FORENSIC SCIENCE

Unit Study

WonderHere

family-style curriculum

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Parents,

We are honored and thrilled that you've chosen us to come alongside your family as you pursue a wonder-filled education for your children! For the next six weeks, you and your children will explore and learn about all things FORENSIC SCIENCE! This learning may cause your child to have some wonders along the way... champion them to pursue those wonders. Remember, YOU are their greatest cheerleader!

This Unit Study is written to you - the parent, the expert on your child. As you read through the information and activities each week, remember you have the freedom and power to adjust it and make it work for YOUR family. Homeschooling is not "school at home"... it's a lifestyle, a posture of constant learning and growing.

Our *First Things First* guide is there to help you navigate our foundational learning elements that make our curriculum unique. Download it (plus lots of other goodies) over at WonderHere.com/Unit-Studies/Digital-Files.

Be encouraged, moms and dads! Your child is a problem solver, community-minded, a courageous learner, filled with wonder, and capable of much... and so are YOU! We are here to help you be their best teacher. We're rooting for you!

Tiffany & Jessica

How to use this Unit Study

a quick guide

Seven Learning Elements

Our curriculum uses 7 key Learning Elements that are interwoven throughout our program to set the table for your child's wonder to take over and for learning to spark. Literature, art, play, nature, community, music, and phenomena (which is a fancy word for something that is observed or studied), each playing an important role in a well-rounded learning process.

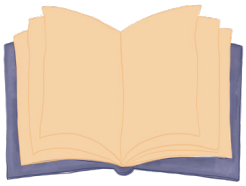
Your child will become familiar with these Learning Elements as they experience them weekly through engaging hands-on activities.

Community

Learning should never be just about ourselves. A community empathy project will guide us on how to serve others.

Phenomena

Phenomena (or Project) Based Learning allows your child's questions and wonders guide learning through research and creating.

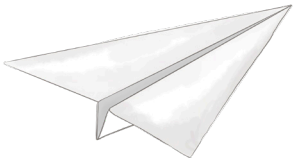


Literature

Enjoy high quality fiction and non-fiction books that bring home the concepts being explored.

Art

Engage your child's creativity through Invitations to Create. Enjoy art projects, recipes, crafts, and projects of all other mediums.



Play

Play isn't a break from learning... play IS learning. Enjoy Invitations to Play that will engage your child's imagination.

Music

The study of music allows the brain to take in information on another level. Your child will study a composer, listening to a new musical piece each week.

Nature

Time spent outdoors allows us to engage our senses and expand our ability to learn. Your children will enjoy nature, take notice of it, and make connections with their studies and the outdoors.

How to use this Unit Study
a quick guide

Middle & High School Extension Activities

The heartbeat of this curriculum is "family togetherness" - we believe your children can learn the same concepts together at different levels according to their age, ability, and interest. Our hope is that this takes a bit of stress off of you as the parent (no more juggling different curricula!). While the weekly activities are perfect for most ages, if you have middle or high school students look out for this light bulb icon for extension activities to take the learning deeper. They can also enjoy a separate book list of middle and high school literature.

Digital Files & Online Resources

Project-based, child-led learning can be sometimes be overwhelming. *What if my child has a question that I can't answer?* and many other similar worries may pop into your head. That's why we want to equip you with as many aids as possible, like supplemental activities, printables, and links to online resources that can help enrich your child's learning. Access these digital files and online resources at

WonderHere.com/Unit-Studies/Digital-Files

First Things First Guide

A big part of homeschooling is knowing your philosophy - the big ideas that will give you purpose and keep you going when it gets hard. Our *First Things First* Guide lays out the WonderHere philosophy, gives an in-depth look at each of the seven learning elements, lists practical tips for prioritizing project time, lends some encouragement to you parents, and shows a glimpse of the heart behind WonderHere.

Access the *First Things First Guide* at WonderHere.com/Unit-Studies/Digital-Files.

UNIT OVERVIEW

	Nature Journaling	Composer Study	Literature
Week 1: Forensic Science	Wildlife Forensic Sciences	*Law and Order* by Mike Post	*Solve This! Forensics: Super Science and Curious Capers for the Daring Detective in You* by Kate Messner and Anne Ruppert
Week 2: DNA & Biological Evidence	Crime Scene Creatures	*Hill Street Blues* by Mike Post	*The Secret Code Inside You: All About Your DNA* by Rajani LaRocca
Week 3: Fingerprint & Pattern Analysis	Explore Patterns in Nature	*NYPD* by Mike Post	*The Deductive Detective* by Brian Rock
Week 4: Trace Evidence	Explore Forensic Geology	*LA Law* by Mike Post	*Who Pushed Humpty Dumpty?* by David Levinthal and John Nickle
Week 5: Digital Evidence	Solve the Mushroom Mystery	*Magnum, P.I.* by Mike Post	*Goldilocks and the Three Dinosaurs* by Mo Willems
Week 6: Toxicology	Toxic Plant Identification Hike	*The Rockford Files* by Mike Post	*What Really Happened to Humpty?* Jeanie Franz Ransom

	Invitation to Play	Invitation to Create
Week 1: Forensic Science	Cyphers	Go on a Treasure Hunt
Week 2: DNA & Biological Evidence	Fruit Bowl DNA Extraction	DNA Strand Bracelets
Week 3: Fingerprint & Pattern Analysis	Fingerprint Expansion & Matching	Fingerprint Art
Week 4: Trace Evidence	Footprint Impressions Hopscotch	Ransom Letters
Week 5: Digital Evidence	Solve a Crime	Facial Recognition Portraits
Week 6: Toxicology	PH Cabbage Experiment	Create an Apothecary

MATERIALS LIST

	Thematic Tub	Nature Journaling	Literature
Week 1: Forensic Science	The Thematic Tub is used for exploring and wondering during PBL Time. Fill your tub with any of all of the following items, plus anything else in the subject of forensic science. • Gloves • Magnifying glass • Ink pad • Binoculars • DNA model kit (found on Amazon) • Secret Decoder activity pad (found on Amazon) • Flashlight • Notepad and pencil • Play camera or old camera that can be used for pretend • Invisible ink pens • Caution tape • Game of Clue • Guess Who Game • I Spy Books • Hidden Pictures books		*Solve This! Forensics: Super Science and Curious Capers for the Daring Detective in You* by Kate Messner and Anne Ruppert
Week 2: DNA & Biological Evidence		• Camera	*The Secret Code Inside You: All About Your DNA* by Rajani LaRocca
Week 3: Fingerprint & Pattern Analysis			*The Deductive Detective* by Brian Rock
Week 4: Trace Evidence			*Who Pushed Humpty Dumpty?* by David Levinthal and John Nickle
Week 5: Digital Evidence			*Goldilocks and the Three Dinosaurs* by Mo Willems
Week 6: Toxicology			*What Really Happened to Humpty?* Jeanie Franz Ransom

