

TABLE OF CONTENTS

To the Teacher	3	Packaging Art	52
Steps for the Reader	4	<i>The Remarkable Thermothrockle</i>	54-56
Vocabulary Words and Definitions	6-12	Concept II: <i>Some Changes Are Planned; Others Are Accidental</i>	57
Concept I: <i>Change May Produce Unexpected Results</i>	13	The Long Exile	58
Shaped Like a Pear	14	The Luck of Cortez	60
Having Their Say	16	Learning About Mars and Venus	62
Four Clues from Jupiter	18	<i>Explorer I</i> Saves the Day	64
Seeing from Space	20	Fuel in the Cornfield	66
The Rabbit Invasion	22	Runaway Plant	68
Don't Tell Her It Can't Be Done	24	The Leakeys' African Discoveries	70
Failure to Understand	26	The Vanished Mandans	72
Democracy Comes to India	28	A New Flag for an Old Colony	74
Window to the West	30	Boom to Bust, 1929 to 1933	76
The Price of Victory	32	Frozen in Time	78
The Farms That Blew Away	34	Mexico's Lost Lakes	80
Of Time and the Railroads	36	Fighting Fog	82
When the Mississippi Flowed Backward	38	An Undersea Mystery	84
The Now-and-Then Island	40	The Speed of Electronic Thought	86
One Word and a World of Difference	42	A Country in Transition	88
The Theory That Exploded	44	A Chemist Finds a Way	90
From Planes to Trains?	46	A Lucky Accident	92
Seeing by Computer	48	Artists of the North	94
From Campfire to Museum	50	A New Craft for the Navaho	96
		<i>The Sun Sisters</i>	98-100

		<i>The Sword of Light</i>	142-144
Concept III: <i>Modern Ways of Life Require Planned Changes</i>	101	Concept IV: <i>Where Might Change Take Us?</i>	145
History at Your Fingertips	102	One Man's Peaceful War	146
African Americans in Our Past	104	New Frontier Underwater	148
Conquering Math Anxiety	106	Looking Outward	150
Cooperation in Space	108	Workhorse in Space	152
Farm-Fresh Fish	110	New Medicines from the Sea	154
Pollution Is Everybody's Business	112	Reviving an American Icon	156
Cultures in Conflict	114	Faraway Places Just Like Home	158
The Many Voices of India	116	Taller or Smaller?	160
Up by Their Bootstraps	118	Electronic Money	162
A Working Partnership	120	Automation vs. People	164
Eyes in the Sky	122	Farms in Space	166
A Harvest for the Future	124	Changing a Sea into a Lake	168
More Than Flood Control	126	Running Out of Steam	170
The River That Won't Be Conquered	128	Sharing Antarctica	172
How Long Is a Meter?	130	Games Mathematicians Play	174
Guessing the Unknown	132	The Speed-Up That Will Slow Time	176
Chunneling Through	134	Say Good-bye to Traffic Jams	178
Planning for Safety	136	The Three R's for the Next Millennium—Reduce, Reuse, Recycle	180
Nature Is Their Enemy	138	Art—But What Kind?	182
Putting the Arts Together	140	A Musical Revolution	184



Shaped Like a Pear

Sailors long ago were often afraid that if they sailed too far from home they would fall off the edge of the flat ocean. In the past, many people had to trust the word of others, for they had no way to gather information for themselves.

Today, we can fly in airplanes high over the earth and see the curve that

is proof of its roundness. Astronauts soaring miles high can send us pictures that support our beliefs. Most people now accept the fact that the earth is definitely not flat. But many of them don't realize that it's not exactly round either. Actually, some scientists in the 1950s discovered that the earth is shaped more like a pear, thicker on one end than the other.

A mathematician, Ann Eckels Bailie, used computers to gather information to use in planning space flights. In her work, she figured the distance of spacecraft from the planets and stars.

During her regular work of tracking the second U.S. satellite, Vanguard I, she discovered some facts that didn't seem to make sense. It appeared that the perigee—or point nearest to the earth—of the Vanguard orbit measured a different distance from the northern hemisphere of our earth than from the southern hemisphere.

