S6 Biology activities

Questions on unit 4: Circulatory system

1. List the features of a good transport system
2. Explain why large, active animals need a transport system.
3. With a reference to fish and mammals, compare a single and double circulation systems.
4. Explain why a double circulation is more efficient than a single circulation system
5. Describe the function of the atrioventricular valves
6. Describe the role of tendinous cords, which can be seen in the ventricles.
7. Explain why the wall of the left ventricle needs to be much thicker than the wall of the wall of the right ventricle.
8. Explain why it might be harmful if the right ventricles create too much pressure.
9. Describe the cardiac cycle with reference to the action of the valves in the heart.
10. Explain what cause the atrioventricular valves to close.
11. Explain why the sinoatrial node is called pacemaker.
12. Explain why the atrial fibrillation decreases the efficiency of the heart.
13. Explain why the ventricles contract from the apex upwards.
14. Describe the shape of an electrocardiogram trace.
15. Explain why the QRS complex has a larger peak than the P wave.
16. Compare open and closed circulatory systems with reference to locusts and fish.
17. Discus why an open circulatory system is not as efficient as a closed system.
18. Draw a table to compare the structure of arteries, capillaries and veins.
19. Explain how the structure of arteries, capillaries and veins enable them to carry out their functions.
20. To compare blood, tissue fluid and lymph, construct a table to show the location, direction of flow and what causes the flow.
21. Explain why blood contains many proteins that are not found in the tissue fluid or lymph.
22. What produces the hydrostatic pressure in the blood?
23. Describe how fluid can pass through the capillary wall from the plasma to the tissue fluid.
24. State where the red blood cells pick up the oxygen and where they are likely to be release it again.
25. What part of the hemoglobin molecule binds to oxygen?
26. Explain the meaning of the term affinity.
27. Describe and explain the shape of adult oxyhemoglobin dissociation curve.
28. Explain why fetal hemoglobin must have a higher affinity for oxygen than adult hemoglobin.
29. List the ways carbon dioxide can be transported in the blood.
30. Describe how carbon dioxide is converted to hydrogencarbonate ions.
31. Explain the need for the chloride shift.
32. Explain how the presence of carbon dioxide can reduce the affinity of haemoglobin for oxygen.
33. Describe how hemoglobin can supply more oxygen to actively tissues than to those that have a lower level of respiration.
34. Why do large organisms need a circulatory system?
35. Mammals have a double circulation. What does this mean?

36. Cardiac muscle is described as being myogenic. What does this mean?
37. Define mass flow.
38. Give two advantages of a closed double circulatory system.
39. Why is the thickness of a blood vessel not a good indicator of whether it is an artery or a vein?
40. Draw a flow diagram showing all the main structures through which a red blood cell moves on its passage from the superior vena cava to the dorsal aorta.
41. Which chamber of the heart has the most muscular wall? Give reasons for your answer.
42. List the four stages of the cardiac cycle in the order in which they occur.
43. State precise location of the main pacemaker of the heart.
44. a) Calculate the cardiac output of a heart when the stroke volume is 60 cm3 and the heart rate is 75 beats per minute.
b) calculate the volume of the blood ejected from this heart in one hour.
45. Where is radial pulse taken?
46. Suggest what will happen to the heart rate if the vagus nerve is cut.
47. Distinguish between plasma and serum.
48. a) Name two proteins which help to buffer the blood.
b) what is the function of fibrinogen?
49. a) Why is haemoglobin called conjugated protein?
b) How many oxygen molecules can each haemoglobin molecule transport?
50. What is the effect of high carbon dioxide concentrations on the oxygen dissociation curve of haemoglobin?
51. a) List three effects of exercise on:

