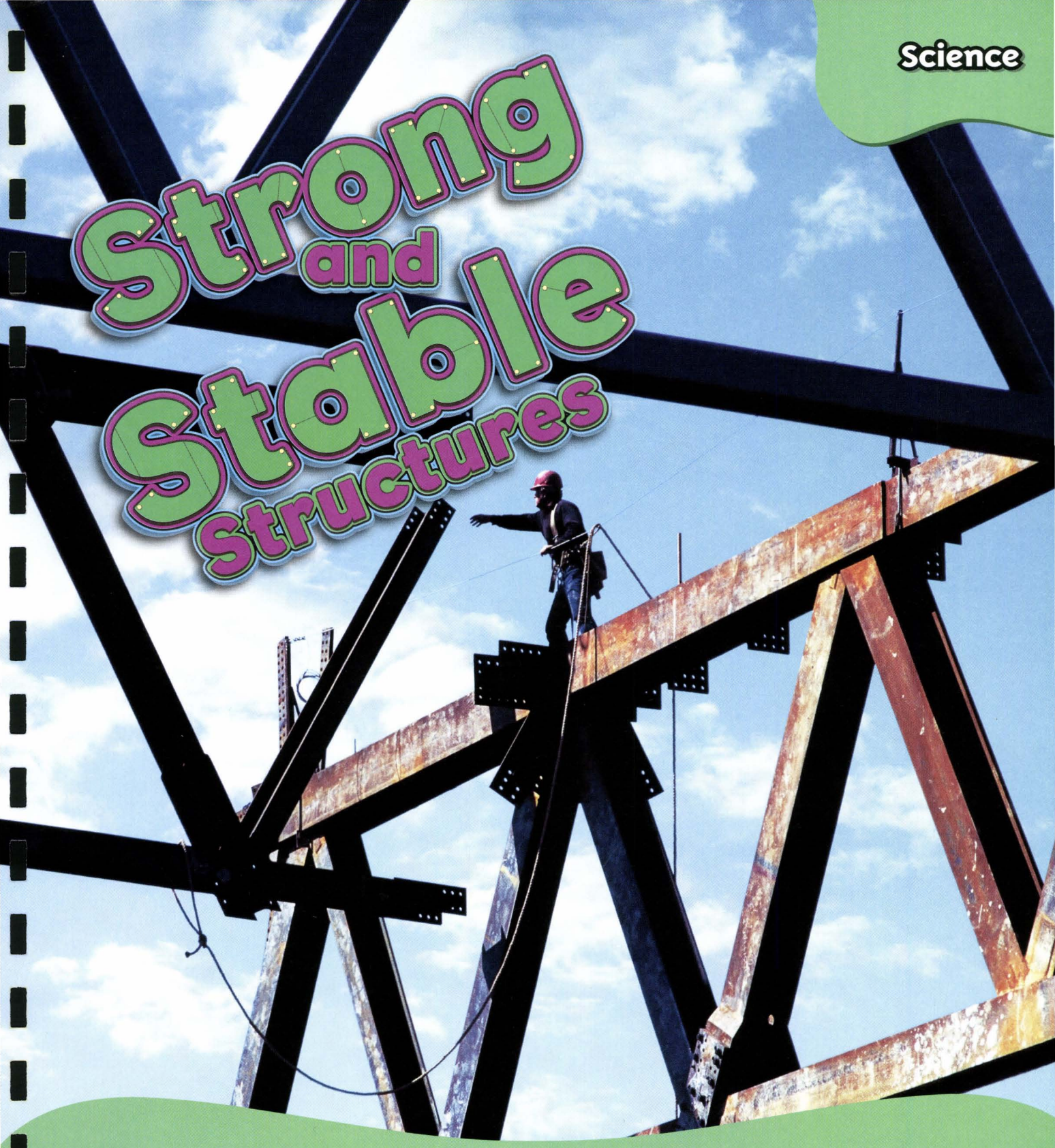
Science

Strong and Stable Structures



In this unit, you will

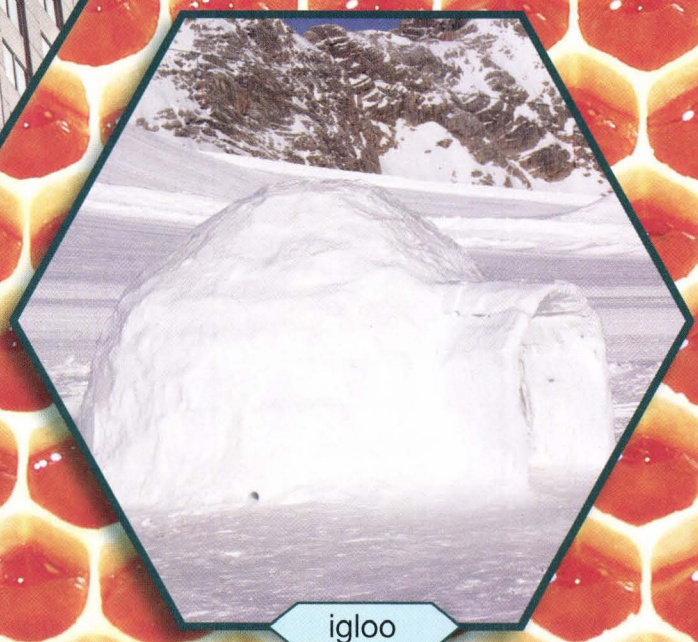
- monitor comprehension
- read labelled visuals
- use labelled visuals when speaking
- vary sentence types
- learn about structures
- explain why different audiences respond differently to media texts

LET'S TALK

Structures in Our World

roller coaster

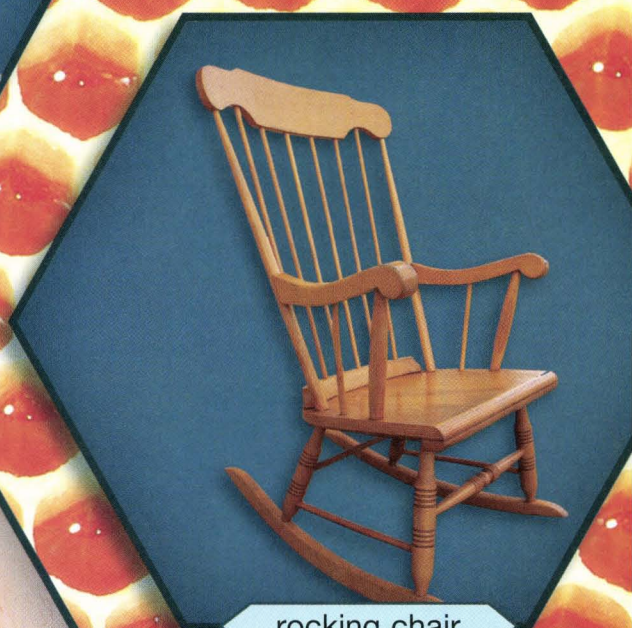
office building



igloo

All structures are useful. What is each of these structures used for?

bird nest



rocking chair

tent

Understanding reading strategies

Monitoring Comprehension

Monitoring comprehension means checking to make sure you understand what you are reading. When you get stuck, you can use fix-up strategies to help you.

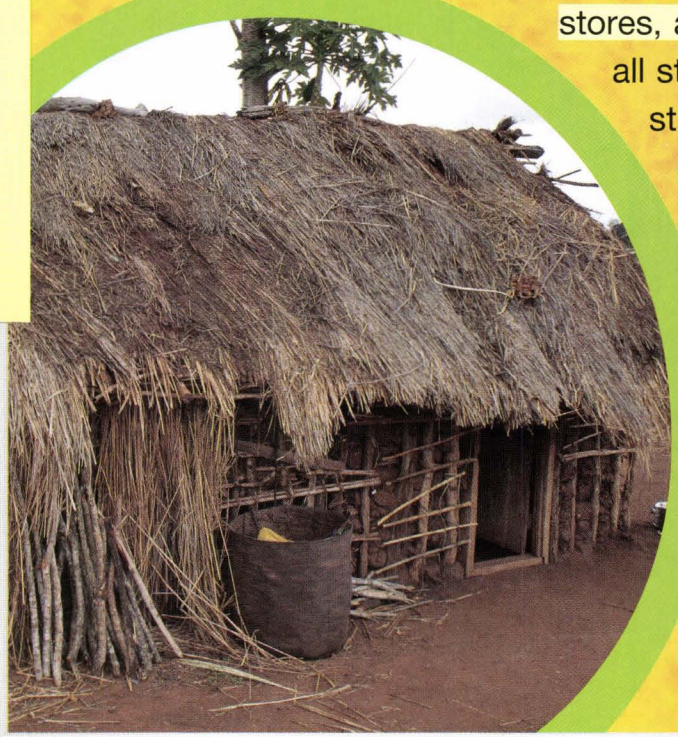
Make sure you understand new words and ideas. What are some examples of structures?

