



TRANSFORMATIONS

SCIENCE, TECHNOLOGY & SOCIETY

Using Transformations

A GUIDE TO THE SERIES

PRODUCT DESCRIPTION

TRANSFORMATIONS is a series of eight 15-minute videotapes and companion Teacher's Guides designed to motivate learning and enhance science instruction in middle-school classrooms.

Developed with the extensive participation of middle school teachers and educational consultants, TRANSFORMATIONS is based on standard science curricula and widely-used textbooks.

Hosted by four high school members of a rock-n-roll band, each video unit features young, enthusiastic engineers and technicians grappling with real-world problems at mines, oil wells, computer companies, and steel mills around the country. The Teacher's Guide for each unit is flexible and easy to use, supporting either single-class sessions or longer term activities and providing ample resources for follow-up projects.

PROGRAM GOALS

TRANSFORMATIONS is designed to:

- ▲ Enhance and enrich science instruction in middle-school classrooms;
- ▲ Explore ways in which technology applies scientific knowledge to meeting society's needs and solving problems;
- ▲ Foster among students a spirit of inquiry, encouraging and developing their problem-solving skills;
- ▲ Help develop citizens who are critical thinkers, prepared to make informed decisions about complex social/technological issues that will confront them in the decades to come.



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GETTING IT RIGHT: Three Stories About Problem Solving

This unit models basic problem solving techniques and introduces the scientific method. The three stories follow the band trying to perfect a song for their demo tape, a student from Massachusetts Institute of Technology (MIT) competing in a design contest, and a trio of petroleum explorationists at Amoco deciding whether to drill for oil. The emphasis is on team-

work, estimating, modeling and the acceptability of false starts and failures.

The unit connects to Earth, General and Physical science curricula, covering:

- ▲ Problem Solving
- ▲ Scientific Models
- ▲ The Scientific Method



AN ANCIENT RING OF GOLD: Mapping and Geologic Time

Gold has always had strong associations for people, as this unit demonstrates. A visit to Newmont Gold Company—the largest gold mine in North America—examines modern day gold-prospecting technology. Members of the band also discuss gold's traditional allure as a mystical commodity and precious metal.

An Ancient Ring of Gold will connect to Earth science curricula, Social Studies lessons on mapping and on civilizations which value gold, such as the ancient Egyptians and Incas. The unit covers:

- ▲ Geologic Time
- ▲ Topographic Maps
- ▲ Rock Formations



LIMITS: Energy Resources and the Environment

This unit examines the various sources of our nation's energy supply, comparing and contrasting the relative advantages of renewable and non-renewable resources. The video features visits to an oil field in West Texas and a project for developing economical photovoltaic power in New Mexico.

Meanwhile, the band members discuss the pros and cons of different forms of energy.

The unit connects to Earth, General and Physical science curricula, covering:

- ▲ Renewable Resources
- ▲ Fossil Fuels
- ▲ Energy and the Environment



SIMPLY INCREDIBLE: Electronics and Computers

The subject of this unit is microelectronic technology, exploring transistors, integrated circuits and the microchips that contain them. The video features a visit to Texas Instruments, the site of some of the original breakthrough work in the development of integrated circuits.

The unit's curriculum connections include General and Physical science, as well as computer classes and music classes discussing electronic music and synthesizers.

Topics covered include:

- ▲ Electrical Circuits
- ▲ Electronics and Computers



THE BAND:

The "hosts" of the series—Billy, Laurie, A.J. and Simone—are high school friends who have formed a rock-n-roll band. As they rehearse, they encounter questions about science and technology.



FIELD VISITS:

As the band members debate and wonder, we cut to location visits with professionals in the field—young, attractive role models who explain how science and technology relate to our world.

A Video Series to Enhance Middle School Science Instruction



POWERFUL STUFF: Heat and Electrical Power

The centerpiece of this video is a visit to Chaparral Steel Company in Texas, which recycles this popular alloy from junkyard cars. In order to produce steel to certain specifications, intensely high levels of heat must be generated by massive amounts of electricity.

Powerful Stuff connects with General and Physical science curricula, plus Social Stud-

ies on the Bronze and Iron Ages, the Industrial Revolution and the discovery of electricity.

