Skill and Practice Sheet Answers

1A Using Your Textbook

Part 1 Answers:

1. Red
2. Any three of the following are correct: force, Newton's first law, inertia, newton, net force
3. Light yellow (or ivory)
4. Acceleration in m/s^2
5. At the end of each section of the student text
6. What is the strongest force in the universe?
7. 1) Looking for: 2) Given: 3)Relationships: 4) Solution:
8. Understanding Vocabulary, Reviewing Concepts, Solving Problems, Test Practice, Applying Your Knowledge

Part 2 Answers:

1. The units are: 1-Motion, 2-Forces, 3-Energy and Systems, 4-Matter and Energy, 5-Electricity, 6-Electricity and Magnetism, 7-Vibration, Waves, and Sound, 8-Light and Optics.
2. Answers will vary according to student interest.
3. The glossary and index are found at the back of the book, after Unit 8. The glossary contains definitions; the index tells where to find information on specific topics.

Part 3 Answers:

1. A change in position.
2. $E_p = mgh$
3. William Kamkwamba is from Malawi. He built a windmill to provide electricity for his family home.

1B Lab Safety

Safety quiz answers:

1. Answers will vary.
2. Answers will vary.
3. Answers will vary. Example: (1) Be quite and listen, (2) Locate your safety buddy, (3) In a safe and orderly manner, follow your teacher out of the lab to a designated safe location.
4. In many cases, investigations require the use of chemicals that may cause harm to your eyes or clothing if these are not protected. Gloves are also important when working with chemicals. For investigations that require heat, using a hot pad is very important.
5. Teamwork helps you to complete the lab efficiently, but keeping safe also requires teamwork. Sometimes, you may need someone to help you pour a chemical or perform a procedure that would be unsafe if you tried it by yourself. A team of people can also work together to keep everyone on the team safe. On your own, it is more difficult to be aware of all the possible dangers in a laboratory setting.
6. Cleaning up after an investigation prepares the work space for the next day's investigation. A clean work space is safer because all chemicals and any sharp or dangerous objects are removed. Clean up also involves turning off any appliances that could heat up and cause a fire.
7. (1) Immediately tell my teacher, (2) Listen carefully and follow any safety instructions provided by the teacher, and (3) Follow the appropriate safety guidelines.
8. Sample answers:
   a. First, I would make sure that my classmates know to stay away from the broken beaker and I would tell my teacher what had happened. Then, I would clean up the glass with a dust pan and a brush. I would not use my hands to clean up the glass. I would place the broken glass in a cardboard box, seal the box, and label it "sharps."
   b. I would make sure my classmates know about the water so they don't slip. I would tell my teacher as soon as possible. I would begin placing paper towels on the wet spot as soon as possible. Carefully, I would work with my classmates to clean up the spill. It would be best to use gloves during the clean up in case any chemicals are mixed in with the water.

c. I would tell my teacher about the smell and follow any safety instructions given to me by the teacher. I would help to make sure that the lab is well ventilated (by helping to open windows and doors, for example). I would ask to leave the lab to get some fresh air if I needed to do so.
d. I would stop talking and listen to any safety instructions from my teacher. I would follow the classroom plan for exiting the lab as soon as possible. I would not worry about removing my lab apron. I may remove my goggles if it seems unsafe to keep them on.
e. I would take her hand and lead her to the eye wash station as soon as possible. I would tell a classmate to tell our teacher as soon as possible. When the teacher arrives, I would let her/him help my lab partner.
f. I would stop talking and listen to any safety instructions from my teacher. I would follow the classroom plan for exiting the lab as soon as possible. I may need to use the nearest classroom fire extinguisher if my teacher is unable to do so.

1C Scientific Processes

1. Maria and Elena's question is: Does hot water in an ice cube tray freeze faster than cold water in an ice cube tray?
2. Maria's hypothesis: Hot water will take longer to freeze into solid ice cubes than cold water, because the hot water molecules have to slow down more than cold water molecules to enter the solid state and become ice.
3. Examples of variables include:

   Amount of water in each ice cube tray "slot" must be uniform.

   Each ice cube tray must be made of same material, "slots" in all trays must be identical.

