Shoeprints

Part of: **Dartmouth Rural STEM Educator Partnership**
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Driving Question	Overview
Single big question addressed by this lesson. **How do scientists analyze and use shoeprints to assist in solving a crime?**	Brief (1-2 sentence) description of the lesson. **Students will examine their own shoes and those of their peers, identify unique characteristics, and make comparisons. They will then make a shoe-print cast and discuss how it is individual evidence. 2-3 day activity**

NGSS Standards	Objectives
[NGSS](#) standards addressed **Making a cast:** **-IPS Unit 2: Matter Meets Energy (I see a link here, depending on what the students already know).** **-MS-PS1-3** **Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. [Clarification Statement: Emphasis is on natural** **resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels.] [Assessment Boundary: Assessment is limited to qualitative information.]**	Through this lesson, students will (2-3 measurable objectives): **+Explain how shoeprints can be individualized** **+Make a plaster cast** **+Explain why shoeprints can be helpful in connecting a suspect to a scene**

Correlation to the Next Generation Science Standards

	Background	Activity 1	Activity 2	Activity 3	Questions	Extension Activities
Science and Engineering Practices						
Developing and Using Models		◆				
Planning and Carrying Out Investigations		◆	◆		◆	
Analyzing and Interpreting Data		◆	◆		◆	
Using Mathematics and Computational Thinking						◆
Obtaining, Evaluating, and Communicating Information	◆	◆	◆	◆	◆	◆
Crosscutting Concepts						
Scale, Proportion, and Quantity		◆	◆			◆
Core Ideas: Physical Sciences						

Materials
What materials are needed to run the lesson?

Two google doc sheets-linked below
https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxjcmltZXNjZW5lYW5hbHlzaXN8Z3g6Mzc3NWFiNTZjMzFlMGU5NQ

https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxjcmltZXNjZW5lYW5hbHlzaXN8Z3g6NDlkZTIyYWVmMDBkNjgwYYQ

[Footwear Identification and Casting Kit | Carolina.com](#)
Included in kit:
- **1 Inkless Footwear Staining Tray with Pad**
- **2 Shoe Impression Rejuvenator Ink, 0.5 oz**
- **36 Inkless Shoe Impression Cards**
- **1 Shake-N-Cast™ Pouch**
- **1 Disposable Casting Frame**
- **1 L Reference Scale**
- **1 Digital Resource Instruction Card**
- **1 Teacher's Manual with Reproducible Student Guide**

Needed But Not Included:
- **4 Rulers or Meter Sticks**
- **Play Sand, 10 lb**
- **Students' Shoes for Impression**
- **Students' "Suspect Shoes"**
- **Plastic Tub, Large (9 x 18" or larger)**
- **Navigational Compass**
- **Paper Towels**
- **Scissors**
- **Tap Water**
- **Soft-Bristled Brush**
- **Aerosol Hairspray**
- **Plastic Card or Index Card**
- **Flashlight with Batteries**
- **Digital Camera(s)**
- **Camera Tripod (optional)**
- **Document Camera (optional)**
- **Large Spoon (optional)**
- **Paper, 8-1/2 x 14" (optional)**

   Additional:

- **Activa air-drying clay**
- **Plaster of Paris**

Preparation
What needs to be prepared before the lesson?

~30 min Organizing stations and prepping

Background information
Any background information that may be helpful to the teachers?

Footprints/shoeprints are common at crime scenes and can be supportive evidence that a suspect was present at a scene. They are often hard to avoid making and can be key in solving crimes.

First, students make prints of their own shoes, using a special no-mess inkless shoe-print technology, to learn about pattern recognition. You then demonstrate the process of creating, cleaning, and handling a footwear cast using a no-mess, self-contained casting product designed specifically for crime scene field technicians. The activity requires about 65 min of class time on the first day, plus another 30 min of class time at least 24 hr later.

Story line to frame the lesson

Lesson

Lesson 1.

Show a PowerPoint presentation to review characteristics of shoeprints that have probative value.

Distribute the Shoeprints Worksheet and have students identify the class characteristics (brand, size, tread pattern) and "accidentals" that can individualize the shoe (wear, tear, imperfections).

Optional: students make an ink print of the sole of their own shoe and identify accidentals that may be present.

Set cast of suspect imprint with kit above for next lesson.

Lesson 2.

Students will make a cast of their shoe using Fast drying clay and plaster and compare the cast to a two-dimensional print of their sho df

Students will examine the casting from the suspect mold and make observations about it based on what they have learned.

Evidence of Learning

How will students demonstrate their learning? Exit questions?
By engaging with the work sheets and through demonstration of what they've learned by "solving the crime."

Extensions

Examining other ways to capture a print or impression- pros and cons

Glossary of terms

positive/negative identification

casts and molds

class marks

individual evidence

impression

print

mold

Appendices

References or other materials as needed.