Chapter Science Investigation   Name _____

Investigating Epidemics in Our Ecosystem

What You Need

reference materials or access
to the Internet

coloring pencils

Find Out

Do this activity to see how quickly harmful agents of disease transfer from person to person in our ecosystem.

Process Skills

Interpreting Data
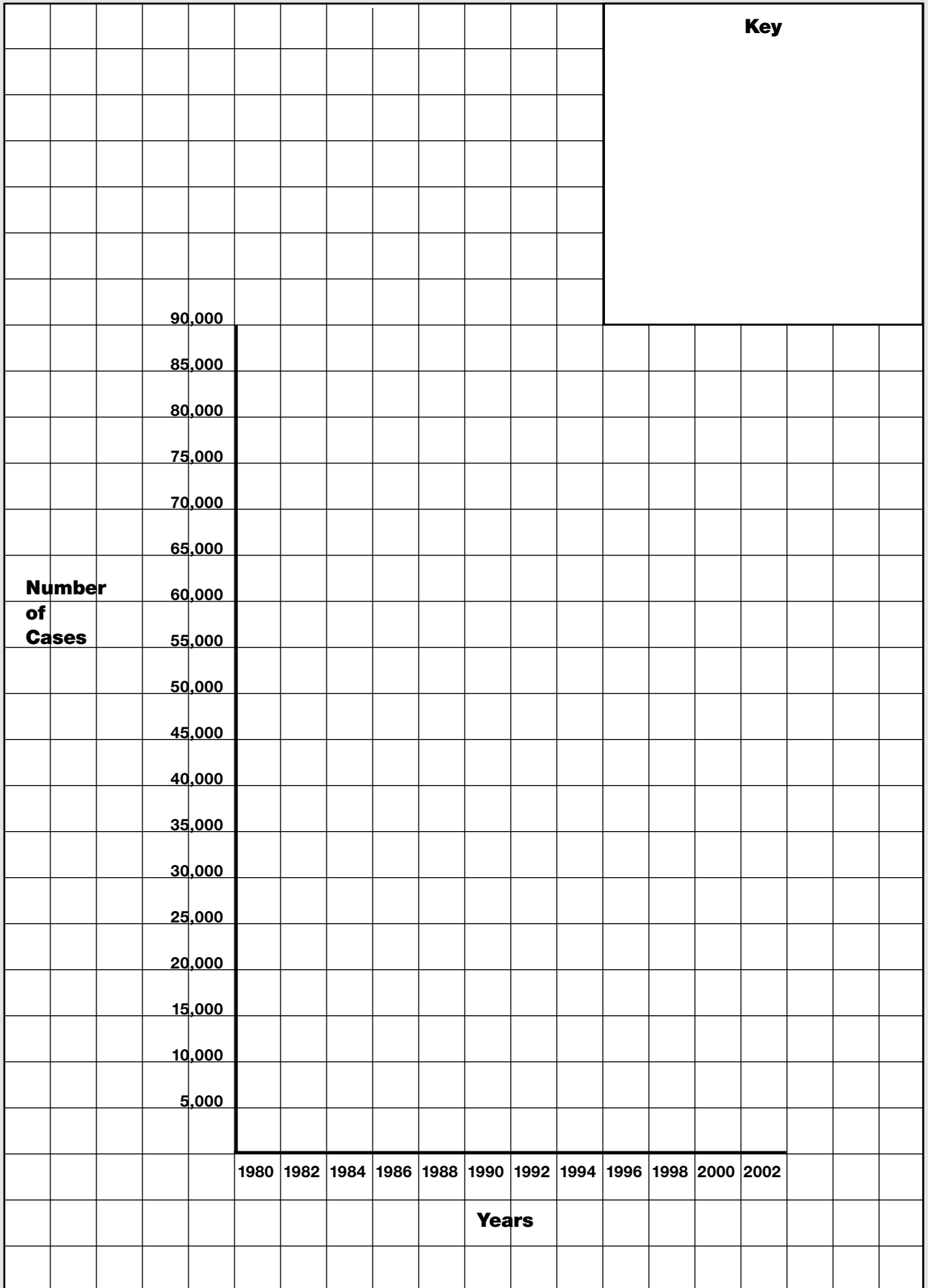Using Numbers
Communicating

Time

- 40 minutes the first day
- 20 minutes each day for two weeks

What to Do

1. Fill in the key on your chart as follows: AIDS—Acquired Immunodeficiency Syndrome—red; HIV—human immunodeficiency virus—blue; Ebola virus—green; Lyme disease—yellow; cholera—purple; typhoid—orange; and influenza—gray. Research these topics. Be sure to find out whether the agent of each disease is a bacterium or a virus.

2. Look up the number of reported cases from 1980 to the present for each of the topics. **Record** the data that you find.

3. **Graph** your findings using the corresponding color for each disease you investigated.

Key

Number of Cases

90,000
85,000
80,000
75,000
70,000
65,000
60,000
55,000
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000

| 1980 | 1982 | 1984 | 1986 | 1988 | 1990 | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 |

Years

Conclusions

1. Using your graph, **predict** which agents of disease will continue to infect greater numbers of people if they are not controlled through medicine or contact prevention.
   Predictions will vary, but students should note that viruses will be more likely to infect greater numbers of people because there are no vaccines or cures for most viral diseases.

2. Which agents of disease appear to be controlled to some degree?
   Students' results and responses will vary based on the data collected. Students should note some control over bacterial diseases.