   Placement of trays in freezer must provide equal cooling.

   All "hot" water must be at the same initial temperature.

   All "cold" water must be at the same initial temperature.
4. Examples of measurements include:

   Initial temperature of hot water.

   Initial temperature of cold water.

   Volume of water to fill each ice cube tray "slot."

   Time taken for water to freeze solid.
5. Sample procedure in 9 steps:

   (1) Place 1 liter of water in a refrigerator to chill for 1 hour.

   (2) Boil water in pot on a stove (water will be 100°C).

   (3) Using pot holders, a kitchen funnel, and a medicine-measuring cup, carefully measure out 15 mL of boiling water into each slot in two labeled ice cube trays.

   (4) Remove chilled water from refrigerator, measure temperature.

   (5) Carefully measure 15 mL chilled water into each slot in two labeled ice cube trays.

   (6) Place trays on bottom shelf of freezer, along the back wall.

   (7) Start timer.

   (8) After 1/2 hour, begin checking trays every 15 minutes to see if solid ice has formed in any tray.

   (9) Stop timing when at least one tray has solid ice cubes in it.
6. The average time was 3 hours and 15 minutes.
7. Repeating experiments ensures the accuracy of your results. Each time you are able to repeat your results, you reduce the effect of sources of error in the experiment that may come from following a certain procedure, human error, or from the conditions in which the experiment is taking place.
8. The only valid conclusion that can be drawn is (d).
9. Maria and Elena could ask a few of their friends to repeat their experiment. This would mean that the experiment would be repeated in other places with other freezers. If their friends are able to repeat the girls' results, then the kind of freezer used can be eliminated as a factor that influenced the results.
10. A new question could be: Do dissolved minerals in water affect how fast water freezes?
    For further study: Ask student to come up with a plan to test the validity of statements b and c. Encourage your students to research methods for measuring dissolved minerals and oxygen in water.

1D Identifying Control and Experimental Variables

1. Experimental variable: antibacterial cleaner (antibacterial cleaner vs. no antibacterial cleaner). Control Variables: Petri dish, cotton swab, source of bacteria, length of experiment, incubation temperature, incubation light exposure
2. Experimental variable: amount of water each plant gets. Control variables: plant type, plant size, pot, soil, duration of experiment, amount of light exposure.
3. Experimental variable: bread type (preservatives vs. no preservatives). Control variables: plastic bag, damp paper towel, dark environment, duration of experiment.
4. Experimental variable: fertilizer (fertilizer vs. no fertilizer). Control variables: amount of water, algae sample, location of beakers (sunlight), duration of experiment.

1E What's Your Hypothesis?

1. Sample hypothesis: The water level in the cup is lower because the Sun heated the water in the cup and that caused evaporation of the water.
2. Sample hypothesis: The candle heats up the air above it. Warm air is less dense so it rises. The effect causes the air in the box to move in the area above the candle. When the smoke from moves above the candle, it gets heated and rises out of the chimney above the candle.
3. Sample hypothesis: Increasing the temperature of water will increase the rate at which evaporation occurs.
4. Sample hypothesis: If the river is flowing down a mountain, it will flow faster than if it is flowing along flat land. In other words, the force of gravity causes river water to flow faster if the water is moving from a high to a lower place.
5. Sample hypothesis: I think the flower bulbs have been dug up and eaten by squirrels.
6. Sample hypothesis: Since kelp is a food source for the sea urchins, the urchin population might die out. Without a sea urchin population as a food source, the sea otter population might die out.
7. Sample hypothesis: Snowshoe hares turn white in the winter so that they can blend in with the snow and avoid being caught by lynx. In the summertime, the brown coat of the hare blends in with the color of the ground.
8. Sample hypothesis: Yes, I think there would be animals like coyotes in other deserts. [Example: The jackal in the Kalahari Desert in Southwest Africa plays a similar ecological role as the coyote.]

