

GCSE Biology (9 – 1)

The Heart and Blood Vessels

Name:

Group:



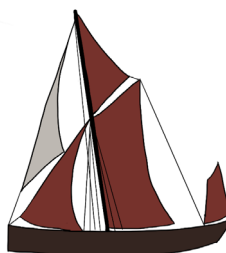
Instructions

- Read each question carefully before you begin to answer it.
- Use black ink or black ball-point pen for your answers.
- Fill in the boxes at the top of this page with your name and group.
- Attempt to answer every question in the booklet.
- Answer the questions in the spaces provided – there may be more space than you need in some answer spaces.
- Calculators may be used for this booklet.
- For any calculations, you **must** show all your working.
- Any and all drawings or graphs should be completed in pencil.

For markers use	
Question	Mark
1	/4
2	/9
3	/6
4	/14
5	/16
6	/6
7	/5
Total	/60
%	
Grade	

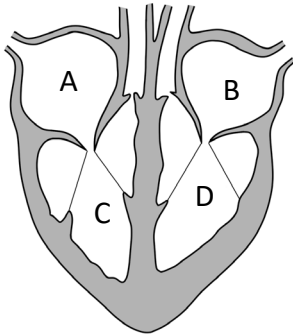
Information

- The maximum mark for this paper is 60 marks.
- The marks for each question are shown in brackets.
- Please be aware that good English and clear presentation are required in your answers.



1. The following questions look at various aspects of the circulation system. Answer each part by circling the correct answer from the options given.

- a) The diagram below shows a section through a human heart.
Which two chambers will contract at the same time? Circle the letter of the correct answer.



A
A and B

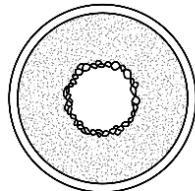
B
A and C

C
B and C

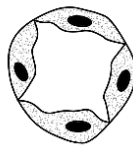
D
B and D

(1 mark)

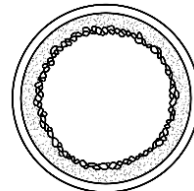
- b) The figure below shows cross-sections through three types of blood vessel, not to the same scale.
Which cross-section shows a vein? Circle the letter of the correct answer.



X



Y



Z

(1 mark)

- c) Which blood component is responsible for clotting?
Circle the letter of the correct answer.

A
Red blood cells

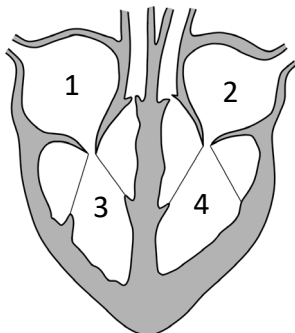
B
White blood cells

C
Platelets

D
Plasma

(1 mark)

- d) The diagram below shows a section through a human heart.
In which chamber would the pace maker be found? Circle the letter of the correct answer.



A
2

B
1

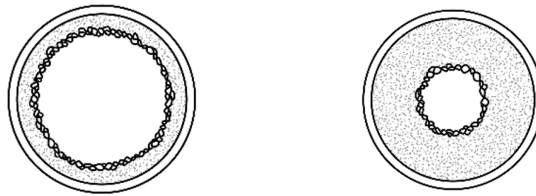
C
3

D
4

(1 mark)

(Total for Question 1 is 4 marks)

2. The figure below shows a section through a vein and artery.



a) Describe **three** structural differences between a vein and an artery.

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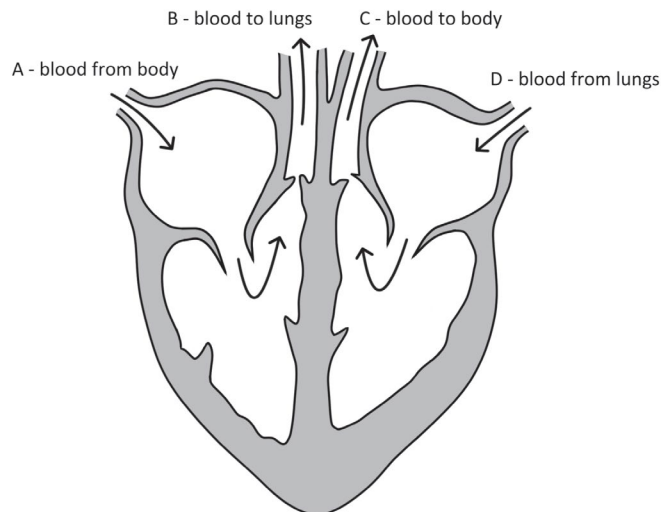
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(3 marks)

b) The figure below shows a section through a human heart.



Identify the blood vessels A, B, C and D from the figure of the heart above.

A = ...

B = ...

C = ...

D = ...

(4 marks)

c) Which **two** blood vessels in the figure above carry deoxygenated blood?

