



LEVEL 3 CERTIFICATE/DIPLOMA

4463U10-1

MONDAY, 22 MAY 2023 – MORNING

MEDICAL SCIENCE

Unit 1: Human Health and Disease

2 hours plus your additional time allowance

Surname _____

First name(s) _____

Centre Number _____

Candidate Number 4 _____

Section A

Section B

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1 – 7.	24	
8.	3	
9.	7	
10.	5	
11.	16	
12.	19	
13.	10	
14.	6	
Total	90	

ADDITIONAL MATERIALS

You will need the resource folder that contains the pre-release article.

You will need a calculator and ruler for this examination.

INSTRUCTIONS TO CANDIDATES

Use black ink, black ball-point pen or your usual method.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces provided on the front cover.

Answer ALL questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

(Turn over)

INFORMATION FOR CANDIDATES

The total number of marks for this paper is 90.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

Questions in Section A are based on the pre-release article.

Workings for calculations should be shown.

SECTION A

Answer ALL questions.

1. State THREE symptoms of migraine. [1 mark]

1. _____

2. _____

3. _____

(Turn over)

2. Females are more likely to suffer from migraines. Explain why females are more likely to be affected by migraines. [3 marks]

- 3. A migraine can cause changes to the nervous system and blood vessels to the brain. This will affect brain activity.**

(a) (i) Name a test that records brain activity. [1 mark]

(ii) Describe how this test is performed. [2 marks]

(b) Name another condition that can be diagnosed using the test given in 3 (a) (i). [1 mark]

4 (a) State how a person's vision can be affected by migraine. [1 mark]

(b) (i) Name ONE test that can be performed to test a person's vision. [1 mark]

(ii) Describe how this test is carried out. [1 mark]

5. Use the information from FIGURE 1 and FIGURE 2 to answer this question.

(a) Give TWO ways that a person's employment can lead to them suffering from migraines. [2 marks]

1. _____

2. _____

- 5 (b) A plant-based diet is believed to have both advantages and disadvantages for migraine sufferers.**

Suggest how a plant-based diet could be an advantage and a disadvantage to migraine sufferers. [2 marks]

Advantage: _____

Disadvantage: _____

5 (c) Other than a plant-based diet, state THREE lifestyle changes that a person could make to reduce the frequency of their migraines. [1 mark]

1. _____

2. _____

3. _____

6. Use the information from FIGURE 3 to answer this question.
- (a) In 2019, the number of people aged 15–69 years old in the UK was 46 million.

Calculate the estimated number of people that were suffering from migraines in the UK in 2019. Give your answer in standard form. [3 marks]

number of people = _____

- 6 (b) The direct cost of migraines in England is £1 billion. Explain why the indirect cost of migraines is much higher at £8.8 billion. [2 marks]**

7. Not all treatments for migraines are effective. Suggest a **DIFFERENT** reason why a person would be reluctant to undergo a course of treatment using the following methods:

- (a) medication such as painkillers or triptans

[1 mark]

- (b) acupuncture [1 mark]

7 (c) transcranial magnetic stimulation (TMS) [1 mark]

SECTION B

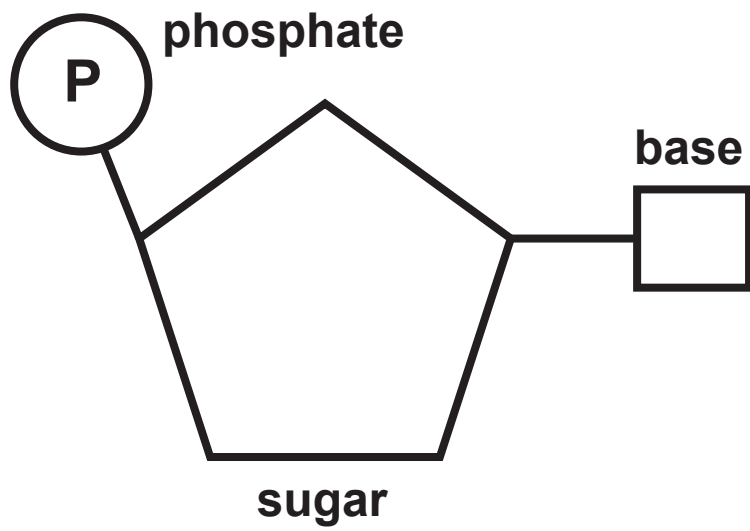
Answer ALL questions.

