NOTES TO TEACHERS

CHAPTER 1

REAL JUICE OR SWEETENED FRUIT-FLAVOURED WATER?

Comment

It would be instructive to have students bring drink labels to class and compare the information on them.

It would also be instructive to link this activity with the new edition of *Canada's Food Guide*, which recommends limiting the intake of juices, eating more fruit and drinking more water.

MAKING A THOUGHTFUL CHOICE

Comment

Students can be left to find information on their own. If they have access to a computer, you may direct them to the appropriate sections of the *Observatory* Companion Website (under *Info briefs: activities*).

Be sure to tell students that all sources of information are not equally reliable and that opinions are not always impartial (advise them to read part 4 of the *Toolbox,* if applicable).

CHAPTER 2

A MAGIC KEY

Comment

- Ask students to come to class with a key they want to colour or no longer use.
- Prior to the activity, prepare enough copper chloride solution to give 150 mL to each student or team of students. Consult the product data sheet as needed (see Companion Website).

OUT OF SIGHT

Comment

Ready-made models sold on the market can also be used for this modelling activity.

Suggested materials

- polystyrene balls *or* marshmallows
- stir sticks *or* toothpicks

CHAPTER 3

GAS UNDER PRESSURE

Comment

A smaller balloon may be used, but there will be problems fitting it around the neck of the bottle. A 1-L bottle will work better with a smaller balloon.

Alternative

Below is another protocol for observing the relationship between gas pressure and volume. You may recommend the protocol suggested in the activity or else the one described below:

Materials

- clear plastic bottle (2 L *or* 1 L)
- inflatable balloon (30 cm *or* 22 cm)
- drinking straw
- transparent adhesive tape *or* adhesive putty

Procedure

1. Make a hole in the bottom of the bottle just large enough to insert the drinking straw.

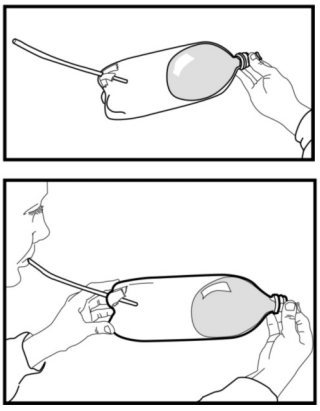
2. Keep part of the straw outside the bottle and secure it with the adhesive tape or adhesive putty to prevent air from escaping through the hole.

3. Hold the balloon by the end and insert into the bottle. Blow until the balloon is partially inflated.

4. Squeeze the tip of the balloon between your fingers to keep it inflated.

5. Blow into the straw and observe what the balloon does.

6. Suck air from the bottle through the straw and observe what the balloon does.



BLOOD PRESSURE

Comment

At the start of this activity, demonstrate what happens in atherosclerosis by modelling the blockage of blood flow in an artery.

Materials

- clear *or* transparent plastic bottle (500 mL *or* 1 L)
- drinking glass (diameter smaller than funnel diameter)
- plastic funnel (8 cm *or* 10 cm in diameter)
- 200 mL of tap water (cold)
- red colouring (optional)
- graduated cylinder (100 mL *or* 200 mL)
- about 2 mL of margarine
- plastic *or* metal knife
- toothpick
- stopwatch

Procedure

1. Tell students that the funnel represents an artery.

2. Colour the water with a few drops of red colouring to simulate blood (optional).

3. Plug the funnel with your finger to keep the water from flowing through, then slowly pour in 100 mL of water.

4. Assign a student to time how long the water takes to go through the funnel.

5. Put the mouth of the funnel over the mouth of the bottle and remove your finger. Let the water run through and record the flow time.

6. Empty the water from the bottle.

7. Using the knife, place a small amount of margarine in the tube of the funnel. Fill about half of the tube and tamp the margarine so it stays in place when water flows through the tube.

8. Insert a toothpick to make a hole in the middle of the tube so that liquid can stream through.

9. Fill the funnel again with 100 mL of water and record the time the liquid takes to flow into the bottle.

Water flow time – open funnel: about 2 seconds.
Water flow time – partly clogged funnel: 4-5 minutes.

Note: Flow time (step 9) will depend on the size of the hole made with the toothpick.

Drawing a conclusion

- Lead students to conclude that the fat deposited in the arteries will gradually clog them and interfere with blood flow.

Making the connection

- After the demonstration, ask students to explain the connection between blood pressure and atherosclerosis.

One consequence of atherosclerosis (arteries blocked by fatty deposits) is hypertension, also known as high blood pressure. This occurs when the artery diameter becomes narrower owing to partial blockage and blood pressure increases to ensure sufficient flow for oxygenating the body.

