

READING 1 SAFER HOMES IN EARTHQUAKE ZONES

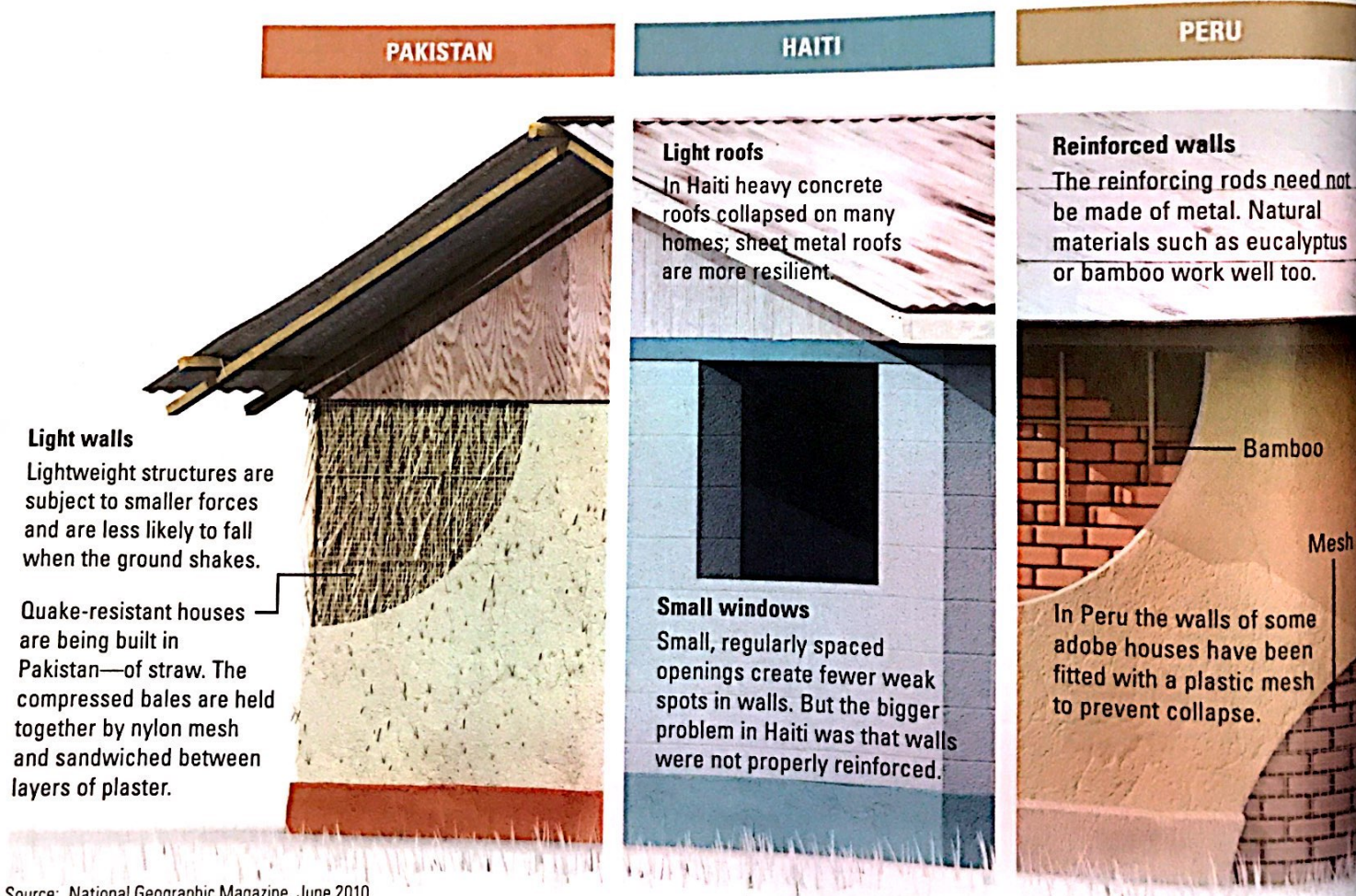
One engineer sums it up in a few brief words: "Earthquakes don't kill; buildings do." In Los Angeles, Tokyo, and other wealthy cities in earthquake zones, high-tech, earthquake-resistant construction has become an expensive fact of life. Engineers reinforce concrete walls with steel. Some recent buildings rest on elaborate shock absorbers that have many layers of padding. Experts say these kinds of safeguards have paid off. They believe that strict building codes¹ saved thousands of lives when an earthquake hit Chile in 2010. It was the sixth most powerful earthquake on record. There was extensive damage. Yet, the death toll—521—was relatively low.