8. An example of a polysaccharide found in humans is shown opposite.

(a) Name this polysaccharide. [1 mark]

(b) Name the monomer labelled X. [1 mark]

(c) Name the bond labelled Y. [1 mark]



9. The diagram opposite shows a nucleotide.

(a) Use the diagram, and your own knowledge, to describe the specific structure of a nucleotide in DNA. [2 marks]

9 (b) Watson and Crick proposed that DNA replication was semi-conservative.

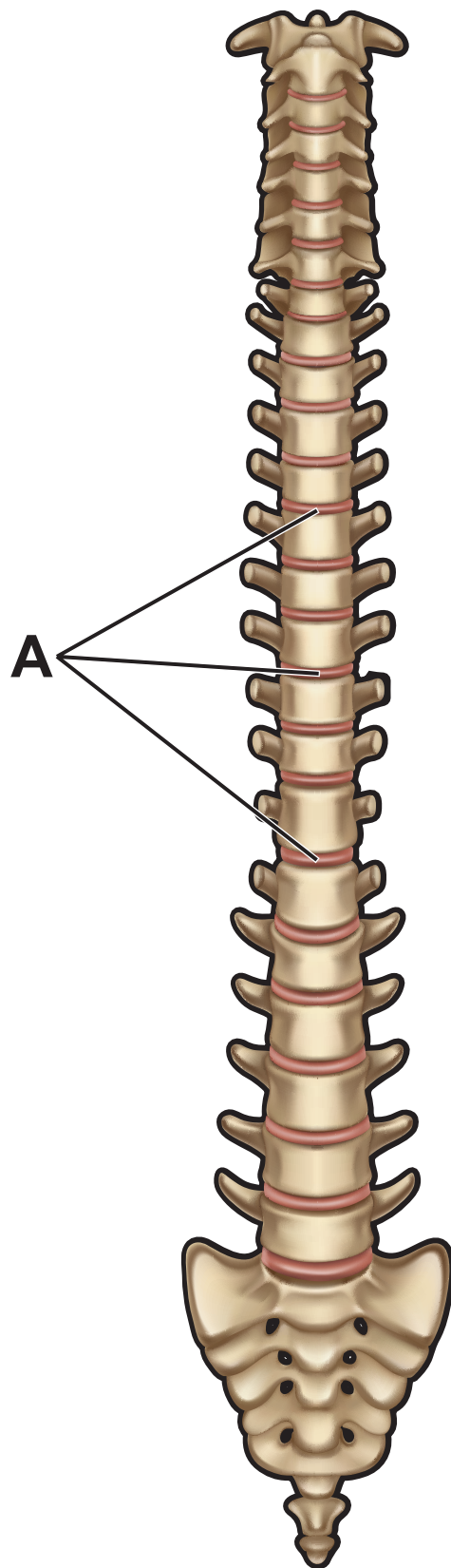
**Explain what is meant by the term
'semi-conservative replication'. [2 marks]**

Stage	Statement
A	RNA polymerase attaches mRNA nucleotides to their complementary base pairs.
B	A tRNA molecule will attach to the large subunit of the ribosome.
C	A polypeptide chain with amino acids in a specific order will be formed.
D	DNA helicase breaks hydrogen bonds between complementary base pairs and unzips a section of DNA.
E	The tRNA leaves and the next tRNA attaches to the ribosome.
F	The mRNA strand leaves the nucleus and attaches to the small subunit of a ribosome.
G	The ribosome moves along the mRNA and holds the tRNA in position until the amino acid is able to form a peptide bond with adjacent amino acids.

- 9 (c) The main stages of protein synthesis are shown opposite. However, the stages are not in the correct order.