	Invitation to Play	Invitation to Create
Week 1: Forensic Science	• Scissors • Cyphers (download at **WonderHere.com/Digital-Files)** • Brass clip	• Cyphers (download at **WonderHere.com/Digital-Files)** • Treasure • Paper and pencils (for clues)
Week 2: DNA & Biological Evidence	• Knife • Chopping board • Sieve • Bamboo skewer • Banana • Isopropyl alcohol • Warm water • 1 tsp salt • Dish Soap • 2 glasses • Plastic bag • Microscope	• Blue, red, yellow, and green beads (colors can be substituted) • Elastic string • Gene Sequence Cards (download at **WonderHere.com/Digital-Files)**
Week 3: Fingerprint & Pattern Analysis	• Index Cards • Ink Pad • Pencil or pen • Balloons	• Ink pads of various colors • Cardstock or white paper • Ink pens or fine line Sharpies • Wet wipes
Week 4: Trace Evidence	• A few towels • Roll of aluminum foil • Shoes • Permanent marker • Sidewalk chalk (optional)	• Magazines • Glue sticks or white glue • Heavy paper (cardstock) • Scissors
Week 5: Digital Evidence	• White tape • Crime scene tape • Evidence (fingerprints, ransom notes, photographic evidence, etc) • A fairy tale • Other props (use the Thematic Tub!)	• Grid paper (1 inch grids or larger) • Pencil • Eraser • Ruler • Photograph of suspect
Week 6: Toxicology	• Red cabbage (chopped up) • Large pot, bowl, and strainer • Coffee filters • Baking soda, lemon juice, milk, and water • Plastic cups • Sharpie (to label)	• Glass jar with lid • Dried herbs, like chamomile • Alcohol or vinegar • Parchment paper • Cheesecloth • Large bowl • Glass bottle with dropper

Unit Projects

Empathy Experience

What if we all approached education from the belief that what we learn, we could then in turn use to help others? What if... this whole thing is about more than your child gaining new skills and learning new knowledge? What if we can actually make the world a better place?

Empathy Experiences is the answer to these “what ifs”. Your child will focus on better understanding and serving others who may live in different circumstances than they do.

Blanket Drive for Homelessness

This unit we will study forensics in a way that is fun and exciting. However, it is important to keep in mind that crimes produce victims. Many times, crimes can (directly or indirectly cause people to become homeless.

Homelessness is a real issue in the United States. Homeless people often struggle to stay warm as they sleep (encourage your child to imagine sleeping without their favorite blankie). Organize a blanket drive for the homeless, or give to an already existing drive.

Phenomena Based Learning (PBL)

What is PBL?

Phenomena-Based Learning (PBL) is a child-centered, multidisciplinary learning approach focused on wonder, curiosity, and problem-solving. Children learn through projects, investigating their way through problems and scenarios that are relevant to the world around them.

The term phenomena means "an observable fact, occurrence, or object, whether ordinary or extraordinary, that can be perceived by the senses or known by thought or intuition. Phenomena can be related to anything that is unusual or difficult to understand or explain fully." There is so much to wonder about when we consider the fascinating world around us. PBL shows us how to tap into that curiosity and convert it into learning!

PBL Goals

The goal in this Unit Study is *not* for your child to learn everything there is to know about forensic science (as much of it they would not be mentally and emotionally mature enough for), but rather for them to:

1. Get an exposure to the subject.
2. Train their brains how to be curious about the subject.
3. Practice research and presenting skills.
4. Perhaps work on a big end-of-unit project (not required, but totally fun!)

Our PBL Approach

Each week, PBL is divided into the following sections:
Wonder, Research, Create, and Share.

Wonder: Here we list questions that you can ask your child to get their brains thinking critically and creatively about forensics. Don't be nervous if you do not know the answers to the questions (odds are, if you aren't a forensic scientist yourself, you *won't* know the answers). You and your child will be learning together!

Research: Here we give you some answers to yours and your child's questions. But guess what... we aren't forensic scientists either! What we *are* experts at is teaching children how to seek more information through reputable resources like vetted websites, encyclopedias, books, and more.

Create: Once your child has asked questions and sought information, they get the opportunity to showcase their knew knowledge by creating during Project Time. We will give you plenty of guidance on Project Time, do not fret!

Share: The best part of learning is sharing your new knowledge! We will guide your child on sharing their project in ways that will strengthen their confidence through public speaking, presenting, and/or publishing.

Unit Projects

Math Project Who Stole the Cookie From the Cookie Jar?

One of our favorite parts of thematic learning is showing kids how math is pretty much everywhere, and that math can be one of the best parts of their day!

This unit, your child will be using mathematical skills coupled with deductive reasoning to solve a mystery... who stole the cookies from the cookie jar?! We can't wait for you to see your little detective in action! As they work through the math project pages, you will see their creativity sync with their math knowledge to become master investigators.

And don't worry if the math covered in this project doesn't line up with the concepts in your chosen math curriculum. While children can learn concrete math knowledge from this project (see benchmarks addressed on the next page), the true goal is to expose them to new topics, review already learned content, and show how math can be relevant and applicable to the real world.

Don't forget to check out our *First Things First* guide for tips on creating a Project Friendly Learning Environment!

Mathematics Topics Addressed	Primary	Post-Primary	Compre-hensive
Focus on asking and answering questions	✔	✔	✔
Compare, classify, and organize information through observations and measurements	✔	✔	✔
Focus on drawing conclusions	✔	✔	✔
Focus on solving everyday problems	✔	✔	✔
Follow simple step-by-step directions	✔	✔	✔
Practice mental arithmetic operations	✔	✔	✔
Perform basic mathematic operations using natural numbers	✔	✔	✔
Decompose numbers from 1 to 10	✔	✔	
Practice basic addition and subtraction skills/ algorithms 0–100		✔	✔
Learn 0-10 multiplication tables		✔	✔
Multiplication and division with natural numbers		✔	✔

Minis *activities for young learners*

If you've got multiple children at home ranging in ages, then you may be all too familiar with this scenario:

You've worked hard to set the tone for your homeschooling day with your oldest. You're both zoned into a lesson in the workbook or are working hard on a project, when your toddler decides to take part... wanting to help sissy paint her poster or feeling the need to scribble all over her "Your Turn" page. Your oldest starts to get distracted, frustrated even, and that peaceful morning you planned seems to be falling apart. Mom (or dad) guilt sets in, because you want to make yourself available to all your kids.

We believe in family togetherness and know that your "Mini" can glean much from this thematic unit.

Taking time to include them in an intentional and developmentally appropriate way will help set a peaceful tone for your homeschooling day, as well as build a solid foundation for their own learning at a young age.

So, here are a couple of ways to "invite" your Mini to learn along with their siblings in a way that won't make you want to tear your hair out! It's also a great opportunity for your older children to help "teach" their younger siblings, so everyone wins!

BOOK *baskets*

Using the basket of Mini-friendly books that are suggested below, allow your mini time to explore the pictures and words.

Place writing tools for them to draw as a response to the books in the basket. Have them orally tell you about their drawing, and take a moment to write down what they say on their paper.

- *A Monster Mystery - Children's Touch and Feel Storybook* by Little Hippo Books
- *Richard Scarry's The Great Steamboat Mystery* by Richard Scarry
- *Zootopia Little Golden Book* by Heather Knowles
- any *I-Spy Book*

BUSY *baskets*

It's important to give your Mini opportunities to explore and tinker, using and growing their gross and fine motor skills.