What Do You Know about Structures?

by Janice Parker

What Is a Structure?

Look up. Is there a ceiling over your head? If there is, it is probably held up by walls that stand on a floor. You are inside a building of some kind. A building is a type of structure. Houses, bridges, tunnels, stores, and schools are all structures. Most structures are built to be strong and to keep out the forces of nature, such as wind, snow, and rain.

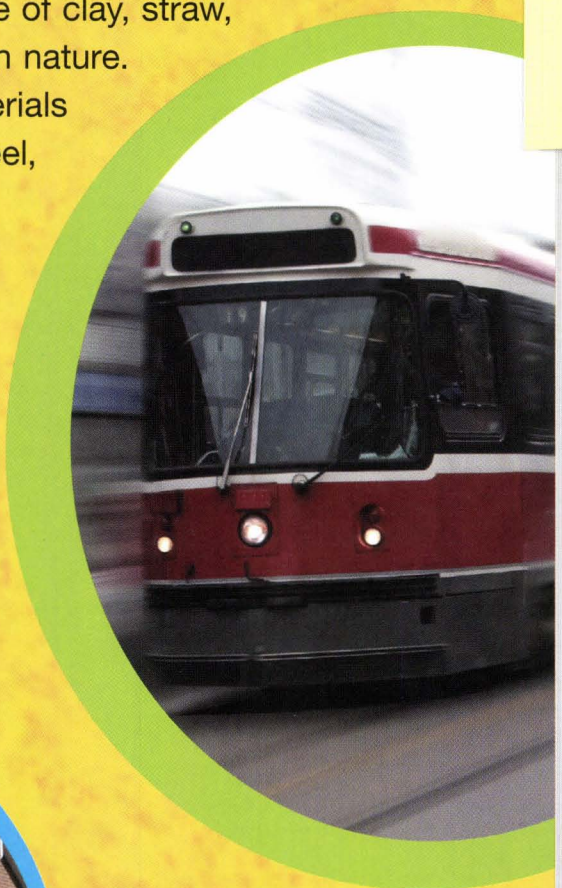


◀ Some houses are made from materials found in nature.

Structures come in many shapes and sizes. Some structures provide shelter and safety. Others, like bikes and planes, help us get from place to place.

Structures are made from many different materials. Some are made of clay, straw, or other materials found in nature. Others are built with materials people make, such as steel, glass, or concrete.

People have been building structures for thousands of years. Some animals build structures, too. A bird nest is one example.



▲ **Not all structures are buildings. Buses, cars, and trucks are also structures.**

◀ **Concrete and bricks are used to build strong structures where people live and work.**

←

Stop to ask yourself, "Does this make sense?" Why are structures useful?

Building Materials

Structures can be made from many types of materials. Some materials are better than others for building certain kinds of structures. For example, glass is the best material for building an aquarium, which is a place where fish live.

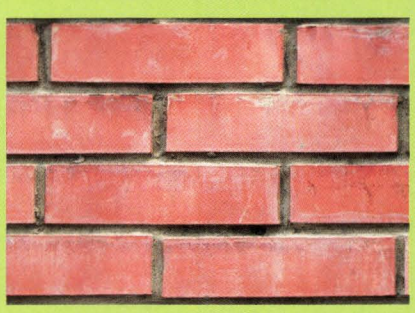
Read ahead to get information about new words or ideas. What types of materials are used for building structures?

Use photos, illustrations, and charts to help you understand new words and ideas. What information will you find in this chart?

Types of Building Materials

Stone

- found in nature
- strong and long lasting
- can be used whole or cut into blocks



Clay

- a type of soil
- soft and sticky when wet, hard when dry
- can be made into bricks

Wood

- comes from trees
- easy to use
- can be held together with nails

Concrete

- like stone, but made by people
- strong when dry
- can be poured into any shape when wet

Glass

- made from melted sand
- light shines through it
- can be made in many colours

Steel

- made from metals
- very strong
- can be melted and moulded into shapes

←
Use photos, illustrations, and charts to help you understand new words and ideas. How is concrete different from wood? How is concrete like steel?

Animal Homes

by Angela Wilkes

Applying Strategies

Monitoring Comprehension

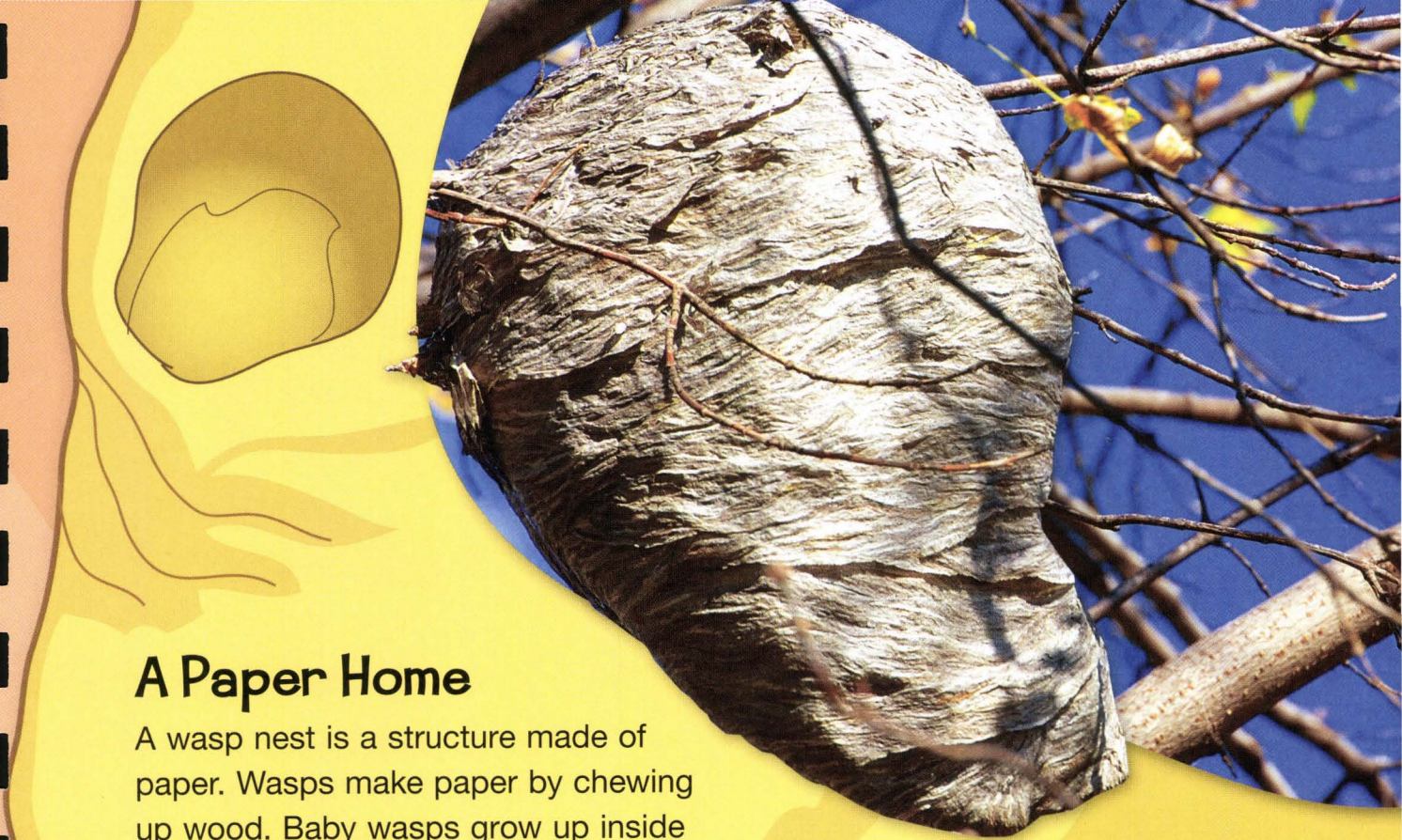
As you read, check your understanding. If you get stuck:

- Make sure you understand new words and ideas.
- Stop to ask yourself, "Does this make sense?"
- Read ahead to get information about new words or ideas.
- Use photos, illustrations, and charts to help you understand new words and ideas.