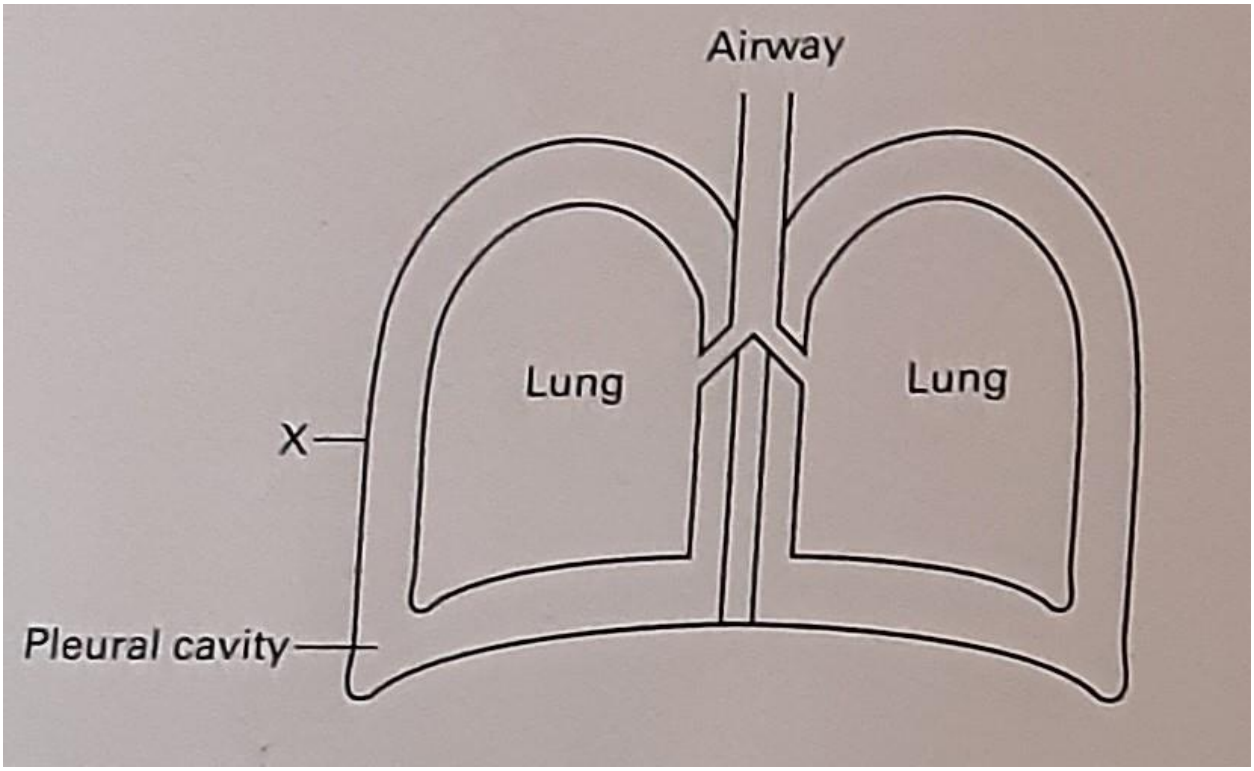
i the Respiratory system

ii the cardiovascular system.