Place the following materials into a basket for your Mini to play with:

- Magnifying glass
- Washable ink pad, wipes, and paper to practice capturing their fingerprints
- Pretend detective badge
- Flashlight
- Notepad and pencil
- Secret Decoder activity pad (can be found on Amazon)
- Play camera or old camera that can be used for pretend

Middle & High School BOOKS

As your children engage with the concepts, materials, and activities in the Unit Study, it is important to be extra intentional with your middle and high school children. They will be learning about these historical and government topics at a deeper level, and we want the literature and texts they read to reflect that complex understanding.

Review the middle and high school book lists on the next page and determine, along with your child, which ones they would like to read. You may decide to read the entire list, or pick the one book they would be most interested in.

As they read, encourage them to use the accompanying Book Study Guide (located at WonderHere.com/Unit-Studies/Digital-Files) to help them think deeply and critically about their book.

Remember, older children still enjoy being read aloud to, so do not hesitate to do that every now and then. Studies show that reading aloud to children of all ages increases focus, improves fluency, and strengthens the parent/child relationship.

Visit **WonderHere.com/Unit-Studies/Digital-Files** to download the Book Study Guide.

Middle School Books

***The Case of the Missing Moonstone (The Wollstonecraft Detective Agency, Book 1)* by Jordan Stratford**
"Jordan Stratford imagines an alternate 1826, where Ada Lovelace (the world's first computer programmer) and Mary Shelley (author of Frankenstein) meet as girls and form a secret detective agency!"

***The Mysterious Benedict Society Boxed Set* by Trenton Lee Stewart**
"Are you a gifted child looking for special opportunities?" Dozens of children respond to this peculiar ad in the newspaper and are then put through a series of mind-bending tests, which readers take along with them. Only four children—two boys and two girls—succeed. Their challenge: to go on a secret mission that only the most intelligent and inventive children could complete.

***Curious Cases: True Crime for Kids: Hijinks, Heists, Mysteries, and More* by Rebecca Valley**
"True crime is a genre that captures readers of all ages, but oftentimes the stories are too intense—even for kids who love spooky books and movies. Curious Cases: True Crime for Kids presents a slew of fascinating stories that are all age-appropriate."

High School Book

***Forensics: Uncover the Science and Technology of Crime Scene Investigation* by Carla Mooney**
"Combining hands-on activities with forensic science, kids will have fun learning about the world of forensics, evidence collection, and crime lab analysis. Entertaining illustrations and fascinating sidebars illuminate the topic and bring it to life, reinforcing new vocabulary."

COMPOSER study:

Mike Post

This Unit's Composer Study

One way we empower you to guide your child in making connections in their learning is through our Composer Study, which emphasizes one of our seven Learning Elements... music!

Each unit's chosen musical selection will reflect the overall theme of the unit. Some units will feature a composers of old, and others more modern composers that showcase what the profession looks like today. For example, it is important for your child to know that not all musicians are pop stars or classical composers. Often, composers will work in the TV and film industry, as is the case with this unit's composer.

In this Forensic Science Unit Study, we wanted to hone in on the sometimes somber, sometimes adventurous feel associated with CSI work. The composer your child will be listening to for the next six weeks is **Mike Post**, who penned many songs for hit CSI themed television shows.

We start with the iconic *Law and Order* theme, then listen to the more upbeat *Hill Street Blues* theme the week after. In Week Three, we study the percussive *NYPD* theme, and then the brass-forward *LA Law* theme the following week. Week Five brings us the high energy *Magnum, P.I.* theme, and then we round out the final week with the electric sounding *Rockford Files.*

Composer Study Routine

There are a couple ways to approach the Composer Study:

1. Create a playlist of all six songs that plays in the background during other activities, like project time.
2. Set aside dedicated time to listen to one song each week.

However your approach, be sure to take time and reflect on the songs. Here are a few questions you can ask your child:

- What instruments do you hear in this song?
- What feeling does this song give?
- What do you like about this song? What do you not like about it?
- If you were the composer, what is one thing you would change about the song.
- CHALLENGE: Try to write lyrics to one of these songs!

Weekly Songs

Week 1: *Law and Order*

Week 2: *Hill Street Blues*

Week 3: *NYPD*

Week 4: *LA Law*

Week 5: *Magnum, P.I.*

Week 6: *The Rockford Files*

Composer Biography

Mike Post is considered one of the most successful composers in television history. He has written music for seven thousand hours of television, many of the shows relating to law and crime.

Born in Los Angeles, California, and he started playing piano at six years old. He quickly became obsessed with music. By 15 years old, Post was playing for audiences all around LA. Post shared that as a teenager, school kept him from spending his whole day playing music, but he couldn't be stopped. He created a paper piano for himself and played silent songs to himself all day, behind the cover of a propped up textbook. Post has won 5 Grammy awards and loves his career in music.

Visit
WonderHere.com/Digital-Files
for links to each Song of the Week.

WEEK ONE

Week One... here we go!

Phenomena-based learning can be one of the most powerful routines in your child's week. Don't be intimidated by its open-endedness. You don't need to have all the answers (unless you're a forensic scientist, then you probably should).

Remember, the goal isn't to simply fill their minds with facts. Instead, chase their wonders! Have them spend time learning about and researching any sub topics that interest them.

Encourage them to record what they wondered, researched, and created in the "Project Time" section of their Workbook (found at **WonderHere.com/Digital-Files**). If they are a younger learner, they can draw and dictate their findings to you, and you can write them down. Doing this will help keep track of their learning and look back at their progress.

Go through the following process on the next couple pages:

Wonder, Research, Create, Share.

If you need a refresher on this routine, flip back to page 13 of this Unit Study to learn more about PBL.

Wonder

Parents, this initial "wondering" process of phenomena based learning is crucial. Don't skip it! Ask the following questions, taking time before each one. Take notes of your child's responses in a notebook. They may not have many answers right away, and that's okay! The goal is to get them used to asking curious questions and then using research to answer them.

You can say the italicized words directly to your child, or you can paraphrase:

Have you ever heard of the term "forensic science"? What about "CSI"? If so, what comes to mind when you hear those words? If you have never heard of them, can you make a guess about what they mean?

What do you think a forensic scientist does? Why do we need forensic scientists? How might forensic science be useful?

Do you know any famous forensic scientists? Any idea how you can become one? What other questions do you have about forensic science so far? If you don't have many, that's okay! You will have some soon!

PBL What is Forensic Science?

Visit **WonderHere.com/Unit-Studies/Digital-Files** for supplemental online resources.

WEEK ONE

Research

Forensic scientists *are, first and foremost, scientists. Like other scientists they rely on fact and experimentation to draw conclusions about the world around them. Unlike most scientists, forensic scientists play an important role in the court systems.*

When a crime is committed, forensic scientists go to the scene and collect ***evidence****, or potential proof of a crime. These scientists are specifically trained to use their knowledge about the world to help judges and juries interpret the events of a crime.*

Most crimes don't happen in plain sight. Even if there are no witnesses to a crime, there is often evidence that can be used to determine what happened, when it happened, how it happened, and sometimes, even, who did it. Let's imagine together for a minute:

You've had a long day, and you decide to wind down by going on a walk after dinner. It is dark outside, and the moon is no bigger than a sliver in the sky. You get caught up in the rhythm of the cicadas and wander down the sidewalks of your home town. It is getting late. You decide it is time to head home. Turning, you notice that the streetlight above the cupcake shop is flickering. You pause

Visit **WonderHere.com/Digital-Files** for supplemental online resources.

