

Life Processes

Q: 1 Two statements are given - one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements A and R.

Assertion (A): Warm-blooded animals have their left and right side of the heart separated for more efficient supply of oxygen to the body.

Reason (R): Warm-blooded animals need high energy to maintain their body temperatures.

- 1** Both A and R are true and R is the correct explanation for A.
- 2** Both A and R are true but R is not the correct explanation for A.
- 3** A is true but R is false.
- 4** A is false but R is true.

Q: 2 Haemoglobin and Chlorophyll have similar structures.

- A molecule of haemoglobin is composed of the atoms of four elements- carbon, hydrogen, oxygen and nitrogen, all four organised around iron.
- A chlorophyll is composed of the same elements, which are organised around magnesium.

Considering the above information, which element of haemoglobin is MOST LIKELY responsible for the red colour of our blood?

- 1** hydrogen
- 2** nitrogen
- 3** carbon
- 4** iron

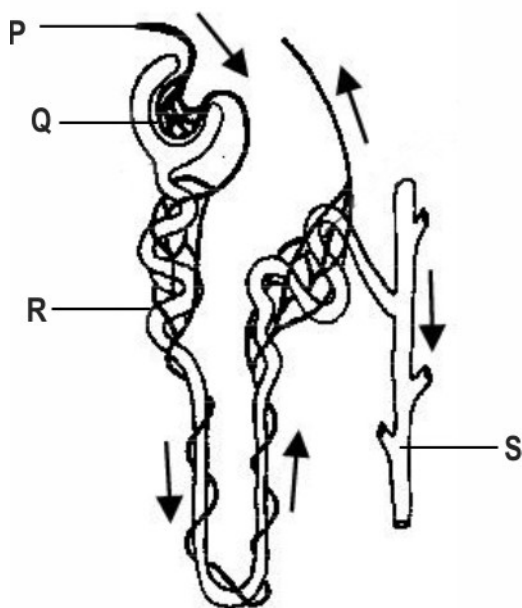
Q: 3 Many processes happen in the bodies of living organisms.

Those processes which involve the building up of complex molecules from simpler ones are called anabolism. Those which involve the breakdown of complex molecules into simpler ones are called catabolism.

Which of the following life processes can be considered as an example of anabolism?

- 1** digestion
- 2** respiration
- 3** transpiration
- 4** photosynthesis

Q: 4 Given below is a diagram of a nephron.



Which row of the following table correctly shows where filtration and selective reabsorption occur?

| | Filtration | Selective reabsorption |
|---|------------|------------------------|
| 1 | P | Q |
| 2 | Q | S |
| 3 | Q | R |
| 4 | P | R |

Q: 5 Which row in the table below shows the correct products of anaerobic respiration in humans and in yeast?

| | humans lactic acid | humans carbon dioxide | yeast lactic acid | yeast carbon dioxide |
|---|-----------------------|--------------------------|----------------------|-------------------------|
| 1 | X | √ | X | X |
| 2 | √ | X | X | √ |
| 3 | X | √ | √ | X |
| 4 | √ | √ | √ | X |

Q: 6 Read the following two statements and answer the question.

1. Gastroparesis is a disease in which the muscles of the stomach become paralysed and cannot contract or relax.
2. Foods high in fat can delay the process of digestion and the emptying of the stomach.

Which of the following food would be advised to a patient suffering from gastroparesis?

- | | |
|---------------------------------------|--|
| 1 soups and juices only | 2 soups and chicken salads only |
| 3 fried chicken and fried rice | 4 ice cream and milk only |

Q: 7 Which row of the table given below correctly gives the movement of gases across blood and cells?

| | Oxygen | Carbon dioxide | | | | |
|----------|--------|----------------|-----------|-------|--------|-----------|
| | from | to | process | from | to | process |
| 1 | RBC | cells | diffusion | cells | RBC | osmosis |
| 2 | RBC | cells | osmosis | cells | plasma | osmosis |
| 3 | RBC | cells | osmosis | cells | RBC | diffusion |
| 4 | RBC | cells | diffusion | cells | plasma | diffusion |

- | | | | |
|------------|------------|------------|------------|
| 1 P | 2 Q | 3 R | 4 S |
|------------|------------|------------|------------|

Q: 8 Read the following statements.

