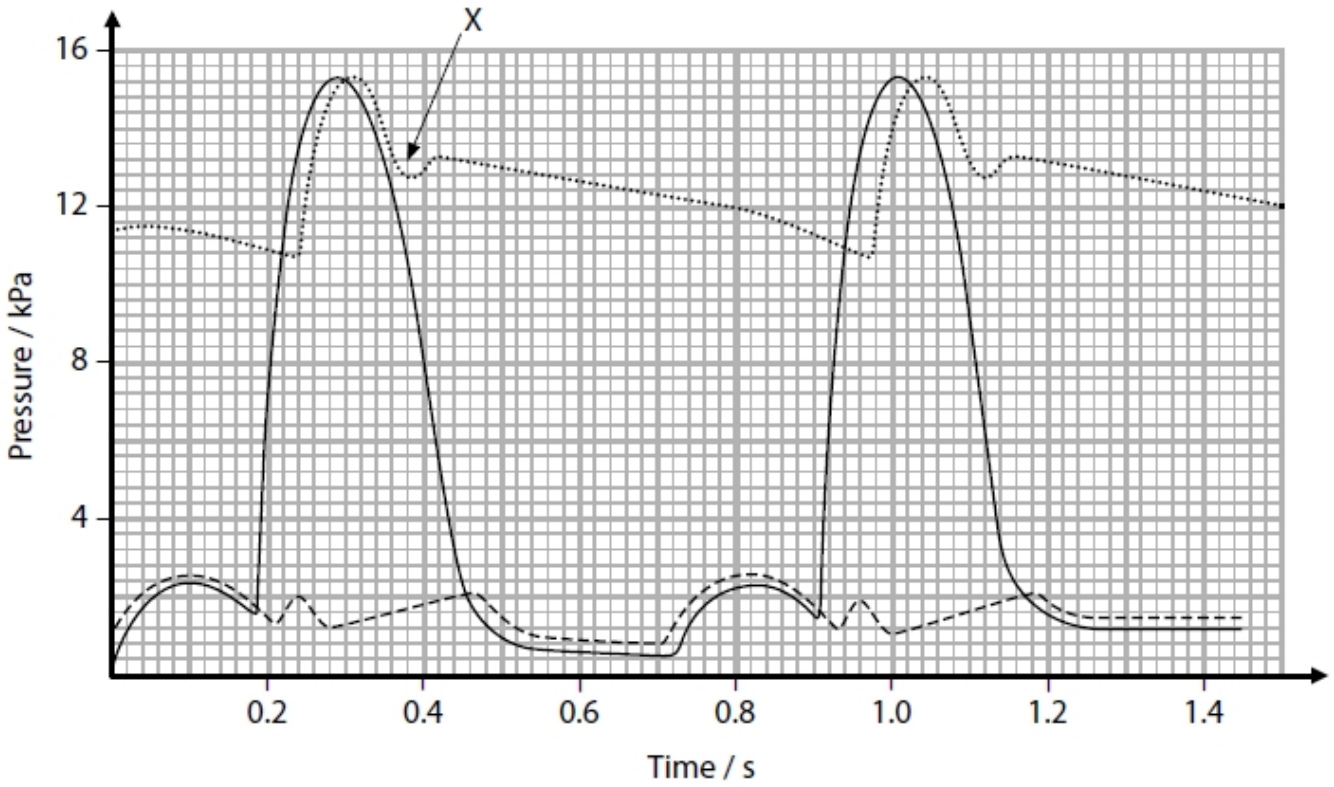
Q1.

During the cardiac cycle, there are pressure changes in the left atrium, left ventricle and aorta.

The graph shows these pressure changes in the left atrium, left ventricle and aorta of a person.



(a) (i) Which time period corresponds with ventricular systole?

(1)

- **A** 0.52 to 0.72
- **B** 0.72 to 0.92
- **C** 0.92 to 1.20
- **D** 0.24 to 0.98

(ii) Which of the following is occurring in the heart at 1.0 second on the graph?

(1)

- **A** semilunar valve is closed and atrioventricular valve is closed
- **B** semilunar valve is closed and atrioventricular valve is open
- **C** semilunar valve is open and atrioventricular valve is closed
- **D** semilunar valve is open and atrioventricular valve is open

(iii) Use the information on the graph to calculate the heart rate of this person.

(2)

Answer ..... beats per minute

(b) When the heart valves close, they make a sound. This sound can be detected and recorded.