Put the statements in the correct order. Some have been done for you. [3 marks]

D	_____	_____	B	_____	E	_____
---	-------	-------	---	-------	---	-------



10. The diagram opposite shows the spinal column.

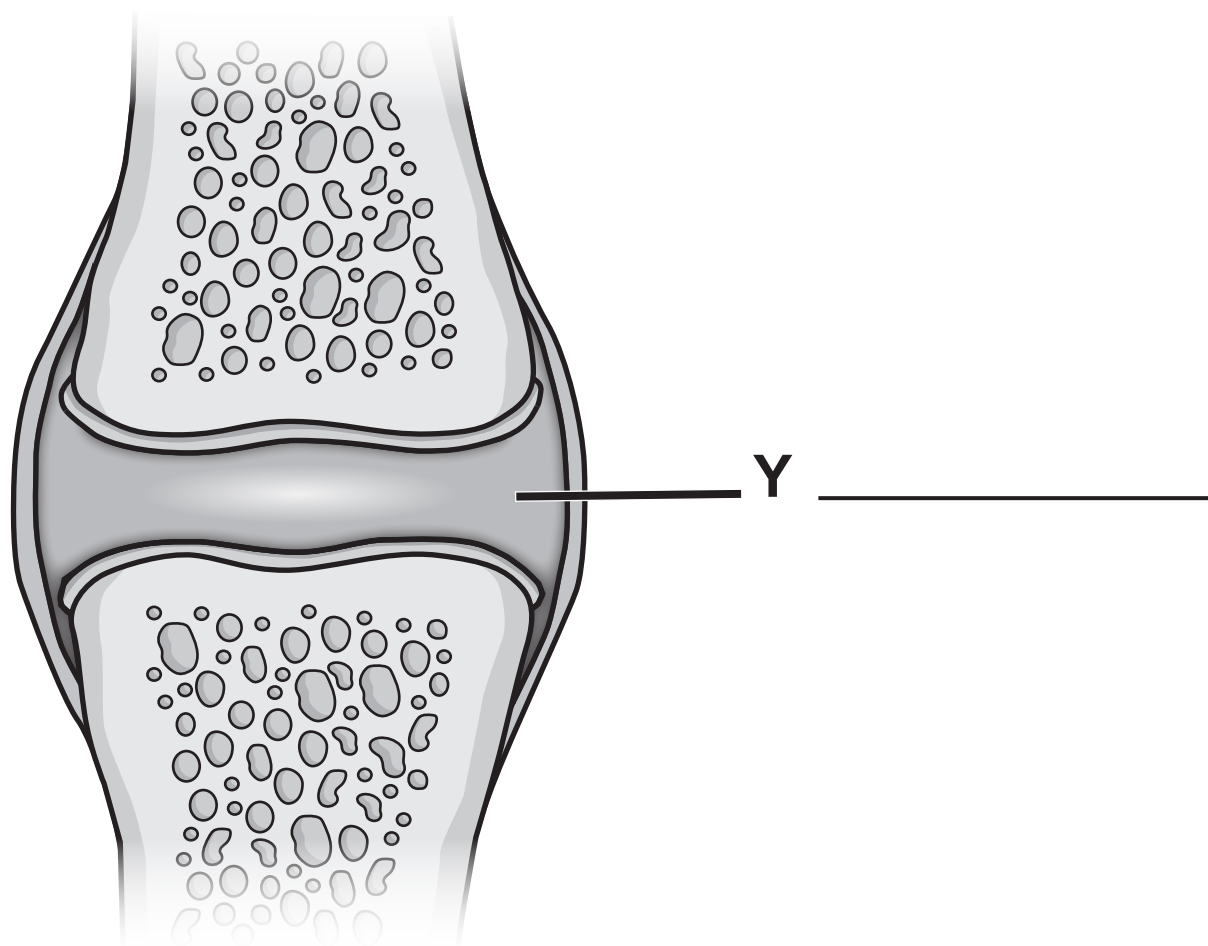
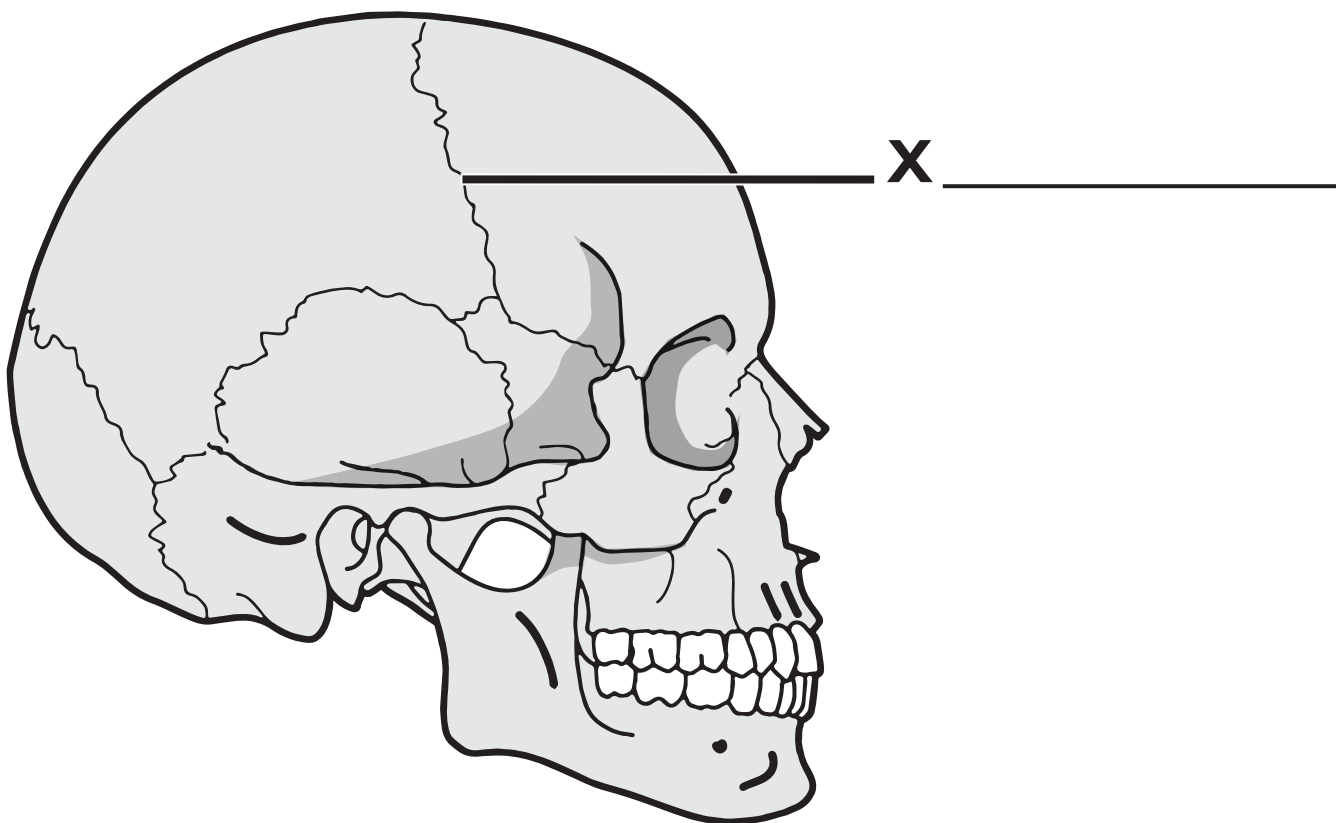
(a) Name the joints found in the spinal column.