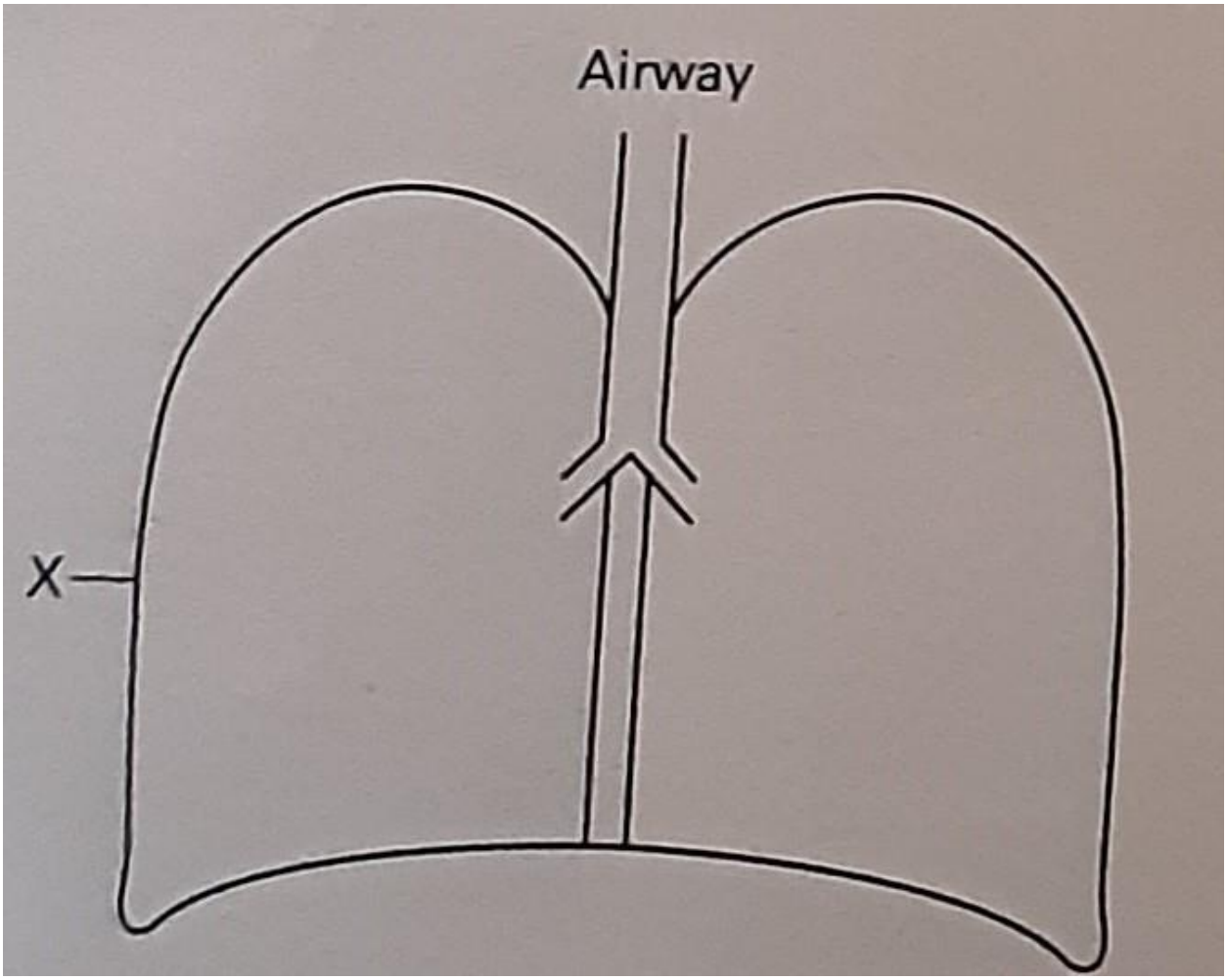
b) Give three factors that cause oxygen to be unloaded from blood supplying active muscle tissue.

52. By which process does fluid leave the blood and enter the tissue fluid?
53. Which components of the blood do not enter the tissue fluid?

54. a) The figure below shows the lungs in their respective pleural cavities.



i. Sketch on a copy of the figure below the appearance of the lungs if the wall of the thorax were punctured at X.



ii. Explain the reasons for the altered appearance you sketched in the figure above.

