 1.7 times more likely to die with biological valves

*if **no** other marks awarded, allow for **1** mark chance of death after a valve replacement is 8% / 7.77247% **or** correctly rounded value*

1

(c) platelets

allow thrombocytes

1

(d) **Level 3:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.

5-6

Level 2: Some logically linked reasons are given. There may also be a simple judgement.

3-4

Level 1: Relevant points are made. They are not logically linked.

1-2

No relevant content

0

Indicative content:

mechanical valves

- longer lasting **or** more durable **or** don't wear out as easily **or** less likely to need replacing (within 6 years)
- blood clots (on the brain) are more likely (after surgery)

- patient has to take anti-clotting medication (for the rest of their lives)
- if medication not taken (correctly), clots can lead to blood clots on brain / heart attack
- medication can lead to excessive bleeding (after injury)
- some patients say they can hear the valves opening and closing
- survival rate at 5 years is slightly higher for mechanical valve
- lower percentage of deaths due to heart-related problems

biological valves

- no additional medication required
- ethical issues surrounding use of animal tissue
- valve may harden
- more likely to need further operation **or** another new valve
- more likely to be rejected
- more likely to need (immuno-suppressant) medication

both valves

- both are readily available
- little wait time

a **level 2** response should contain comparisons of both valves **and** some reference to own knowledge

[14]