¹ *building codes*: government rules for safe construction

People in less developed countries have not been so lucky, however. Haiti also experienced a strong earthquake in 2010. Although the one in Chile was 500 times more powerful, the Haitian quake killed at least 223,000 people and left more than a million homeless (see Tables 1 and 2). In Haiti and other countries with few resources, expensive, earthquake-resistant structures don't stand a chance of getting built. Even basic earthquake engineering is often beyond their means. Billions of people live in houses that can't withstand the violent shaking of an earthquake. Fortunately, safer homes can be built cheaply, using local material such as straw, bamboo,² and recycled materials like old tires.

² *bamboo*: a tropical grass with hard, hollow stems

Figure 1. Inexpensive Earthquake-Resistant Construction



Source: National Geographic Magazine, June 2010

Table 1. Earthquakes with Highest Death Tolls since 1900

Country	Date	Magnitude	Fatalities
China	1976	7.0	242,000
Haiti	2010	7.0	223,000
China	1920	7.8	180,000
Indonesia	2004	9.1	165,000*
Japan	1923	7.9	143,000
Soviet Union (present day Turkmenistan)	1948	7.3	110,000
Italy	1908	7.1	75,000
Pakistan	2005	7.6	73,000
China	2008	7.9	69,000

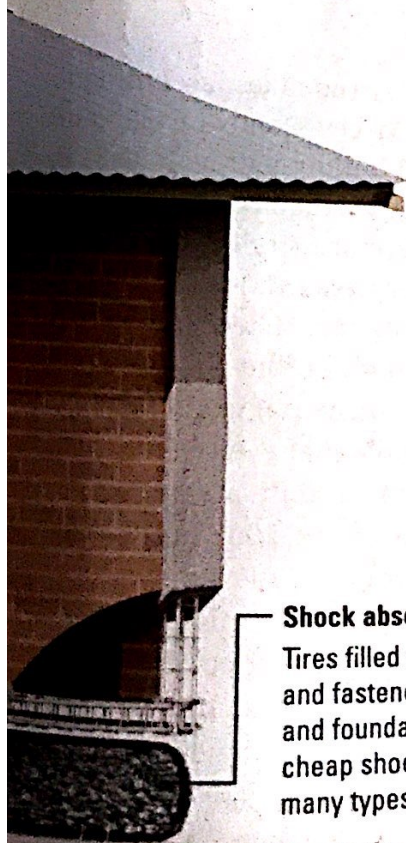
*includes deaths from tsunami caused by earthquake
 Source: EM-DAT, Centre for Research on the Epidemiology of Disasters

Table 2. Earthquakes with Highest Magnitudes since 1900

Country	Date	Magnitude	Fatalities
Chile	1960	9.5	1,655
Alaska, USA	1964	9.2	128
Indonesia	2004	9.1	165,000*
Japan	2011	9.0	16,000
Kamchatka, Soviet Union	1952	9.0	0
Chile	2010	8.8	521
off coast of Ecuador	1906	8.8	500-1,500
Alaska, USA	1965	8.7	0
Indonesia	2005	8.6	1,300