PBL What is Forensic Science?

to watch moths and flies swarm around the bulb, attracted to the light and heat. You begin again to walk home.

CRUNCH! Glass shards cover the sidewalk. There is a gaping hole in the window of the cupcake shop. You alert the authorities and head home. The next day, a newspaper reads: CUPCAKE BURGLAR ON MAIN STREET. RED VELVET RUFFIAN ON THE LOOSE.

Although you witnessed the crime scene, you didn't see enough to help solve it. The police have to call in the help of a forensic scientist. A forensic scientist will dust for fingerprints, measure the distance between a window and broken glass, observe animal and insect behavior, along with many other means of observation and data collection.

After collecting all the evidence, the forensic scientist will attempt to interpret the data. They may run the fingerprints through a database to find a match, or determine the force at which the rock was thrown through the window (or notice whether the window was broken from inside or outside). They might determine what time the crime occurred by measuring the age of the flies and larva in the smashed remnants of cupcakes in the shop.

After analyzing the data, the forensic scientist will appear in court as an expert witness. In court, no one is allowed to share their opinions. The focus is on the facts and evidence. However, expert witnesses, like forensic scientists, are encouraged to share their factual findings and any conclusions they make with those results.

In this case, the forensic scientist might share that the fingerprint is a match to the defendant, that the rock was thrown from outside the shop, and that the crime likely happened at 5:45pm. Using this data, the scientist might share that they believe this could mean that the defendant was the Red Velvet Ruffian, and encourage the jury to pursue justice.

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continue the learning...

- **Revisit the Wonder section.** Can your child answer questions they couldn't before?
- **Explore the Thematic Tub.** This is a great hands-on learning opportunity that will give visual and kinesthetic reference to some of the concepts they just learned.
- **Do more research.** Visit WonderHere.com/Digital-Files to access kid-friendly websites where they can learn more. Remember to take notes!

WEEK ONE

Create

Since it is so early in this unit study, your child may not yet feel compelled to create anything about forensic science. Perhaps they'd enjoy unrestricted project time where they can create whatever they'd like (at our WonderHere Schoolhouse, it's always popsicle sticks and hot glue guns!).

Use this first week to establish a PBL routine and set out project time materials that will entice your child to create. Check out our *First Things First Guide* to learn more about establishing a Project Friendly Environment!

Share

Learning is most satisfying when it is shared with others. Our knowledge is not meant to be hoarded to ourselves. Your child learned lots through PBL this week and it deserved to be celebrated!

Encourage your child to stand up in front of the family and talk about 1-2 things they learned about forensic science so far. They may share for 30 seconds; they may share for 5 minutes. The goal is to get them used to processing their learning by speaking in front of others.

What is Forensic Science?

Nature Journaling

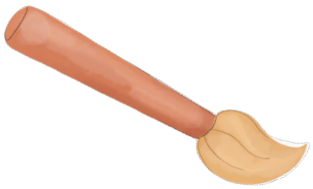
Wildlife Forensic Sciences

Animals play a key role in forensic science. Criminal activity can affect animal life. For example, an act of arson can create dire consequences within the ecosystem. However, there is also a branch of forensic science that deals with the interconnectedness of animals and humans.

Poaching, hazardous waste, oil spills, and illegal captivity of animals are all possible crimes that directly impact animal well-being. In these cases, forensic scientists are called upon as expert witnesses.

This week, take your child to a park, nature center, or lake and observe the interactions between animals and humans there. Maybe trash is left on the ground, causing potential harm to the animals there. Perhaps birds are being fed rice or bread, both of which could be harmful to their health.

Pay close attention, taking note of any possible "criminal activity." Later, discuss what you can do to protect your environment.



WEEK ONE

Invitation to Create Cyphers

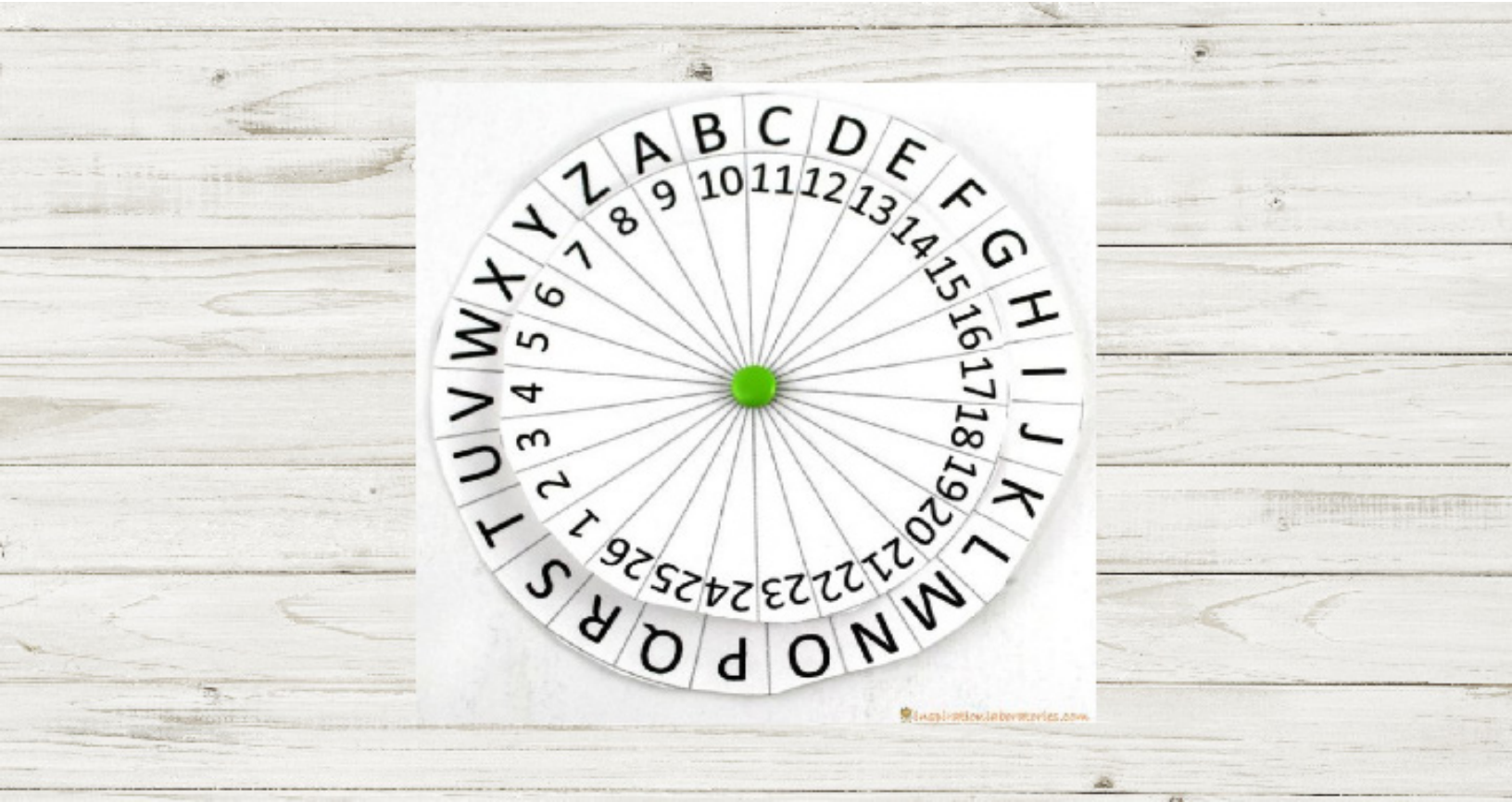
Cyphers and codes are an important tool in forensic science. A **cypher** is an encrypted (or secret) message. Sometimes important evidence is coded, so that the average person cannot interpret it. Scientists might use different code-breaking methods to determine the meaning behind the marks.