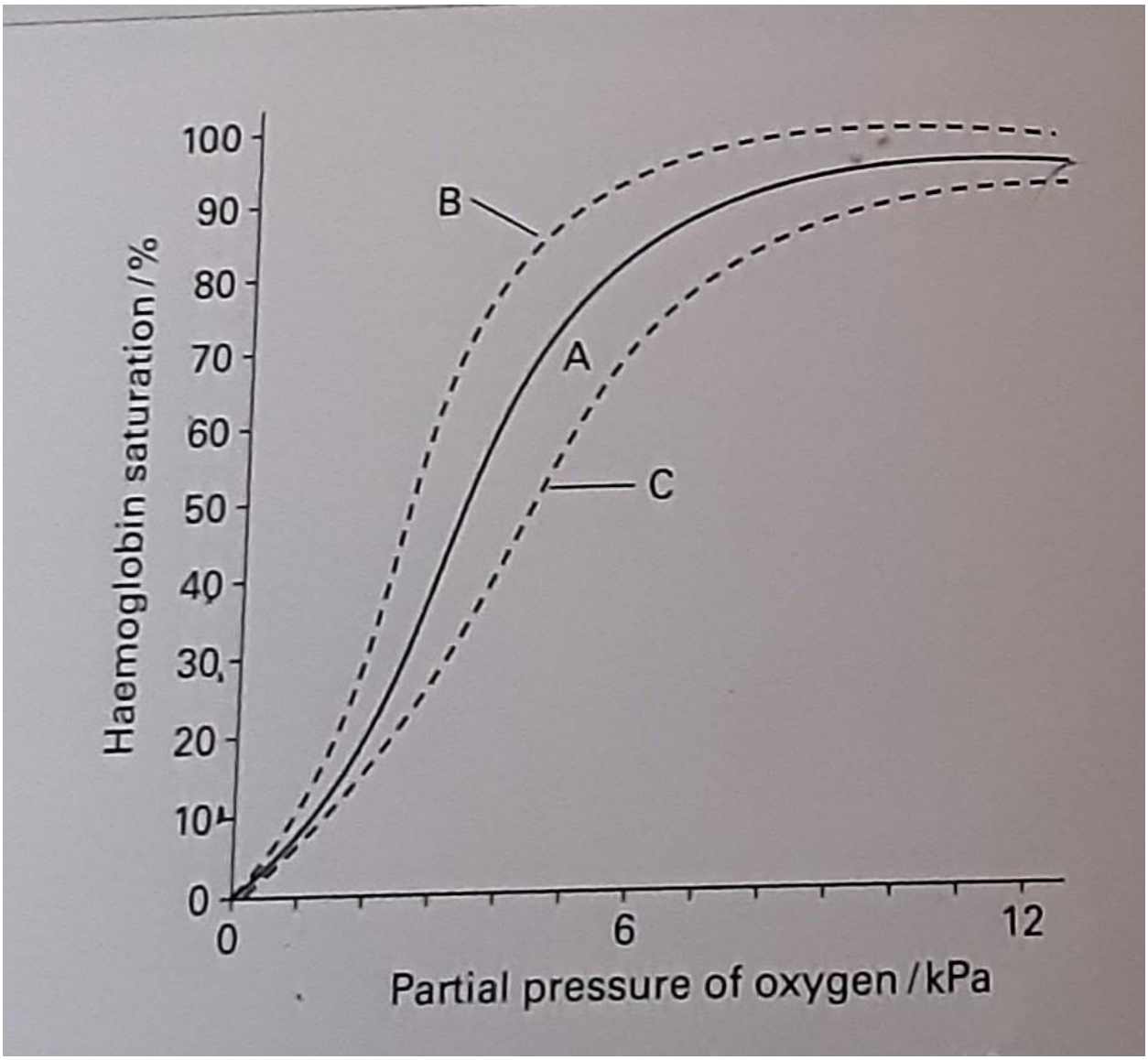
b) The fugure below shows the oxygen dissociation curve for haemoglobin under different conditions. Curve A is the normal curve; curves B and C represent the dissociation curves in conditions of a high level of carbon dioxide

or a high level of toxic carbon monoxide.

i. Explain briefly why the dissociation curves have a sigmoid or 'S' shape.

ii. Identify which curve is due to the presence of a high level of carbon dioxide.

iii. Explain any physiological advantages resulting from the altered dissociation curve in the presence of a high level of carbon dioxide.



iv. Suggest how the effect of carbon monoxide on the oxygen dissociation curve shown contributes to the toxic effect of the gas.