X: amount of carbon dioxide produced per molecule of glucose during aerobic respiration

Y: amount of carbon dioxide produced per molecule of glucose during fermentation by yeast

Which of the following is TRUE about X and Y?

- | | |
|----------------------------|----------------------------------|
| 1 X is more than Y. | 2 X is less than Y. |
| 3 X is equal to Y. | 4 (Cannot be determined.) |

Q: 9 Human beings exhibit 'double circulation' during which blood is passed through the lungs and heart. [3]

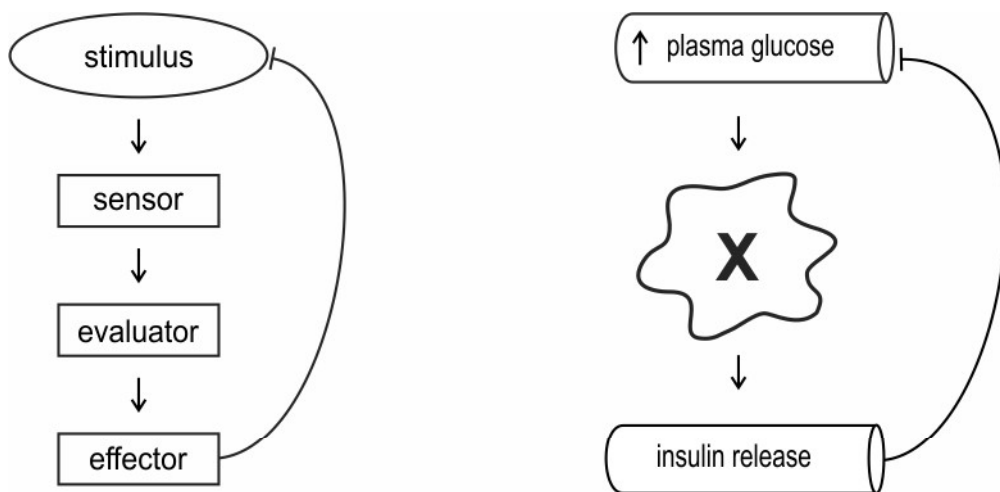
(a) State the route of the first and the second circulation through the chambers of the heart and explain the usefulness of such circulation in humans.

(b) Name the blood vessels that:

- (i) carry oxygenated blood from the lungs to the heart
- (ii) carry deoxygenated blood from the heart to the lungs

Q: 10 A major portion of the carbohydrates produced by plants is stored in different parts of the plant (storage organs). Explain the mechanism by which this stored food is made available when different organs need it for growth. [2]

Q: 11 In human beings, hormonal action is largely controlled by a mechanism where the secretion of one hormone is regulated by the action of another. An example of blood glucose levels control is shown in the diagram below. [2]



- (a) What is the mechanism of hormone action known as?
(b) Which is the sensor X that helps in detecting blood glucose level?
(c) What would happen if such mechanism is absent in humans?

Q: 12 Not all plants carry out photosynthesis by the same mechanism. In most plants, photosynthesis depends directly on the gaseous carbon dioxide that diffuses into the leaf through the stomata. [4]

However, some plants - such as pineapple - have the ability to store carbon dioxide in the vacuoles of the leaf cells as part of a complex carbon compound. This complex compound is transported to the chloroplasts and releases carbon dioxide when required, for photosynthesis to occur.

This special photosynthesis mechanism is believed to have evolved as an adaptation to conserve water for survival in dry conditions.

- (a) Which process in the plants does this photosynthesis mechanism minimise to help the plant survive in dry conditions?
(b) How is the ability to store carbon dioxide as a complex compound likely to help minimise the process referred to in (a)?
(c) When are such plants likely to take in carbon dioxide from the environment?

