

Dear Educator,

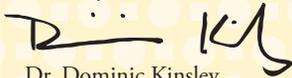
Technology runs the world, and it's no different for the American egg farming industry. With U.S. egg production averaging 75 billion eggs per year, the egg industry depends on technology to continue to meet rising consumer demands.

These lessons from the American Egg Board (AEB) and the award-winning curriculum specialists at Young Minds Inspired (YMI) highlight real-world examples of the role technology plays in modern egg farming. Students will explore ways in which science has driven innovation to improve hen health and ensure that production practices result in eggs of consistently high quality for the consumer, and how science has expanded the role that eggs play beyond their value as a food.

We hope you will find these lessons helpful in supplementing the valuable resources already available at the Egg Board's home site, aeb.org, and at the AEB's companion site, incredibleegg.org. Be sure to check back periodically for updates. Although the materials are copyrighted, you may make as many copies as needed for educational purposes.

Please comment online at ymiclassroom.com/feedback-egg-board to provide feedback. We look forward to hearing from you.

Sincerely,



Dr. Dominic Kinsley
Editor in Chief
Young Minds Inspired

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

Target Audience

Middle school students in Science and STEM classes.

Program Objectives

- Educate students on the agricultural production and processing systems of the U.S. egg industry.
- Introduce students to practical applications of science and technology in the U.S. egg industry.
- Raise awareness of the engineering design process that has supported innovations in the U.S. egg industry.

Standards Alignment

This program aligns with Family and Consumer Science, Science, and Next Generation Science Standards. For more details, visit ymiclassroom.com/egg-board.

How to Use This Program

Download and photocopy this teacher's guide and the three activity sheets. Review the materials to incorporate the lessons into your existing plans. The engineering and design portion of Activity 1 may incorporate homework time toward completion. Activity 2 will require a scale (digital, if possible). Part 1 of Activity 3 will require clear bowls and paper towels or newspapers for clean-up if you have students complete it in class.

Activity 1

T-egg-nology?

PART 1: Have students view Chapters 7, 8, and 9 in the Eggs 101 video series at aeb.org/educators/video. Videos run approximately 3-4 minutes each. Use the explanations below to review students' answers. You may wish to view, and/or suggest that students view, even more advanced technological systems in action by watching the Farm-to-Table Virtual Field Trip videos at aeb.org/educators/farm-to-table-virtual-field-trips.

Answers:

1. Feeding hens — Computer-controlled feeding system runs on rails to distribute fresh food equally.
2. Gathering eggs — Conveyor belts move and position eggs for packaging.
3. Packaging eggs — Lasers apply date information on package; robots move packages.

PART 2: Have students use the engineering design process graphic to consider how engineers might have arrived at the solutions they saw in the videos to address these three processes. Encourage students to consider and suggest improvements that might use even more advanced technology.

Activity 2

Egg Sizing: A Case Study

PART 1: This activity requires enough eggs of different sizes (e.g., medium, large, extra large) so that each group of four or five students can work with eggs of



two different sizes. Also provide each group with a scale (digital, if possible). Groups should rotate through the activity so that those waiting their turn to do their investigation can complete conversion charts while they wait.

Size conversions (ounce per egg): medium—about 1.75 oz.; large—about 2 oz.; extra large—about 2.25 oz.

Students should find that, while there may be slight variations among individual eggs in size and weight, each carton of eggs meets USDA guidelines, ensuring that consumers can always expect to buy eggs with confidence.

PART 2: Answers: 1. Older hens lay larger eggs. 2. Underweight birds produce smaller eggs. 3. Stress, heat, overcrowding, and poor nutrition can result in smaller eggs.

Activity 3

Beyond the Kitchen

PART 1: Assign this part of the activity as either homework or classwork. If done in class, use the eggs from Activity 2 as models for the sketch, having students work in pairs using a small, clear bowl in which to crack and observe the egg. Remind students to wash their hands when they are finished.