For this activity, you will want to print the cyphers from **WonderHere.com/Digital-Files.** There are two cyphers, and you can work with both or choose one to try out.

The **Pigpen cypher** is great for consistent coding. It uses lines and dots to signify letters. This code allows anyone with the key to interpret the message at any time.

The **Wheel cypher** is more complicated. It works with two parts: an inner and outer wheel. The wheels can be matched together in many ways, so the code can only be broken if the code-breaker knows one set of letters to match up. This is great for children who want to change up their code for improved secrecy.

Test out your code with this week's Invitation to Play (pages 30-31). Or send secret messages through the mail to friends so that they can practice code-breaking, too!



How to Create

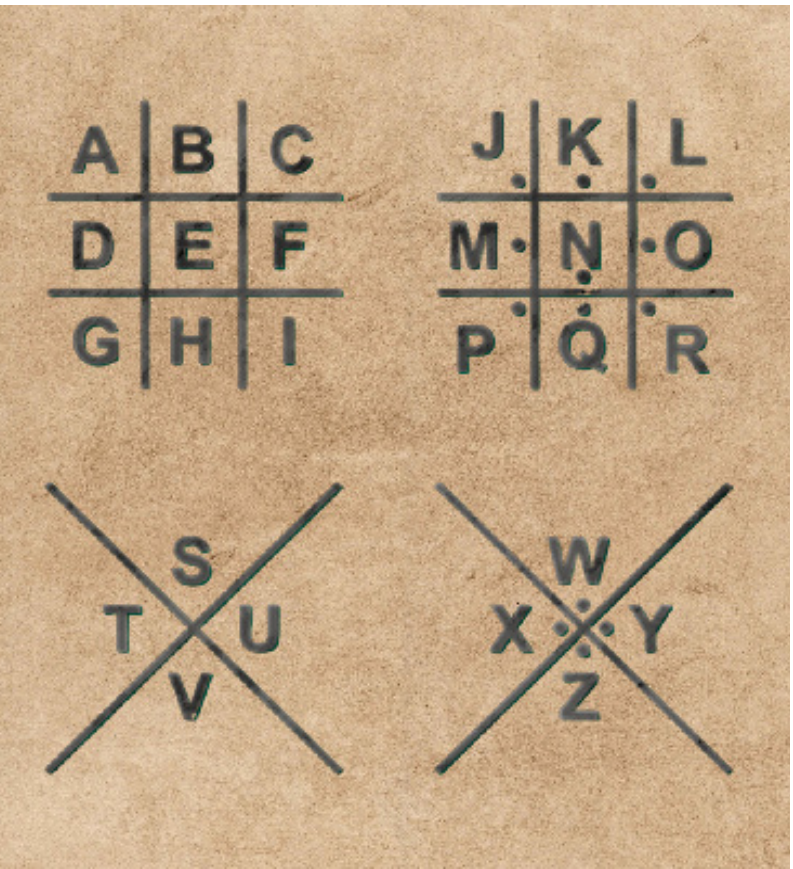
What you need:

- Scissors
- Cyphers (download at **Wonder-Here.com/Digital-Files)**
- Brass clip

Instructions:

Print and cut out the Pigpen cypher. Each letter correlates to a symbol. The code looks like two tic-tac-toe boards and two X's. In each space is a letter, and in some spaces there is also a dot.

You will draw the shape of the lines around the letter you need, drawing a dot if included. To decode, you look for the matching shape and read the letter it indicates.



For the Wheel cypher, you will need to print and cut out both circles, connecting them with a brass clip. Be sure the smaller circle is on top of the larger on, with the letters facing out. Turn the cypher. The letter on the inner dial is what you would write on the page (in place of the letter on the outer dial).

To decode, find the letter on the inner dial and trace it to the letter on the outer dial. The letter on the outer dial is the decoded version of your message.

Write codes and decode them with a friend or sibling!

Middle & High School Extension Activities

Middle and high schoolers might be interested in learning Morse Code, creating their own system of pictographs, or even learning about the history of how code has been used in war and conflict to send secret messages across the globe.

Invite your middle and high schoolers to dive deep into research. They might love learning the origins of code, how codes have been broken, developed, or thwarted. Encourage their curiosities, questions, and expressions of interest through creation, play, and dialogue.

WEEK ONE

Invitation to Play

Forensic scientists must rely on the evidence they collect from crime scenes in order to form expert opinions for the court. They might collect a partial fingerprint, but must consider the following:

- location of the fingerprint
- any other fingerprints in the room
- which objects prints are found on

These observations help determine whether or not this piece of evidence is enough to declare someone guilty.

This week, your child will go on a treasure hunt guided by the cyphers from this week's Invitation to Play.

Go on a Treasure Hunt

Pick a prize or treasure and place it in a hidden location. Plan several locations along the way to hide clues. If your child isn't independently reading, you might want to plan one cypher per treasure.

Have your child solve the cypher and follow its instructions to the next location. They will need to continue to solve cyphers to find each new location until they arrive at the final destination and discover their treasure! Treasure hunts are great for fostering collaboration, teaching conflict-resolution and problem solving, and building critical thinking skills. Plus, they are incredibly fun!

How to Play

What You Need:

- Cyphers (download at **WonderHere.com/Digital-Files)**
- Treasure (could be a coupon for ice cream, a new toy or puzzle, or anything your kid will enjoy!)
- Paper and pencils (for clues)

Instructions:

1. Gather the two cyphers to use for making your clues.
2. Hide the treasure in a secret location. Consider the ability of the child when hiding it, as you don't want to make it too easy or too difficult.
3. Pick three or more other locations to hide clues. As you decide, write out the locations. You might say "under the couch!" or "behind the fish tank!" Translate these locations into the coded language using the cypher.
4. You should keep the first clue in your hand, and hide the others in their locations. Make sure that the one that says "under the couch" is not, in fact, under the couch, but is in the location just before it.
5. When the hunt is ready, teach your child how to use the cypher to read the clues. They will need a pencil and paper to write out their translations.
6. Once they find the treasure, celebrate their victory!

Middle & High School Extension Activities

Middle and high schoolers love a good treasure hunt. For these ages, the planning will take much more energy. Consider writing the clues in riddles, using more challenging cyphers, or hiding more clues in hard to find places.

You might even have your child make a treasure hunt for you. By creating clues, hiding them, and organizing their hunt, they are using critical thinking, and engaging in complex reasoning and problem solving.

For those that love treasure hunts, a trip to an escape room might be a fantastic treasure to uncover!

WEEK ONE

Literature *Solve This! Forensics: Super Science and Curious Capers for the Daring Detective in You*

Can you believe we are almost at the end of Week One? Take a minute to celebrate all the hard work you've put in. Let's end this week strong by reading a good book and solving a few mysteries!