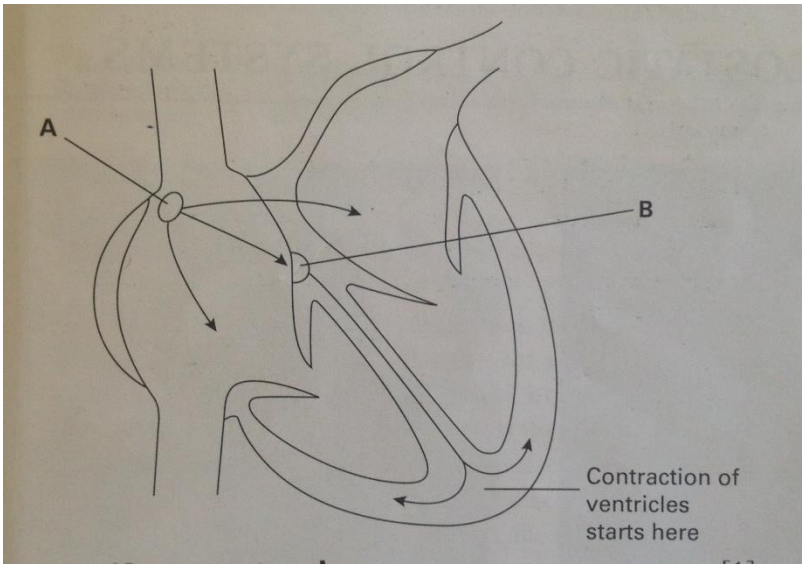
55. Answers should be written in continuous prose. Credit will be given for biological accuracy , the organization and presentation of the information and the way in which the answer is expressed.
Read the following passage.

The mammalian heart is a double pump adapted to forcing blood , at the same rate but different pressures, along the two systems of a double circulation. High pressure in systemic(body)

circulation has evolved with low pressure in the pulmonary(lung) circulation and a lower pressure lymphatic circulation. Each heart beat is controlled by a wave of electrical excitation. In turn , the cardiac output of the heart adapts to meet the body's needs and is influenced by nervous and hormonal control.

a. The heart forces blood at the same rate but different pressures along the two systems of a double circulation. Explain how the mechanism that controls each heartbeat, and the structure of the heart, enable it to do this.
b. Describe the part played by hormones and the nervous system in controlling heart rate.
c. Describe how lymph is formed.

56. The diagram shows a vertical section through a human heart. The arrows represent the direction of movement of the electrical activity which starts muscle contraction.



a. Name the structure A

b. Explain why each of the following is important in the pumping of blood through the heart.

i. There is a slight delay in the passage of electrical activity that takes place at point B.

ii. The contraction of the ventricles starts at the base.