Q: 13 When some particles (like sand or dust) fall into our eyes, our eyes start to water on their own and we blink to get the particle out of our eyes. This is a type of reaction to a stimulus that the human body shows. **[2]**

(a) Is the above-mentioned reaction involuntary or voluntary?

(b) What is the specific name given to the pathway that brings about this immediate reaction to a stimulus?

(c) What are the names given to:

(i) the organ that responds to a stimulus

(ii) the part of the brain that receives sensory impulses



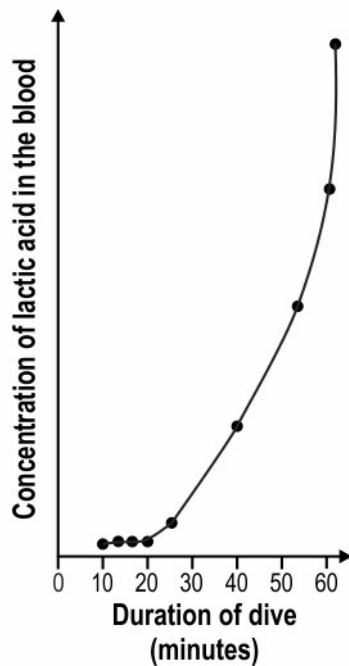
Q: 14 A Weddell seal, a deep-sea diving mammal, has special adaptations that enable it to [5]
respire for long periods under water without inhaling air. Three such adaptations are given below.

P) When diving, the blood flow to all parts of the seal's body is reduced by 80-95%, except for a closed circuit between the lungs, heart and brain.

Q) 70% of the oxygen in the seal's body is stored in the blood (in hemoglobin), as compared to just 51% in humans.

R) 25% of the oxygen in the seal's body is stored in the muscles (in myoglobin), as compared to just 13% in humans.

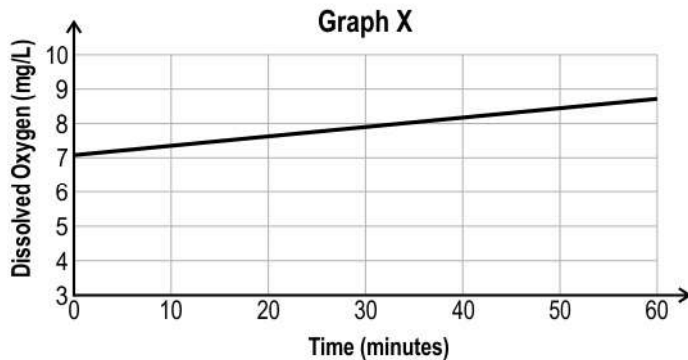
In 1980, a group of scientists carried out an experiment to understand how a Weddell seal respire under water during dives of different durations. After each dive completed by the seal, they measured the concentration of lactic acid in the seal's blood. The graph below represents the data obtained by the scientists.



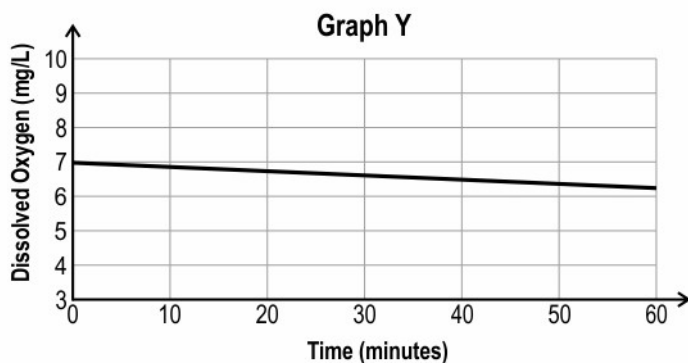
(a) Based on the graph, what can be inferred about the **CHANGE** in the respiration happening in the seal's body after 20 minutes under water? Justify your answer.