*includes deaths from tsunami caused by earthquake
 Source: Australia Geographic

INDONESIA



Shock absorbers

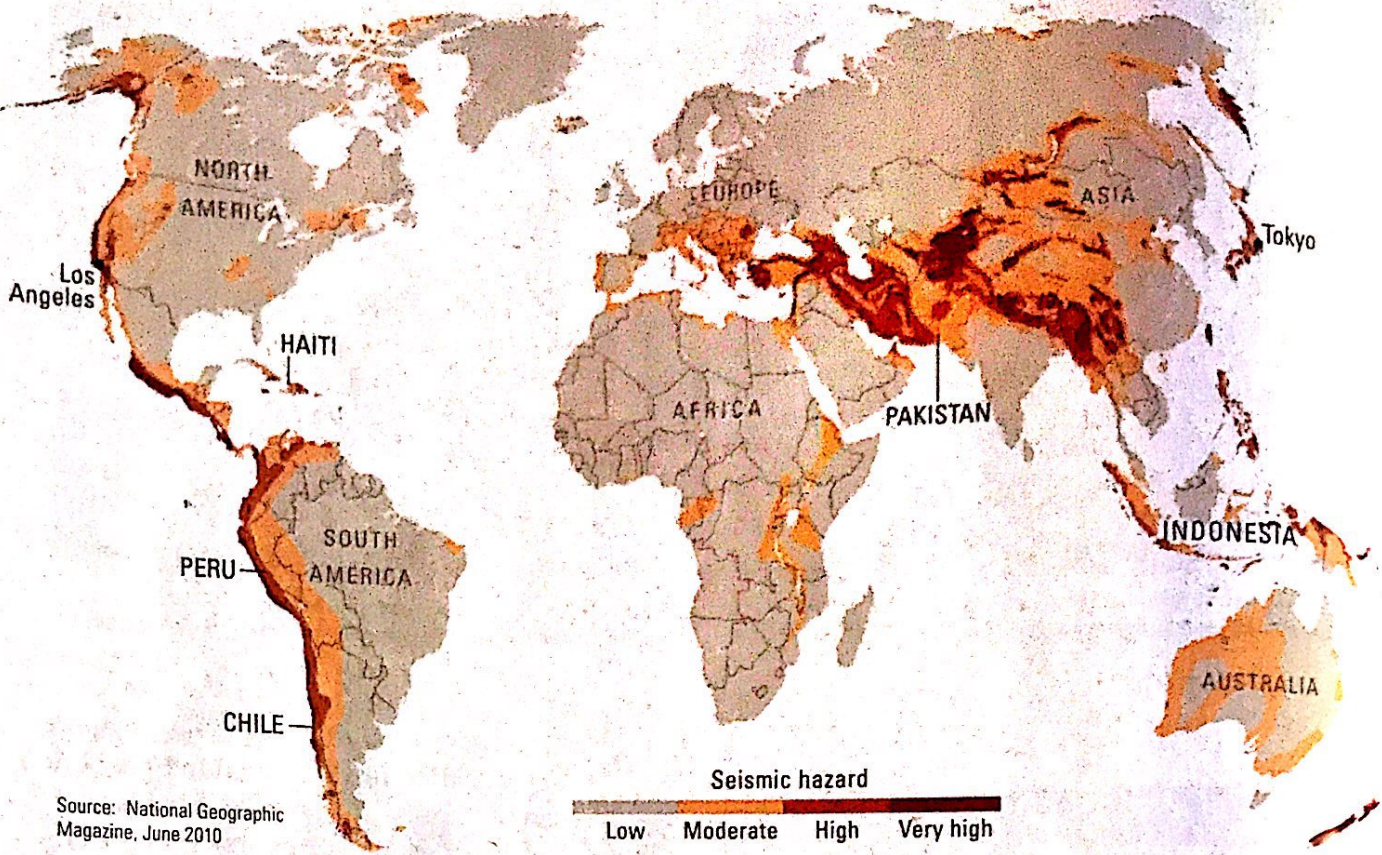
Tires filled with stones or sand and fastened between floor and foundation can serve as cheap shock absorbers for many types of building.

“The devastation in Haiti wouldn’t happen ³ in a developed country,” says engineer Marcial Blondet of the Catholic University of Peru. Blondet has been working on innovative building ideas since 1970, when an earthquake in Peru killed 70,000 people. Many of the victims died when their houses crumbled around them. Heavy, brittle walls of traditional sundried brick cracked instantly when the ground started shaking. Subsequent tremors brought roofs tumbling down. Blondet’s research team has found that brick walls like these can be reinforced with a strong plastic mesh.³ In an earthquake, walls will crack, but they won’t collapse. The occupants may lose their homes, but they won’t lose their lives. This inexpensive plastic mesh can also reinforce concrete walls like the ones that are common in Haiti.

