Chapter Project Worksheet 1
Answers will vary. Samples:
An ad on TV for a fast food restaurant is aimed at children. The restaurant sells hamburgers but the ad shows free toys that people get when they buy a certain meal. Kids will want their parents to take them to the restaurant so they can get the toys.
An ad for expensive running shoes in a magazine for teenagers. The ad shows a professional basketball player wearing the brand of shoes being sold. The basketball player is a great athlete who makes a lot of money and is admired by teenage boys and girls.
A newspaper ad for a clothing sale at a department store. The ad is aimed at adults. It has lots of bright colors and starburst shapes to attract attention to the low prices. Adults would probably be attracted to the ad because the products are all being sold for less than their regular prices.

Chapter Project Worksheet 2
1. Answers will vary. Sample: The main reason children start to smoke is that they see adults and teenagers smoking and want to be like them. Teenagers, too, often start smoking because they want to be more grown up, but many simply do it to fit in with friends who already smoke.
2. Answers will vary. Sample: Most adults actually want to quit smoking but find it hard to do so because they are addicted to it.
3. Answers will vary. Samples: Tar inhaled in smoke makes cilia in the respiratory system less effective at moving contaminants out of the air passages, so smokers get sick more often. Smoke is irritating, too, so smokers have an uncomfortable cough. Carbon monoxide in smoke takes the place of oxygen and binds to hemoglobin so smokers have higher heart rates and breathing rates and feel out of breath easier. They can’t exercise as hard as people who don’t smoke. Various chemicals in smoke have been shown to cause cancer. Cancer can be fatal. Smokers are more likely to have heart attacks. Smokers can develop bronchitis and emphysema.
4.–6. Answers will vary. Student’s ads should be appropriately geared to appeal to the particular age group at which they are aiming.

The Respiratory System
Guided Reading and Study
Use Target Reading Skills
Possible answers:
Path of Air
Air enters the nose
To the pharynx
To the trachea

To the bronchi
To the lungs

1. a, d
2. a. Move oxygen from the outside environment into the body; b. Remove carbon dioxide and water from the body
3. Oxygen
4. Respiration is the process in which oxygen and glucose undergo a series of chemical reactions inside cells to release energy.
5. a. energy; b. carbon dioxide; c. water
6. false
7. a, c, d
8. true
9. nostrils; pharynx; trachea; bronchi
10. A sneeze shoots particles and bacteria out of the nose and into the air.
11. throat
12. b
13. d
14. a
15. c
16. b, c
17. cartilage
18. false
19. choke
20. c
21. true
22. The blood picks up oxygen from the air inside the alveoli.
23. Oxygen passes through the walls of the alveoli and through the capillary walls into the blood. Carbon dioxide and water pass from the blood into the alveoli.
24. The alveoli provide a large surface area in a relatively small space.
25. false
26. The diaphragm is a large, dome-shaped muscle that plays an important role in breathing.
27. larger; decreases; inhale; smaller; lungs
28. larynx
29. Vocal cords are folds of connective tissue stretching across the opening of the larynx that produce the voice.
30. Muscles make the vocal cords contract. Air from the lungs rushes through the opening between them. The movement of the vocal cords makes the air vibrate to create a sound.

The Respiratory System
Review and Reinforce
1. Respiration is the process inside the cells where glucose is broken down using oxygen to produce energy. Breathing is the process in which air flows into and out of the lungs.
2. The respiratory system provides oxygen to the body and eliminates carbon dioxide and water from the body.
3. Nose, pharynx, trachea, and bronchi
4. Air is warmed, moistened, and filtered.
5. Oxygen moves from the air to the blood and carbon dioxide moves from the blood to the air.
6. Contraction and relaxation of the diaphragm and rib muscles causes inhalation and exhalation.
7. Sound is produced when air passes over the vocal cords.
8. pharynx
9. trachea
10. lung
11. diaphragm
12. vocal cords
13. larynx
14. bronchus
15. alveolus

The Respiratory System

Enrich
1. A peak represents the point where the person has just inhaled and is starting to exhale. A low point represents the point where the person has just exhaled and is starting to inhale.
2. 2,700 mL; 2,200 mL
3. 500 mL
4. 3,500 mL
5. 1,500 mL
6. The peaks and low points of the spirogram would be closer together.
7. The line of the graph would move upward as the person inhaled and then would move in a horizontal line as the person held his or her breath.

Skills Lab
A Breath of Fresh Air
For answers, see the Teacher’s Edition.

