

12 The blood circulatory system - answers

1 (a) White cells have nuclei, red cells do not have nuclei. Some white cells can change their shape, red cells cannot.

(b) White cells ingest bacteria or make antibodies. Red cells carry oxygen.

2 Blood cells are made in the red bone marrow, e.g. in the ribs, sternum or vertebrae.

3 Fibrinogen, albumin and globulin (any two) are plasma proteins.

4 In addition to proteins, plasma contains salts (ions), glucose, lipids and amino acids, hormones, carbon dioxide and urea.

5 (1) Atria fill with blood, (2) ventricles relax, (3) semi-lunar valves close, (4) atria contract, (5) tricuspid and bicuspid valves open, (6) ventricles contract, (7) bicuspid and tricuspid valves close, (8) semi-lunar valves open.

Note: The order of semi-lunar valves and bicuspid and tricuspid valves may be reversed as their action is virtually simultaneous.

6 The missing words are: (A) left, (B) pulmonary, (C) left, (D) aorta, (E) deoxygenated, (F) vena cava, (G) right, (H) pulmonary, (I) lungs.

7 (d) Capillaries are thin-walled, not thick-walled.

8 Arteries carry blood *from* the heart. Veins carry blood *to* the heart.

9 There are valves in the heart (between each atrium and ventricle, in the aorta and pulmonary artery), in some of the large veins and in some of the lymphatics.

10 Tissue fluid is plasma (minus its proteins) which has leaked out of the capillaries. Lymph is tissue fluid which has entered the lymphatics.

11 Some of the larger lymphatics are able to contract, otherwise the lymph is propelled by body muscles which contract and 'squash' the lymphatics.

12 Lymph nodes contain white blood cells which ingest bacteria and prevent them from reaching the circulation.

13 Oxygen is transported from the lungs (A) to the whole body. Carbon dioxide (B) is transported from the whole body to the lungs. Urea (C) is transported from the liver to the kidneys. Digested food (D) is transported from the intestine to the whole body (E) (via the liver). Heat is transported from active muscles (F) to the whole body (G).

14 (d) Blood leaving a muscle will have more carbon dioxide, less oxygen and less glucose as a result of respiration.

15 (d) Blood from the alimentary canal returns to the heart by way of the hepatic portal vein, hepatic vein and vena cava.

The blood circulatory system - answers (continued)

16 Platelets release a substance which, indirectly, causes fibrinogen to be converted to fibrin. The fibrin forms a network which traps red cells to form a clot.

17 A blood clot forms a barrier to entry by bacteria. White cells ingest and kill bacteria. Antibodies from lymphocytes inactivate bacteria or make them easier to ingest. White cells in lymph nodes trap bacteria.

18 (b) The anti-bacterial substances produced by lymphocytes are called antibodies.

19 (b) If your immunity is acquired, natural and active, it must result from having recovered from a disease.

20 (a) Diphtheria and tetanus vaccines are prepared from the inactivated toxins (toxoids).

(b) Whooping cough vaccine is prepared from the dead bacteria.

(c) Temporary immunity to tetanus, rabies and chicken pox can be produced by injecting antibodies to these diseases.

21 (d) Group AB persons have neither anti-A nor anti-B antibodies in their plasma, so red cells from any donor will not be clumped.

22 The four main risk factors for coronary heart disease are thought to be (i) smoking, (ii) high blood pressure (possibly accentuated by stress), (iii) high blood cholesterol (possibly aggravated by a fatty diet), (iv) lack of exercise.

12 The blood circulatory system

1 How do white cells differ from red cells

- (a) in their structure,
- (b) their function?

2 Where are blood cells made in the body?

3 Name two proteins carried in the plasma.

4 What else is carried in the plasma?

5 Put the following events in their correct order starting with the first one listed:

atria fill with blood, semi-lunar valves close, tricuspid and bicuspid valves close, ventricles contract, semi-lunar valves open, atria contract, ventricles relax, tricuspid and bicuspid valves open

6 Fill in the missing words.

Oxygenated blood from the lungs returns to the ...(A).... atrium of the heart in the ...(B).... vein. From here it enters the ...(C).... ventricle and leaves the heart in the ...(D).... to go to the body.

From the body.....(E)...blood returns via the ...(F)....to the ...(G).... atrium, and then leaves the heart in the ...(H)..... artery to go to the ...(I)....

7 Which one of the following is not a characteristic of capillary blood vessels?

- (a) Repeatedly branched.
- (b) Small diameter.
- (c) Permeable to salts (ions)
- (d) Thick walled.

8 Arteries carry blood the heart. Veins carry bloodthe heart.

9 In which parts of the circulatory system are there valves?

10 What is the connection between tissue fluid, plasma and lymph?

11 How is lymph propelled through the lymphatics?

12 What is the function of lymph nodes?

13 Complete the table.

Substance	Transported by the blood	
	<i>From</i>	<i>To</i>
Oxygen	(A)	whole body
(B)	whole body	lungs
(C)	liver	kidneys
(D)	intestine	(E)
Heat	(F)	(G)

The blood circulatory system (continued)

- 14** After a period of vigorous activity you would expect blood leaving a muscle to have
- (a) less carbon dioxide, less oxygen and less glucose
 - (b) more carbon dioxide, more oxygen and less glucose
 - (c) more carbon dioxide, more oxygen and more glucose
 - (d) more carbon dioxide, less oxygen and less glucose.
- 15** Blood from the alimentary canal returns to the heart by way of
- (a) hepatic vein and vena cava
 - (b) hepatic artery, hepatic vein and vena cava
 - (c) hepatic portal vein and vena cava
 - (d) hepatic portal vein, hepatic vein and vena cava.
- 16** Describe briefly how platelets, fibrin and red cells interact to form a blood clot.
- 17** Briefly describe the principal lines of defence against bacteria entering the blood system.
- 18** The substances produced by lymphocytes to combat bacterial cells are called
- (a) antigens,
 - (b) antibodies,
 - (c) antidotes,
 - (d) antitoxins.
- 19** You may acquire natural, active immunity to a disease if
- (a) you are injected with an antibody to the disease
 - (b) you recover from an attack of the disease
 - (c) you are inoculated, against the disease
 - (d) you are born with antibodies to the disease?
- 20** In each case, give an example of a disease to which immunity can be acquired by injecting
- (a) an inactivated bacterial toxin
 - (b) a killed bacterium
 - (c) an antibody.
- 21** A person: whose blood group is AB can receive a blood transfusion from
- (a) group O only
 - (b) group AB only
 - (c) groups A and B
 - (d) any group.
- 22** Apart from any inherited tendency towards coronary heart disease, what are thought to be the four main risk factors?