Animals need homes, just like people do. Homes keep animals warm in the winter. They are a safe place to have babies. Some animals make structures to live in.

A Snowy Home

Polar bears live in cold, snowy places. A mother polar bear makes a home called a *den*. She digs her den in snow. In the winter, she has her babies in the den.



A Paper Home

A wasp nest is a structure made of paper. Wasps make paper by chewing up wood. Baby wasps grow up inside the nest.

A Nest for Babies

Birds make nests for their eggs. A nest is warm and away from danger. Most birds make nests in trees.

Make a Nest

What You Need

- paintbrush and glue
- plastic bowl
- dried grass
- moss
- feathers and leaves
- candy wrappers

What You Do

1. Use the paintbrush to spread glue on the outside of the bowl. Stick small handfuls of grass onto the bowl.

2. Spread glue on the inside of the bowl. Stick grass and moss inside the bowl.

3. Put some small feathers and leaves inside the nest. Add some candy wrappers for colour.

Reflect on

Strategies: How did looking at photos help you check your understanding about what you were reading?

Connections: What animal homes have you seen? What were they made of?

DOME HOME

by Etta Kaner

soldier crab

Applying Strategies

Monitoring Comprehension

As you read, check your understanding. If you get stuck,

- Make sure you understand new words and ideas.
- Stop to ask yourself, "Does this make sense?"
- Read ahead to get information about new words or ideas.
- Use photos, illustrations, and charts to help you understand new words and ideas.

Getting into Shape

Animal homes come in all kinds of shapes. Each animal builds a home that is shaped for its needs.

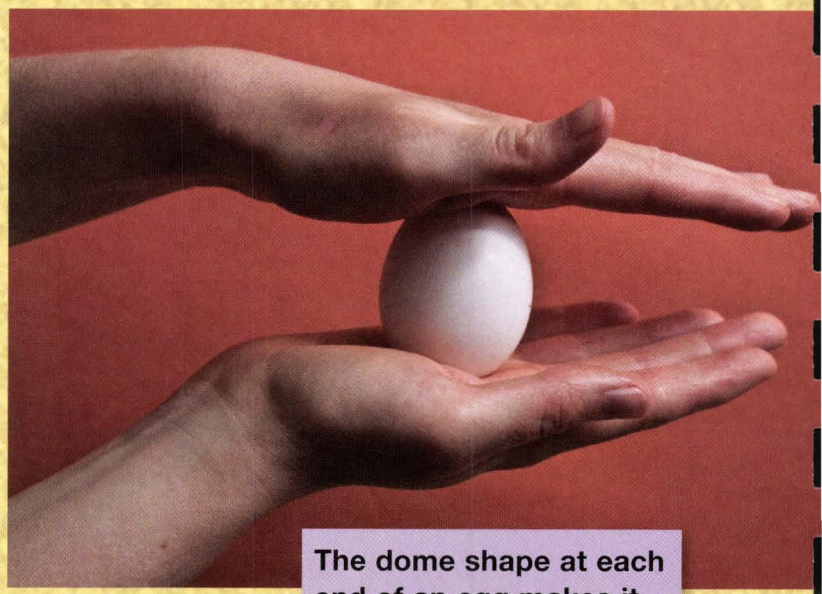
Soldier crabs build sand homes shaped like domes. A soldier crab works hard to build its home.

Soldier crabs often move in a large group. They look like an army of marching soldiers.

As Strong As An Egg

Hold the ends of an egg between the palms of your hands. Now press as hard as you can. It's impossible to break it, right? That's because each end of the egg is a dome, which is a very strong shape. No wonder a soldier crab builds its shelter in the shape of a dome.

The soldier crab stays in its shelter while the tide is in. The shelter protects it from drowning. Then the crab digs its way out of the shelter when the tide goes out.



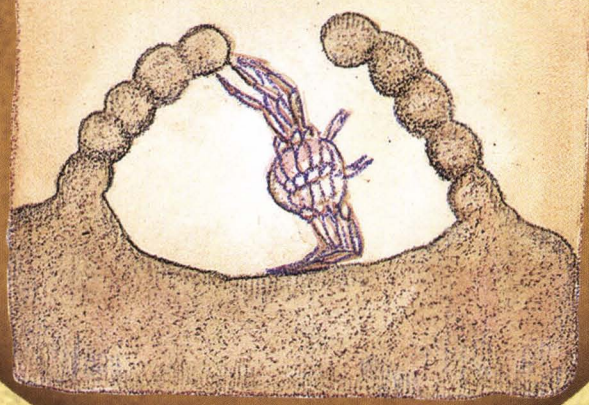
The dome shape at each end of an egg makes it hard to break.

Building a Dome Home

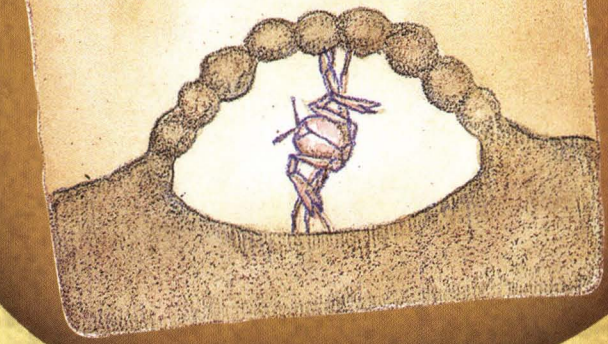
1 The soldier crab digs a shallow pit in the sand.

2 It runs backwards in a circle, pushing up tiny balls of sand it has made. These balls make a low wall.

3 The crab continues to push up balls of sand. The wall gets higher and higher, and finally curves in.



4 It fills in the hole at the top with a tiny ball of sand.



5 Finally, it makes the top thicker by pushing up more sand from the bottom.

Reflect on

Strategies: How did the visuals help you understand new ideas in the article?

Your Learning: What did you learn about the shape of a dome?

The Wonder of Beavers

by Amy Bauman and Patricia Corrigan

Applying Strategies

Monitoring Comprehension

As you read, check your understanding. If you get stuck,

- Make sure you understand new words and ideas.
- Stop to ask yourself, "Does this make sense?"
- Read ahead to get information about new words or ideas.
- Use photos, illustrations, and charts to help you understand new words and ideas.

If you hike through the woods near the end of the day, you might be lucky enough to spot a very busy and hard-working creature. If you see a large, dark animal swimming in the water, it could be a beaver!

Beavers have wide flat tails. They use their tails to help them build.

Beavers are animals that live along rivers, lakes, and ponds in North America and Europe. They like both water and land. Beavers are best known for the dams they build in their watery habitats.

Beavers are some of nature's best builders. They build dams in rivers, marshes, and lakes. Some dams are as long as two football fields!

A beaver built this dam from branches and mud. A dam is a structure that stops water from flowing.

Beavers build dams out of branches, stones, and mud. First, they cut down trees with their front teeth. Then they bite off the branches and drag them into the water.

Beavers usually work alone. Sometimes, beaver families, called *colonies*, will work together on big projects.

A beaver's front teeth are long, orange, and sharp!

Often, a beaver colony lives together in a home called a *lodge*. The lodge is made of sticks and mud. Each lodge has one big room.

Beavers live in structures called lodges. Most lodges are about 5 m wide and 2 m high.

Inside the lodge, beavers will build the floor above the water to keep it dry. They cover the floor with soft grasses. The colony sleeps here.

Beavers go in and out of the lodge through tunnels. They also escape from enemies through these tunnels.

Here you can see the inside of a beaver lodge.

The beaver will use this branch to build a dam or a lodge.

Some people think beavers harm the environment because they cut down too many trees. Other people believe beavers are helpful to the environment. Beaver dams can become homes for other animals. Dams can also stop a stream from drying up, or land from eroding.

The beaver is a clever and useful creature. You would be lucky to spot a busy beaver someday!

Reflect on

Strategies: What strategies did you use when you got stuck?

Critical Literacy: How might someone who thinks beavers harm the environment write about beavers? What title might they use?

Understanding media

Dream House

Explaining Why Different Audiences Respond Differently to Media Texts

What is your dream house? Different people would answer this question in different ways.