CHAPTER 4

PEERING ABOVE THE CROWD

Comment

- Juice or cream boxes of the same size (about 7 cm at the base and 24 cm high) may also be used. Ask students to bring some boxes from home and make sure they are properly rinsed to prevent bad odours.
- Since a large supply of glass mirrors may be costly, plastic mirrors may be used instead.

NOT IN PLAIN SIGHT

Comment

You may have students conduct a similar sampling survey among their family and friends.

You may suggest that students use spreadsheet-type software to keep track of their data.

CHAPTER 5

SAME OR DIFFERENT?

Comment

If you plan to demonstrate the observation method in class, start by assigning a number to each student. Instead of writing their names in the table, students can simply record their assigned numbers.

Alternatives for choosing a group to observe

- students entering school in the morning
- students from another class
- the students' families

MULTIPLICATION AND DIVISION

Comment

Have pipe cleaners of different colours on hand for this activity.

Alternative

- Ask students to model only one method of reproduction.
- Divide the class into two teams: one can model mitosis, the other meiosis.
- Have students compare their models.
  - What do the models have in common?
  - What are their principal differences?

CHAPTER 6

A HEALTHY LUNCH BOX

Alternatives

Instead of having students plan their own lunch box menu, suggest that they plan a menu for one of the following people:

- 5-year-old boy
- 30-year-old woman
- 22-year-old runner
- 62-year-old sedentary man with high blood pressure

Students could also analyze their own lunch box contents to see whether they are following the recommendations of *Canada's Food Guide*. In this case, they should determine how many servings of each food group they have in their lunch boxes.

You can ask the students to share their healthy menu with the group. This could give them new lunch ideas.

Canada's Food Guide is available online. A link to Health Canada's Website is provided on the *Observatory* Companion Website (under *Info briefs: activities)*.

