

To the Teacher

The format used in most science activities and experiments does not always fascinate middle school students. An interesting and unique approach to experimentation is sometimes all that is needed to capture the attention of the young learner.

Ask the Science Expert uses a unique approach to presenting the science problem of each experiment. The problem that students are asked to solve is presented in the form of an "Ask the Science Expert" advice column. This is followed by background information addressed to students about the topic being discussed. Following the background is a set of Prelab Research Questions in which students must rely on their powers of research to locate the answers. After completing the Prelab Research Questions, students engage in an experiment to help them determine the proper response to the problem stated in the beginning advice column.

Once the experiment is complete, students are armed with the information that will allow them to respond appropriately to the problem statement. The student now becomes the science expert and is ready to provide advice for the person who posed the original question. Students then write the conclusion statement in a format of one or two paragraphs in an advice column box addressing the original question.

This book includes both physical and life science activities. It allows students to use problem-solving and research skills to reach a conclusion. The advice-column format captures the attention of the student. The student's response makes use of good writing skills that reflect his or her conclusions to the experiment. An answer key at the back of the book provides information for the teacher, sample data tables and procedures, and probable conclusion statements.



Table of Contents

Life Sciences

Teeth in Trouble	5
Little Beings.....	10
Bird Bones	16
Green Factories	22
Keeping the Beat.....	28
Plant Perspiration	34
Caffeine Drinkers	41
Baby Plants	46
Facts About Fungi	52
What a Response!	58
Speeding Up the Process.....	64

Physical Sciences

Polymer Savvy	70
Toxic Rain	76
It's Freezing in Here.....	82
Floaters	88
Free Fall.....	94
How Tall?	100
Falling	106
Working for an Answer	112
Smart Packaging	119
Teacher Notes and Answer Key	125

Teeth in Trouble

Dear Science Expert,

- I go to the dentist's office every six months to get my teeth cleaned. I am 25 years old, but every time I go to the dental hygienist, she wants to treat my teeth with fluoride. I thought this was a children's treatment, but she said my mouth is very acidic and it is causing my teeth to develop cavities.

- I have at least one cavity each time I get my teeth cleaned. She and my dentist think these fluoride treatments along with using a fluoride gel each day may eliminate my cavities. My insurance does not cover the cost of the fluoride treatments. Do you think it is worth the expense? Does fluoride really help prevent tooth decay?

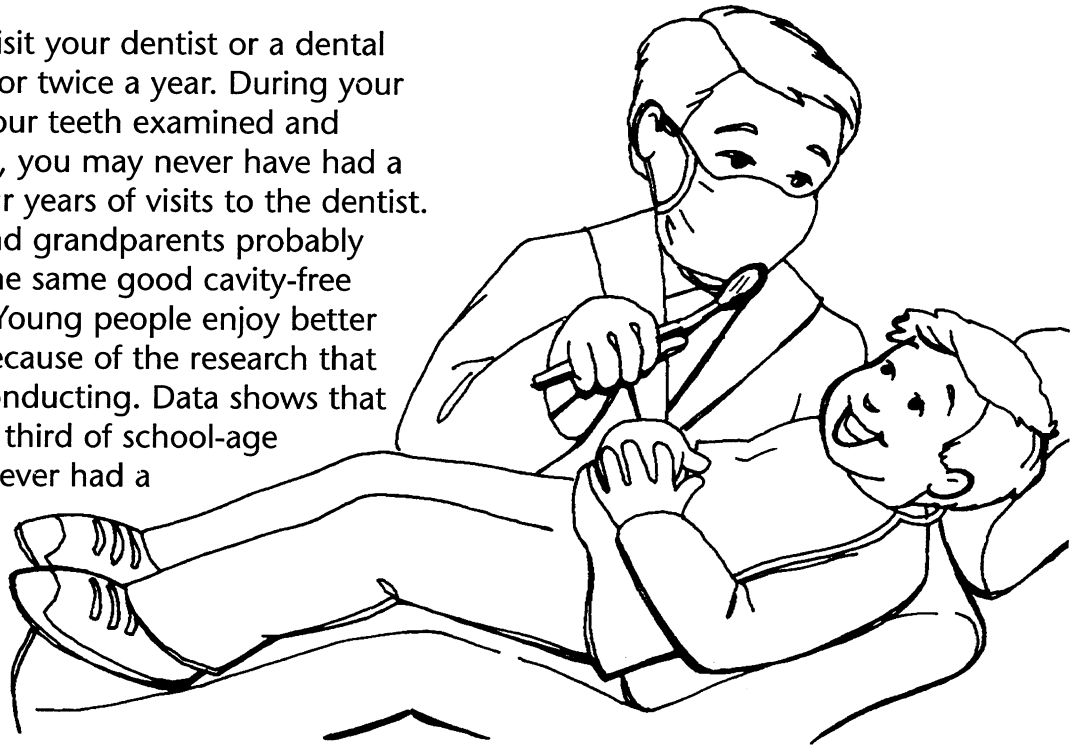
Sincerely,
Cavity Prone

Procedure

1. Read the Background Information: Teeth in Trouble: Tooth Decay and the Environment.
2. Answer the Prelab Research Questions.
3. Follow the steps of the procedure to conduct the experiment following the Prelab Research Questions so that you become the science expert.
4. Acting as the science expert, write a response to Cavity Prone's letter.

Tooth Decay and the Environment

You probably visit your dentist or a dental hygienist once or twice a year. During your visit, you get your teeth examined and cleaned. In fact, you may never have had a cavity in all your years of visits to the dentist. Your parents and grandparents probably cannot boast the same good cavity-free record as you. Young people enjoy better health today because of the research that scientists are conducting. Data shows that today over one third of school-age children have never had a tooth cavity.



What is different today from when your parents were children? Your parents were told to brush their teeth after meals and eat a good diet just like you were. They may have even been told to floss their teeth daily. The difference between today and then is the presence of fluoride in our water supply.

Bacteria that gets into the mouth produce enzymes and acids. These acids have the ability to split proteins. This can destroy the protein matrix of the enamel, resulting in tooth decay. The presence of fluoride on tooth enamel can protect the tooth from decay, because fluoride on tooth enamel is not easily dissolved by the acids in your mouth. This results in more cavity-free checkups.