(b) Adaptation R helps the seal the most to produce energy for **SWIMMING** during the first 20 minutes of a dive. Explain why adaptations P and Q do not help as much.

Q: 15 Anita conducted an experiment to examine photosynthesis in aquatic plants kept in a tank by measuring dissolved oxygen. She plotted her results in the following graph X: [4]



She repeated the experiment while covering the tank with an opaque black cloth. She plotted the results in the following graph Y:



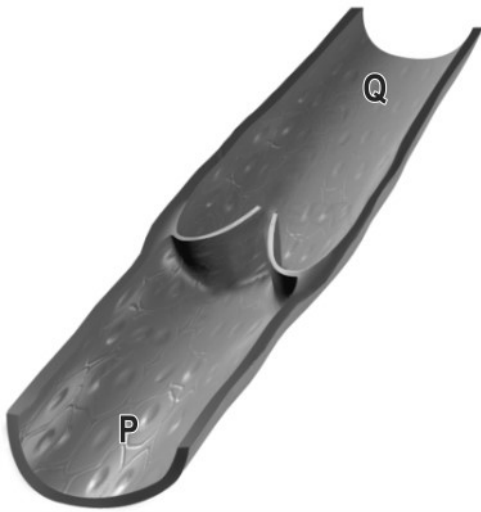
- (a) What could be the aim of her experiment?
- (b) Apart from photosynthesis, what other cellular process can be observed by the experiment?
- (c) Why does the oxygen level rise in graph X?
- (d) Explain the downward slope of the graph Y.

Q: 16 Terrestrial animals use lungs to breathe while aquatic animals like fishes use gills to absorb dissolved oxygen in water. Frogs are organisms that can survive both in water and on land. [3]

- (a) How does a frog acquire oxygen while it is underwater?
- (b) Are lungs of terrestrial animals and gills of fishes analogous organs? Explain why or why not.
- (c) Why do aquatic animals have a higher breathing rate than terrestrial animals?

Q: 17 The image below shows the cross section of a blood vessel of a human arm.

[2]



- (a) What is the type of blood vessel shown in the image?
(b) Which direction will the blood flow in such a blood vessel?

Q: 18 We often hear people complain about 'acidity' in the stomach.

[3]

- (a) Overproduction of what substance is most likely the reason for the complaint?
(b) Why is the production of this substance necessary?
(c) How does the stomach prevent itself from the harmful effects of overproduction of the substance?

Q: 19 There are various muscles present in the human digestive system known as sphincters. Two examples of those are given below:

[2]

1. pyloric sphincter - at the junction of stomach and small intestine
2. anal sphincter - at the anus

Give ONE most likely consequence of malfunctioning of each of these sphincters.

Q: 20 The developing human embryo gets nutrition from the mother through a special tissue called placenta.

[3]

- (a) Mention TWO structural designs of the placenta that help the embryo to get nutrition.
(b) Is the placental tissue designed for one way transport? Justify your answer.

Q: 21 Arthropods and molluscs have a copper-containing respiratory pigment called hemocyanin while human beings have iron-containing hemoglobin. **[2]**

- (a) How do respiratory pigments help in the process of respiration?
(b) Why do multicellular animals need a respiratory pigments?



The table below gives the correct answer for each multiple-choice question in this test.

| Q.No | Correct Answers |
|------|-----------------|
| 1 | 1 |
| 2 | 4 |
| 3 | 4 |
| 4 | 3 |
| 5 | 2 |
| 6 | 1 |
| 7 | 4 |
| 8 | 1 |