3. Throughout the entire period, which agents of disease spread the most?
   Students' results and responses will vary based on the data collected. Students should note less control over viral diseases.

New Questions

1. Identify areas of the world in which cases of cholera and typhoid continue to be reported.
   Students' responses will vary based on the data collected.

2. What agents of disease cause cholera and typhoid?
   Cholera is caused by the bacterium *Vibriocholerae.* Typhoid is caused by the rickettsial virus *Rickettsia prowazekii.*

STOP

 UNIT D • Chapter 2: *Global Health*

Name _____
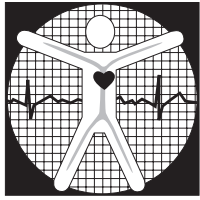
ACTIVITY

Virus Modeling

List and measure the parts you see in the T-4 virus.

Part	Length

The multihedron top is taller than it is wide, 17 mm × 12 mm. The ringed shaft is longer than the top is tall, 21 mm. The long segment of the six appendages is as long as the top is wide, 12 mm. The short segment of the six appendages is slightly shorter, 11 mm.

List the materials you are going to use in your model.
Answers will vary depending on students' plans.

Draw a design of your model.
Students' models do not have to be small, but should reflect the scale of the photo or computer-generated model shown on page D37.

Name _____

Conclusions

① **Compare** your finished **model** with the photo and computer-generated model. **Describe** how your **model** is different from them, and how it is the same.
Answers will vary depending on students' models.

② **Compare** your model with your classmates' models. Is there one that is more similar to the photo and computer-generated model than yours? How is yours better? **Describe** ways you could improve your model.
Answers will vary depending on students' models.

③ **List** ways your model is not like a real virus.
Answers will vary but may include the model's size, what it is made of, or ways their models don't resemble the photo or computer-generated model. Students might also point out that their model viruses are not real.

Asking New Questions

① **Compare** your model of a virus to a typical animal cell. **List** the differences between them.
Possible answer: unlike an animal cell, a virus has no nucleus or cell membrane.

② Do any structures on your virus model remind you of structures in cells? **Make inferences** about what you think the different parts of the virus do.
Possible answer: some structures help the virus move.

③ Do you think a virus could reproduce, digest or produce food, or move? Use what you know about viruses to develop a **hypothesis** about what a virus is. Don't worry about being wrong. Scientists make predictions based on the information they have at the moment, and then change their ideas as new information is discovered.
Possible answer: a virus can move and reproduce, enabling the disease to spread.

④ **Write** two or three problem statements or questions about viruses that you would like to be able to answer.
Accept all reasonable questions.

Name _____
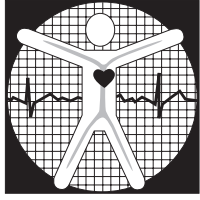
ACTIVITY

Measuring Soil Seepage

Describe the two spots you chose. **Write** or **draw** what they look like.
One place may be dry or rocky; the other should have green grass and dark dirt.

Which soil seems harder?
Students should observe that the spot where plants don't grow well is harder.

How long did it take the water to soak into the ground in both spots?
Record the times in the chart.

Spot	How Long It Took for Water to Soak into Ground
Can 1 (spot where plants don't grow)	Students' test results will vary.
Can 2 (spot where plants grow well)	Students' test results will vary.

Use your information to **make a bar graph** of the two soaking times.
The left axis of students' graphs should be labeled Minutes; the bottom line can be labeled Cans or Soils.
The bar for Can 1 will be higher than the bar for Can 2.

Name _____

Conclusions

(1) At which location was water absorbed more quickly?
the grassy location that had less-compact soil

(2) Remember the results from poking the soil at each spot with your pencil. Do you think there is a relationship between soil hardness and soaking rate?
Hard, compact soil does not allow much water seepage.

Asking New Questions

(1) Use your findings to **infer** which kind of soil would be a better choice for landfill soil.
Hard, compact soil is better for landfills.

(2) Why would soil that allows greater water seepage not be good for a landfill?
Quick-draining soils are more likely to drain into the water supply. Chemicals in the landfill could move into natural water supplies.

   UNIT D • **Chapter 2:** *Global Health*

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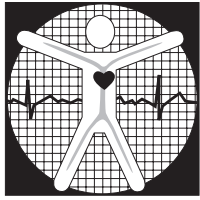
ACTIVITY

Finding Out About Diseases

What kind of information is in the *Morbidity and Mortality Weekly Report?*
Notifiable diseases of the states in the United States, New York City, the District of Columbia, and the U.S. territories.

Tell what system of **classification** is used to organize the report.
types of contagious diseases; locations where diseases occur

Record your **observations** and **calculations** in the **chart.**

Table I	Table II	Table III	Table IV
Students' results depend on the report.			

Name _____

Conclusions

① Were the data only from each state of the United States? If not,
what other places were included?
No; Tables I–III also include data from the U.S. territories, the District of Columbia, and New York
City. Table IV includes voluntary reports from cities with populations of more than 100,000.

② Where do the data come from?
Sources include different government agencies and state and local health departments.

Asking New Questions

① What other information or reports would help public health
officials prevent disease?
Possible answers: number of people in a region, number of people who have been vaccinated, or
number of people who have travelled to another region.

② How would this report be useful to your doctor?
Possible answer: the doctor can be prepared for diseases occurring in the region.