

Dear Educator,

Your students may not be aware that among the many ways science touches their lives are the coatings that provide protective, decorative, and restorative finishes to countless objects they encounter and use every day. From preventing rust, food spoilage, and UV damage to giving paint magnetic and other novel properties, coatings cover 70 percent of the products made in the U.S.!

This free educational program, **Got You Covered!**, created by the American Coatings Association (ACA) in cooperation with the curriculum specialists at Young Minds Inspired (YMI), uses standards-based activities to investigate a broad array of STEM-related coatings applications with your students. In addition to sparking dialogue about how technological advancements influence everything in our lives, from environmental conservation to art and design, this program can also introduce students to opportunities for careers in science and engineering.

We hope your classes find fun and inspiration in completing these activities and furthering their studies in STEM subjects. Please let us know your opinion of the program by returning the enclosed reply card or by commenting at ymiclassroom.com/feedback-aca. We depend on your feedback to continue providing free educational programs that make a real difference in students' lives.

Sincerely,



Dr. Dominic Kinsley
Editor in Chief
Young Minds Inspired



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For questions, contact us toll-free at 1-800-859-8005 or by email at feedback@ymiclassroom.com.

GOT YOU COVERED!

Target Audience

This program is designed for middle school students, grades 6-9, as a supplement to the STEM curriculum.

Program Objectives

- To help students understand the many ways coatings improve and enhance our world.
- To guide students' appreciation of the science behind modern coatings.
- To challenge students' imaginations and encourage them to consider a career in advancing the future of science and technology.

Program Components

- This one-page teacher's guide
- Three reproducible student activity sheets
- A colorful classroom wall poster
- Follow-up activities found at ymiclassroom.com/aca
- A STEM career guide for students to share with their families, available at ymiclassroom.com/aca
- A reply card for your comments or comment online at ymiclassroom.com/feedback-aca

How To Use This Program

Photocopy the teacher's guide and activity sheets to share with fellow teachers and your school science department before displaying the poster. Review and schedule the activities and have students take their sheets home to share with a parent. This program aligns with Next Generation and National Science Standards for grades 6-9. For more information, visit ymiclassroom.com/aca.

Representatives from the paint and coatings industry may be available to visit your classroom and teach students more about the science of coatings. For further information, please visit www.paint.org/got-you-covered.

Activity 1 • You're Covered

Begin by asking students for examples of coatings. They might name different kinds of paint, polyurethane, shellac, etc. Then ask students to speculate on the roles they think coatings play in their lives. Distribute the activity sheet and have them complete **Part 1** to test their awareness, then ask if any of the answers were a surprise.

Answers: A. 5; B. 3; C. 7; D. 8; E. 9; F. 6; G. 2; H. 1; I. 4; J. 10.

Complete **Part 2** as a group. **Possible answers:**

- A.** Glass and plastics on television and tablet screens; wireless charging stations; defibrillator
- B.** Antimicrobial, odor-fighting sneaker liners; polyurethane (PU) faux leather on pants and purses; PU breathable "wet bags" to carry wet clothing and diapers; anti-glare eyeglass coating; washable linings on lunch bags; reflective vests
- C.** Food storage can and carton liners; galvanized finishes on steel and iron; enamel finishes on cast-iron pans; Teflon coating on non-stick pans; automobile paint; grease on bicycle chains; stain on wood floors and furniture
- D.** Nail polish; wall paint in gloss, magnetic, or other finishes

Activity 2 • What's Your Wavelength?

Prior to introducing this exercise, obtain the materials



listed in **Part 1** below and practice creating and decoding your own messages. As you will see, it works best with light pressure and a cyan or light blue crayon and very precise cross-hatching with red ink and yellow highlighter over top. We also recommend setting specific guidelines, based on your school's code of conduct, for the content of the secret messages. (Note: Decoder glasses are available at ideastage.com.)

Begin the lesson by asking students what they already know about the science behind color.

Part 1: Provide paired-off students with cardboard, a pattern for glasses, red acetate or cellophane (available from Amazon, Walmart, and most craft or photography shops), blue crayons, red ink pens, and yellow highlighters. Provide time for them to make and decorate their glasses (you can have them do this at home to save time), and to write and disguise their secret messages. Then, have them trade and decode their papers. Provide some guidance as they experiment with the density of the cross-hatching and highlighter to get this to work well.

Part 2: Divide the class into groups. Distribute a set of watercolor paints and colored construction paper and allow time for students to experiment. If possible, use cyan, magenta, and yellow to replicate how printers and other subtractive mixing systems work. If time is short, demonstrate this activity.

Activity 3 • Cool & Collected

Begin this lesson by reminding students about the subtractive mixing experiment they completed, and ask them to make a hypothesis about the impact dark and light colors would have on temperature. Then, divide the class into teams and give each group these materials — small transparent plastic cups, a plate or shallow bowl, and a variety of materials to use for the roof (plastic wrap, aluminum foil, Styrofoam, cardboard, white and black paint, and felt or fabric in 2-3 colors of varying darkness). Students will create structures by turning the cup upside down on top of the plate, so that the bottom of the cup becomes the top of the structure. The roof materials will then be placed on the cup. When their structures are complete, they will place an ice cube (try to have ice cubes of a consistent size) on the plate and then put the cup back on top. If doing this experiment indoors, placing the structures in direct sunlight (such as on a windowsill) or using heat lamps will mimic performing the experiment outside. As students work, make suggestions such as painting certain parts of the cup black vs. painting the entire cup, or using a variety of roofing materials.

Conclusion: Remember that black objects appear black because they are absorbing all colors of light, while white objects appear white because they are reflecting all colors of light. How comfortable would students feel wearing all-black clothing on a hot day?

Resources

- ymiclassroom.com/aca
- www.paint.org/got-you-covered