Thanks to quality control technology, there has not been a food-borne illness associated with egg products since 1970. Learn more at aeb.org/food-manufacturers/egg-science-tech-talk-videos#are-egg-products-safe.

PART 2: Have students develop their questions based on the different categories of egg uses found at the Eggyclopedia's "Uses, Other" link. Questions can center around different egg parts that are utilized, the ways in which different egg nutrients are used, etc. Compile student questions for a fun class quiz in a format of your choice (True/False, multiple choice, Q and A, etc.).

Resources

- ymiclassroom.com/egg-board
- American Egg Board: aeb.org
- The Incredible Egg: incredibleegg.org
- USDA on egg size: fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/egg-products-preparation/shell-eggs-from-farm-to-table/CT_Index

T-egg-nology?

Technology not only delivers the coolest content to the latest devices; it's also responsible for making sure that eggs provide consistently high quality nutritional benefits to consumers every day.

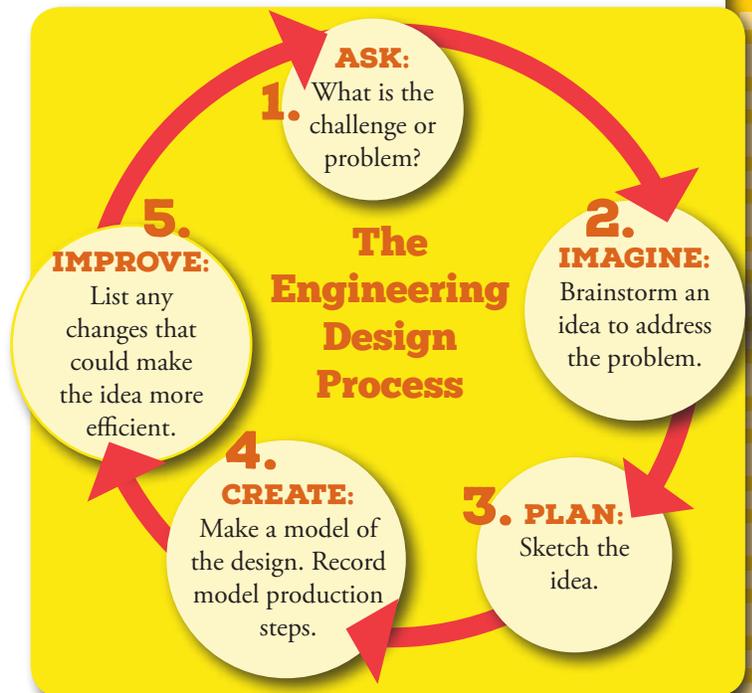
PART 1: Technology has been used to automate many parts of the egg production process. Watch Chapters 7, 8, and 9 in the Eggs 101 video series at aeb.org/educators/video to find out how technology is used to feed hens, gather eggs, and package eggs for sale. As you watch, list some examples of ways in which science and technology address these three processes:

Egg Industry Processes	Science and Tech Solutions From Video
1. Feeding hens	
2. Gathering eggs	
3. Packaging eggs	



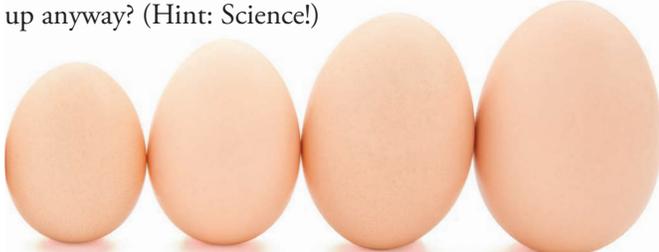
PART 2: Now “reverse engineer” one of these technologies using the engineering design process at right. For example, how did the engineers who created this technology define the problem? What other ideas might they have imagined as solutions? How did they diagram the technology to show its main features?

Now that you’ve seen the technology in action, what improvements can you imagine? Use the back of this paper to make notes.



