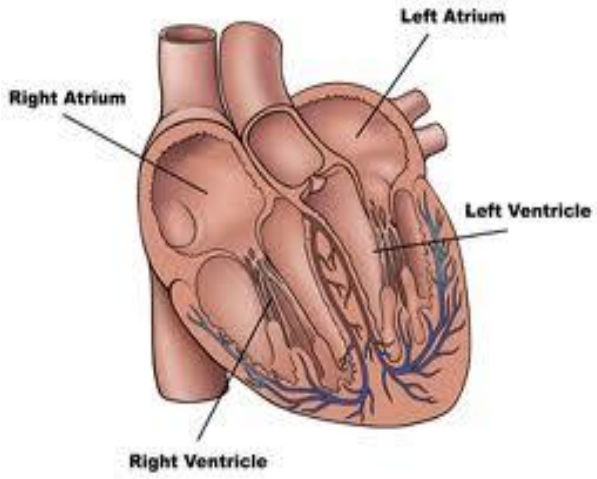
1. The diagram below shows a section through the human heart.

What is the correct position of the pacemaker?



2. Which of the following vessels in the circulatory system contains blood at the lowest pressure?

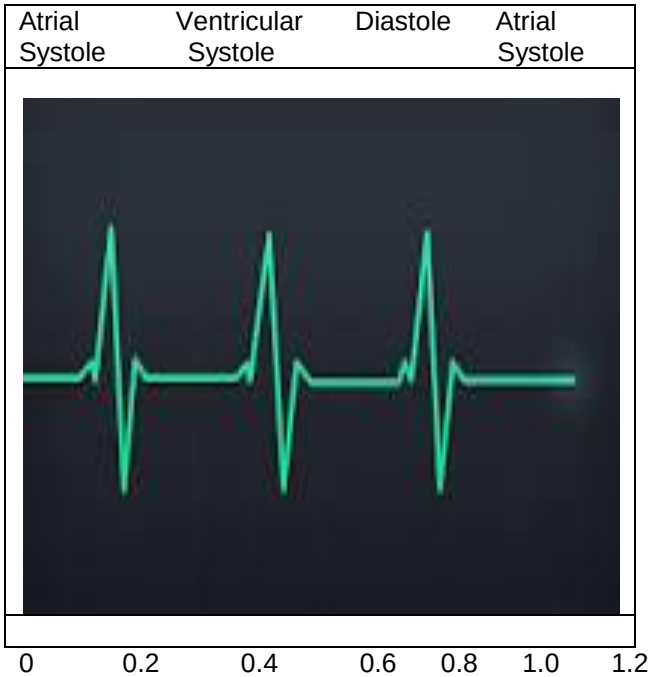
A Jugular Vein

B Renal Vein

C Vena cava

D Hepatic portal vein

3. The diagram below records the beat of a human heart.



What is the heart rate in beats per minute (bpm) ?

A 50bpm

B 60bpm

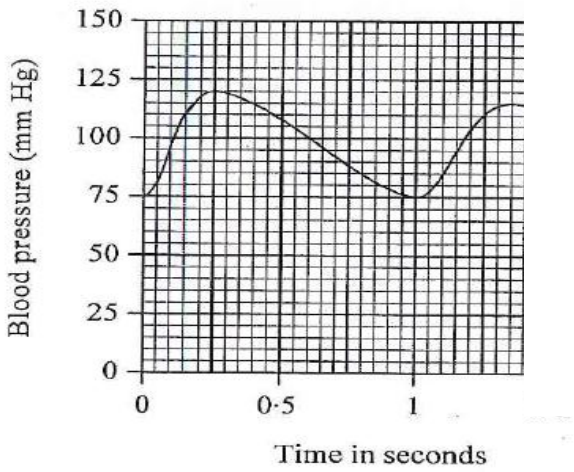
C 70bpm

D 120bpm

4. Which of the events below produces the normal sounds of heart beat heard through a stethoscope?

A Contraction of the atria.
B Contraction of the ventricles.
C Closing of the heart valves.
D Opening of the heart valves.

5. The graph below shows changes in arterial blood pressure.



The shape of the graph is due to

A the action of the heart muscle.

B the action of the diaphragm.

