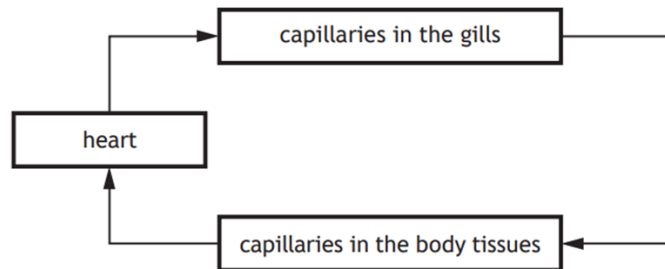


Circulatory System Past Papers

1. The diagram illustrates the circulatory system of a fish. The arrows indicate the direction of blood flow.



Which row in the table describes the type of circulatory system of a fish and the blood pressure in the capillaries in the gills and body tissues?

	Type of circulatory system	Blood pressure in the capillaries in the gills	Blood pressure in the capillaries in the body tissues
A	single	lower	higher
B	double	higher	lower
C	single	higher	lower
D	double	lower	higher

2. Which line in the table below shows correctly the number of each type of chamber in amphibian and bird hearts?

	Number of atria		Number of ventricles	
	Amphibian	Bird	Amphibian	Bird
A	2	2	1	2
B	1	2	2	1
C	2	1	2	1
D	2	1	1	2

3. Which row in the table identifies features of an amphibian heart?

	Number of atria	Number of ventricles	Mixing of oxygenated and deoxygenated blood
A	1	1	no
B	2	1	no
C	1	2	yes
D	2	1	yes

4. Which row in the table below identifies the number of heart chambers and the type of circulatory system in amphibians?

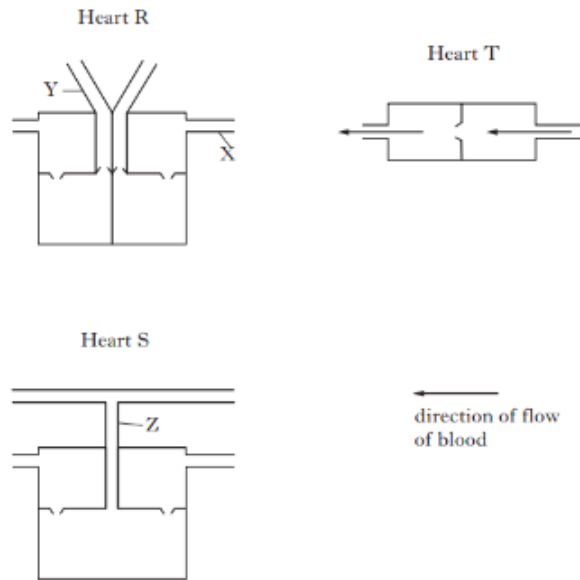
	Number of heart chambers	Type of circulatory system
A	3	incomplete double
B	4	incomplete double
C	3	complete double
D	4	complete double

5. Which of the following statements describes the circulation system in a reptile.

- A Single circulation with mixing of oxygenated & deoxygenated blood.
- B Incomplete double circulation with mixed oxygenated & deoxygenated blood.
- C Incomplete double circulation with no mixing of oxygenated & deoxygenated blood.
- D Complete double circulation with no mixing of oxygenated & deoxygenated blood.

Circulatory System Past Papers

1. The following diagrams represent the structures of fish, mammal and amphibian hearts.



- (a) Complete the table below by inserting the correct letters, animal group and type of circulation.

Heart	Animal group	Type of circulation (single, incomplete double or complete double)
		single
	mammal	
S		