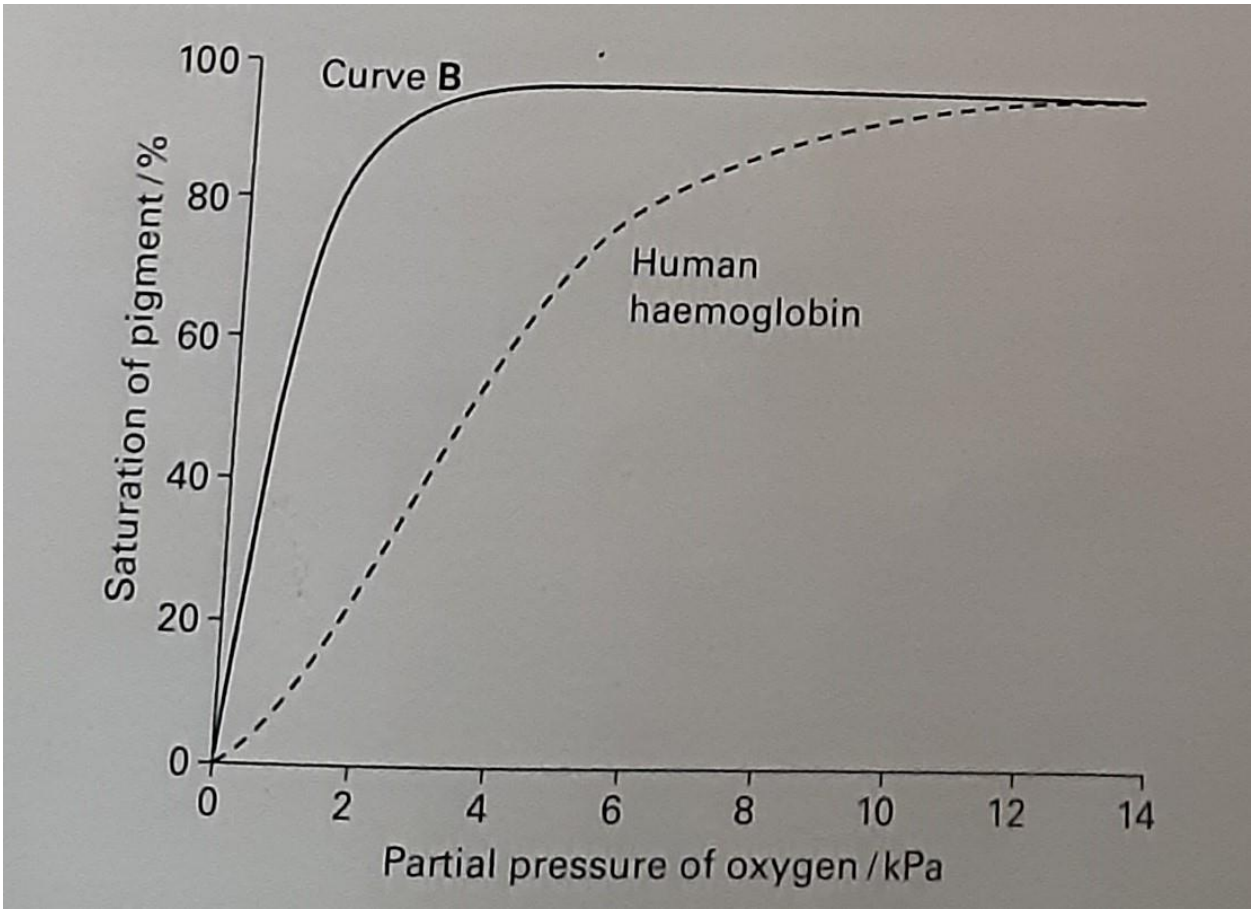
b. Describe how stimulation of the cardiovascular centre in the medulla may result in an increase in heart rate.

57. a) Outline the main chemical components of mammalian blood plasma, briefly one function of each.

b) Describe fully how mammalian blood picks up and transport respiratory gases.

c) Explain briefly how the blood capillaries exchange other materials with the cells of the body's tissues.

