



Saving the Citrus

DIRECTIONS

As you read, circle words that signal text structure. Then, complete the activity on page 3.

- 1 Are you an orange juice lover? If so, you should be worried when freezing temperatures threaten Florida's oranges. There are several reasons why this can be troubling news. First, the oranges are worth billions of dollars. Second, growing oranges creates jobs. And third, when a large orange crop is destroyed, the price of oranges and orange juice goes up all over the United States.

Where Does Citrus Come From?

- 2 Early on, citrus fruits, such as oranges, lemons, and grapefruit, came from Southeast Asia and China. The climate is warm in these areas, and citrus fruits need warm weather to survive.
- 3 Citrus fruits were first introduced to North America all the way back in 1513. Today, Florida produces roughly 80 percent of the orange crop grown in the United States, and the Florida citrus industry employs tens of thousands of people. Citrus fruits are also grown in California, Texas, and Louisiana. In each state, cold weather can be a problem.

What Happens When Citrus Freezes?

- 4 The first thing that happens when freezing temperatures hit a citrus grove is that frost forms on the trees. The trees might have flowers for the season's crop, or they might already be bearing fruit. Sometimes, trees have both flower buds and ripe fruit.
- 5 If frost hits new flower buds, they may fall off. This means that the flowers will not turn into fruit and there won't be a crop for the next season. That can be a devastating event!
- 6 If there's a brief period of freezing, then ripe or unripe citrus fruits can usually survive. Citrus fruits with the highest sugar content, such as tangerines, withstand freezing the best. The sugar in them acts as a sort of antifreeze. The fruit begins to turn mushy, though, after hours of freezing temperatures. After six hours, the juice inside oranges freezes. After the fruit thaws, these oranges may not be able to be sold for their juice. Unfortunately, they often become bitter after being frozen. However, if the juice isn't too bitter, then it might be able to be mixed with sweeter juice from other oranges.



- 7 To prevent frost from damaging a citrus orchard, the focus is on saving the fruit—not the trees. The trees are able to withstand longer periods of cold than the fruit can. But a long, severe freeze can damage the trees themselves. If that happens, then it might take them years to recover and bear fruit again. Citrus growers must work to protect their crops.

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- 8 The first course of action is to pick the ripe fruit before a frost occurs. This is a realistic option for small crops. But, a grower with hundreds—or thousands—of trees bearing ripe fruit usually can't hire enough workers to pick the fruit that quickly. And unripe citrus fruit will not continue to ripen after it is picked.
- 9 The next option is to use wind machines. California growers prevent frost from forming on trees by using wind machines. The wind machines are like huge blowers that mix the warm air with the cold air. This raises the temperature. It works when there is a layer of warm air that moves over a layer of cold air. Although it only warms the trees by a few degrees, that may be enough to prevent frost from forming. The majority of California growers use wind blowers because air **inversions** are common there.
- 10 Another way to deal with frost is to hire helicopters to **hover** over the trees. This kind of flying takes a very skilled pilot since the helicopter must fly at treetop level without striking the trees. It's also an expensive solution. Renting a helicopter and pilot can cost as much as \$1,650 per hour. However, one large helicopter can protect as many as 50 acres of citrus.
- 11 A final option is irrigating the ground to prevent frost. The water is much warmer than the air, so warm, moist air rises from the ground and into the trees. This method is one of the least expensive and the safest, but it's effective only if the freeze doesn't last a long time.
- 12 Citrus growers guard their plants since they know how precious the fruits are. It's not only about their business but about **consumers**, too. If there's a long, hard freeze, it's unlikely oranges will survive. Still, there are many measures in place to care for the prized fruits you enjoy in your juice.

inversions: weather events in which air temperature rises as it increases altitude; this results in the ground being colder than the surrounding air

hover: to stay nearby or overhead

consumers: anyone who buys and uses something



Shifting Key Ideas

Look back at the words you circled while reading. Write down which words or phrases helped you notice a shift of ideas. Then, write the key ideas from each section.