Thinking about connections can help you understand different feelings about the same house. What connections can you make to this house? What connections might your grandparents make?

Making inferences can help you understand different feelings about the same house. What kinds of books or movies or games might the owners of this house enjoy?

Visualizing can help you understand different feelings about the same house. Who can you visualize answering the door in this house? Who might look out of place answering the front door?

Who do you think would look at this house and say, "My dream house!" Who might not feel at home here?

Understanding writing strategies

Varying Sentence Types

Imagine a world with only one kind of fruit. That would be boring! We all like variety. Readers like variety, too, and you can keep them interested if you learn how to vary the types of sentences you use when you write.

Here are some different types of sentences you can use in your writing:

Have you ever seen the CN Tower?

This is a question.

The CN Tower is tall and strong.

This is a simple sentence.

Think of all the problems people solved to build the tower.

This is a command. It tells the reader to do something.

The CN Tower is an amazing structure!

This is an exclamatory sentence. It shows strong emotion.

How to vary sentence types:

- ☑ Read your writing out loud.
- ☑ Identify the different sentence types you used.
- ☑ Try different sentence types to add variety.

Applying Strategies

Reading Like a Writer

As you read, identify different sentence types. Think about how the variety in sentence types helps make the writing interesting.

MAIL A POSTCARD!

Dear Jenny,

We went to an Aboriginal powwow. The singing and dancing were great! Then we saw teepees, and they are really interesting. Did you know teepees were made of animal skins wrapped around poles?

I learned that teepees are waterproof. In winter they are warm, and in summer they stay cool. I wish we could use a teepee when we go camping.

Write me soon!

Your friend,
Kayla

TO:

Jenny Tremain
7 Wilkes Crescent
Calgary, AB T2N 3T4

Hi Tom,

Today we stopped in Ottawa to see the National Gallery of Canada. It's amazing! The big tower is made of glass. Would you want to be the person who has to clean it?

All that glass is really heavy, so there is a steel frame to hold it up. The view from inside the tower is great. You can see the Parliament Buildings.

Come to Ottawa sometime. It's a fun city!

See you soon,
Rajiv

TO:

Tom Campbell
46 Redmond Road
Halifax, NS B3N 2K1

Reflect on

Writer's Craft: Find examples of three different types of sentences. Explain how these make the writing interesting.

Connections: Write an exclamatory sentence about a place you've visited.

Understanding reading strategies

Text Features: Labelled Visuals

Illustrations and photos, or visuals, help readers understand what they are reading. Labels point out important parts in visuals.

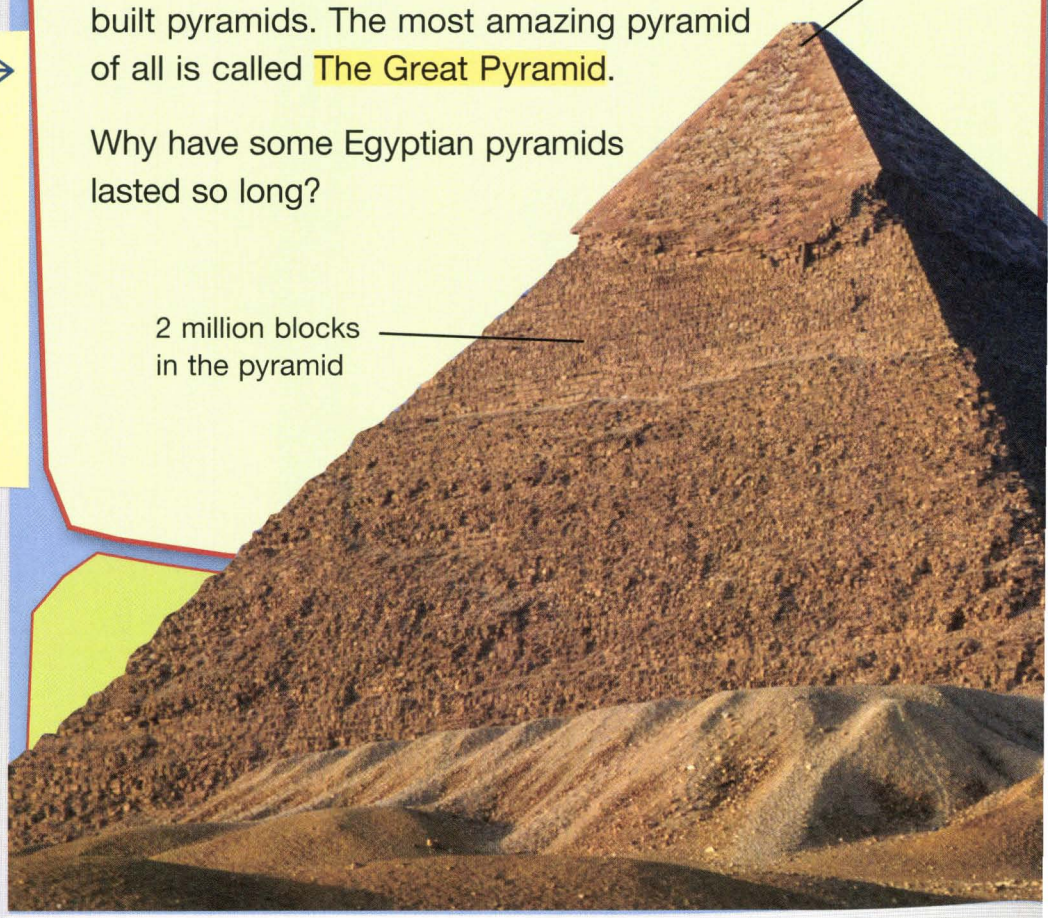
The Pyramids of Egypt

by Boris Brodsky

Building Big

It's not easy to build a big structure that is strong and stable enough to last for thousands of years. But the ancient Egyptians did it. They built pyramids. The most amazing pyramid of all is called The Great Pyramid.

Why have some Egyptian pyramids lasted so long?



→ Labelled visuals help readers understand what they are reading. What does the labelled photo on this page help you understand?

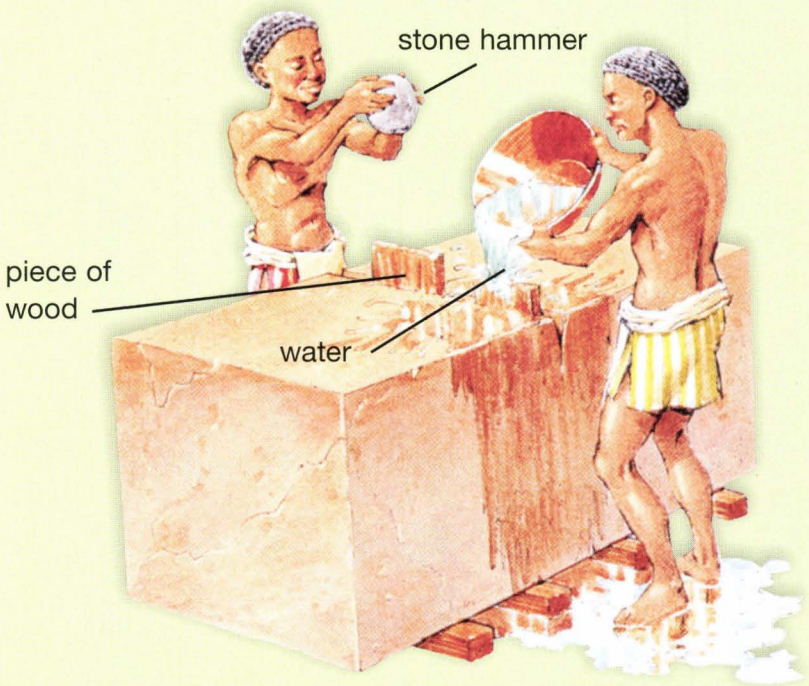
A Strong Shape

Some shapes help a structure last a long time. A pyramid starts out big at the bottom and gets smaller as it goes up. This helps to make it strong and stable.

Building with Stone

The Egyptians used stone to build the pyramids. Stone is a very strong building material. It can support the weight of a heavy building. And it lasts a very long time.

To make stone blocks the right size, workers hammered pieces of wood into the stone. Then they poured on water. The wood got bigger as it soaked up the water. That made the stone split.



Labelled visuals help readers understand what they are reading. What does the visual on this page help you understand?

