

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.

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.