Egg Sizing: A Case Study

Medium. Large. Extra Large. Jumbo. Everyone knows that eggs come in different sizes. There are even specialty egg sizes — pee wee and small! But just how do eggs measure up anyway? (Hint: Science!)



Medium **Large** **Extra Large** **Jumbo**

PART 1: Learn more about egg sizing through your own egg-vestigation! Maybe you can't weigh an egg 60 times in one second like the sensors used in egg processing today, but you can appreciate the efficiency of this technology by weighing eggs the old-school way.

Directions

1. Egg sizing guidelines are set by the U.S. Department of Agriculture (USDA) based on weight per dozen eggs. Use the math conversion chart below to calculate the average weight for each egg size.
2. Now weigh your eggs individually and record the weight in the second chart.
3. How did your results compare to those of a typical egg?

USDA Guidelines

Egg Size	Weight Per Dozen	Weight Per Egg (convert)
Medium	21 ounces	
Large	24 ounces	
Extra Large	27 ounces	

Egg-vestigation Results

	Egg Size	Weight
Egg #1		
Egg #2		



PART 2: How do you think the following factors affect the size of eggs? Write your ideas below, then check out the Size topic in the Eggyclopedia at incredibleegg.org to see if you were correct. Was there anything that surprised you?

Egg Size Factors

1. Age of the hen: _____

2. Weight of the hen: _____

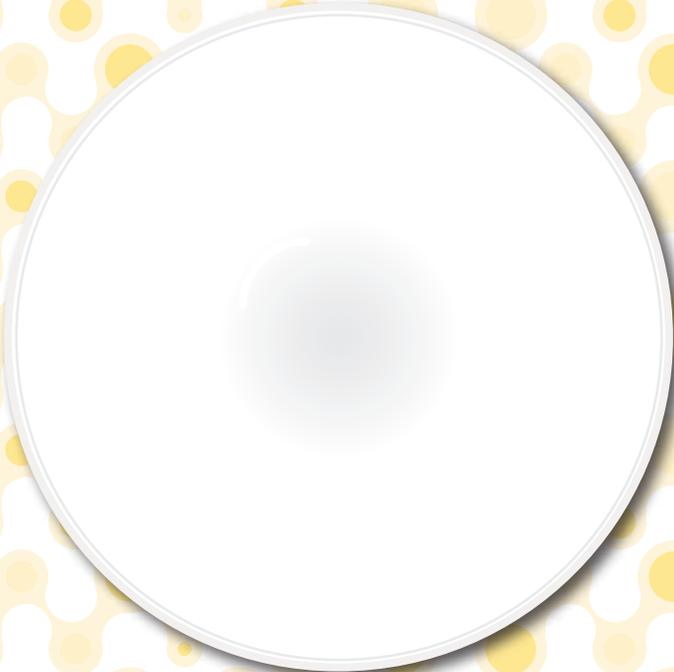
3. The environment in which the hen is living:

Beyond the Kitchen

PART 1: The value of eggs reaches beyond the kitchen into realms of science that might be surprising. That's due in part to the contents of an egg.



What's in an egg? Get together with a group of classmates and carefully crack open a raw egg to see what's inside. Use the space below to make a detailed sketch of the contents. Label the parts you know.



Now use the labeled egg diagram found at aeb.org/images/EggDiagramWithAnswers.pdf to finish labeling your egg.

PART 2: Do you really know what it's like to have egg on your face? You do, if you've used egg white as a facial treatment. For a fascinating glimpse of all that eggs do for us, check out the Eggyclopedia's "Uses, Other" link. Then help your teacher put together a fun quiz by creating three questions based on facts you learn in these categories, to see if you can stump your classmates.

A. Cosmetics

Question: _____

Answer: _____

Why I found this interesting: _____

B. Agriculture

Question: _____

Answer: _____

Why I found this interesting: _____

C. Medicine

Question: _____

Answer: _____

Why I found this interesting: _____