C the closing of the valves in the veins

D muscular contraction of the arteries

6. Cardiac output is calculated using the following formula:

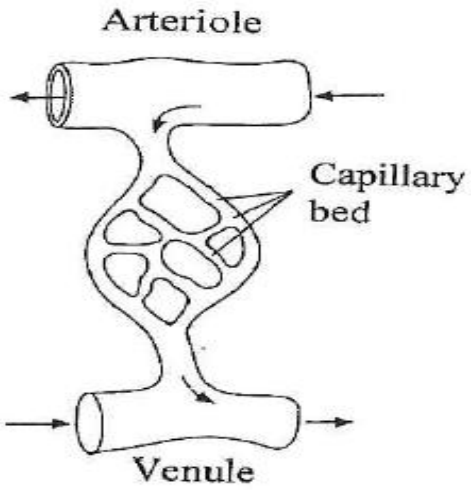
Cardiac output = Heart Rate X Stroke Volume

The table below shows the heart and cardiac output of four individuals.

Individual	Hear Rate (bpm)	Cardiac Output (L/min)
A	60	5.8
B	68	6.1
C	72	7.2
D	78	7.6

Which individual has the greatest stroke volume?

7. The diagram below represents a part of the circulatory system of the skin.



Which line in the table below correctly identifies changes which would take place in the blood as it flows from arteriole to venule?

	Concentration of	
	glucose	CO_2
A	increase	decrease
B	decrease	decrease
C	increase	increase
D	decrease	increase

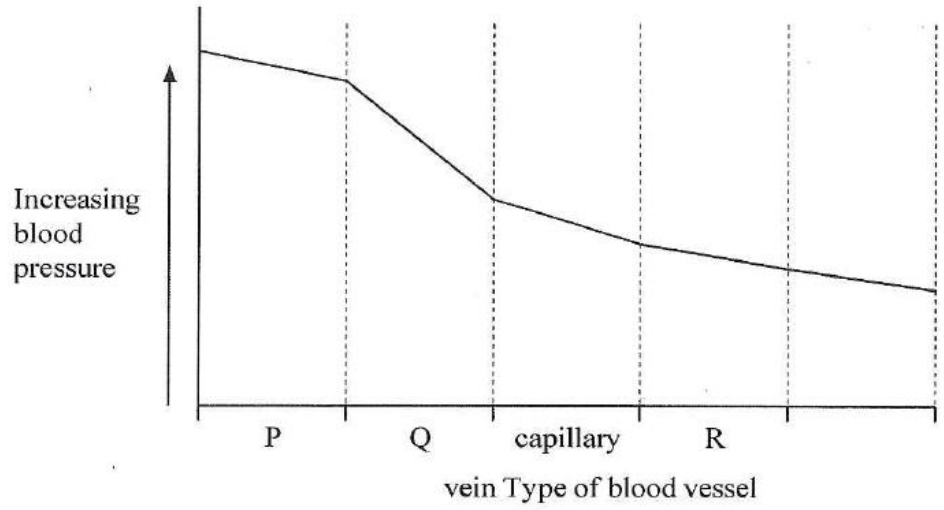
8. The durations of ventricular diastole and systole are shown below.

Diastole 0.4 seconds
Systole 0.2 seconds

What is the heart rate for this individual?

A 60 beats per minute
B 72 beats per minute
C 100 beats per minute
D 120 beats per minute

9. The graph show average blood pressure in different types of blood vessels.



(a) Name the types of blood vessel represented by P,Q and R.

P_____

Q_____

R_____ (2 Marks)

(b) Blood pressure values fluctuate in vessel type P.

Explain the reason for this.

_____

_____ (1 Mark)

(c) Explain why there is a large drop in blood pressure in vessel type Q

_____

_____ (1 Mark)

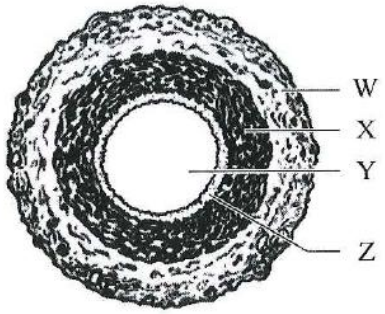
(d) In the vena cava, blood pressure falls below atmospheric air pressure yet blood is still available to return to the heart.