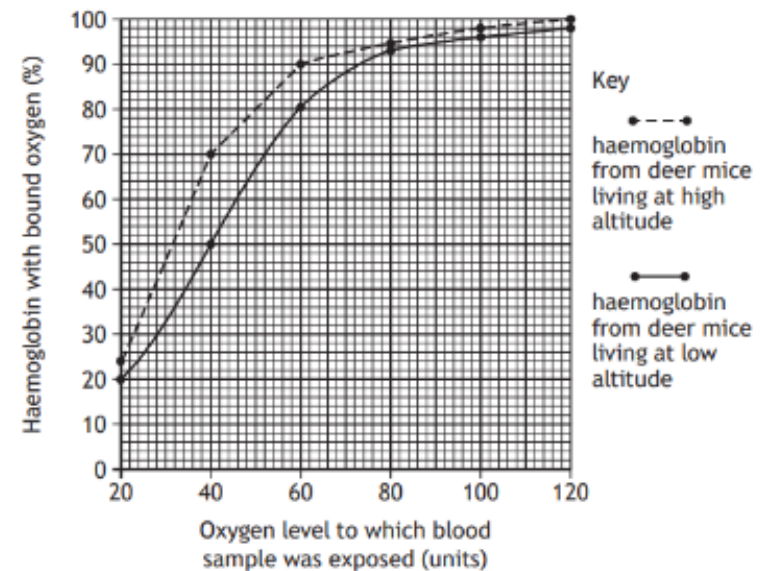
- (b) Add arrows in the vessels X, Y and Z on the diagrams to indicate the direction of flow of blood within them.
- (c) Explain how heart R is better adapted than heart S to allow a high metabolic rate in the cells which it supplies with blood.

2. Deer mice (*Peromyscus maniculatus*) are small mammals living in a variety of habitats ranging from low to high altitude.

An investigation was carried out to compare the haemoglobin from two populations of deer mice living at low and high altitudes.

Blood samples were taken from both populations and exposed to different levels of oxygen. The percentage of haemoglobin in the blood samples which had oxygen bound to it was measured.

The results are shown in the graph.



Describe the structure of a deer mouse heart and explain how this allows efficient delivery of oxygen to cells.

Description _____

Explanation _____

2

1

2

2

Circulatory System Past Papers

3. i) Describe the arrangement of the heart chambers in a bird.

1

5. Describe the arrangement of heart chambers in birds and amphibians and relate this to their metabolic rates.

4

- (ii) Explain how the arrangement of its heart chambers supports a bird's high metabolic rate.

2

4. Underline the correct option in each choice bracket to make the sentences correct.

Seals are mammals. Their hearts have $\left\{ \begin{smallmatrix} \text{three} \\ \text{four} \end{smallmatrix} \right\}$ chambers and a $\left\{ \begin{smallmatrix} \text{single} \\ \text{double} \end{smallmatrix} \right\}$ circulation.

This arrangement allows seals to maintain $\left\{ \begin{smallmatrix} \text{low} \\ \text{high} \end{smallmatrix} \right\}$ metabolic rates.

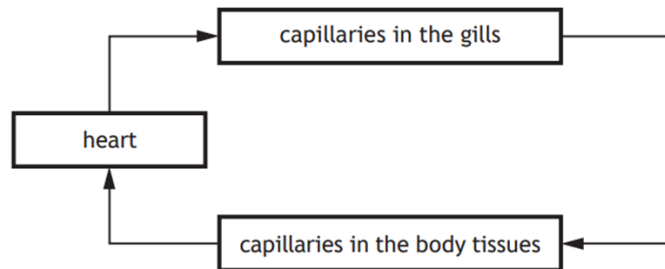
2

6. Write notes on the circulatory system and heart chambers of mammals.

4

Circulatory System Past Papers

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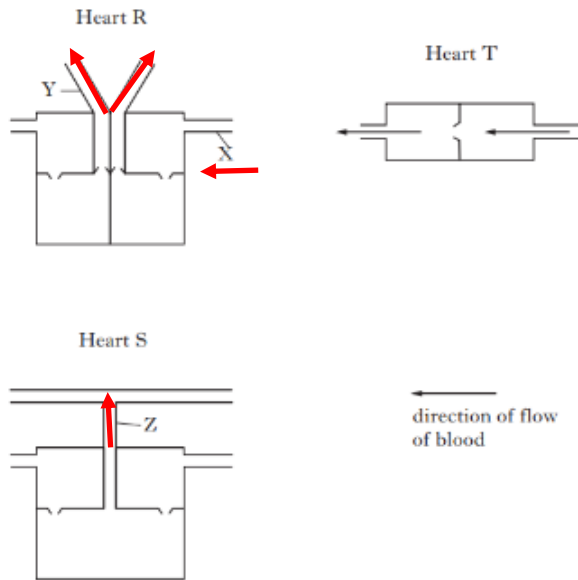
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Circulatory System Past Papers

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- (a) Complete the table below by inserting the correct letters, animal group and type of circulation.