[1 mark]

(b) State the name and function of structure **A** which is found between the vertebrae. [2 marks]

Name: _____

Function: _____



10 (c)

Different types of joint are found in the skull and knee.

Write the names of joints X and Y in the spaces opposite. [2 marks]

5

(Turn over)

Mode of Transmission of HIV	Method for reducing the risk of becoming infected with HIV
using contaminated needles	use a sterile needle

11. HIV statistics for the UK in 2015 and 2019 can be seen in the table below.

	2015	2019
Number of people living in the UK with HIV	101 200	105 200
Approximate numbers of people living with unknown HIV	13 150	6600
Number of new cases of HIV diagnosed	6000	4139

- (a) Complete the table opposite to show the mode of transmission of HIV and ways in which a person could reduce the risk of becoming infected with the virus. [4 marks]

11 (b)

Describe TWO effects of HIV on body systems.

[2 marks]

1. _____

2. _____

(Turn over)

11 (c)

Suggest TWO reasons for the decrease in the number of people living with unknown HIV between 2015 and 2019. [2 marks]

11 (d)

Calculate the percentage change in the number of new cases of HIV diagnosed in the UK between 2015 and 2019. [3 marks]

percentage change = _____

11 (e)

The table below shows the number of newly diagnosed HIV cases in different regions of England in 2018.