Explain how the blood is maintained.

_____

_____ _____ (2 marks)

10. (a) The diagram shows a section through an artery.



(i) Name the parts of the artery labelled Y and Z

Y_____ Z_____ (1 mark)

(ii) Layer X contains type of tissue found in layer X.

Name **one** other type of tissue found in layer X

_____ (1 mark)

(iii) Describe the role of the elastic fibres in the wall of an artery.

_____ (1 mark)

(b) Veins are another type of blood vessel.

Name a structural feature of a vein and describe its function.

Name _____

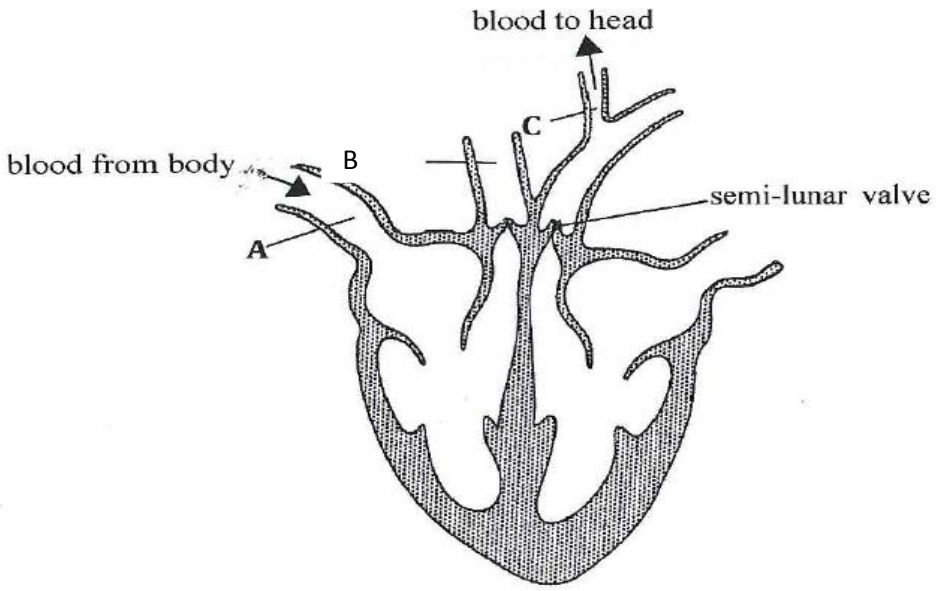
Function _____ (1 mark)

(c) Name the **two** blood vessels which carry blood away from the heart.

1_____ (1 mark)

2_____ (1 mark)

11. The diagram below shows the human heart and some associated blood vessels. The arrows on the diagram show the direction of blood flow.



(a) Name blood vessels A, B and C

A_____

B_____

C_____ (2 marks)

(b) Place arrows on the diagram to show the path of oxygenated blood as it flows through the heart (1 mark)

(c) Describe the function of the semi-lunar valve **labelled on the diagram.**

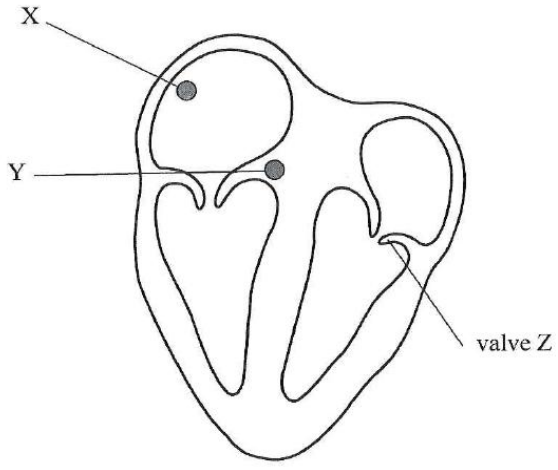
_____

_____ (1 mark)

(d) During which stage of the cardiac cycle do the semi-lunar valves open?

_____ (1 mark)

12. The diagram shows a section through the heart and two areas, X and Y, which help to coordinate the heart beat.



(a) (i) Name structures X and Y

X_____

Y_____ (1 mark)

(ii) Electrical impulses travel from X to Y

What is happening to the heart during this time?