Engineers in other countries are also working ⁴ on methods that use other types of inexpensive and local materials. Researchers in India have successfully tested concrete house walls reinforced with bamboo, which is both cheap and

³ mesh: loosely woven material with big spaces, much like a net

Figure 2. Map of Seismic Activity around the World



widely available there. In Indonesia, a model house rests on a foundation of old tires filled with sand. These kinds of houses are not as strong as houses that use more sophisticated earthquake-resistant technology, but they cost much less. The lower cost means they are more likely to be built in countries like Indonesia.

John van de Lindt, a professor of civil engineering at Colorado State University, knows that choosing the right building materials can be a matter of life and death in an earthquake zone. He says that builders and engineers want buildings to be as safe as possible. Yet, they must also be realistic about costs. Working with local materials is an important first step. In northern Pakistan, this means straw. Traditional houses are built of stone and mud, but straw is far

more resilient during earthquakes, according to California engineer Darcey Donovan. She and her colleagues started building straw houses in Pakistan after the 2005 earthquake.

“John van de Lindt... knows that choosing the right building materials can be a matter of life and death in an earthquake zone.”

There are similar challenges in other areas that are prone to earthquakes. There are many exciting ideas, but the slow progress is discouraging. One major problem is that even these cheap solutions aren't always cheap enough. Since 2007, only about 2,500 houses in Peru have been reinforced with plastic mesh. Unfortunately, that still leaves millions of unsafe houses in Peru, to say nothing of other developing countries. Blondet acknowledges that many houses will collapse in the next earthquake. Fortunately, however, there are also many more safe houses made of local materials that are likely to withstand future earthquakes.

READING COMPREHENSION

Big Picture

A Choose the best answer for each of the following questions.

1. What is the main idea of paragraph 1?
 - a. Many countries cannot afford to build earthquake-resistant homes.
 - b. The number of deaths from earthquakes is very high.
 - c. Earthquake-resistant construction can save lives.
2. What is the purpose of paragraphs 3, 4, and 5?
 - a. To show that engineers are helping communities that have experienced earthquakes
 - b. To show that local and inexpensive building materials can be earthquake resistant
 - c. To show the high-tech innovations in earthquake-resistant construction
3. The following sentence is the main idea for which paragraph?

Although there are inexpensive ways to construct earthquake-resistant buildings, for some communities, these are still too expensive.

 - a. Paragraph 4
 - b. Paragraph 5
 - c. Paragraph 6
4. What is the main idea of Reading 1?
 - a. Earthquake-resistant construction is too expensive for some countries.
 - b. Inexpensive earthquake-resistant construction is possible.
 - c. More people will die in earthquakes if we don't build better houses.

B In Exercise A, question 2 suggests that paragraphs 3, 4, and 5 all have similar purposes. Write the main idea of each paragraph.

1. Paragraph 3: _____
2. Paragraph 4: _____
3. Paragraph 5: _____

Close-Up

A Briefly answer the following questions according to information in Reading 1.

1. Why was the earthquake damage so much worse in Haiti than in Chile?

2. How can plastic mesh help save lives?

3. What are the advantages of building materials such as bamboo and old tires?

4. Why is straw a good building material for areas that experience a lot of earthquakes?

5. Why aren't more communities adopting the new building ideas described in the reading?

B Briefly answer the following question after studying Figure 1.

What are two building suggestions shown in Figure 1 that are not discussed in the reading?

Reading Skill

Understanding Information in Tables

Academic texts often include tables and graphs. These visuals may show information in the main text in a different form, or they may provide additional information. It is important to understand how the tables are connected to the main text.

1. Look for references to tables and graphs within the text (for example, see *Tables 1 and 2*). The surrounding text probably contains information closely connected to the information in the table.
2. Think about how the information in tables and graphs extends the ideas and arguments presented in the text.

A Look at Tables 1 and 2. Work with a partner to answer the following questions.

1. What information in the reading is also in the tables? Underline the overlapping information in the tables and the text.
 2. For the events or ideas that you underlined in the reading, what additional information does the table provide?
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B Compare the information in the two tables. Then discuss the following questions with a partner.