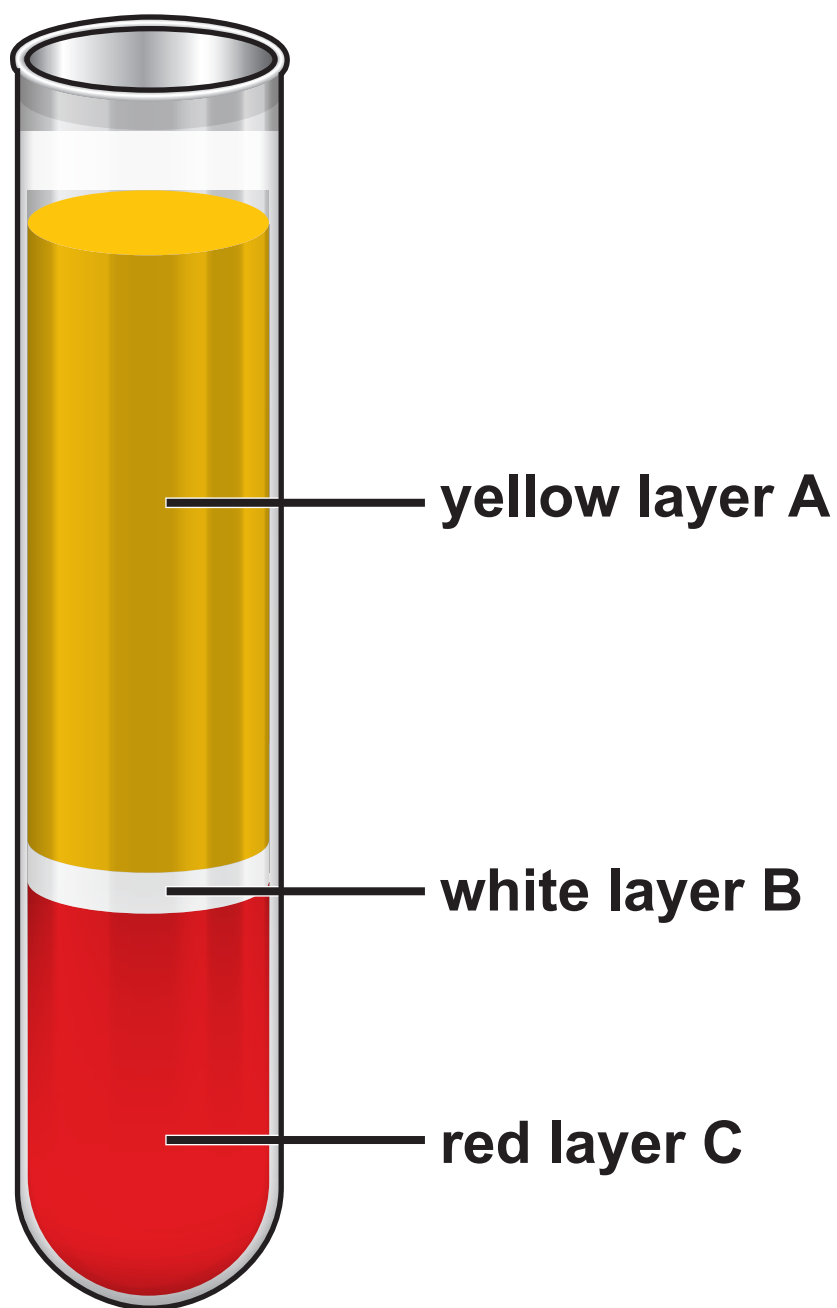
Region	Population	Newly diagnosed HIV cases
London	8 900 000	1400
East of England	6 200 000	425
North West	7 290 000	474
East Midlands	4 800 000	276
West Midlands	5 900 000	334
Yorkshire and the Humber	5 480 000	293
South East	9 130 000	440
South West	5 560 000	224
North East	2 660 000	105

(Turn over)

11 (e) (i)

Plot the data for newly diagnosed cases in England on the grid opposite. [4 marks]

(ii) Use the data to suggest a reason for the difference in newly diagnosed cases in London compared with other regions. [1 mark]



12. When a blood sample is spun in a centrifuge, its component parts will settle into layers. The diagram opposite shows a sample of blood which has separated into layers.

