

Women					
	20s	30s	40s	50s	60s
low VO <sub>2</sub> max	35	31	27	25	19
	22	18	14	10	6
medium VO <sub>2</sub> max	47	43	39	35	31
	36	32	28	24	20
high VO <sub>2</sub> max	56	52	48	44	40
	48	44	40	36	32

### Evaluation

- (c) Determining the concentration of oxygen and carbon dioxide in arterial and venous blood would be very useful. However, most schools do not have equipment that enables blood analysis.
- (d) The data presented in the chart of standards were determined using a specific procedure. If the students did not perform the same procedure, they should expect slightly different results.

### Synthesis

- (e) Body mass cannot be used exclusively to determine fitness. To some degree, genetics and not activity level determine body type.
- (f) Dieting tends to slow body metabolism and encourages the storage of fats during fasting. Exercise will offset this effect as it increases metabolism and helps increase weight loss.
- (g) Sports are a combination of strength and endurance. Different sports have different benefits. Weight training, for example, will increase the strength component needed for a sport but has few benefits for aerobic fitness.

## UNIT 20 D REVIEW

(Pages 398–401)

### Part 1

- A
- C
- B
- B
- B
- A
- D
- C
- D
- A
- D
- D
- 4, 3, 1, 2
- 4, 2, 3, 1

### Part 2

- Capillaries are the sites of diffusion of oxygen and nutrients.
  - The aorta is the blood vessel with the highest blood pressure.
- The diaphragm, 10, relaxes during exhalation.
  - The left bronchus, 5, conducts air into the left lung.
  - The epiglottis, 2, prevents food from entering the trachea.
  - The lung, 9, is the structure in which pressure changes associated with inhalation and exhalation occur.
- Flask 2 is the control.

18. Iodine would indicate the presence of starch in flasks 2 and 3. In flask 2, there is no enzyme that will initiate the hydrolysis of starch. The amylase in flask 3 has denatured and will not work.
19. Two diseases that could be reduced by lifestyle changes include lung cancer, which could be reduced by reducing smoking, and some forms of hypertension, which could be reduced by altering diet and exercise habits.  
Answers will vary. Students should consider both pros and cons. Many people need help to change their lifestyle.
20. Test tube 1 is the control. It indicates that pancreatin and bile salts are needed for the digestion of fats and proteins.
21. Fats are digested to fatty acids, and proteins are broken down to amino acids. Both acids lower the pH of the solution.
22. Bile salts cause emulsification (physical digestion). This allows pancreatin to chemically digest more of the lipids. In test tube 2, only chemical digestion occurs.
23. In test tube 3, fats are emulsified, but no fatty acids are produced; only physical digestion has occurred.
24. Myoglobin accepts oxygen more readily than hemoglobin.
25. Hemoglobin becomes saturated at approximately 55 mmHg.
26. Myoglobin becomes saturated at approximately 40 mmHg.
27. Myoglobin picks up oxygen more easily than hemoglobin. This ensures that the muscles receive the needed oxygen for exercise.
28. Helper T cells identify antigens displayed on the cell membrane of the macrophage and release lymphokine, which causes B cells to divide into clones. Helper T cells send another message to the B cells, triggering them to produce antibodies.  
Killer T cells destroy microorganisms and mutated cells by puncturing the membranes of foreign invaders, body cells infected with foreign invaders, and mutated cells, killing them.  
Suppressor T cells inhibit the immune system response.  
B cells produce antibodies against antigens.  
Memory B cells retain information about the shape of an antigen so that antibodies can be quickly made during a subsequent infection with the same antigen.
29. Lactose is digested into monosaccharides by enzymes in the small intestine and absorbed as monosaccharides. Proteins begin to be digested by pepsin in the stomach; trypsin and erepsin in the small intestine complete protein digestion. The resulting amino acids are absorbed in the small intestine. Butterfat is emulsified by bile and chemically digested by lipase in the small intestine; it is absorbed by lacteals as fatty acids and glycerol and recombines into fat in the blood. Vitamins and minerals do not digest; rather, they are absorbed through the stomach.
30. When food enters the stomach, nerves in the stomach wall cause the muscles to contract and gastric fluids to be secreted. A large meal will activate more receptors, causing more forceful stomach contractions and faster emptying. If the meal is fatty, the small intestine secretes a digestive hormone (enterogastrone) that slows peristaltic movements, allowing time for fat digestion and absorption.
31. Blood builds up in the pulmonary veins. Blood pressure in the lung capillaries increases, thus pushing more plasma into the alveoli. The alveoli fill with fluid.  
Fluid in the alveoli prevents air from entering the alveoli; therefore, the diffusion of oxygen into the blood and carbon dioxide out of the blood is impaired. Breathing becomes difficult.  
A heart transplant could provide a solution if the situation is extreme. A faulty left AV valve would cause the enlargement of the left side of the heart. The valve may be faulty and need replacing.

32. Lack of protein in the blood results in lowered osmotic pressure. As a result, blood pressure forces more fluid out of the capillaries than is returned by osmotic pressure of the plasma. The result is an excess of ECF, which gathers in the abdomen and lower limbs. A short-term solution is a transfusion of plasma. But a long-term solution requires increasing the protein content of the diet. This solution isn't always possible in poorer nations because of the expense of foods such as meat, fish, and poultry.
33. Muscle tetanus is the state of constant muscle contraction due to repeated muscle stimulation.
34. It takes time for carcinogens to build up and cause problems. The DNA may not be affected at the site that regulates cell division.
35. It was not fashionable for women to smoke until later.
36. Death rates for men will decline. According to the graph, the rates for women will continue to increase unless there is a marked decline in the number of women who smoke.
37. Rates for men began to decline, and rates for women continued to increase. More males die than females.
38. Many running shoes today have built-in support and padding in the upper part of the shoe and in the sole.
39. • Specialized structures function in the overall biochemical balance of the living system by adjusting to changes in the external or internal environment to maintain the necessary range of conditions. For example, the respiratory system increases or decreases the rate of breathing to ensure that adequate amounts of  $O_2$  are available and  $CO_2$  does not build up within the cells and tissues. The circulatory system delivers food to cells and takes away wastes. The digestive system breaks down food that a person eats into its components so that nutrients are available and wastes are taken out of the body. The excretory system maintains the salt and water balance in the blood and tissues and removes any toxins produced by the body.
- If these specialized structures do not function, the needs of the cells and tissues of the human body will not be met, and they will become diseased or die.