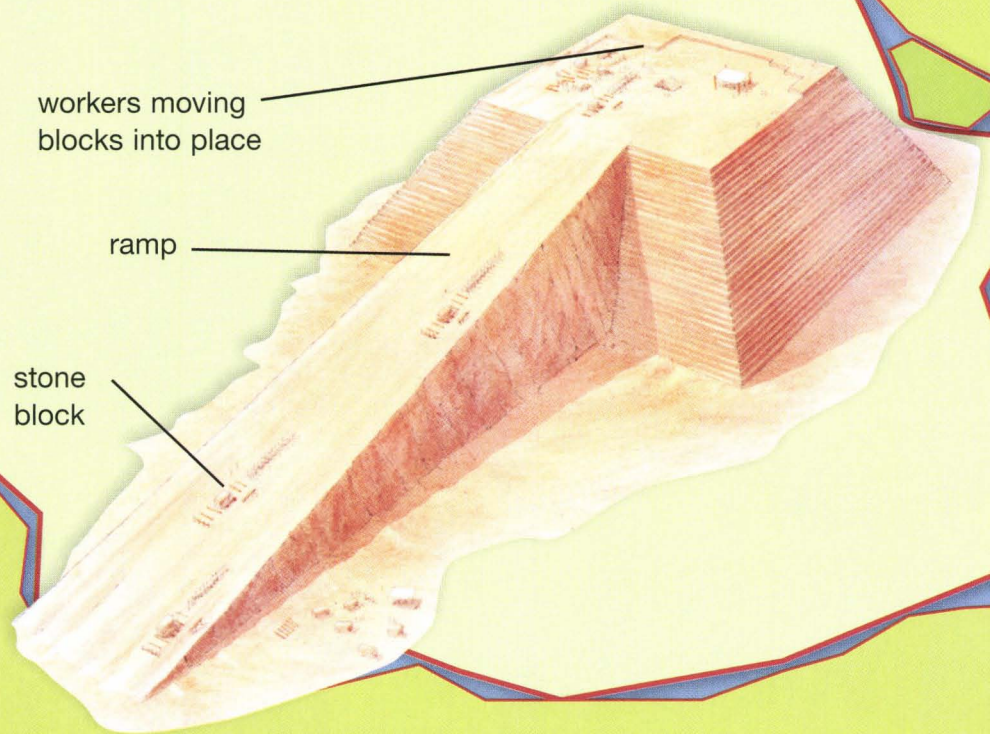
Labels point out important parts in visuals. What should you notice in this labelled illustration?

Shaping the Blocks

The workers had to carefully smooth and shape the blocks by hand. Each block had to fit exactly in place. That helps to keep the pyramid strong and stable.

Moving the Blocks

The stone blocks used to build the pyramids are big—and very heavy! How did ancient Egyptians move these blocks? Most people believe they used ramps made of dirt. It took many workers to drag the blocks up the ramp. Logs placed under the blocks made them easier to move.



Labelled visuals help readers understand what they are reading. What does this visual help you understand?

Labels point out important parts in visuals. What should you notice in this labelled illustration?

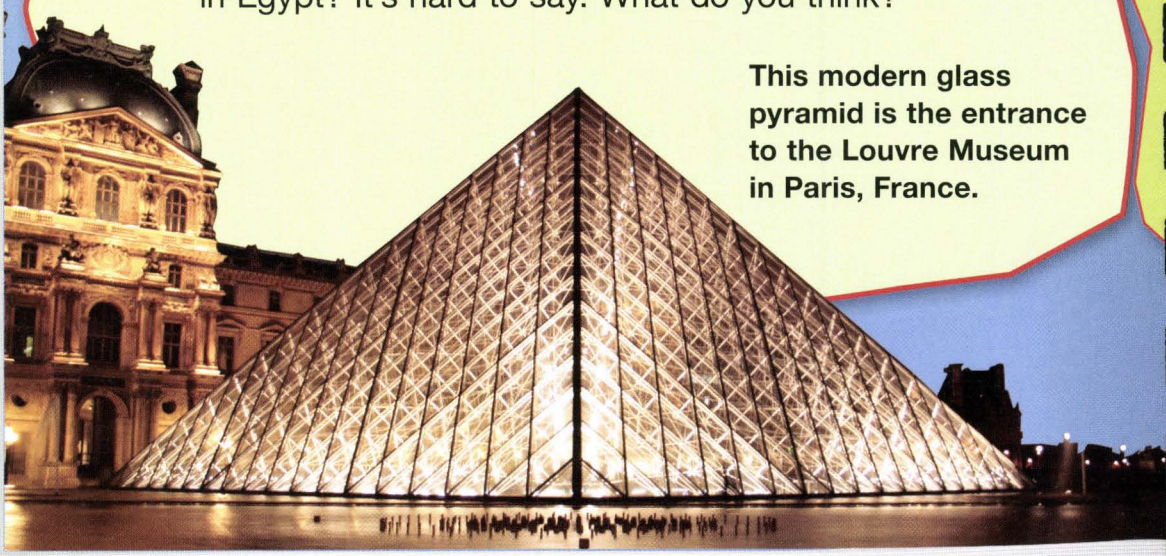
A Pyramid That Didn't Last

Some pyramids were not as strong and stable as others. The pyramid you see here is much smaller than the Great Pyramid, and it is not as old. Now it is falling apart. The workers did not make it as strong and stable as the Great Pyramid.

The pyramid of Sahure, in Egypt, has crumbled over time.

A Modern Pyramid

In France, there is a modern pyramid built of steel and glass. These are strong building materials, so this pyramid will last a long time. Will it last for thousands of years, like the pyramids in Egypt? It's hard to say. What do you think?



This modern glass pyramid is the entrance to the Louvre Museum in Paris, France.

Tunnels Underground

by Craig Shackleton

Applying Strategies

Text Features: Labelled Visuals

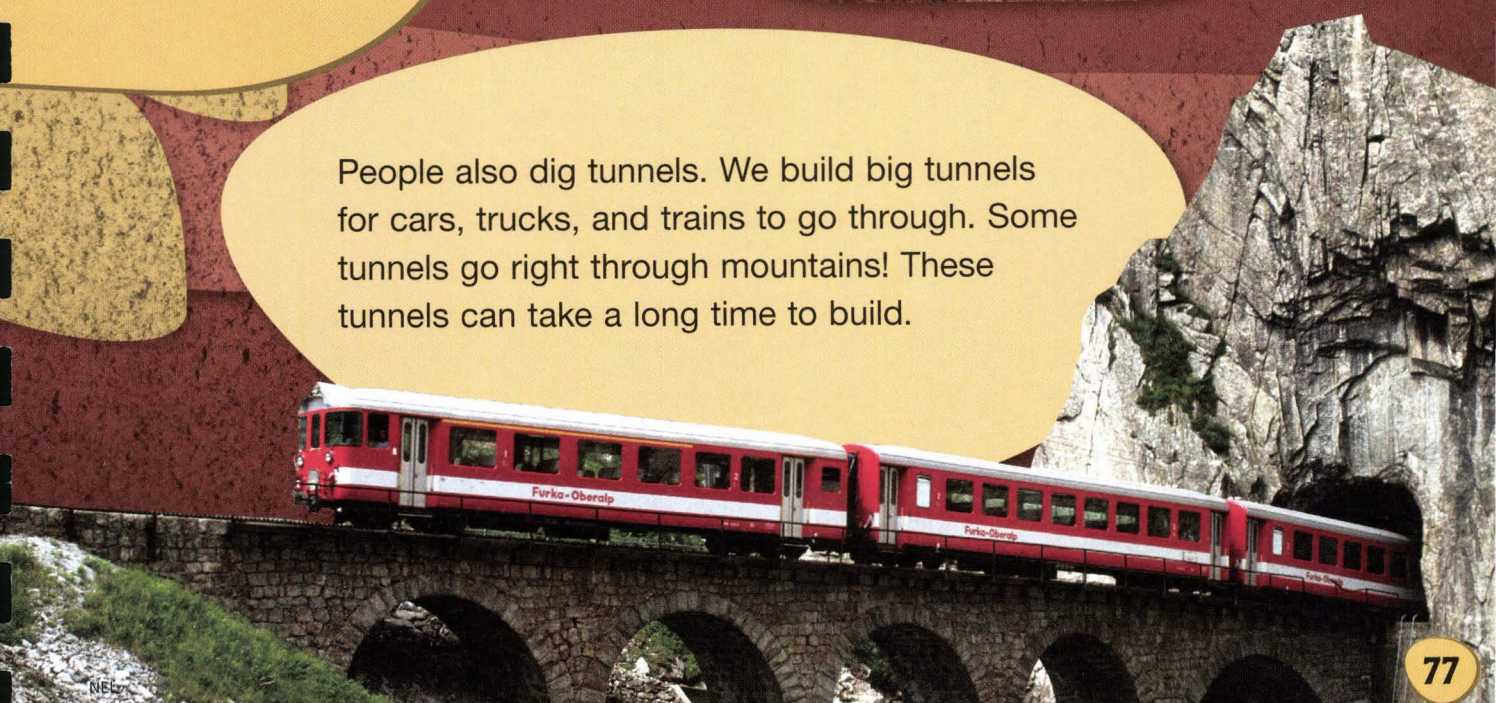
As you read, use what you know about labelled visuals:

- Labelled visuals help readers understand what they are reading.
- Labels point out important parts in visuals.