Text Section	Words that Signal a Shift	Key Ideas
Introduction		There are several reasons why freezing temperatures can be very troubling to citrus trees.
Where Does Citrus Come From?		
What Happens When Citrus Freezes?		
Saving the Citrus		



Coral Reefs in Danger

DIRECTIONS

Read the text, and complete the activity on page 6.

- 1 Deep beneath the Earth's oceans, divers swim with schools of brightly colored fish and float above breathtaking coral reefs. But did you know that these scenes are changing? They're changing because coral reefs are dying. To understand why, you have to understand how coral reefs live.

The Beauty of Coral Reefs

- 2 Australia's Great Barrier Reef is the largest coral reef in the world. It's about 1,200 miles long. What makes it so amazing is that tiny corals, which are marine animals smaller than your big toe, built this spectacular reef.
- 3 Small plants, called algae, live on coral. The coral and the algae need each other in order to live. Corals act more like plants than animals in some ways. For example, they stay on the ocean floor rather than move around. They also don't make their own food, as plants do. They count on algae for this role. Corals and algae have a great partnership.
- 4 There are hundreds of kinds of coral. For example, one kind has a soft skeleton and delicate structure that causes it to wave in the passing **currents**. Because this coral looks like a waving fan, its name is the sea fan. Similarly, another type of stony coral looks like a brain and so it's called brain coral.
- 5 A hollow tube that runs through a coral is called a polyp. **Tentacles** at one end snatch food from the water. The other end of the polyp grabs onto a surface so the coral doesn't float away with the current. Often, one coral attaches to another, which is how a coral reef is created.
- 6 A coral's skeleton consists of calcium carbonate, a mineral that also makes your bones strong. As a coral dies, its skeleton stays attached to other coral in its group. Millions of coral skeletons, along with the skeletons of other sea creatures, join together. After thousands of years, a coral reef is formed.
- 7 You might think it's the coral that makes a coral reef so colorful, but it's not. It's the algae living on the coral that gives living coral its interesting color.

currents: fast-moving water in an ocean or stream

tentacles: limbs of a creature that are used to feel and touch



- 8 Coral reefs aren't just attractive to look at; they are key elements of ocean habitats. For instance, if a coral reef is healthy, fish, lobsters, and other sea creatures can find food, and they can hide from **predators**. Fish that live around coral reefs are food for many people around the world. Also, coral reefs are possible sources of new medicines.

predators: animals that prey on others

What Coral Reefs Need

- 9 We need coral reefs. So, it's in our best interest to protect them. Over the last few decades, researchers have observed that coral reefs have begun to die. It's easy to tell when a coral reef dies because it turns into a white graveyard. This happens because the algae living on the coral die off. Without the algae, the coral cannot live. And without the coral, the algae cannot live.
- 10 Over-fishing is one of the main reasons why coral reefs are dying. For many hundreds of years, people fished the waters around coral reefs freely. Since there were fewer people then, there was still enough fish. Today, people want fresh ocean fish all the time. As a result, fewer fish live near coral reefs now.
- 11 In order to live, coral needs plenty of sunlight, as well as clear, clean, and warm ocean water. Unfortunately, so do humans. And as more people live near coral reefs, there is more pollution that can kill the coral reefs nearby.
- 12 Coral (and the algae it depends on) can only survive if the temperature of the ocean water is between 72 and 82 degrees Fahrenheit. Lately, ocean water is getting warmer. That means coral and algae are getting wiped out.

Saving Coral Reefs

- 13 One way to help save coral reefs is to set some parts of them aside to protect, just as we have done for other natural resources. Then, the coral and fish populations have an opportunity to recover.
- 14 If people limit pollution and change other practices, then there will be more hope for coral reefs. We don't want to lose these beautiful, natural wonders!



Central Idea? Prove it!

Determine which of the ideas in the Central Ideas column are a central idea of **Coral Reefs in Danger**. To decide if the idea is a central idea, gather supporting key details from the text and record them on the chart. If you cannot find supporting key details, place an X over the idea to show it is not a central idea.

Key Details	Central Ideas
	Coral reefs are both beautiful and important to an ocean's ecosystem.
	Coral is more like a plant than an animal.
	Human activity is harming coral reefs.
	Coral reefs thrive when there is sunlight and warm temperatures.
	Coral reefs can be saved.