About This Book

"Calling all budding sleuths! Solve your way through each entertaining, imaginary G-rated mystery to explore the forensic science of investigating and analyzing evidence. You'll study smudges on a computer keyboard, dust for fingerprints, examine bite marks on a discarded snack, analyze toxicology tests on blood samples, and much, much more. Piece together the clues to see if you can solve each case."

Reading Tip of the Week: Get Cozy!

Read alouds are the best when you're in a comfy spot like a couch, perhaps with a blanket if the weather calls for it, with a nice beverage like hot cocoa or lemonade. You might even want to turn on some instrumental music in the background. Setting a peaceful environment is always a great idea. Also, be sure to ask your child the questions on the following page to keep them engaged as you read aloud to them!

Visit **WonderHere.com/Digital-Files** for a video read aloud of this book.

What is Forensic Science?

Questions to Ask

Before Reading

- Look at the front and back cover of the book. What do you wonder?
- What does the title tell you about the book?
- What kind of mysteries do you think you will solve in this book?
- Look at the table of contents. How many mysteries will you solve?
- Is this story fiction or nonfiction? How do you know?
- What do you already know about this topic?
- Are you interested to read this book? Why or why not?

During Reading

Mystery #1: Stolen Species
- What evidence has been gathered for this mystery? (pgs. 26-27)
- Who are the prime suspects? (pgs. 28-29).
- Based off the information who have so far, who are your top two suspects?
- Which analysis was most interesting to you? Why? (pgs. 30-43)
- What did you think of the solution? Is it what you expected? (pgs. 44-47)

Mystery #2: Bonobo Ransom
- What evidence has been gathered for this mystery? (pgs. 56-57)
- Who are the prime suspects? (pgs. 58-59).
- Based off the information who have so far, who are your top two suspects?
- Which analysis was most interesting to you? Why? (pgs. 60-73)
- What did you think of the solution? Is it what you expected? (pgs. 74-77)

Mystery #3: The Grave Robber's Mistake
- What evidence has been gathered for this mystery? (pgs. 88-89)
- Who are the prime suspects? (pgs. 90-91).
- Based off the information who have so far, who are your top two suspects?
- Which analysis was most interesting to you? Why? (pgs. 92-103)
- What did you think of the solution? Is it what you expected? (pgs. 104-107)

Mystery #4: Stolen Bones
- What evidence has been gathered for this mystery? (pgs. 120-121)
- Who are the prime suspects? (pgs. 122-123).
- Based off the information who have so far, who are your top two suspects?
- Which analysis was most interesting to you? Why? (pgs. 124-131)
- What did you think of the solution? Is it what you expected? (pgs. 132-135)

After Reading

- What questions would you like to ask the author right now?
- What is your opinion of the book? Did you enjoy reading it? Explain.

WEEK TWO

You officially have one week under your belt... HOORAY! As you work your way through Week Two, you will sense familiarity in the weekly routines. We encourage you to play around with these routines within your schedule until you find a rhythm that works best for your family.

DNA & Biological Evidence

This week is all about DNA & Biological Evidence. For some children, this will be the first time they ever hear these terms. Others will be more familiar. Starting the PBL routine by asking "Wonder" questions will help you gauge exactly how much they know and what exactly they are curious about.

As you review the following pages, encourage your child to record what they wondered, researched, and created about DNA & Biological Evidence in the "Project Time" section of their Workbook (found at **WonderHere.com/Digital-Files**).

If they are a younger learner, they can draw and dictate their findings to you, and you can write them down. Doing this will help keep track of their learning and provide a way to look back at their progress. It's always fun to see how far we've come in our learning!

Wonder

Alright, it's time to see how much your child already knows about DNA & Biological Evidence, and also what they *want* to know! Ask the following questions, taking time before each one. Take notes of your child's responses in a notebook. They may not have many answers right away, and that's okay! The goal is to get them used to asking curious questions and then using research to answer them.

You can say the italicized words directly to your child, or you can paraphrase:

What is evidence? Why is evidence important in solving a case?

How does a forensic scientist look for evidence?

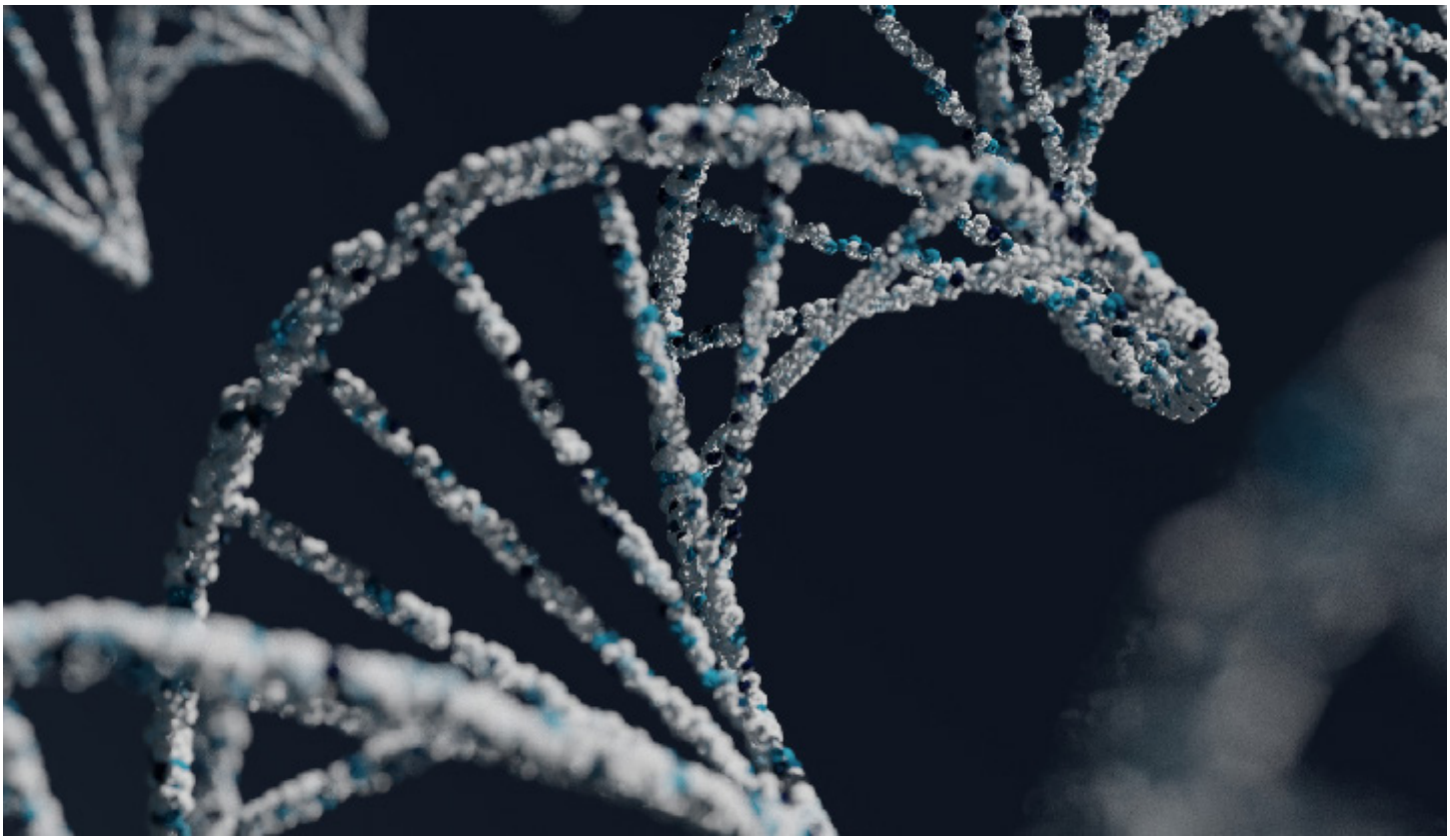
What is DNA? Who has DNA?