| Q.No | Teacher should award marks if students have done the following: | Marks |
|------|---|-------|
| 9 | (a) - During first circulation: oxygenated blood from lungs come to the left atrium to left ventricle to pass to the body - During second circulation: deoxygenated blood from body comes to right atrium and then right ventricle to pass for oxygenation to the lungs again. [0.5 marks for each point] -allows for separation of oxygenated and deoxygenated blood in the body [1 mark] | 2 |
| | (b) 0.5 marks for each correct answer: (i) pulmonary vein (ii) pulmonary artery | 1 |
| 10 | 0.5 marks for each point: - Sugar from storage organ is moved to phloem using ATP/energy. - This increases osmotic pressure of phloem. - This results in intake of water into the phloem. - Increased pressure inside the phloem cells moves sugar to cells with lower pressure to reach other organs. | 2 |
| 11 | (a) feedback mechanism | 1 |
| | (b) beta cells OR cells of the pancreas | 1 |
| | (c) Balance of life processes would be disturbed in the human body. | 0 |
| 12 | (a) transpiration | 1 |
| | (b) 1 mark for each of the following points: - Since stored carbon dioxide can be used, stomata need not be open for photosynthesis to occur during the day. - Keeping the stomata closed during the day helps to minimise water loss due to transpiration. | 2 |
| | (c) during the night | 1 |
| 13 | (a) involuntary | 0.5 |



| Q.No | Teacher should award marks if students have done the following: | Marks |
|------|--|-------|
| | (b) reflex arc | 0.5 |
| | (c) 0.5 marks for each correct answer: (i) effector (ii) forebrain | 1 |
| 14 | (a) Respiration is mostly aerobic in the first 20 minutes, and mostly anaerobic after the first 20 minutes. [1 mark] Justification: - Lactic acid is a product of anaerobic respiration. [1 mark] - The sharp rise in lactic acid concentration after 20 minutes indicates anaerobic respiration happening after 20 minutes. [1 mark] | 3 |
| | (b) 1 mark for each point: - Most of the energy needed for swimming is produced by the muscles. - Since most of the blood does not reach the muscles during a dive, the oxygen stored in the blood is not as useful for swimming as the oxygen stored in the muscles. | 2 |
| 15 | (a) to show that light is necessary for photosynthesis | 1 |
| | (b) respiration | 1 |
| | (c) In the presence of light, the plants performed photosynthesis which released oxygen at a higher rate than the rate of oxygen utilisation by respiration. Hence the oxygen levels rise. | 1 |
| | (d) The downward slope depicts that dissolved oxygen is used up by the plant for respiration but no new oxygen is produced as the plant does not perform photosynthesis in absence of light. | 1 |
| 16 | (a) Frog's skin is thin and permeable to oxygen and water. [0.5 marks] It takes up the dissolved oxygen from the water through the process of diffusion. [0.5 marks] | 1 |



| Q.No | Teacher should award marks if students have done the following: | Marks |
|------|--|-------|
| | (b) Yes, they are analogous organs. [0.5 marks] Because they have different structure but similar function. [0.5 marks] | 1 |
| | (c) Amount of dissolved oxygen in water is lower as compared to oxygen present in the air. Hence aquatic animals have to breathe faster. | 1 |
| 17 | 1 mark for each correct answer: (a) vein (b) from P to Q | 2 |
| 18 | (a) hydrochloric acid | 1 |
| | (b) It creates an acidic medium for functioning of enzyme pepsin. | 1 |
| | (c) The stomach also produces mucus that coats the lining to prevent damage by hydrochloric acid. | 1 |
| 19 | 1 mark for each consequence such as: - pyloric sphincter : food getting into small intestine too fast causing poor absorption / poor digestion - Anal sphincter : involuntary release of feces from the body | 2 |
| 20 | (a) 1mark for each correct point: - It has villi on the embryo side. - It has blood spaces on the mother's side. | 2 |
| | (b) No, the waste generated by the developing embryo is transferred out through the placental tissue. | 1 |
| 21 | (a) Respiratory pigments combine with oxygen and help in transport of oxygen throughout the body. | 1 |



| Q.No | Teacher should award marks if students have done the following: | Marks |
|------|--|-------|
| | (b) When the body size of animals is large, diffusion pressure alone cannot take care of oxygen delivery to all parts of the body. Hence, respiratory pigments take up oxygen from the air in the lungs and carry it to tissues which are deficient in oxygen. | 1 |