Tunnels Big and Small

A tunnel is a long hole under the ground. Many animals dig tunnels to live in. Have you ever seen an anthill? The ants live in tiny tunnels they have dug under the hill.

People also dig tunnels. We build big tunnels for cars, trucks, and trains to go through. Some tunnels go right through mountains! These tunnels can take a long time to build.



Building a Tunnel

There are special machines that dig tunnels. These machines cut through dirt and rock. A moving belt carries the dirt and rock that have been cut away.

The dirt and rock are dumped into train cars. Then the train drives over to an elevator.

The elevator lifts the dirt and rock out of the tunnel so trucks can carry it away.

Workers build strong walls inside the tunnel. These walls keep the tunnel from caving in.

Sometimes people build tunnels under water. These tunnels have to be very strong so they are safe. No one wants a tunnel to cave in!

Reflect on

Strategies: How did labelled visuals help you understand what you were reading?

Connections: Why is it dangerous for children to dig snow tunnels?

Applying Strategies

Text Features: Labelled Visuals

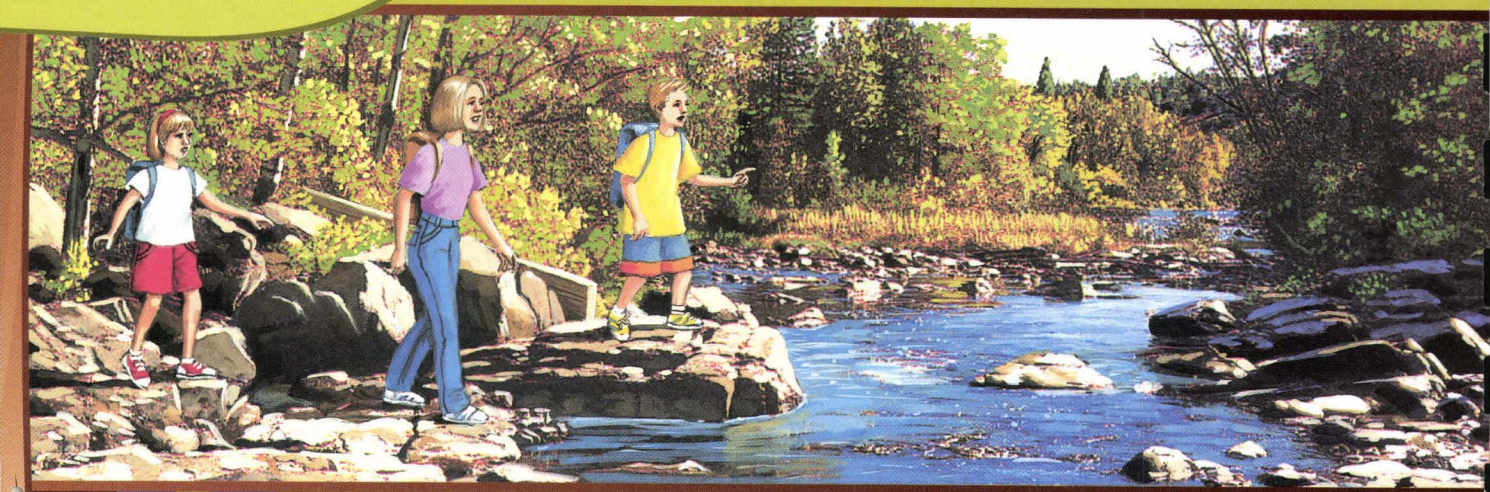
As you read, use what you know about labelled visuals:

- Labelled visuals help readers understand what they are reading.
- Labels point out important parts in visuals.

Getting to

by Todd Mercer

Amanda, Jared, and their mom had a problem. They were hiking along a nature trail when they saw that a stream flowed right across their path.



The three hikers sat down in a shady spot. "What do we do now?" asked Jared. "I don't want to finish our hike with soaking wet feet."

Suddenly Amanda cried out, "Look!" and she pointed to some bushes. "I think I see a board over there."

Mom, Amanda, and Jared went over to investigate. They found a long board.

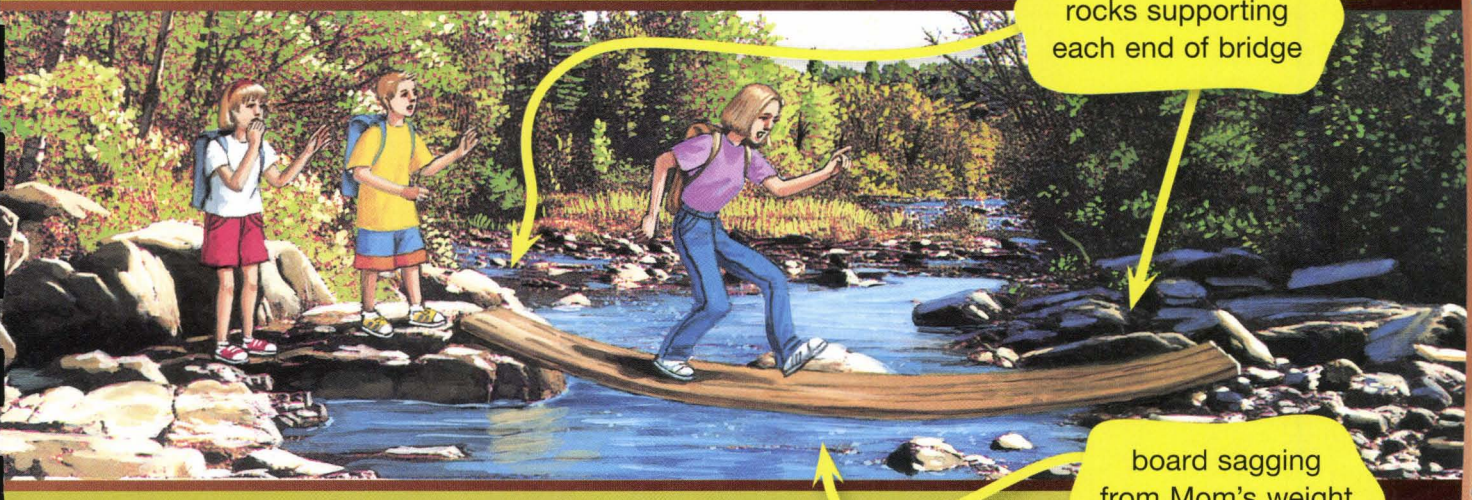
"This might be the answer to our problem," said Jared.

the Other Side

Mom and Jared dragged the board to the stream. Then they placed the board across the stream to make a bridge.

"Do you think this bridge is strong enough to hold us up?" asked Amanda.

"I'm the heaviest person," said Mom. "I'll test it." She started to walk slowly across the bridge.



Then Jared called out, "Come back, Mom! The board is starting to sag. When you get to the middle, the board will sag right down into the water."