(i) State a time from the graph when the sound of an atrioventricular valve closing would be detected.

(1)

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(ii) Explain why the atrioventricular valves need to close.

(2)

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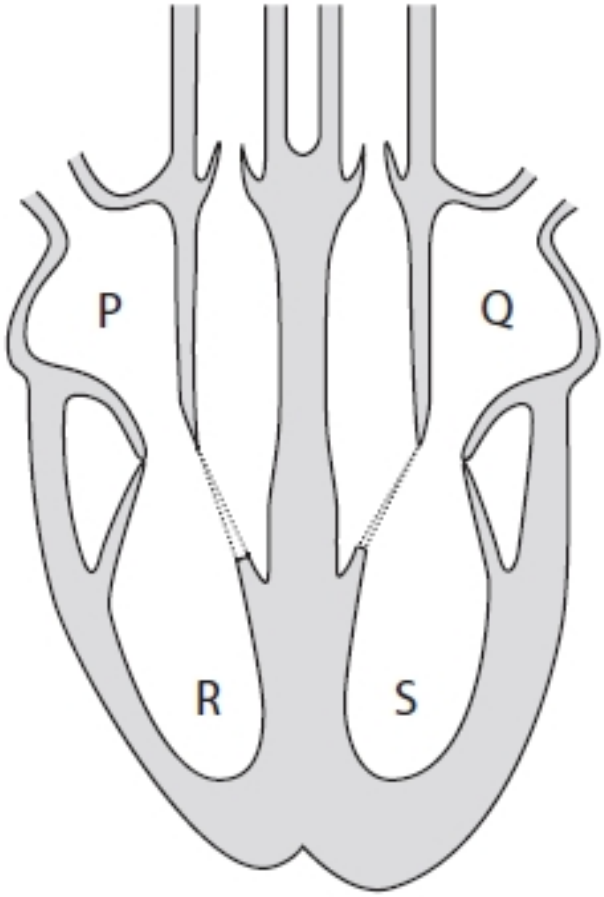
(Total for question = 7 marks)

Q2.

The diagram shows a section of a human heart and blood vessels.



(i) The blood vessel transporting blood with the highest pressure is

(1)

☒ **A** aorta

☒ **B** pulmonary artery

☒ **C** pulmonary vein

☒ **D** vena cava

(ii) The order in which blood flows through the chambers of the heart is

(1)

☒ **A** P → R → S → Q

☒ **B** P → R → Q → S

☒ **C** P → S → R → Q

☒ **D** P → S → Q → R

(iii) Which structures will fill with blood as a result of atrial systole?

(1)

☒ **A** P and R

☒ **B** P and Q

☒ **C** Q and R

☒ **D** R and S

Q3.

As levels of activity increase, the heart can respond to the changing demand for oxygen.

During the cardiac cycle there are pressure changes in the chambers of the heart.

Explain how pressure differences in the heart ensure efficient pumping of the blood into the arteries.

(3)