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(2 marks)

(Total for Question 2 is 9 marks)

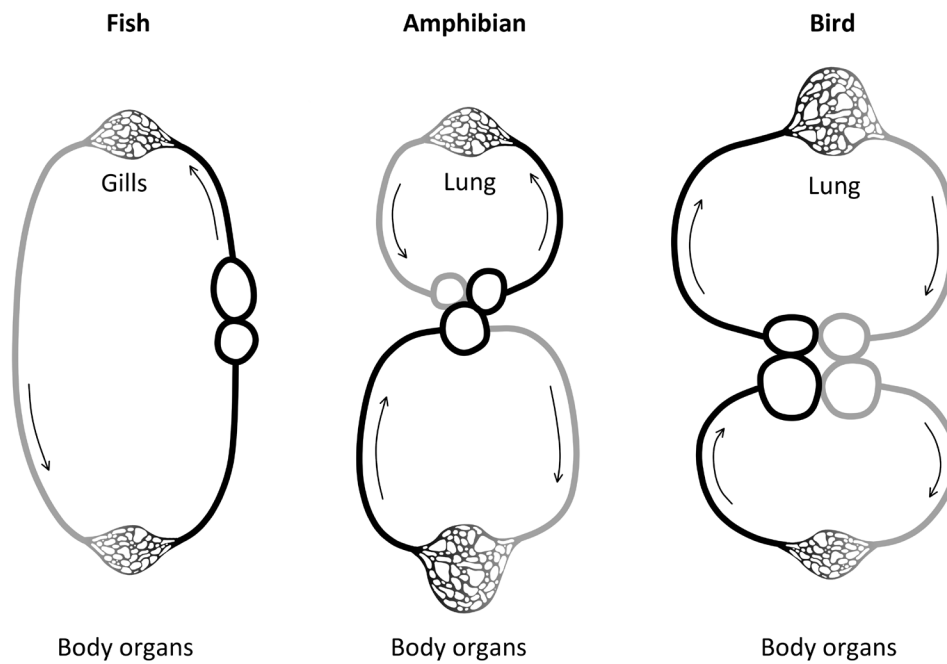
3. Describe the functions of each of the components of the blood.

[illegible]

(6 marks)

(Total for Question 3 is 6 marks)

4. Look at figure below, it shows the circulation systems in a fish, amphibian and bird.



a) Which circulatory system is most similar to humans and give a reason for your answer?

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(3 marks)

The figure below shows the estimated blood flow through different part of the body when someone is exercising and when they are resting

Body part	Estimated rate of blood flow in cm ³ per minute	
	Resting	Exercising
Digestive system	1000	3000
Brain	800	805
Heart muscle	480	2800
Other muscles	1500	18250
Lungs	1200	19500
Other organs	1180	1120

b) The volume of blood moving through the heart increases when the person exercises. Determine the percentage change in blood flow through the heart during the exercise.

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(2 marks)

c) Explain why there is a change in the rate of blood flow through the digestive system during exercise.

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(2 marks)

d) The stroke volume is the amount of blood leaving two chambers of the heart after each contraction.
From which chamber of the heart does this volume of oxygenated blood flow?

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(1 mark)

e) A person has a cardiac output of 6.2 litres per minute. Their heart rate is measured at 150 beats per minute. Determine the stroke volume, give your answer in millilitres.

Stroke volume = ...

(2 marks)

f) Explain why the cardiac muscle wall of the left ventricle is significantly thicker than the cardiac muscle wall of the right ventricle.

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(4 marks)

(Total for Question 4 is 14 marks)

- b) During exercise, a runner has a cardiac output of 15 litres per minute. Their stroke volume is measured to be 150 ml per beat. Define the term cardiac output.

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(1 mark)

- c) Calculate the runner's heart rate in beats per minute, bpm, during this period of exercise.

Heart rate = ...

(2 marks)

- d) Explain how regular exercise can lead to a lower resting heart rate.

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(2 marks)

- e) Identify the blood vessels that supply the heart itself with oxygenated blood.

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(1 mark)

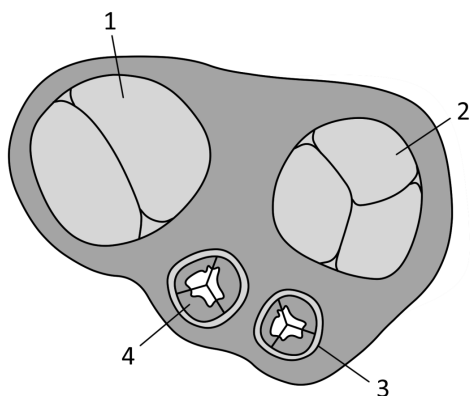
- f) Explain how a blockage in the blood vessels that supply the heart could lead to a heart attack.

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(4 marks)

(Total for Question 5 is 16 marks)

6. The figure below shows an internal view of the human heart with the atria removed so valves can be seen.



- a) Which of the valves, labelled 1 to 4, is pushed open by oxygenated blood entering a ventricle?
Circle the letter of the correct answer.

A

B

C

D

1

2

3

4

(1 mark)

- b) Valves are found in the heart and in veins. What is the function of valves.

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(2 marks)

- c) Identify the valves that are found between the right atrium and right ventricle and between the left atrium and the left ventricle.

Between the right atrium and the right ventricle = ...

Between the left atrium and the left ventricle = ...

(2 marks)

Sometimes, a damaged heart valve needs to be replaced.

In some cases, valves from pig hearts can be used to replace damaged human heart valves.

- d) Suggest **one** advantage of using a pig heart valve compared to using a completely artificial valve.

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(1 mark)

(Total for Question 6 is 6 marks)