How long ago do you think DNA was discovered? Take a guess!

What does DNA tell us? Can a person see DNA? If so, how?

How does a forensic scientist capture DNA? How do they use it as evidence in a case?

PBL DNA & Biological Evidence



Visit **WonderHere.com/Unit-Studies/Digital-Files** for supplemental online resources.

WEEK TWO

Research

***DNA**, a short way of saying deoxyribonucleic acid, is the code to life. Every living thing is made up of tiny cells that carry DNA. The DNA in the cells tells it how it should look and act. A plant cell has specific instructions that tell it what type of plant to grow into, what colors it's petals will be, and how it will react to bugs, light, water, and other environmental factors.*

A squirrel has specific DNA in its animal cells that tell it to grow hair, have a taste for nuts, to climb trees, and to have a large, bushy tail.

*Even more so, each living thing, called an **organism**, is coded with DNA specific to itself. In that way, your golden retriever might look and act like many other golden retrievers, but the one you have is still unique from every other dog of the same breed out there.*

This is the same for humans. When we are born, we take have half the DNA coding from our dad and half from our mom to create a unique genetic identity. While the DNA comes directly from our parents, the combination of the two different, unique strands create new patterns that result in a totally original human.

How does this relate to forensic science?

Visit **WonderHere.com/Digital-Files** for supplemental online resources.

PBL DNA & Biological Evidence

Well, remember that Red Velvet Ruffian in Week One? Imagine a forensic scientist collecting a DNA sample from the saliva left on a half-eaten cupcake. By analyzing the DNA, the scientist will be able to tell if a fly, raccoon, or human ate the baked good. After narrowing the search down to one specific species, the forensic scientist can then take a closer look at the DNA to see if it matches any human DNA already in the database.

Sometimes courts will require their defendants to take a DNA test (usually by collecting saliva) in order to see if the DNA evidence matches that person.

DNA is entirely unique to each person. Though you may share many common genetic codes with your biological family, your DNA can still distinguish you from your brothers, sisters, parents, or cousins.

So what exactly does DNA look like? Imagine a ladder, twisted into a spiral. There are two long strands connected by short links. DNA is composed of four ***bases****, or chemicals. Imagine the twisted ladder made of four unique materials: metal, wood, plastic, and stone. In DNA, these four materials are called* ***adenine, thymine, guanine,*** *and* ***cytosine****.*

Even though every strand is made of the same four base chemicals, it is the pattern of these chemicals that creates a unique genetic identity, containing patterns that determine a lot about you! Your DNA determines which allergies you have, your eye color, how tall you will be, how strong your immune system is, how many fingers and toes you will have, which flavors will delight or disgust you... and on, and on, and on.

Biological Evidence *(meaning DNA or evidence from living things) is an important tool in forensic science, as it gives specific, detailed information that can impact a criminal investigation. DNA evidence can't always tell a scientist who committed the crime, but it can tell who was in the room. Combining that with other biological evidence, like using insect life cycles to determine the time of the crime, forensic scientists are able to build a picture of the events that took place, even if no one was there to witness the event.*

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continue the learning...

- **Revisit the Wonder section.**
  Can your child answer questions they couldn't before?
- **Explore the Thematic Tub.**
  This is a great hands-on learning opportunity that will give visual and kinesthetic reference to some of the concepts they just learned.
- **Do more research.**
  Visit WonderHere.com/Digital-Files to access kid-friendly websites where they can learn more.
  Remember to take notes!

WEEK TWO

Create

Now that your child knows a little bit more about DNA, let's get creative! Setting aside time to "create" during the PBL routine does not have to be daunting. There is no need for a full report, 3D model, or poster presentation (though some learners may accomplish that by the end of six weeks!).

Give your child complete freedom and control here. They may create something related to the topic, they may not. The goal here is to foster autonomy, idea generation, and confidence.

If they are completely stumped, here are some fun ideas:

- Use craft items to make a simple representation of a DNA strand.
- Use drawing tools (colored pencils, markers, crayons) to draw a DNA strand.
- Continue writing the Red Velvet Ruffian story.
- Play with the Thematic Tub.

Share

Give your child the opportunity to verbally share what they created in front of family, friends, or fellow learners at co-op!

DNA & Biological Evidence

Nature Journaling

Crime Scene Creatures

Bugs, animals, and plant life all play a key role in forensic science. Did you know that forensic scientists have used pollen to identify a criminal? Pollen can be as unique as fingerprints, pointing to where a crime occurred. By analyzing the pollen collected on a person's clothes or other objects, scientists can test a suspect's **alibi** to see whether or not they were at the scene of the crime.

Insects are often used to determine the time a crime occurred. Because many insects have such short life cycles, forensic scientists are able to compile data from the living creatures on sight, along with data from the weather and other conditions, to solve the time or day that a crime took place.

This week, take your notebook and a camera with you as you visit two different locations. It could be your backyard and a friend's, or two different parks. Document all the different plant and animal species you can, paying attention to how small differences can play a key role in solving crime. You may want to collect plant or pollen samples to look at under a microscope.

WEEK TWO

Invitation to Play

DNA, or **deoxyribonucleic acid**, is located inside the cell of all living things. DNA is the instruction manual for the organism, meaning that it tells the living thing how to look and act. DNA is passed down from parents to their offspring, giving each new creature a mixture of DNA from each parent.

People and animals have DNA, and so do plants! This week, pull out the microscope and take a look at DNA in your home. You will be using a banana, but you can also try this out on other common foods, like strawberries, blueberries, or grapes.

Fruit Bowl DNA Extraction

You'll want to talk to your child about lab safety, and teach them the scientific method. Encourage them to take thorough notes (younger learners can draw their observations). By documenting their experiment, they are better able to analyze and interpret findings, in order to draw conclusions, much like a forensic scientist.

As they work, try to answer their questions about DNA and all that it codes. You may need to write down their questions to research later. They may want to test other household items for DNA. Allow them to experiment (though be mindful of chemical reactions).

How to Play

What you need:

- Knife
- Chopping board
- Sieve
- Bamboo skewer
- Banana
- Isopropyl alcohol (rubbing alcohol)
- Warm water
- 1 teaspoon salt
- Dish Soap
- 2 glasses
- Plastic bag which seals
- Microscope

Instructions

1. Put the isopropyl in the freezer and leave for 20 minutes to cool.
2. Cut the banana into tiny pieces and place in plastic bag and seal tightly.
3. Mush the banana thoroughly.
4. In a separate glass, dissolve salt into warm water.
5. Once dissolved, add in 5 squirts of dish soap.
6. Pour the mixture in with the banana and mix until blended well.
7. Use a sieve to drain liquid into an empty glass, leaving the clumps of banana behind.
8. Add isopropyl to the banana solution, until the glass is 1/4 full. Mix.
9. Observe the layer of white that appears above the banana mixture.
10. Use a skewer to carefully pull a strand out.
11. View this strand under the microscope to see the DNA.