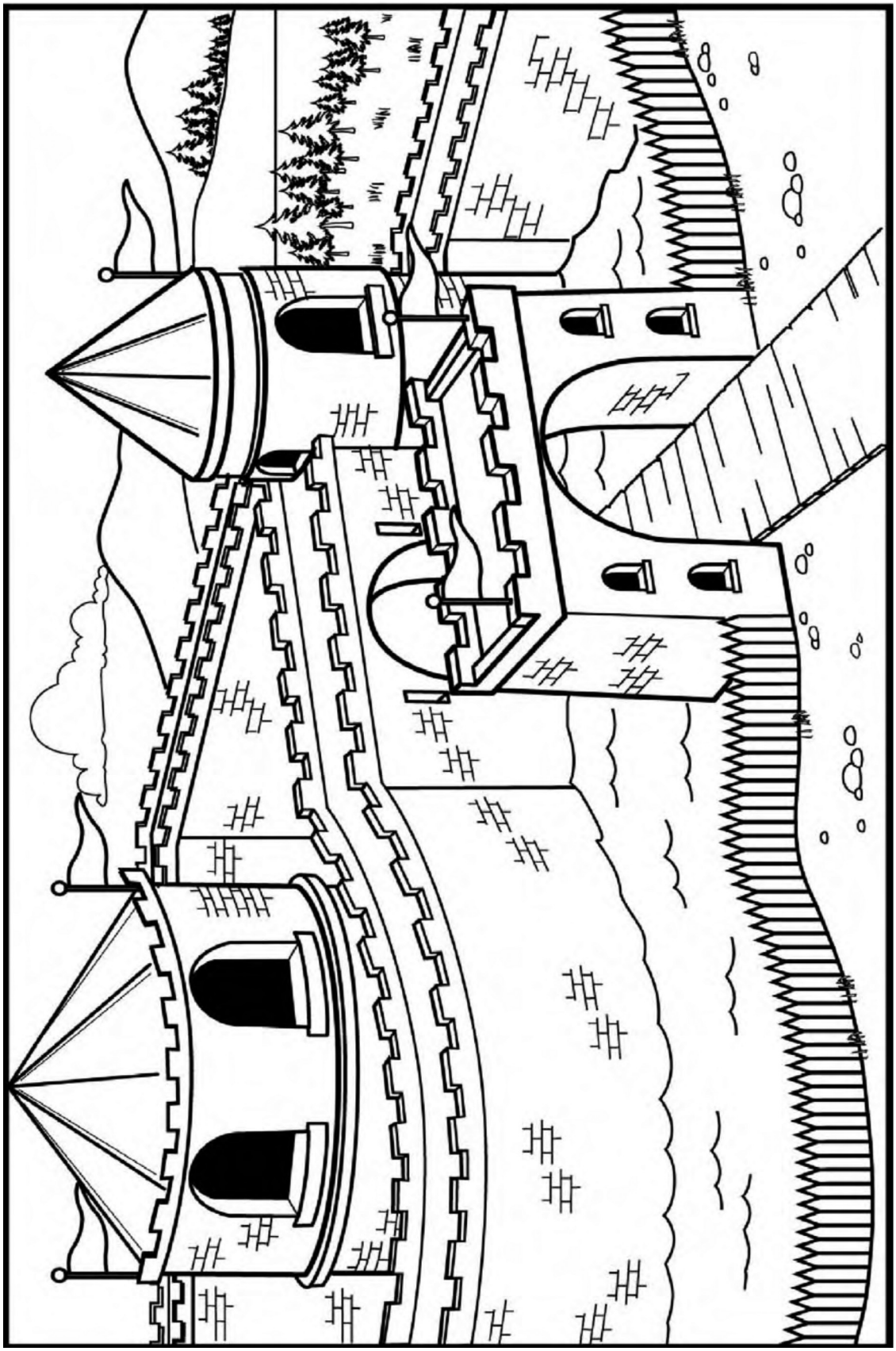
ATTACK AND COUNTERATTACK

Comment

The castle on the next page may be used as a basic model illustrating the body's defence mechanisms.

Students are to represent the body's two ways of protecting itself:

- The white cells stage a frontal attack on antigens (foreign substances such as toxins and microorganisms) by digesting them.
- The white cells secrete antibodies that attack the antigens.



CHAPTER 7

HELMETS: TO WEAR OR NOT TO WEAR

Comment

Students can be left to find information on their own. If they have access to a computer, you may direct them to the appropriate sections of the *Observatory* Companion Website (under *Info briefs: activities*).

Be sure to tell students that all sources of information are not equally reliable and that opinions are not always impartial (advise them to read part 4 of the *Toolbox* if applicable).

SYSTEM IN PERIL

Comment

Students can be left to find information on their own. If they have access to a computer, you may direct them to the appropriate sections of the *Observatory* Companion Website (under *Info briefs: activities*).

Be sure to tell students that all sources of information are not equally reliable and that opinions are not always impartial (advise them to read part 4 of the *Toolbox* if applicable).

CHAPTER 8

ENHANCED FOODS

Comment

The suggested activity does not fully apply the experimental method, but only certain steps of the method.

BOY OR GIRL?

Comment

Students can be left to find information on their own. If they have access to a computer, you may direct them to the appropriate sections of the *Observatory* Companion Website (under *Info briefs: activities*).

Be sure to tell students that all sources of information are not equally reliable and that opinions are not always impartial (advise them to read part 4 of the *Toolbox* if applicable).

Alternatives

- Ask students to write a newspaper or magazine article on the subject.
- Ask students to make a poster illustrating their position on the subject.

CHAPTER 9

CONQUERING SPACE

Alternative

Suggest that students choose a planet of the solar system and find the desired information about past and present space probes launched to that planet. If you choose this alternative, give students time to browse the Internet prior to the activity period.

Name of space probe	Space agency	Launch date	Objective	Success (S) Failure (F)
Pioneer 1 and *3*	NASA	1958	Reach the Moon.	F
Luna 2	Russian Space Agency	September 12, 1959	Reach the Moon.	S
Luna 3	Russian Space Agency	October 4, 1959	Photograph the hidden side of the Moon.	S
Ranger 7	NASA	July 28, 1964	Photograph the lunar surface.	partial S
Surveyor 1	NASA	May 30, 1966	Send back photos of the Moon.	S
Surveyor 3	NASA	1967	Send back images; collect samples.	S
Surveyor 5	NASA	1967	Analyze soil samples *in situ*.	S
Luna 16	Russian Space Agency	September 12, 1970	Collect samples of lunar soil.	S
Luna 17	Russian Space Agency	November 10, 1970	Land a robotic spacecraft on the Moon.	S
Venera 7	Russian Space Agency	1970	Enter the atmosphere and land on Venus.	S
Mariner 9	NASA	May 1971	Photograph Mars.	S
Mars 2 and *3*	Russian Space Agency	May 1971	Send back data about the planet.	partial S
Pioneer 10	NASA	March 3, 1972	Measure the environment of Jupiter.	S
Venera 8	Russian Space Agency	1972	Analyze Venusian rocks.	S
Pioneer 11	NASA	April 5, 1973	Explore Jupiter and Saturn, then explore outside the solar system.	S