Smoking and Your Health

Guided Reading and Study
Use Target Reading Skills
Possible effects: Damage to protective cilia and risk of cancer due to tar; increase in blood pressure and addiction due to nicotine; risk over time of chronic bronchitis, emphysema, lung cancer, and atherosclerosis.
1. Tar: Dark, sticky substance that forms when tobacco burns; Clumps cilia together so they can’t keep harmful materials out of the lungs
Carbon monoxide: Colorless, odorless gas produced when things are burned; Binds to hemoglobin in red blood cells in place of oxygen
Nicotine: Speeds up the nervous system and heart

Smoking and Your Health

Review and Reinforce
1. tar, carbon monoxide, nicotine
2. Tar causes the cilia to clump together. This decreases their ability to prevent harmful materials from entering the lungs.
3. Carbon monoxide bonds with hemoglobin in the red blood cells. This takes the place of some of the oxygen that would normally attach to the hemoglobin.
4. Bronchitis damages the breathing passages. They become smaller than normal and may become clogged. Emphysema damages the lung tissue and prevents the person from getting enough oxygen and from eliminating carbon dioxide. Lung cancer replaces space used for gas exchange with tumors.
5. The chemicals in smoke can irritate the walls of the blood vessels. This contributes to the buildup of the fatty material that causes atherosclerosis.
6. Smoking increases a person’s likelihood of having a heart attack.

Smoking and Your Health

Enrich
1. About $42.8 billion was spent on cigarettes, while about $100 billion was spent on smoking-related health costs. More than twice as much money was spent on smoking-related health
costs as on cigarettes.
2. about $142.8 billion
3. about $87.3 billion
4. About 30% of the total amount spent on cigarettes went toward taxes.
5. More money was spent on cigarettes than on the Department of Education. Students’ opinions may vary. Sample: I think this is a bad way for people in the United States to spend their money. Education is more important than cigarettes.

The Excretory System
Guided Reading and Study
Use Target Reading Skills
Possible student questions and answers are these:
Where are nephrons located? (In the kidneys)
What three main materials are filtered out of the blood? (Urea, water, glucose)
What happens to these filtered materials? (Most of the water and glucose are reabsorbed. Most of the urea remains as urine.)
1. The excretory system collects wastes produced by cells and removes the wastes from the body.
2. excretion
3. urea and excess water
4. c
5. a
6. b
7. blood; ureters; urinary bladder; urethra
8. Nephrons are tiny structures that remove wastes from blood and produce urine.
9. a. Wastes and needed materials are removed from the blood. b. Much of the needed material is returned to the blood and wastes are eliminated from the body.
10. false
11. glucose and water; urea and other wastes
12. Analyzing the contents of urine can detect some medical problems, such as diabetes or kidney malfunction.
13. water
14. false
15. a. lungs b. skin; c. liver
16. The liver breaks down proteins into urea, and converts part of hemoglobin molecules into substances such as bile.

The Excretory System
Review and Reinforce
1. carbon dioxide, urea, water
2. Urine is produced in the kidneys and passes through the ureters into the bladder. It is eliminated from the body through the urethra.
3. The kidney is the main organ of excretion. Three other organs of excretion are the skin, lungs, and liver.
4. When the body has more water than necessary, the kidneys excrete a large amount of water. When the body needs water, the kidneys produce more concentrated urine and less water is excreted.
5. Nephrons are located in kidneys. In the first stage, wastes and glucose are removed from the blood. In the second stage, desirable materials are reabsorbed into the blood.
6. kidney
7. ureter
8. urinary bladder
9. urethra
10. The process of removing waste from the body
11. Ureters and the urethra are tubes through which urine passes in the body. Each of the two ureters carries urine from a kidney to the bladder. The single urethra carries urine outside the body from the bladder.
12. A poisonous chemical that is a result of the breakdown of proteins
13. The watery fluid that contains urea and other wastes; produced by the kidneys

The Excretory System
Enrich
1. The results indicate that the person has a severe condition of diabetes.
2. The results indicate that the person has kidney disease.
3. Nitrite indicates an infection. You could examine the urine under a microscope for the presence of white blood cells. A positive result would confirm this result.
4. The doctor should check for presence of protein, nitrite, red blood cells, or white blood cells.
5. The results indicate that the person does not have diabetes, kidney disease, or a urinary infection.

Skills Lab
Clues About Health
For answers, see the Teacher’s Edition.

Key Terms
urea, alveoli, bronchitis, nephron, diaphragm, urethra, larynx, tar, cilia, nicotine, kidney
Answer: respiration
Connecting Concepts
This concept map is only one way to represent the main ideas and relationships in this chapter. Accept other logical answers from students.
Laboratory Investigation

Measuring the Volume of Exhaled Air

Pre-Lab Discussion

1. Air is taken into the lungs. Oxygen from the air is exchanged with waste products, mainly carbon dioxide, which are carried in the blood. These wastes are then removed from the body as the person exhales air from the lungs.
2. Breathing involves the movement of air into and out of the lungs. Respiration involves processes that occur in cells.