(a) (i)

Name the blood components in the layers labelled **A–C**. [3 marks]

A: _____

B: _____

C: _____

12 (a) (ii)

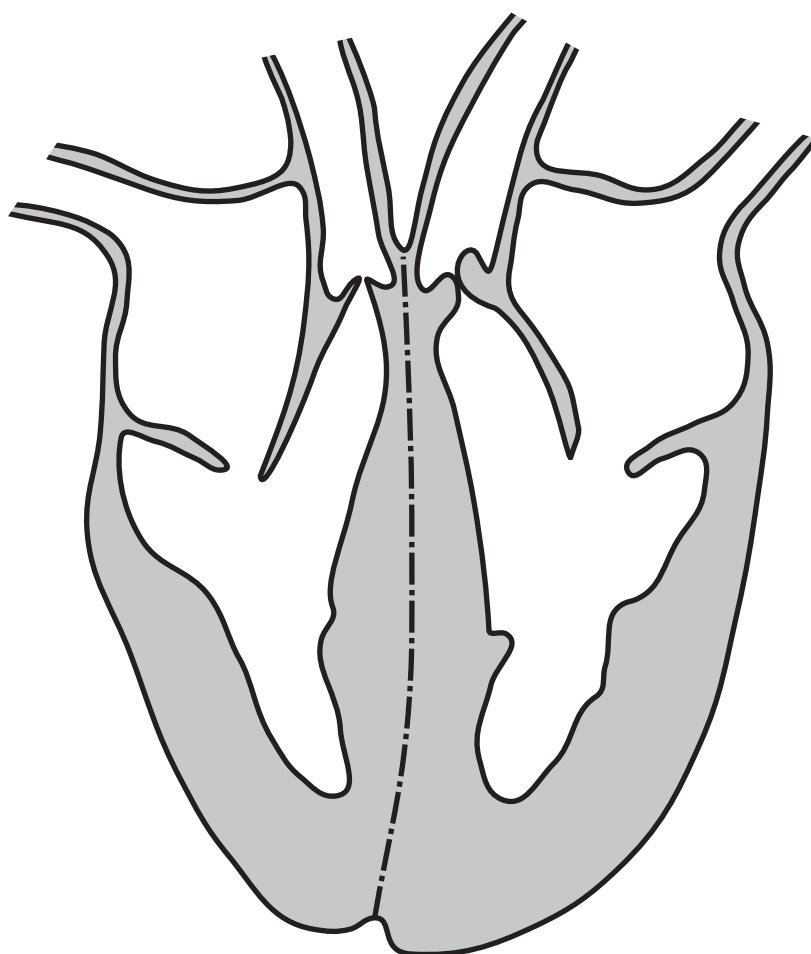
Describe the function(s) of two of the blood components named in 12 (a) (i). [2 marks]

Component: _____

Function: _____

Component: _____

Function: _____



12 (b)

Blood is transported through the circulatory system via blood vessels and the heart.

(i) Describe the function of the valves in the heart.

[1 mark]

(ii) Name another part of the circulatory system that also contains valves. [1 mark]

(Turn over)

12 (b) (iii)

**The cardiac muscle is said to be 'myogenic'.
Explain the term 'myogenic'. [1 mark]**

**(iv) State the name of the blood vessels that supply
oxygen and glucose to the heart muscle. [1 mark]**

12 (b) (v)