Name of space probe	Space agency	Launch date	Objective	Success (S) Failure (F)
Mars 4, 5, 6 and *7*	Russian Space Agency	July/August 1973	Explore Mars.	F
Mars 5	Russian Space Agency	July 25, 1973	Send back images from Mars.	partial S
Luna 21	Russian Space Agency	October 4, 1959	Land a second robotic spacecraft on the Moon.	S
Mariner 10	NASA	November 3, 1973	Photograph the surface of Mercury.	S
Viking 1	NASA	August 20, 1975	Detect possible life on Mars and conduct soil analyses.	S
Viking 2	NASA	September 9, 1975	Detect possible life on Mars and conduct soil analyses.	S
Venera 9 and *10*	Russian Space Agency	October 1975	Land on Venus and photograph the surface.	S
Pioneer Venus 1 and *2*	NASA	December 1978	Map the surface of Venus and analyze the composition of the planet's atmosphere.	S
Voyager 1 and *2*	NASA	1980–1981	Observe Jupiter and its satellites; overfly Saturn.	S
Venera 13 and *14*	Russian Space Agency	1982	Obtain colour images of the surface of Venus.	S
Venera 15 and *16*	Russian Space Agency	1983	Make radar observations of the surface of Venus.	S
Vega 1 and *2*	Russian Space Agency	1985	Release a balloon probe in the atmosphere of Venus.	S
Phobos 1 and *2*	Russian Space Agency	July 1988	Explore Mars' satellite.	F
Magellan	NASA	May 5, 1989	Transmit radar images from the surface of Venus.	S
Galileo	NASA	October 1989	Study Jupiter and its satellites.	S
Mars Global Surveyor	NASA	November 7, 1996	Inaugurate new Mars exploration program.	S
Mars 96	Russian Space Agency	November 1996	Explore Mars.	F
Mars Pathfinder	NASA	1997	Explore Mars.	S
Mars Climate Orbiter	NASA	1998	Explore Mars.	F
Mars Polar Lander	NASA	1999	Explore Mars.	F
Mars Odyssey	NASA	April 7, 2001	Explore Mars.	S

NIGHT SKIING OR STARGAZING?

Comment

Students can be left to find information on their own. If they have access to a computer, you may direct them to the appropriate sections of the *Observatory* Companion Website (under *Info briefs: activities*).

Be sure to tell students that all sources of information are not equally reliable and that opinions are not always impartial (advise them to read part 4 of the *Toolbox* if applicable).

CHAPTER 10

CREATOR OR DESTROYER?

Comment

Students can be left to find information on their own. If they have access to a computer, you may direct them to the appropriate sections of the *Observatory* Companion Website (under *Info briefs: activities*).

Be sure to tell students that all sources of information are not equally reliable and that opinions are not always impartial (advise them to read part 4 of the *Toolbox* if applicable).

Alternative

- Ask students to write a newspaper or magazine article on the subject.

WITNESSES TO HISTORY

Comment

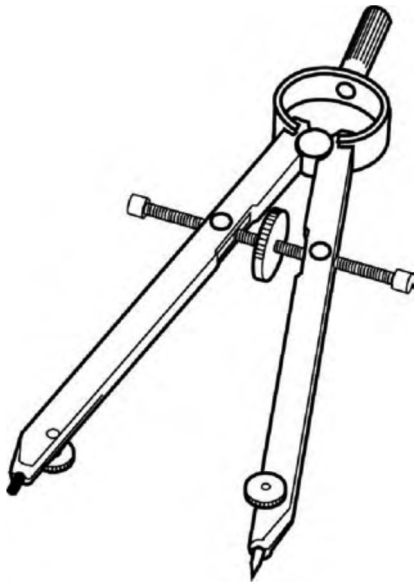
The transparencies supplied with this activity may be used to help students with their observations. You will find them following the activity answer key.

CHAPTER 11

ROUND, ROUND AND ROUND AGAIN

Comment

The answers in the answer key took into account analysis of the compass pictured below. Note that technological analysis for most bow compasses would produce the same answers.



CURVES AND LINES

Comment

Each student should have a ruler, a T-square, two set squares and a compass for this activity.

CHAPTER 12

THE RIGHT STUFF

Comment

- The answer key for the table of results in question 12 lists the samples to provide for students and the numbers to assign those samples. You may write the sample numbers on masking tape, then apply the tape to the corresponding material.
- Wood or modified-wood materials can be purchased at hardware stores.
  - Look first for ACQ treated wood because it is easier to distinguish from untreated wood.
  - Do not choose treated plywood. It will not have the same greenish colour as treated wood.
  - For flake board, choose particleboard.
  - For fibreboard, choose medium density fibreboard (MDF).
- For the metals, you may use electrodes sold by most science equipment suppliers.
- Have students work in teams of four or five to cut down on the number of samples you need to supply.

BONDS, WEAK AND STRONG

Comment

If possible, supply the technical objects shown on the next page so students can observe the different types of links. You could also ask them to bring the objects suggested below to class. Have them work in teams to cut down on the number of technical objects you need to supply.

Other technical objects illustrating different types of links

- Fixed link
  calculator
- Rotating link
  door hinge, cover of portable phone, laptop screen
- Sliding link
  combination square
- Sliding rotating link
  flask mouth
- Spherical link
  joystick, clip-on table lamp
- Helical link
  screw and nut, corkscrew
- Objects having more than one link
  vise (sliding and helical links)

NOTE

If you cannot supply these suggested technical objects, hand out the following page of illustrations.