Heart	Animal group	Type of circulation (single, incomplete double or complete double)
T	fish	single
R	mammal	Complete double
S		Incomplete double

- (b) Add arrows in the vessels X, Y and Z on the diagrams to indicate the direction of flow of blood within them.
- (c) Explain how heart R is better adapted than heart S to allow a high metabolic rate in the cells which it supplies with blood.

No mixing of oxygenated & deoxygenated blood OR blood leaves heart at higher pressure (1)

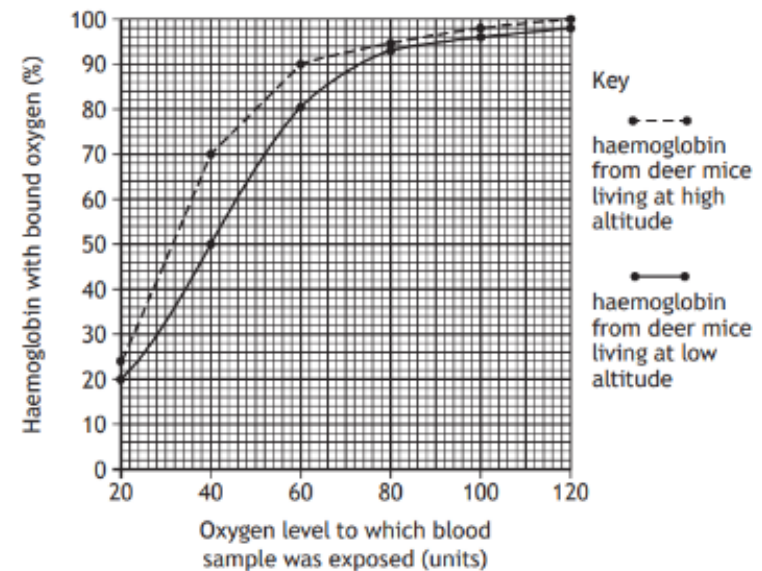
More efficient oxygen delivery to cells for ATP production

2. Deer mice (*Peromyscus maniculatus*) are small mammals living in a variety of habitats ranging from low to high altitude.

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Blood samples were taken from both populations and exposed to different levels of oxygen. The percentage of haemoglobin in the blood samples which had oxygen bound to it was measured.

The results are shown in the graph.



Describe the structure of a deer mouse heart and explain how this allows efficient delivery of oxygen to cells.

Description 2 atria & 2 ventricles

Explanation No mixing of oxygenated & deoxygenated blood

OR blood leaves heart at higher pressure (1)

Circulatory System Past Papers

3. i) Describe the arrangement of the heart chambers in a bird.

2 atria and 2 ventricles

- (ii) Explain how the arrangement of its heart chambers supports a bird's high metabolic rate.

No mixing of oxygenated & deoxygenated blood OR blood leaves

heart at higher pressure (1)

More efficient oxygen delivery to cells for ATP production

4. Underline the correct option in each choice bracket to make the sentences correct.

Seals are mammals. Their hearts have (three) chambers and a (single) circulation.

This arrangement allows seals to maintain (low) metabolic rates.

1

2

2

5. Describe the arrangement of heart chambers in birds and amphibians and relate this to their metabolic rates.

4

Expected Answer(s)	Max Mark	Additional Guidance
1. Amphibian heart has 2 atria and 1 ventricle	1	For full marks to be awarded candidates must give at least 1 correct point for bird and at least 1 for amphibian.
2. Bird heart has 2 atria and 2 ventricles	1	
3. Birds have a higher metabolic rate (or converse)	1	
4. No mixing of oxygenated and deoxygenated blood in bird heart (or converse)	1	
5. More efficient oxygen delivery to bird cells/ muscles/tissues (or converse)	1	
(max 4)		

6. Write notes on the circulatory system and heart chambers of mammals.

4

Expected response	Max mark	Additional guidance
1. complete double circulatory system 2. two atria and two ventricles 3. no mixing of oxygenated and deoxygenated blood 4. blood is (pumped out) at high pressure 5. efficient oxygen delivery to cells/tissues/organs 6. enables/supports high metabolic rates (Any 4)	4	NOT no mixing of blood