_____ (1 mark)

(iii) **Draw** arrows on the diagram to show the pathway taken by electrical impulses produced by structure Y. (1 mark)

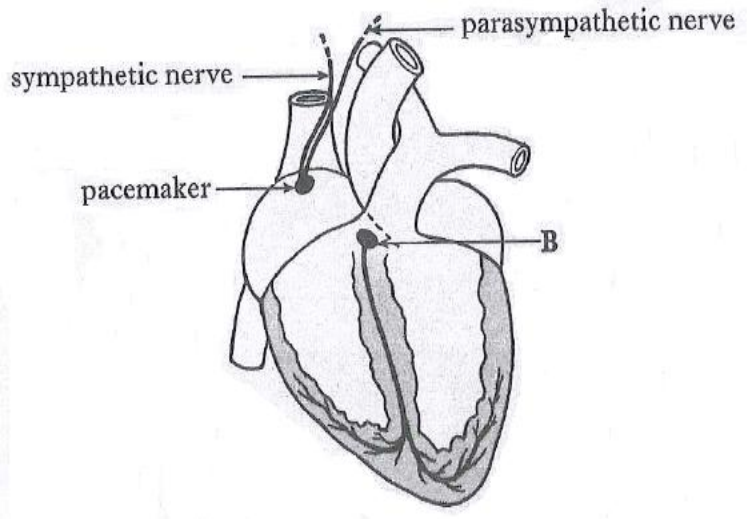
(b) (i) Name valve Z

_____ (1 mark)

(ii) During which stage of the cardiac cycle is valve Z closed?

_____ (1 mark)

13. The diagram below shows the heart and its associated nerves.



(a) (i) On the diagram, mark with an X the chamber where the blood pressure is highest during the cardiac cycle. (1 mark)

(ii) Describe the effect of impulses from the parasympathetic nerve on the heart.

_____ (1 mark)

(b) (i) Name the part of the heart labelled **B**

_____ (1 mark)

(ii) Describe the role of **B** in the cardiac cycle

_____

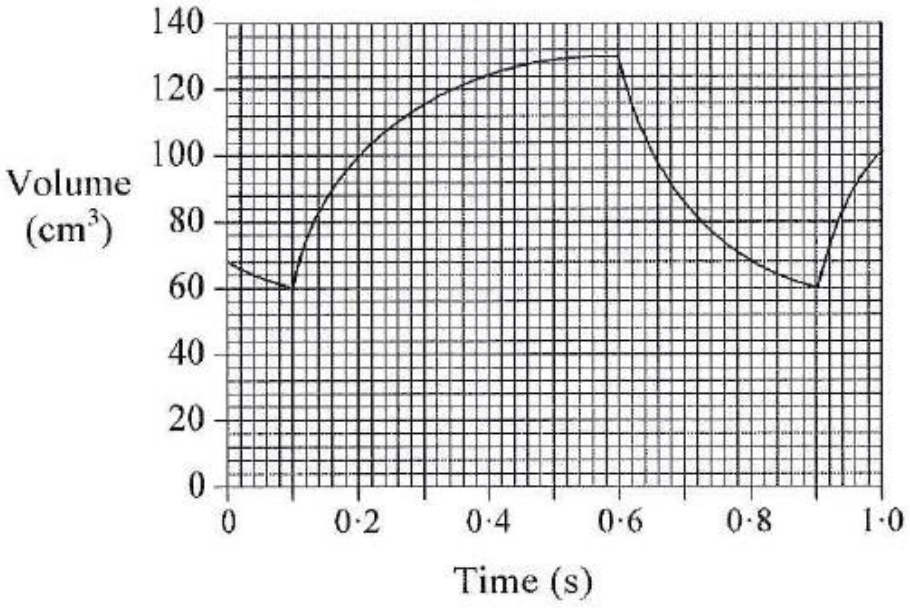
_____ (1 mark)

(iv) An individual has a heart rate of 75bpm. How long does one cardiac cycle last? (1 mark)

Space for calculation

_____ s

14. The graph below shows changes in the volume of blood in the left ventricle of a man's heart.



(a) How long does ventricular systole last?