1. There were two earthquakes in the former Soviet Union only four years apart. Which earthquake had more fatalities? Why do you think the number of fatalities was so different?
2. Why do you think two of the most powerful earthquakes in the tables had no fatalities?
3. Which earthquake is listed in both Table 1 and Table 2? Why do you think only one earthquake is found in both tables?
4. What factors could explain the number of fatalities in both tables?
5. Based on the information in the tables, where do you think another major earthquake might occur in the future? Where do you think an earthquake with a high number of fatalities might occur? Explain your answers.

VOCABULARY PRACTICE

Academic Vocabulary

A Find the words in bold in Reading 1. Use the context and the sentences below to help you match each word to its correct definition.

- F 1. The children spent days creating an **elaborate** (Par. 1) plan for a surprise birthday party.
- h 2. The new law includes **safeguards** (Par. 1) against dangerous chemicals.
- g 3. Airplane parts must **withstand** (Par. 2) the force of high winds and changes in temperature.
- e 4. The engineers used **innovative** (Par. 3) methods to build the bridge.
- a 5. Because their bones are **brittle** (Par. 3), it can be quite serious when old people fall.
- C 6. All of the **occupants** (Par. 3) of the apartment building were able to escape the fire.
- b 7. The plants in this area are naturally **resilient** (Par. 5) and grew back quickly after the drought.
- d 8. The report was very **discouraging** (Par. 6). The police were unable to find the mountain climbers who got lost in the snowstorm.

- a. stiff but easily broken
- b. not easily harmed or damaged; able to recover
- c. people who live inside a place
- d. causing a feeling of hopelessness or lack of confidence to continue
- e. new, different, and usually better
- f. very complicated with many different parts
- g. survive without damage
- h. methods of protection from harm

B Choose an academic word from Exercise A to complete each of the following sentences. Notice and learn the words in bold because they often appear with the academic words.

1. In spite of the cold winter, the trees we planted last year turned out to be **remarkably resilient**. This spring they are growing well.
2. In a special course, the teachers learned to use simple but **innovative** ideas in their classes to help students who struggle with their work.
3. The software engineers have created a(n) **elaborate** system that no one understands. It is extremely complicated.
4. The **occupants** of the **building** say that the elevator needs repairs. Several people have gotten stuck in it.
5. The equipment is used in polar areas because it is able to **withstand** extreme temperatures and remain effective.
6. We were disappointed by the **discouraging** news about the economy.
7. Older people often have **brittle** bones that break easily.
8. We must develop **safeguards** against future natural disasters.



A collapsed building after the Haiti earthquake in 2010

Multiword Vocabulary

A Find the multiword vocabulary in bold in Reading 1 and use the context to help you figure out the meaning. Then match each item to the correct definition.

- | | |
|--|--|
| <u>g</u> 1. a fact of life (Par. 1) | a. the number of people who have died |
| <u>e</u> 2. paid off (Par. 1) | b. have the tendency to be affected by something bad |
| <u>a</u> 3. death toll (Par. 1) | c. extremely important; important enough to affect someone's survival |
| <u>e</u> 4. don't stand a chance of (Par. 2) | d. have no possibility of |
| <u>h</u> 5. beyond their means (Par. 2) | e. in addition to and even more important than |
| <u>c</u> 6. a matter of life and death (Par. 5) | f. was successful after a period of time |
| <u>b</u> 7. are prone to (Par. 6) | g. something that cannot be changed and must be accepted |
| <u>d</u> 8. to say nothing of (Par. 6) | h. too expensive for them |

B Complete the following sentences using the correct multiword vocabulary from Exercise A. In some cases, you need to change the verb or pronoun form.

1. This has been a terrible winter. The temperatures have been extremely low.

2. The _____ the heavy snow.
3. We would like to take a vacation this summer, but I am afraid, for now, it is _____ from this weekend's tragic fire has reached four.
4. For top mountain climbers, having the right equipment can be _____ . Maybe we will be able to afford it next year.
5. Our soccer team is not very strong this year. I am afraid we _____ . Poor preparations can have fatal consequences.
making it to the championship match.
6. An investment in your education will _____ eventually because it will enable you to get a good job.
7. For people who live in Alaska, long, cold winters are just _____ .
8. People who _____ respiratory problems should stay inside today. The pollution is very bad.