58. The diagram shows two oxyhaemoglobin dissociation curves.

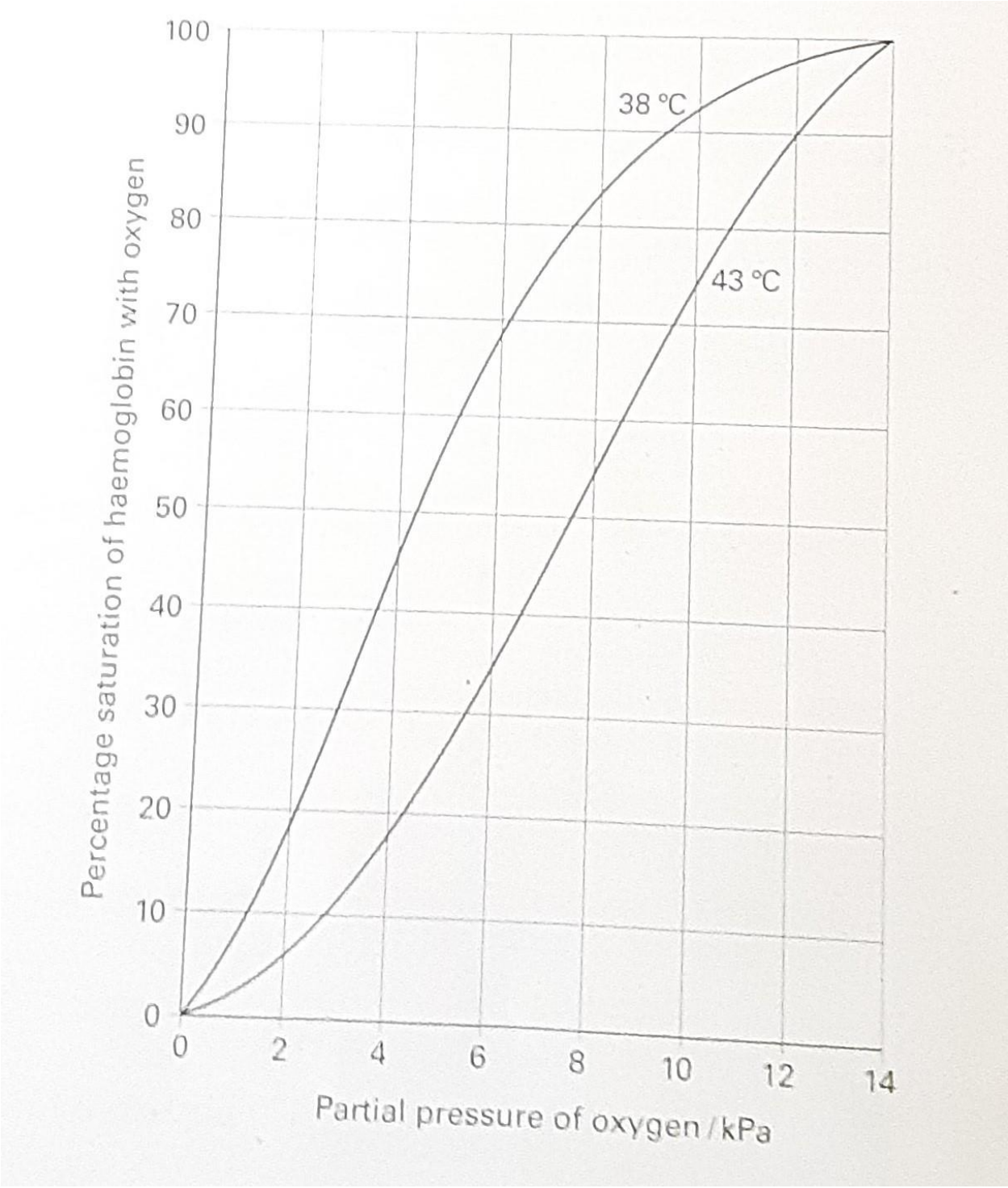


a. Use a graph to explain why human haemoglobin:
   i. Is saturated with oxygen in the lungs;
   ii. Releases oxygen when it reaches the tissues.

b. Explain what causes human oxyheamoglobin to give up a greater proportion of the oxygen it carries during vigorous exercise.

c. Lugworms live in deep sand on sea shores. When the tide is in, they obtain oxygen by pumping water over their gills. At low tide there is no water to pump over the gills. Curve **B** on the graph shows the dissociation curve of a lugworm oxyhaemoglobin.
   Explain the advantages of haemoglobin of this type to the lugworm.

59. The graph below shows the oxygen dissociation curve of haemoglobin from a mammal at two different temperatures (38°c and 43°c).



a)

i. From the graph find the percentage saturation of haemoglobin in blood from an area of the body where temperature is 43^{o}c and the partial pressure of oxygen is 4 Kpa.

ii. Blood that is fully(100%) saturated with oxygen carries 105cm^{3} of oxygen in 1 dm3(litre) of blood.
Calculate the volume of oxygen released from 1 dm^{3}of blood when blood that has become 90% saturated at 38^{o}c reaches a part of the body where the temperature is 43^{o}c and the partial pressure of oxygen is 4 Kpa. Show your working.

b) Suggest how this effect of temperature on the oxygen dissociation curve of haemoglobin might be advantageous to the mammal.

60. The sequence of events in the cardiac cycle needs to be carefully coordinated. Describe the role of the sino-atrial node(SAN) and atrio-ventricular node(AVN) in a coordinating a heartbeat.

I wish you all the best!!!!!!!!!!!!!!!!!!!!!!!!!!!!!