_____s (1 mark)

(b) (i) What is the heart rate of this man?

_____ beats per minute
(1 mark)

(ii) Calculate the volume of blood leaving this man's left ventricle every minute.

_____cm^3 (1 mark)

(c) When this man exercises, the volume of blood leaving his heart increases significantly.

Describe how the nervous system and hormones cause this increase.

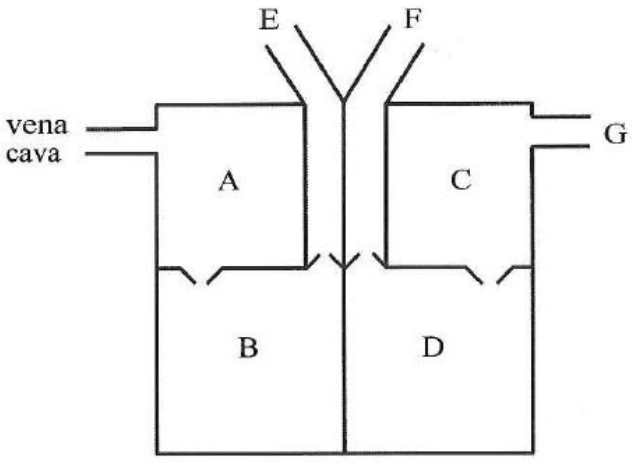
_____

_____

_____

_____(3 marks)

15. The diagram represents a section through the heart.



(i) Name blood vessels E and F

Vessel E_____

Vessel F_____ (1 mark)

(ii) State two differences between the composition of the blood in chambers B and D.

1 _____

2 _____ (1 mark)

(iii) Place a cross (**X**) on the diagram to indicate the position of the sinoatrial node (SAN). (1 mark)

(iv) Describe the effect of the autonomic nervous system on the sinoatrial node (SAN).

_____

_____(2 marks)

(c) State the function of the coronary artery

_____(1 mark)

16. Describe the cardiac cycle under the following headings:

(i) The conducting system of the heart; 5

(ii) Nervous control of the cardiac cycle. 5

(2015paper)

17. Discuss the exchange of substances between plasma and body cells. **8**

1. Plasma is the liquid part of the blood.
2. **Two** named dissolved substances carried by blood – oxygen, carbon dioxide, glucose, amino acids, urea, vitamins, minerals, etc.
3. Site of substance exchange is the capillaries.
4. Capillaries have a large surface area/thin walls/narrow diameter.
5. High pressure forces fluid/plasma out of capillaries **or** pressure filtration occurs.
6. Tissue fluid (bathes the cells).
7. Plasma proteins do not pass through capillary walls/stay in blood.
8. (Dissolved) substances diffuse/move from tissue fluid into body cells.
9. Waste products/named example diffuse /move out of the cells.
10. To be excreted/carbon dioxide breathed out.
11. Liquid/water/tissue fluid returns into the plasma/blood.
12. (Excess) tissue fluid enters lymph vessels.
13. This lymph/fluid is carried back to the blood (by the lymphatic system).

18. Discuss the conducting system of the heart and how it is controlled. 10

1. Controlled by autonomic nervous system
2. Sympathetic speeds up heart and parasympathetic/vagus slows down heart
3. Medulla (oblongata) is control centre (in the brain)
4. Adrenaline speeds up heart rate
5. Pacemaker/SAN in right atrium (on diagram with unlabelled right atrium ok)
6. Pacemaker starts contraction/produces impulses
7. Impulses cause the atria to contract/atrial systole
8. Reaches/stimulates the AVN
9. AVN found at junction of/between atria and ventricles
10. Impulse (from AVN) carried by (conducting) nerves/fibres
11. fibres/nerves spread out over the ventricles
12. Causes contraction of ventricles/ventricular systole
13. Followed by relaxation/resting/diastolic phase

(8 from 13)

Relevance – the following would be deemed irrelevant:
valves, blood vessels, blood cells, haemoglobin, other effects of the autonomic nervous system

A single short reference to an irrelevant point is not penalised, but development of the point is penalised. However, two irrelevant points without development are penalised.

The threshold for awarding the coherence and relevance mark is 5 marks.