At first, she and her colleagues thought that the strange figures were due to some mathematical error. But Bailie wouldn't give up the idea that important new information had been discovered. She and the other scientists discussed the shape of the earth again and again. One person even used Silly Putty to show how the earth bulged a little at the equator. Suddenly, Bailie and the others began to see that the same kind of gravitational pull that made the middle bulge might explain the different measurements for the northern and southern hemispheres.

Further research finally supported these beliefs. Bailie's *accidental finding* gave us a surprising new picture of the shape of the earth.

FIND THE ANSWERS

- Sailors long ago thought the ocean was
 - a pear.
 - round.
 - flat.
 - high.
- The word in paragraph 5 that means *half of the earth* is _____.
- The words "a mathematician" in paragraph 3 describe _____.
- While it is not directly stated, the article suggests that
 - people change their ideas slowly.
 - more airplanes are needed in science.
 - people love to change their minds.
- The perigee is that point in an orbit that is nearest the
 - satellite.
 - earth.
 - computer.
- On the whole, the article tells about
 - how most mathematicians work.
 - an accidental discovery about the earth's shape.
 - how to track an orbit.
- Which statement does this article lead you to believe?
 - Small discoveries can lead to big changes in thought.
 - Small discoveries aren't worth checking.
 - Computers aren't much use anymore.
- Why did Ann Eckels Bailie use computers?
 - To prove the earth was round.
 - To gather information for planning space flights.
 - Because all spacecraft had to carry computers.
- Think about the concept for this article. Which statement seems true both for the article and for the concept?
 - Scientists like space study more than mathematics.
 - New facts can bring about changes in our beliefs.
 - New facts don't really change old ideas.



Having Their Say

In 1833, Lydia Maria Child put into writing her thoughts about slavery. Her book had a long title: *An Appeal in Favor of the Class of Americans called Africans*. Child knew she was taking a chance, but she didn't expect the angry response she received.

Her friends didn't approve; many people stopped talking to her. She had begun to publish *Juvenile Miscellany*, the first magazine for children, but she had to stop publication because so many people had stopped buying the magazine in protest.

Other unexpected things happened, though, that turned out to be good. Some people started thinking about her words. Others decided to free their slaves after reading her words. Famous writers of the time wrote about her bravery in speaking out.

Lydia Maria Child continued to write and publish antislavery journals. She

became the editor for an antislavery journal in New York called *The Standard*. Through this journal, she influenced many thinkers of the times.

Throughout the 1900s, African Americans took advantage of the printed word to put forth their own points of view. One of America's greatest poets was Langston Hughes, an African American who wrote during the first half of the twentieth century. His work is still popular with children as well as adults. But Hughes was no exception. The novelist Toni Morrison won a Pulitzer Prize in 1988 and the Nobel Prize for literature in 1993. Plays written by August Wilson have been awarded two Pulitzer Prizes. The poet Maya Angelou read one of her poems at President Clinton's first inauguration in 1993.

Today the influence of African-American writers extends far beyond the African-American community.

FIND THE ANSWERS

1. Lydia Maria Child published the first
 - a. slave book.
 - b. want ads.
 - c. African book.
 - d. children's magazine.
2. The word in paragraph 4 that means *had an effect on* is _____.
3. The words "no exception" in paragraph 5 refer to _____.
4. While it is not directly stated, the article suggests that
 - a. people can stop a business by not supporting it.
 - b. people need to learn more about writing.
 - c. African Americans are better poets than novelists.
5. Some people thought Lydia Maria Child was too
 - a. bold.
 - b. young.
 - c. tired.
6. On the whole, the article tells about
 - a. the way children learn to write.
 - b. how to start a publishing business.
 - c. the power of the printed word to produce change.
7. Which statement does this article lead you to believe?
 - a. People don't pay much attention to newspapers.
 - b. Writers can influence the way we think.
 - c. Writers want to win prizes.
8. Why do African-American writers want to publish their own writings?
 - a. Congress passed a law for writers.
 - b. They can't get any other jobs.
 - c. They want to express their own points of view.
9. Think about the concept for this group of articles. Which statement seems true both for the article and for the concept?
 - a. Sticking to an idea may have surprising results.
 - b. People should quit if their ideas don't work.
 - c. Young people are the best writers of new ideas.