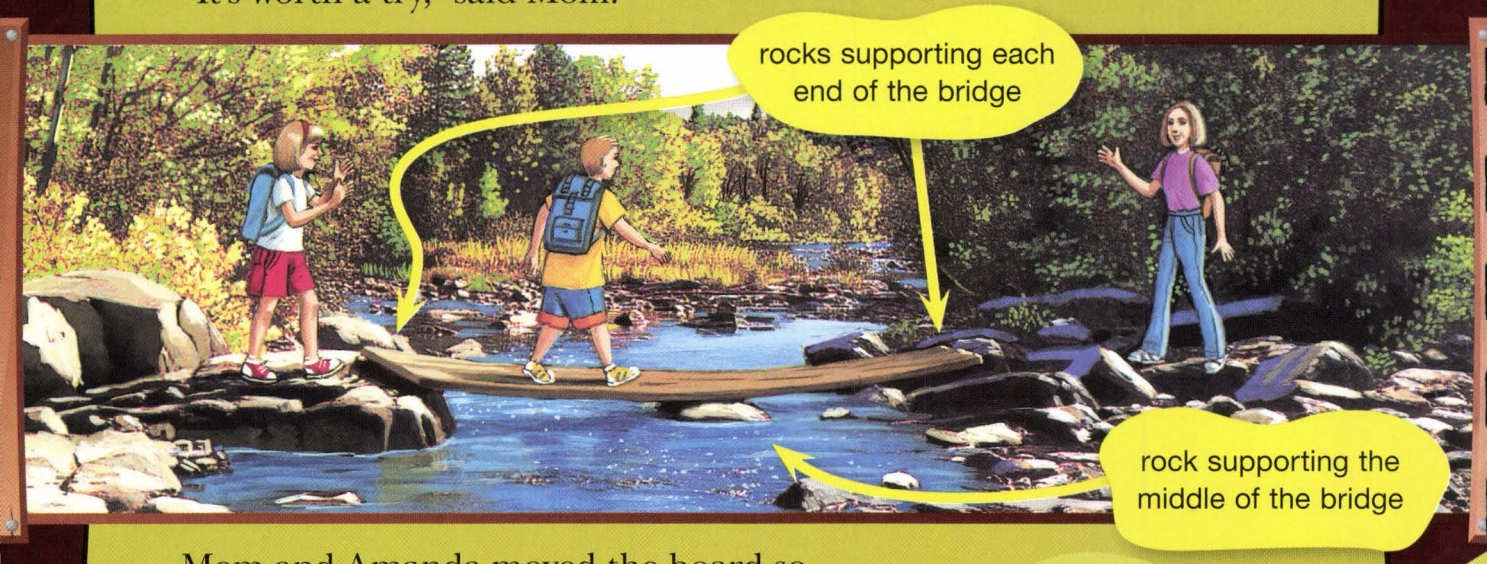
"It might even break!" said Amanda.

Mom carefully came back. "So what do we do now?" she asked.

"We need something to support the bridge in the middle," said Amanda. "That's where it will sag the most."

"There's a rock in the middle of the stream just over there," said Jared. "Let's move the board so the rock is underneath it. The rock will support the bridge so it won't sag too much."

"It's worth a try," said Mom.



Mom and Amanda moved the board so that it rested on the rock in the stream. Mom tested the bridge. It was strong enough to hold her up. Everyone crossed the stream without getting wet.

"Good work, kids," said Mom. "Thanks to you two, we all have dry feet!"

Reflect on

Strategies: How did labelled visuals help you understand what you were reading?

Your Learning: How did knowing about bridges help the family solve a problem? When might your knowledge of bridges help you?

Understanding speaking strategies

Using Labelled Visuals

It's exciting to teach other people how to do something you had fun doing. Labelled visuals can help you explain ideas to listeners.

Vicky used labelled photos to help her give a presentation to her class. She explained how she made a pencil holder.

How to use labelled visuals:

- ☑ Think about what you want to tell your listeners.
- ☑ Take photos or draw pictures.
- ☑ Use labels to show what is important in each visual.

Skyscrapers

by Elaine Landau

Superman leaped over them. Kids love to ride in elevators up to the top of them. Have you ever been in a *very* tall building that rises far above the rest? If you have, it was probably a skyscraper.

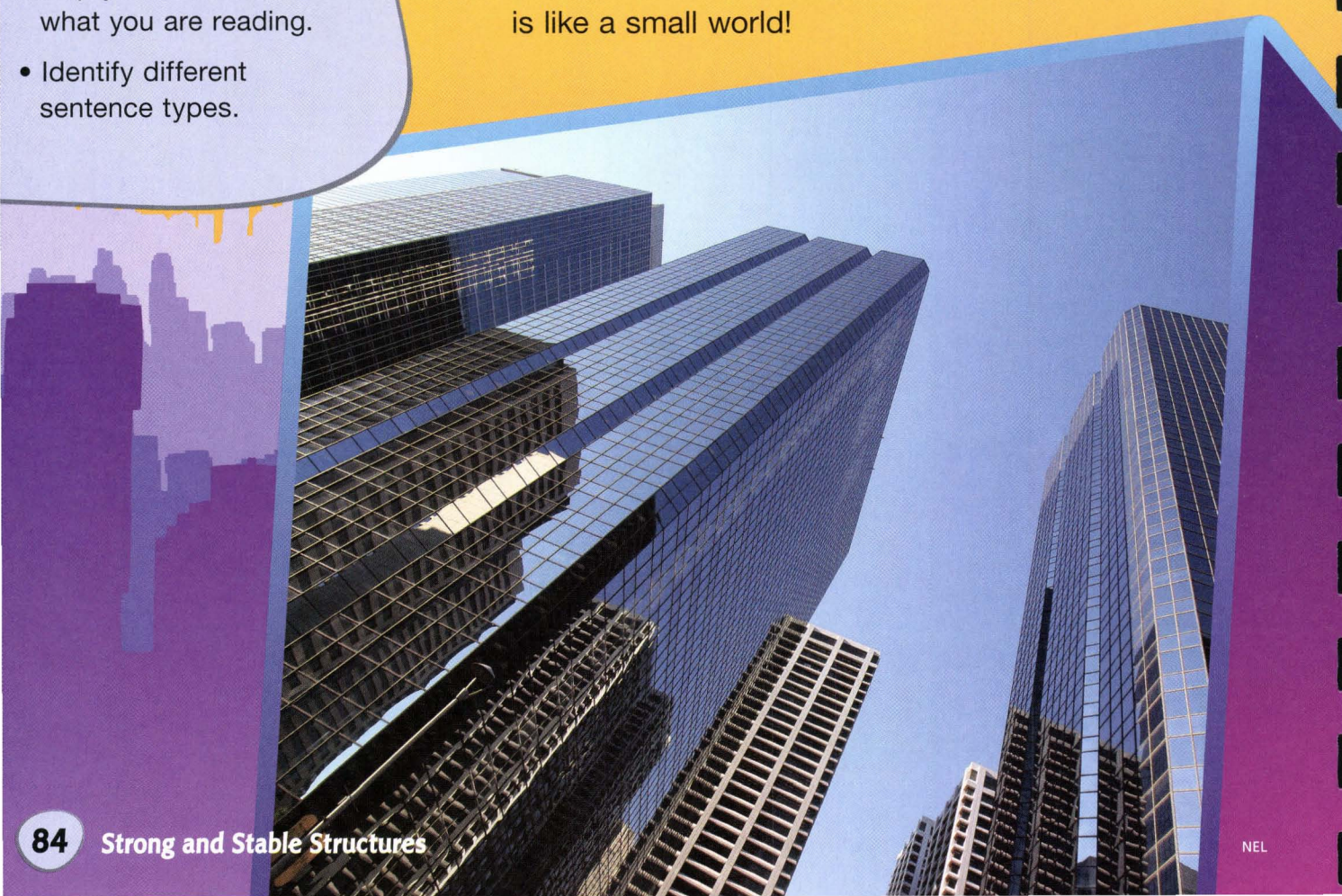
Putting It All Together

As you read, remember to use the strategies you've learned in this unit:

- Monitor your comprehension.
- Use labelled visuals to help you understand what you are reading.
- Identify different sentence types.