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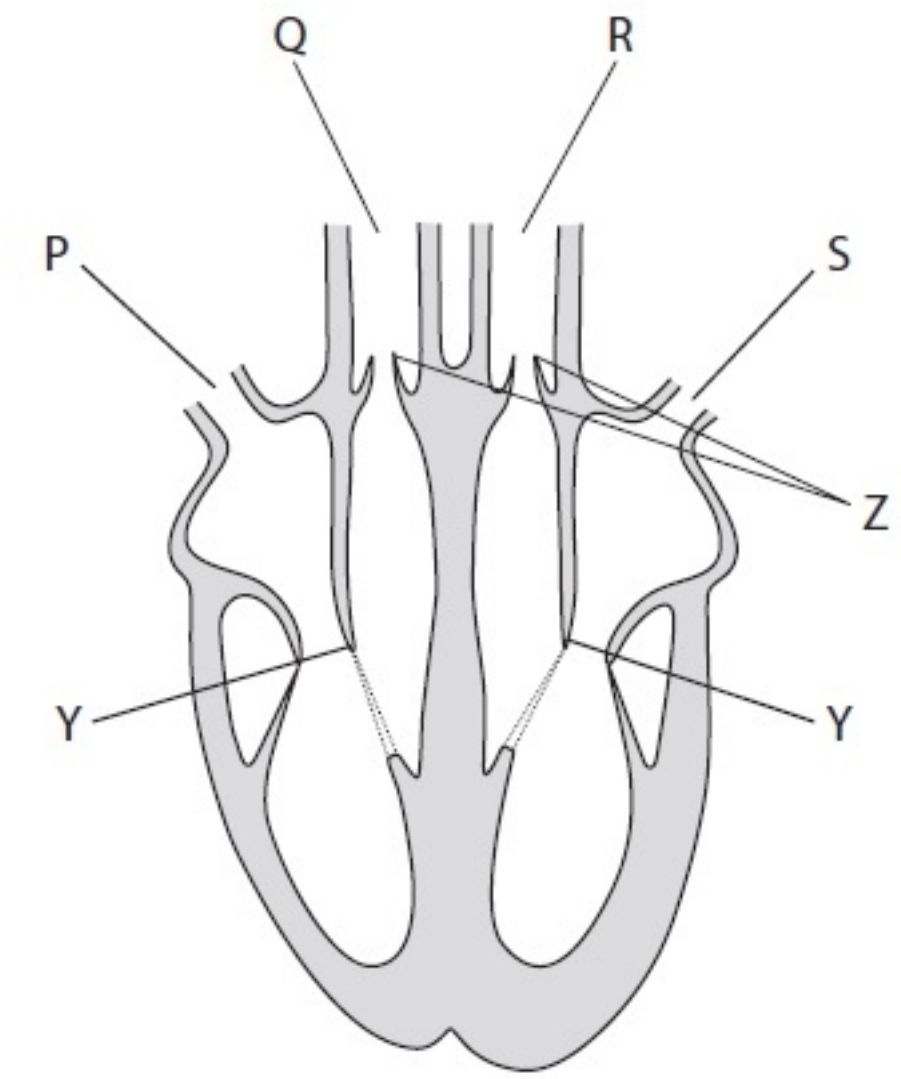
(Total for question = 3 marks)

Q4.

The diagram below shows a section of a human heart and blood vessels P, Q, R and S.



(a) (i) Place a cross ☒ in the box next to the letter that shows the pulmonary artery.

(1)

☒ **A** blood vessel P

☒ **B** blood vessel Q

☒ **C** blood vessel R

☒ **D** blood vessel S

(ii) Place a cross ☒ in the box next to the letter that shows the sequence of blood flow through these blood vessels.

(1)

☒ **A** P → Q → S → R

☒ **B** Q → P → R → S

☒ **C** R → S → P → Q

☒ **D** S → R → Q → P

(b) Explain the difference in thickness of the wall of the **right atrium** and the wall of the **right ventricle.**

(3)

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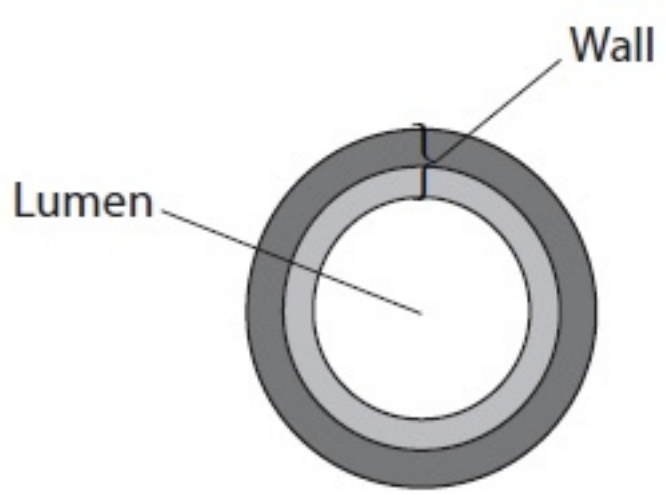
(c) During the cardiac cycle, the valves labelled **Y** and **Z** on the diagram may be open or closed.

For each stage of the cardiac cycle, if the valves are open, place a tick (✓) in the appropriate box and if the valves are closed, place a cross (✗) in the appropriate box.

(2)

Stage of cardiac cycle	Y valves	Z valves
Atrial systole		
Diastole		

(d) The diagram below shows a cross-section of an artery.



(i) The diameter of the lumen of this artery is 1.9 mm.
Calculate the cross-sectional area of the lumen. Show your working.
The area of a circle is calculated using the formula πr^2, where r is the radius of the circle and $\pi = 3.14$.

(2)

Answer = ... mm^2

(i) Explain how the structure of an artery is related to its functions.

(3)

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(Total for question = 12 marks)