Use the Vocabulary

Write answers to the following questions. Use the words in bold in your answers. Then share your answers with a partner.

1. Are you **prone** to catching colds? If so, what are the best **safeguards** against catching them?
2. Some people believe that children are more **resilient** than adults following a serious illness or a tragedy. Do you think this is the case?
3. Have you ever made a plan or done something that others said **didn't stand a chance** of succeeding? Did your plan **pay off** in the end?
4. Most people dream of doing something or buying something that is **beyond their means**. What do you dream about?
5. What do you do when you get **discouraging news**? Do you accept it as a **fact of life**? Try to change it? Try to think about other things? Give an example of discouraging news you have heard.

THINK AND DISCUSS

Work in a small group. Use the information in the reading and your own ideas to discuss the following questions.

1. **Summarize.** How would you describe the connection between the magnitude of an earthquake and the number of fatalities it causes?
2. **Analyze.** Reading 1 contains the following statement, "The occupants may lose their homes, but they won't lose their lives." Explain what this means. Should governments in these countries focus on expensive solutions, which may save buildings, or inexpensive solutions, which may not save the buildings themselves but will save the people inside these buildings?
3. **Predict.** How successful do you think the efforts to use inexpensive materials described in Reading 1 will be over time? Explain your answer.

Vocabulary Review

A Complete the reading with the vocabulary below that you have studied in the unit.

adequate ventilation
at the same time
a breath of fresh air
elaborate system

get in touch with
in keeping with
innovative idea

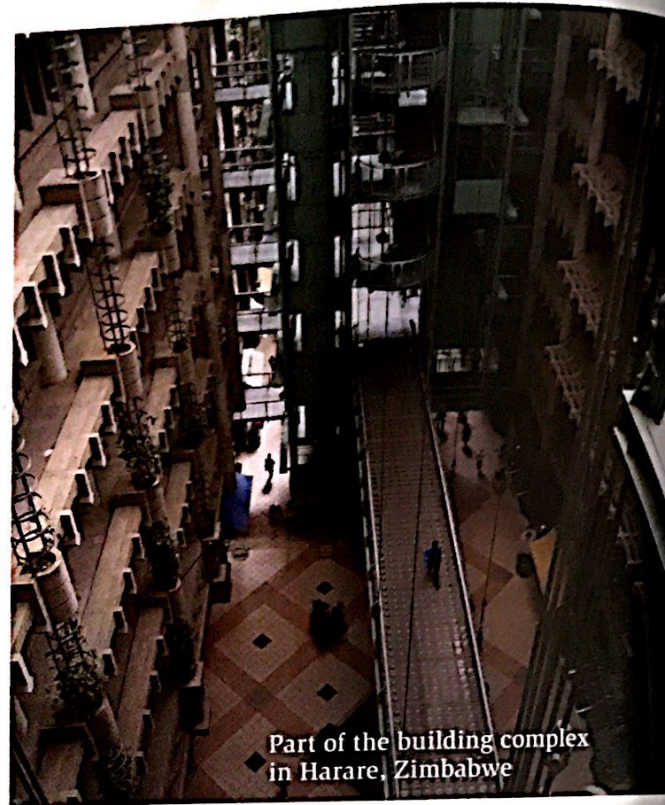
occupants of the building
paid off
withstand extreme temperatures

In Zimbabwe, architects of a new office and shopping complex have brought _____¹ to modern architecture. They wanted to create an exciting, modern building. _____², however, they wanted a design that was _____³ nature and the building's location in southern Africa.

So, for inspiration, they turned to termites. Termites are insects that live in large colonies and eat wood, among other things. Termites live in gigantic earthen mounds that must be kept at a constant temperature. The termites are able to achieve this by using a(n) _____⁴ of heating and cooling vents.