Giants in the Sky

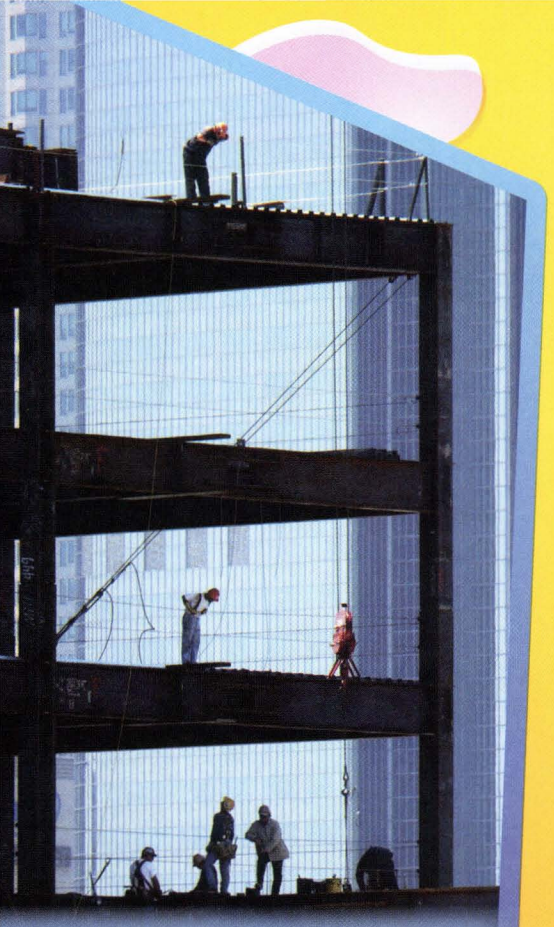
Skyscrapers seem to touch the sky. Most are at least 35 floors high, and some have more than 100 floors. Many skyscrapers are more than just tall. Inside, you may find hotels, restaurants, stores, and hundreds of offices. A skyscraper is like a small world!



Parts of a Skyscraper

A skyscraper has two main parts. One is the foundation. You do not see that part because it lies beneath the ground. The foundation is made of steel or sometimes concrete. It stands on a layer of solid rock or soil. The foundation helps to hold up the rest of the building. A parking garage is often inside the foundation.

The other part of a skyscraper is called the *superstructure*. That is the part of the building that is above the ground.

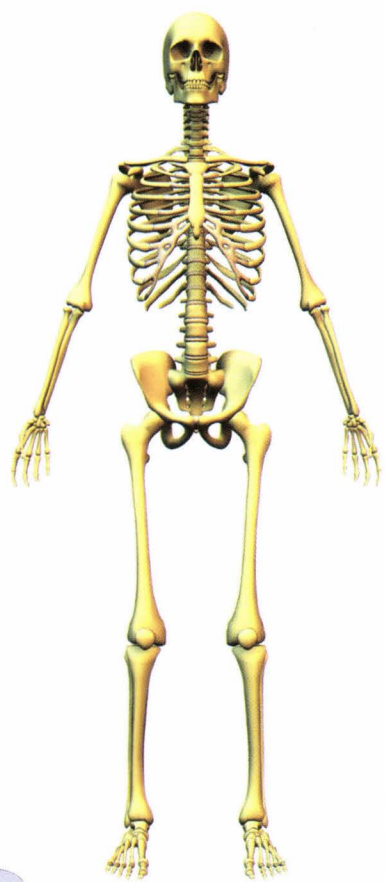


A strong steel frame will hold up this skyscraper.

A Skyscraper's Skeleton

In a building with one or two floors, the walls hold up the building. A skyscraper needs a frame to hold it up. This frame is made of steel, or of concrete with steel inside.

In some ways, a skyscraper's frame is like a human skeleton. Your skeleton is made up of bones. These bones make a frame to hold up your body. A frame made of steel or steel and concrete holds up a skyscraper. The building's walls are attached to the outside of the frame. You cannot see the frame when the building is finished. Like your skeleton, the frame is in there, doing its job.



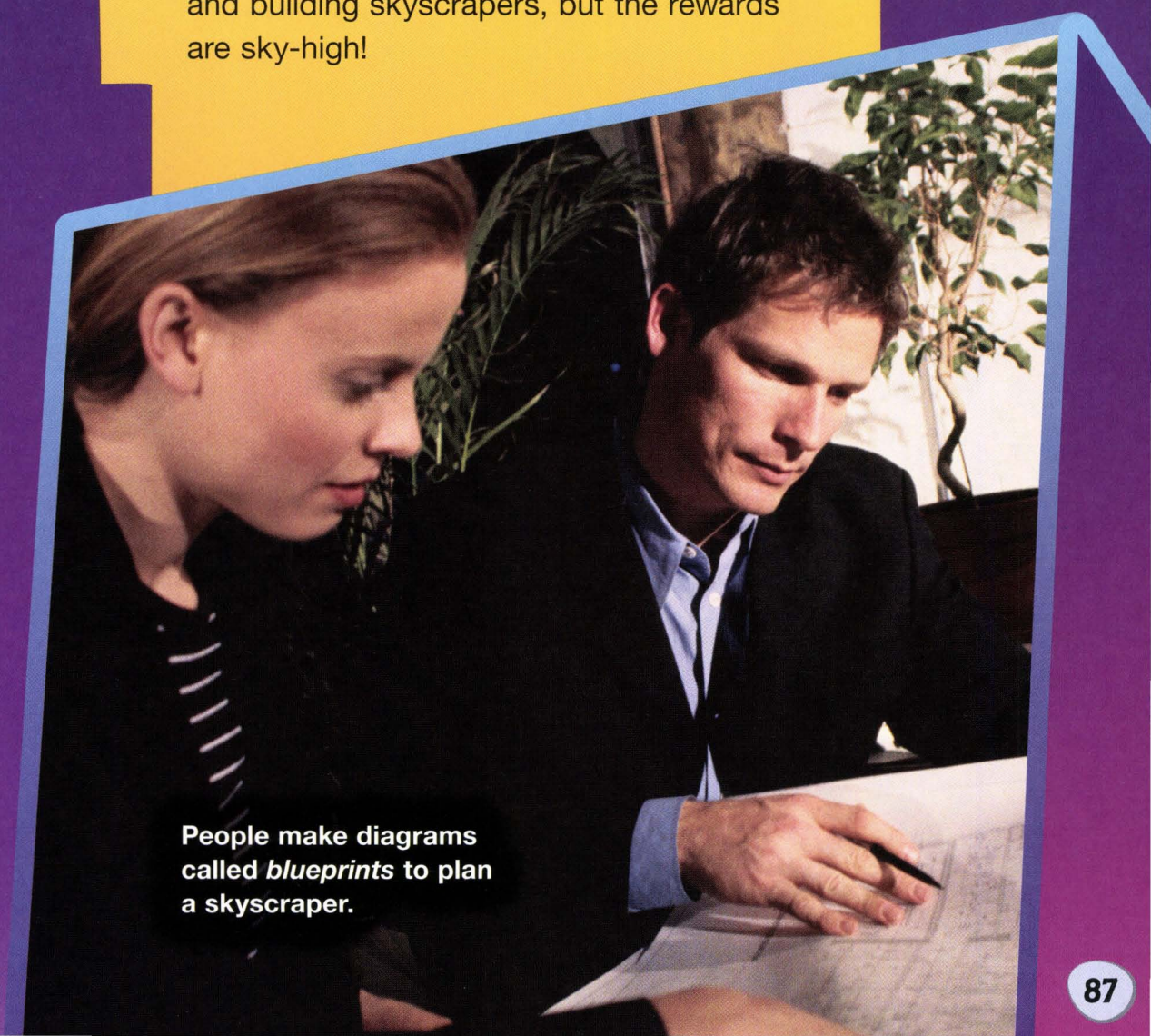
The bones of your skeleton make a frame that holds up your body.

Planning a Skyscraper

Lots of planning goes into building a skyscraper. Many people work on designing the building. They decide on the skyscraper's shape and the materials that will be used to build it. People work hard to make the skyscraper strong enough to stand up to things like storms and earthquakes.

Strong winds can be a problem, too. A skyscraper must not sway back and forth too much in the wind. Too much swaying could cause problems for the elevators. It could also crack the glass on the outside of the building.

A lot of time and work goes into designing and building skyscrapers, but the rewards are sky-high!



People make diagrams called *blueprints* to plan a skyscraper.

Tall and Taller

All skyscrapers are tall, but some are taller than others. On this page, you can see some of the tallest skyscrapers in the world.

New skyscrapers are being built all the time. People are always trying to break the record for the world's tallest skyscraper.

Name: Petronas Twin Towers
Location: Malaysia
Height: 452 m
Number of floors: 88

Name: Taipei 101
Location: Taiwan
Height: 509 m
Number of floors: 101

Reflect on

Strategies: What strategies did you use when you were reading this article? Find a place where you used a strategy to help you.

Your Learning: Find three facts about skyscrapers that you would like to remember.