Topics treated are:

- ▲ Heat
- ▲ Electrical Power
- ▲ Metals



LITTLE BUDDIES: Microbes and Mining

For most people, bacteria are synonymous with germs. This unit explores the wider aspects— and recent technological applications— of these ubiquitous organisms. The video includes a lab visit with a metallurgical engineer working to isolate bacteria to extract specific metals from low-grade ore, and a field visit with an engineer using bacteria and water to do just that— extract copper.

Little Buddies connects to curricula in Life, General and Earth science and could supplement a discussion of cooperation and friendship.

The topics developed are:

- ▲ Microbes
- ▲ Mining



ONE MORE TIME: Recycling

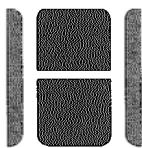
How are technology and society dealing with the fact that each of us produces nearly one ton of solid waste annually? The problem of waste and the need for recycling and reusing materials are the subjects of this unit, and the video features visits to two recycling facilities.

The unit connects to curricula in General,

Earth, Physical and Life sciences, and to Social Studies units on the environment.

Topics developed in this unit are:

- ▲ Waste Management
- ▲ Resources and the Environment
- ▲ Land Use



WHAT'S IT WORTH? Risk and Value in Technology and Society

What is the relationship between technological advances and what society judges as valuable and worth taking a risk for? The video explores these issues by visiting a biomechanical engineer at Dow-Corning-Wright and an oil drilling engineer working offshore in the Gulf of Mexico.

The unit connects to General, Earth and Physical science curricula and is centered around the Social Studies issues of risk/reward and values.

Topics covered include:

- ▲ Social Values and Technology
- ▲ Technology and Economics



GRAPHICS AND ANIMATIONS

help viewers understand important scientific concepts more clearly. Other "sidebar" illustrative sequences stimulate classroom discussion, putting scientific facts into the context of technology and society.



CURRICULUM CONNECTIONS

are designed into Transformations to assist teachers in using the series to supplement established science curricula. Units are based on topics treated in the most commonly used textbooks.

TRANSFORMATIONS is an open-ended set of units designed to supplement classroom science curricula and stimulate discussion and exploration of issues in science, technology and society. You may use any or all of the units in the series, in any order you choose. TRANSFORMATIONS is closed captioned to enhance the educational experience of hearing impaired and learning disabled students.

VIDEO PROGRAMS

Each of the eight TRANSFORMATIONS videos explores a major theme through a set of specific topics and curriculum connections: problem solving, geology and mapping, energy resources and the environment, electronics and computers, microbes, mining, heat and electrical power, recycling and technology and values.

Your students can make connections right away:

- ▲ Following a peer group, as the band members—Billy, Laurie, A.J. and Simone—rehearse together and encounter questions about science and technology.

- ▲ Visiting attractive professional role models on location as they explain how science and technology relate to their world.
- ▲ Understanding important scientific concepts more clearly through animation and other “sidebar” illustrative sequences.

All along, the programs maintain an entertaining visual pace as we get to know the band members better and hear them perform their songs, MTV-style, with lyrics that underscore some of the questions they have raised.

TEACHER'S GUIDES

Each unit includes a 16-page Teacher's Guide that summarizes the key concepts and assists you with your preparation, presentation and follow-up activities:

- ▲ **Introduction to the Teacher** presents background material on the topics presented in each unit.
- ▲ **Introduction to Students** provides material for introducing the unit to your students, including the unit's theme and objectives, connections to students' experience, a presentation of major topics, and key concepts and terms.

- ▲ **Activity Masters** offer students hands-on opportunities in the form of activities and labs.
- ▲ **Extension** includes science fair projects and research topics that build on concepts explored in the unit.
- ▲ **Resource Center** lists up-to-date resources for you and interested students to pursue, including recent book titles and organizations you can contact.

INTEGRATION AND TEAM TEACHING POSSIBILITIES

Current issues of science and technology often cut across the boundaries of our experience, and across the 7th and 8th grade curricula.

TRANSFORMATIONS offers an ideal starting point for an integrated exploration of these topics as well as an opportunity for teachers to combine perspectives creatively. The real-world orientation of the series, its connection to students' experience, and its

focus on skills such as problem-solving, weighing social values, and thinking systematically provide a platform for teachers of science, social studies and language arts to come together as teams.

We invite your comments on how TRANSFORMATIONS has helped you to accomplish this, as well as your suggestions on how we may improve or supplement this series in future editions.

TRANSFORMATIONS was developed and produced by AIME, the American Institute of Mining, Metallurgical and Petroleum Engineers, New York, NY.

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