1F Stopwatch Math

1. Answers are:
   a. 5, 5.05, 5.15, 5.2, 5.5
   b. 6:06, 6:06.004, 6:06.04, 6:06.4
2. Answers are:

Time	9.88w	9.88w	9.91	9.95w
Year	2002	1998	2004	2001

Time	9.97w	10.01	10.08	10.11
Year	1999	2000	2005	2003

3. Answers are:
   a. 1:22.04, 1:22.4, 1:23.117, 1:23.2, 1:24, 1:24.007, 1:25, 1:33
   b. 1:17.99, 1:18.22, 1:18.3, 1:20, 1:20.22, 1:21.003, 1:21.2
   c. 1:24.099, 1:24.9899, 1:24.99, 1:24.9901, 1:25, 1:25.001
4. Infinitely many solutions possible.
   Example: 26:15.21, 26:15.215, 26:15.22, 26:15.225, 26:15.23

1G SI Units

1. 10 g
2. 1000 mm
3. 600 mm
4. 420 g
5. 5 L
6. 0.1 m

7. 1,500,000 mg
8. 300 L
9. 6,500,000 cm
10. 120,000 mg
11. 7.2 L
12. 5.3 kL
13. A decimeter is 100 times larger than a millimeter.
14. A dekagram is 1000 times larger than a centigram
15. A millimeter is 10 times smaller than a centimeter.

1H SI Unit Conversion—Extra Practice

1. 12,756,000 m
2. 347,600,000 cm
3. 384,000 km
4. 200,000,000 m
5. 16,000,000 cm
6. 3,600,000 mm
7. 125,000 m long, 400 m deep, 1,500 m wide
8. 11.18 km/sec
9. 5,400,000 g
10. 2 g
11. 1,200 mg to 2,700 mg
12. 158,000 kg
13. 450,000,000 mg
14. 23,000 g to 90,000 g
15. 40,000 mL
16. 1,000 mL
17. 26,600 kL
18. 1,558,000 L
19. 60 mL
20. 0.947 L

1I SI-English Conversions

1. ≈ 4.3 mi
2. ≈ 4.11 oz
3. ≈ 896 kg
4. ≈ 2.1 qt
5. ≈ 2,400 g
6. ≈ 33 mi
7. 2830 in; 78.7 yd
8. ≈ 1.74 mi
9. ≈ 3.77 L
10. ≈ 0.379 lb

1J Significant Digits

Part 1 answers (Find the number of significant digits):

a. 4
b. 1
c. 4
d. 2
e. 2
f. 3
g. infinitely many (# of students is counted)

Part 2 answers (Report your answers with significant digits):

1. 34,000 cm^2
2. 0.9 liters
3. 12.8 m^2
4. 24.2°C
5. 40:32
6. Answers will vary.

1K Solving Equations with One Variable

Part 1 answers:

1. $w = 4.0$ mm
2. $l = 0.8$ m
3. $h = 8.00$ cm
4. $d = 7.5$ m
5. $s = 4.0$ m/s
6. $t = 30$ s
7. $t = 31.3$ s
8. $D = 7.8$ g/cm^3
9. $m = 1.1$ g
10. $m = 4.5$ g
11. $V = 113$ cm^3
12. $V = 2.3$ cm^3

Part 2 answers:

1. Force = 8 N
2. $p = 20$ Pa
3. $p = 216$ Pa
4. $p = 15{,}000$ Pa

1L Speed

1. 7 km/hr
2. 55 mph
3. 4.5 seconds
4. 5.9 hours; 490 mph
5. 4.0 km
6. 2.5 miles
7. 4.5 meters
8. Answers are:
   a. 2.54 cm/inch
   b. 12 inches/min
9. 6 km/hr
10. Answers are:
    a. 600 seconds
    b. 10 minutes
11. 1,200 meters
12. Answers are:
    a. 42 km
    b. 9.3 km/hr
13. Answers are:
    a. 0.2 km/min
    b. 0.5 km/min
    c. 0.3 km/min faster by bicycle
14. 12.5 km
15. 40 minutes
16. 90. km/hr
17. 820 km/hr
18. 32.5 km or 33 km
19. 8 hours
20. 633 km/hr
21. 731 km/hr
22. 1,680 km
23. 3.84×10^5 km
24. 2.03×10^4 seconds
25. Answers for 25 (a) - (c) will vary. Having students write their own problems will further develop their understanding of how to solve speed problems.