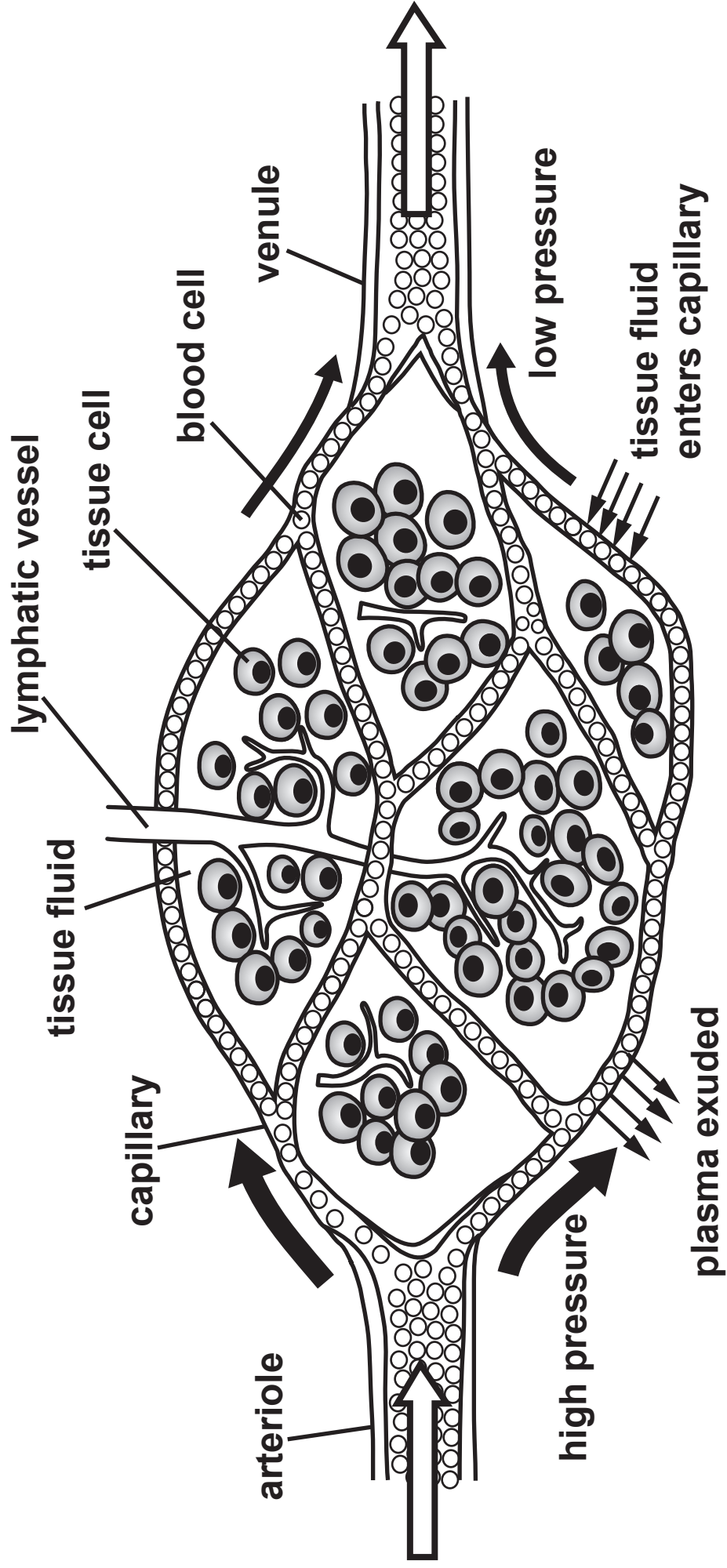
Describe how heartbeat is controlled and coordinated. [4 marks]

12 (c)

The lymphatic system also contains an extensive network of vessels.

- (i) State the name of the largest organ in the lymphatic system. [1 mark]**
-

- (ii) Name the sac-like structures that are also part of the lymphatic system along with the vessels. [1 mark]**
-