Observations

1. The volumes are equal.
2. The glass tube above the surface of the water is the tubing through which the exhaled air enters the bottle. The increased air pressure in the bottle forces the water through the other glass tube. If this tube were not beneath the surface of the water, air—which could not be measured in the graduated cylinder—would be forced out the second tube.
3. Data should show that the average volume of air after exercising should be greater than the average volume measured when students are not exercising.

Data Table 1 (before exercising)

<table>
<thead>
<tr>
<th>Trial</th>
<th>Volume of Water (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>75</td>
</tr>
<tr>
<td>2</td>
<td>79</td>
</tr>
<tr>
<td>3</td>
<td>77</td>
</tr>
<tr>
<td>Average</td>
<td>77</td>
</tr>
</tbody>
</table>

Data Table 2 (after exercising)

<table>
<thead>
<tr>
<th>Trial</th>
<th>Volume of Water (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>97</td>
</tr>
<tr>
<td>2</td>
<td>102</td>
</tr>
<tr>
<td>3</td>
<td>99</td>
</tr>
<tr>
<td>Average</td>
<td>99</td>
</tr>
</tbody>
</table>

Data Table 3 (when breathing returns to normal)

<table>
<thead>
<tr>
<th>Trial</th>
<th>Volume of Water (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td>2</td>
<td>79</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td>Average</td>
<td>80</td>
</tr>
</tbody>
</table>

Analyze and Conclude

1. One trial might be affected by different variables even if you try to control for them. An average of several trials should provide a valid volume.
2. Volumes were likely similar but not exactly the same. Students could allow several minutes of time between each trial or make a special effort to exhale normally and not use a breath that is deeper than usual.
3. Oxygen is needed for cellular respiration. Respiration proceeds at a faster rate when a person exercises, so the person needs more oxygen then. Larger breaths—larger volumes of air—provide more oxygen.

Critical Thinking and Applications

1. Answers might include that students involved in activities requiring a lot of lung capacity, such as athletics or some music activities, would exhale more air. Also, larger students might have larger lung capacities.
2. Students will probably predict that the volumes in Denver would be larger. At a high altitude, the air is thinner. You would have to take a deeper breath to get the same amount of oxygen you can get in a smaller breath in Miami.

More to Explore

Procedures may include using several spirometers. One can be used for each exhaled breath, giving other students time to measure and record the volume of the liquid forced out and to return the liquid to the bottle before that particular spirometer is used again.
Performance Assessment

Analyze and Conclude

1. Answers will vary. Sample: On the left side of my poster, I described how carbon dioxide is removed from the body by the respiratory system. At the top, I used words to tell patients that carbon dioxide is produced during respiration. In the middle, I drew pictures of each of the structures that carbon dioxide passes through and used words to describe the function of each structure. At the bottom, I used words and pictures to explain how air is exhaled from the body. On the right side of my poster, I described how urea is removed from the body by the excretory system. At the top, I used words to tell patients that urea is produced by the breakdown of proteins. In the middle, I used pictures and words to explain how urea is filtered out of the blood by the kidneys. At the bottom, I drew pictures of each of the structures that urea passes through and used words to describe the function of each structure.

2. Answers will vary. Sample: My poster teaches patients that carbon dioxide is a waste product of respiration, the process that releases energy for cells. Blood rich in carbon dioxide enters the capillaries of the lungs. Blood releases the carbon dioxide into the alveoli of the lungs and picks up oxygen. As you exhale the carbon dioxide, the rib muscles and the diaphragm relax, and the chest cavity becomes smaller. This decrease in size squeezes air out of the lungs. Air passes from the alveoli into the bronchi, which are passages that lead into the lungs. Next, it passes through the trachea, the pharynx, and the nose. The trachea, or windpipe, is strengthened by rings of cartilage. The pharynx, or throat, is shared by both the respiratory system and the digestive system. Air leaves the body through the nose.

Urea is a waste product of the breakdown of proteins. Urea is removed from the body by the kidneys. Urea is filtered out of the blood in nephrons. Nephrons are tiny structures in the kidneys that remove wastes and produce urine. Blood enters the capillaries in a nephron and urea, water, glucose, and other substances are filtered out of the blood and into the tube of the nephron. Most of the water and glucose are reabsorbed from the tube, but most of the urea stays in the tube. The liquid remaining in the tube is called urine. Urine flows from the kidneys to the urinary bladder through two narrow tubes called ureters. The urinary bladder is a sacklike muscular organ that stores urine. Urine leaves the body through a small tube called the urethra.