



Classroom Teacher Preparation

Technology 2: Biometrics

Please use the following to prepare for the next SfS lesson.

Description:

This lesson provides an introduction to biometrics, an important security field in our digital lives. Small groups will design and test hand geometry biometrics to be used in place of a combination lock on a school locker. After creating their own biometrics, groups will test each other's biometric designs using handprints collected at the start of class. Students will evaluate the designs and share their observations about factors contributing to the strength of a biometric.

Lesson Objectives – SWBAT (“Students Will Be Able To...”):

3rd-8th

- Identify unique physical and behavioral characteristics that can be used as biometrics
- Create hand geometry biometrics and then evaluate the effectiveness of another group's biometric design

Disciplinary Core Idea (DCI)

PS4 Waves and their Applications in Technologies for Information Transfer - PS4.C Information Technologies & Instrumentation

- (3rd-5th) Patterns can encode, send, receive and decode information.

ETS1 Engineering Design - ETS1.C Optimizing the Design Solution

- (3rd-5th) Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.
- (6th-8th) Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process – that is, some of those characteristics may be incorporated into the new design.

Science & Engineering Practice (SEP)

Analyzing and Interpreting Data

- (3rd-5th) Represent data in tables and/or various graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.
- (6th-8th) Consider limitations of data analysis (e.g., measurement error), and/or seek to improve precision and accuracy of data with better technological tools and methods (e.g., multiple trials).
- (6th-8th) Analyze and interpret data to determine similarities and differences in findings.

Crosscutting Concept (CCC)

Patterns

- (3rd-5th) Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena and designed products.
- (6th-8th) Patterns in rates of change and other numerical relationships can provide information about natural and human designed systems.



Preparation:

This lesson can serve as an introduction to the use and design of biometrics in technology.

Room Set Up for Activities:

Students will be working in small groups of 4-6 (4 is the minimum size), and can work at desks, benches or on the floor.

Safety:

There are no safety concerns for this lesson.

Related Modules:

This lesson may be taught as part of a sequence or group of related modules on **Forensics**. Modules include:

Anatomy/Physiology 22: Fingerprinting – Students discover which type of fingerprint they have before investigating the various ways of leaving behind, collecting, and analyzing prints, including inking and dusting & lifting.

Anatomy/Physiology 21: Hair Identification – This lesson is an introduction to the concept of hair analysis. Students use the medulla pattern of different species to solve a mock crime through claim, evidence, and reasoning.

Anatomy/Physiology 6: Blood Typing – Students learn what determines a person's blood type through a blood-typing activity using simulated blood. From the results, the class will discuss which blood types are compatible and what happens if you give incompatible blood to a patient during a blood transfusion.

Chemistry 8: Design a Chromatography Experiment – Students consider what type of questions paper chromatography can be used to answer, and design and carry out at least one chromatography experiment. While the experiment is running, the students will participate in a discussion of chromatography and interpreting chromatograms.

For other module sequences and groups, look here: www.sciencefromscientists.org/sequences

Standards Covered:

Please click the following link to our website to review the standards covered by this lesson, listed by state: www.sciencefromscientists.org/standards/

Lessons are matched to both national NGSS and local state standards.

After Our Visit:

Extend this lesson by creating your own facial recognition biometric!

Access this Extension activity by visiting the Classroom Post found on our website at sciencefromscientists.org/cohorts. Use the name of your school/cohort and password to log in.

To help Evaluate, check out our Open Response questions online at sciencefromscientists.org/open-response-questions. They are freely available for all of our lessons for current teachers. Use the password supplied by your instructor to log in.

Additional Resources:

- Biometric Identification (1:55) - nice, quick summary of the topic: <https://www.youtube.com/watch?v=eZTfgNliNUA>
- Biometrics Technology (4:18): https://www.youtube.com/watch?v=Vy2e_Zb0eoY
- Biometrics (2:53), dry for students but informative for teachers: <https://www.youtube.com/watch?v=D2fv91DcXw8>
- Fingerprints and other Biometrics: <https://www.fbi.gov/services/cjis/fingerprints-and-other-bioetrics/>
- The Boring and Exciting World of Biometrics: <http://www.pbs.org/wgbh/nova/next/tech/biometrics-and-the-future-of-identification/>