12. The diagram opposite shows the capillary bed.

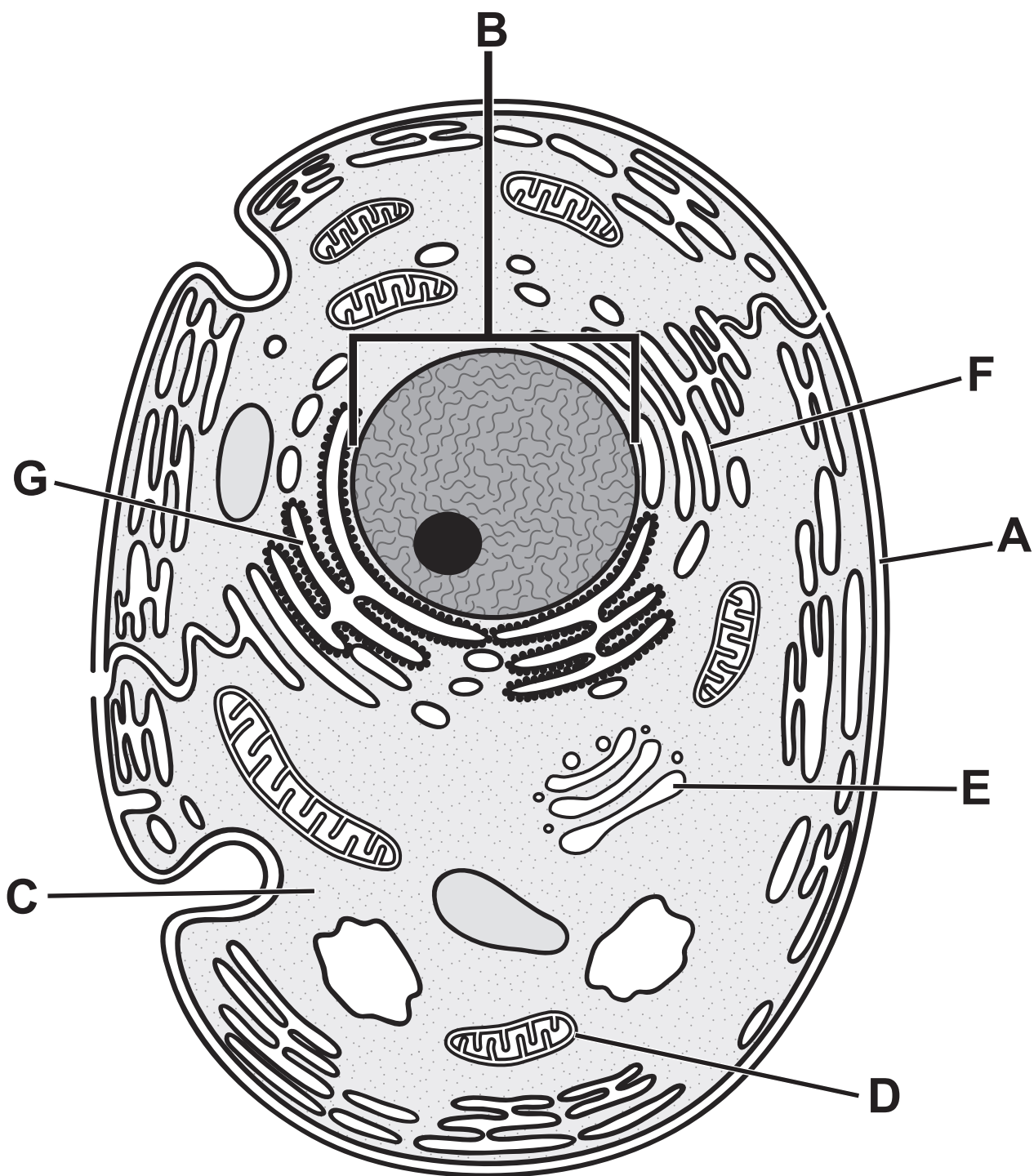
(iii) Use the diagram, and your own knowledge, to describe how tissue fluid is produced. [4 marks]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

(Turn over)

19

(Turn over)



13. The diagram opposite shows the generalised structure of an animal cell.

(a) Complete the table below to identify the parts of the cell. [6 marks]

Name of organelle	Letter
nucleus	_____
_____	F
_____	D
golgi body	_____
rough endoplasmic reticulum	_____
_____	C

(Turn over)

13 (b)

The plasma membrane is another part of the cell.

- (i) In the space below, draw a simple LABELLED diagram of the fluid mosaic model. [2 marks]**

13 (b) (ii)

Molecules can move across the plasma membrane by simple and facilitated diffusion.

- I. Name ONE other method that molecules could use to move across the plasma membrane. [1 mark]**

- II. Describe this method. [1 mark]**

14. Research and clinical trials are essential processes during the development of medications and vaccinations. Strict protocols must be followed when carrying out this research and during clinical trials.

(a) State THREE ethical considerations that must be carried out by scientists before a clinical trial or research can take place. [3 marks]

1. _____

2. _____

14 (a)

3. _____

14 (b)

State THREE statistical methods that could be used when analysing data collected during research or clinical testing. [3 marks]

1. _____

2. _____

3. _____

6

END OF PAPER**(Turn over)**

Question number	Additional page, if required. Write the question numbers in the left-hand margin.

(Turn over)

Question number	Additional page, if required. Write the question numbers in the left-hand margin.