The termites open and close the vents to regulate the temperature. Although the office complex in Zimbabwe is made of concrete, it operates on a similar principle, with a system of vents that bring in the outside air. The office building has no air conditioning or heating, yet it provides _____⁵. It can _____⁶ and still keep the many _____⁷ comfortable all year round.

This new and _____⁸ has _____⁹ in terms of energy costs, which are 10 percent lower than traditional buildings of the same size. The building's designers encourage others in their profession to _____¹⁰ nature. They believe we have a great deal to learn from nature's architects.



Part of the building complex in Harare, Zimbabwe

B Compare answers to Exercise A with a partner. Then discuss the following question.

What design principles did the architects take from termites?

C Complete the following sentences in a way that shows that you understand the meaning of the words in bold.

1. In my city, _____ is just a **fact of life**.
2. There was **discouraging news** about _____ on the radio today.

3. Painters in the early 20th century drew inspiration from the natural world.
4. The unique design of the building appears the light and keeps the interior shaded and cool.
5. My professor asked me to gather more statistical information into my paper.
6. The reason for her decision was immediately apparent. We could see that she was exhausted.
7. The windows are small, but they provide adequate ventilation.
8. The company regularly updates its Web site with news and information.

Multiword Vocabulary

A Find the words in bold in Reading 2. Then write the words that come before and/or after them to complete the multiword vocabulary.

1. Regularly way updated (Par. 1)
2. at the beginning of the 21st century (Par. 2)
3. a breath from the same time (Par. 4)
4. a breath of light together (Par. 6)
5. Draw this idea **in mind** (Par. 6)
6. extended regularly (Par. 7)
7. keep **in touch** regular (Par. 8)
8. from **keeping** high (Par. 8)

B Complete the following sentences with the correct multiword vocabulary from Exercise A. Use the information in parentheses to help you. In some cases, you need to change the verb form.

1. _____ (as one century was changing to the next), the United States was losing manufacturing plants to overseas locations.
2. When she went to Italy, she wanted to _____ (connect with) her family history, so she visited the town where her great grandparents were born.
3. It may take some time for soldiers to adjust when they return home. It is important for military families to _____ (remember).
4. The new library building is _____ (consistent with) the architecture of the rest of the buildings at the university.
5. After many years of similar television programs, this season brings _____ (change, new ideas).
6. It is important to stress hard work and high academic standards. _____ (what was just stated is true, and what follows is also true), schools should provide extra support for students who are not well prepared.

B Review these main idea statements from Big Picture, Exercise A. Then, for each one, write one or two supporting details.

1. People are beginning to question the destruction of old buildings and their replacement with modern ones.

Supporting detail(s):

Replacements with modern ones

2. Many recent architectural designs combine local traditions with modern ideas.

Supporting detail(s):

combine local traditions

VOCABULARY PRACTICE

Academic Vocabulary

A Find the words in bold in Reading 2. Use the context and the sentences below to help you match each word to its correct definition.

- B 1. The museum exhibit included **elements** (Par. 2) of the different cultures of Mexico.
- C 2. My business professor **incorporated** (Par. 2) what he learned as a banker into our course.
- E 3. The hotel **updated** (Par. 4) its rooms with new furniture and curtains.
- A 4. It was **apparent** (Par. 5) from her tone of voice that she was displeased.
- H 5. Artists find their **inspiration** (Par. 7) in unexpected places.
- F 6. The big tree outside my window **filters** (Par. 7) most of the sound from the outside, so my room is very quiet.
- D 7. The **ventilation** (Par. 8) is not very good in my office, so it feels very uncomfortable in the afternoons.
- G 8. Her novels **blend** (Par. 9) the past, present, and future, making them difficult to follow.

- a reduces something by allowing only part of it through
- b parts or features of a larger unit or system
- c included something as part of something larger
- d the movement of fresh air through a room or building
- e made something more modern
- f easy to see or understand
- g mix or combine
- h someone or something that gives you new and creative ideas

B Choose an academic word from Exercise A to complete each of the following sentences. Notice and learn the words in bold because they often appear with the academic words. In some cases, you need to change the verb form.

- 1. The chef blended together the traditional flavors of China, India, and Malaysia to create the taste of Singapore.
- 2. A key incorporated of the economic plan is an increase in taxes.