What do you see? Be sure to document your findings. Write and/or draw what you observe through the microscope. You can repeat this experiment with other fruits or veggies. Compare the strands of DNA from different produce.

WEEK TWO

Invitation to Create DNA Strand Bracelets

DNA and genes are complicated concepts for children to grasp. Making a DNA strand bracelet can help children understand how DNA is beneficial to forensic science by giving them a visual representation of the foundational patterns of genes. This activity will also help strengthen your child's fine motor skills, focus, and creativity!

It would be best to pick two or more different genes to translate into bracelets, as your child will be able to consider how a forensic scientists would use these differences to determine the identity of the genetic evidence.

You will want to work slowly, paying close attention to the order of the beads and their bonds. Your child may benefit from comparing a gene sequence to a code sequence. Similar to codes, genes can be deciphered and provide evidence as to who it belonged to. Scientists are able to search even further, knowing not only which species the DNA belongs to, but even which individual it belongs to.

Let's get to it!

How to Create

What you need:

- Blue, red, yellow, and green beads (or trade these out for 4 different colors of beads)
- Elastic string
- Gene Sequence Cards (download at **WonderHere.com/Digital-Files)**

Instructions

1. Tie off one end of the elastic string.
2. Use the Gene Sequence Cards as a guide to place beads on the elastic.
3. Add beads to the bracelet until the sequence is complete.
4. Pull out a second elastic string, and begin pairing the genes you already beaded with their natural bond. A matches with T, and C matches with G. The beads should always be matched this way.
5. Once you have made two lines of beads, tie off the ends and connect to form a single bracelet.

Invite your child to consider the differences and similarities between the gene sequence bracelets. They might notice that every bracelet has a unique pattern, or that no matter which gene they are coding, the bonded pairs are the same.

Discuss with your child how this information could be beneficial in solving a crime.

Middle & High School Extension Activities

DNA ORIGAMI

Older children might be interested in making DNA origami. Please visit **(WonderHere.com/Digital-Files)** for an instructional video on folding the origami to make DNA.

As they fold, discuss with your child the structure, purpose, and properties of DNA. Write down any of their questions and wonders to research later.

What you need:

- Colorful paper
- Scissors
- Access to instructional video

WEEK TWO

Literature *The Secret Code Inside You: All About Your DNA*

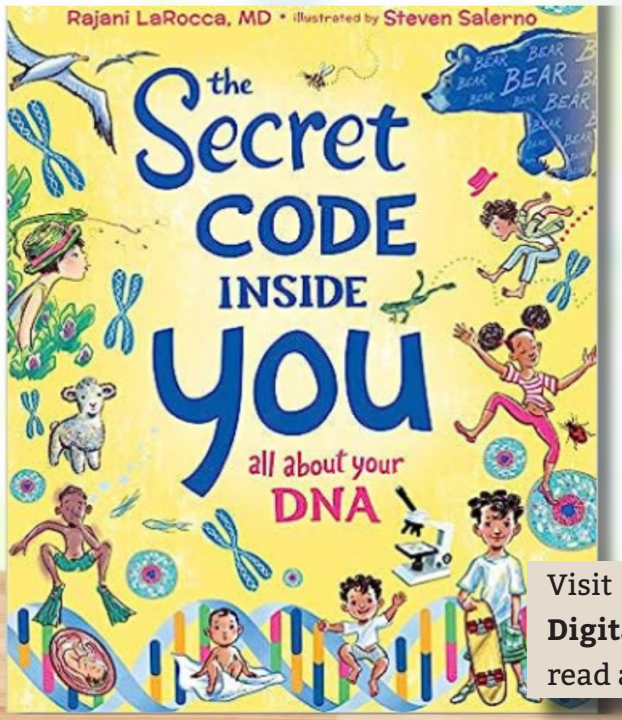
Here we are, having almost completed one-third of this unit study. Keep up the good work! Now let's dive into this week's book.

About This Book

"There's a secret code inside you, a code called DNA. A code that tells your body's cells what they should do each day. It looks like twisted ladders, or tiny, twirling noodles. It makes us into people, instead of into poodles. Why can't humans breathe underwater? Why are some people tall and others short? Why do we resemble our parents and grandparents? This book explores all this and more in flowing, rhyming text, explaining cells, DNA, and genetics in a way that is simple and easy for children to understand."

Reading Tip of the Week: Take a Picture Walk

Prior to beginning the book or to asking the "Before Reading" questions on the next page, encourage your child to take a picture walk. A picture walk is when a reader flips through the pages of the book, briefly glancing at the photos, illustrations, and/or headings. Have your child make predictions about the book when they are finished!



Visit **WonderHere.com/Digital-Files** for a video read aloud of this book.

DNA & Biological Evidence

Questions to Ask

Before Reading

- Look at the front and back cover of the book. What do you wonder?
- What does the title tell you about the book?
- What do you think this book will be about? Why do you think that?
- What would you like to ask the author before you read this book?
- Is this story fiction or nonfiction? How do you know?
- What do you already know about this topic?
- Are you interested to read this book? Why or why not?

During Reading

- Why aren't you leapy like a frog or creepy like a spider?
- What are the tiny building blocks of all of earth's living things?
- What does DNA look like?
- Why is DNA like a secret code inside of us?
- How many chromosomes do humans have?
- Where do we get our chromosomes from?
- Where did your parents get their DNA code from?
- How many cells does your body have?
- What term is DNA short for?
- What animal do we have 96-98% of our DNA in common with?
- If you placed all the DNA in your body from end-to-end, how far would it stretch?

After Reading

- What questions would you like to ask the author now?
- What is one new fact you learned from this book?
- What is one new word you learned?
- Do you find this topic interesting? Why or why not?
- What would you like to know more about?
- What is your opinion of the book? Did you enjoy reading it? Explain.

WEEK THREE

Another week, another chance to learn and grow in family togetherness! Week Three is full of fun, meaningful activities that will keep your child's curiosity piqued.

Fingerprint & Pattern Analysis

This week is all about Fingerprint & Pattern Analysis. You have heard us talk a lot about *phenomena*, and to us, there is nothing quite as phenomenal as every human being on this planet having a unique set a fingerprints. What an extraordinary fact of life! We could probably spend six weeks on this topic alone!

Take a moment to review notes from the last couple of weeks. What concepts have they been most curious about? What patterns, if any, do you see as a parent and observer of your child?

As you review the following pages, encourage your child to record what they wondered, researched, and created about Fingerprint & Pattern Analysis in the "Project Time" section of their Workbook.

As you do this, emphasize to your child that all great scientists practice note-taking daily. It is a very important part of science!

Wonder

Fingerprints are so cool! (Though I think we have already established that). Let's take some time and give your child the opportunity to express their wonders. Allow them a moment to look over the photos on the following pages. Then, ask them the following questions, encouraging them to think critically about each one. Don't rush... give time for deep discussion if your child is willing to go there.

You can say the italicized words directly to your child, or you can paraphrase:

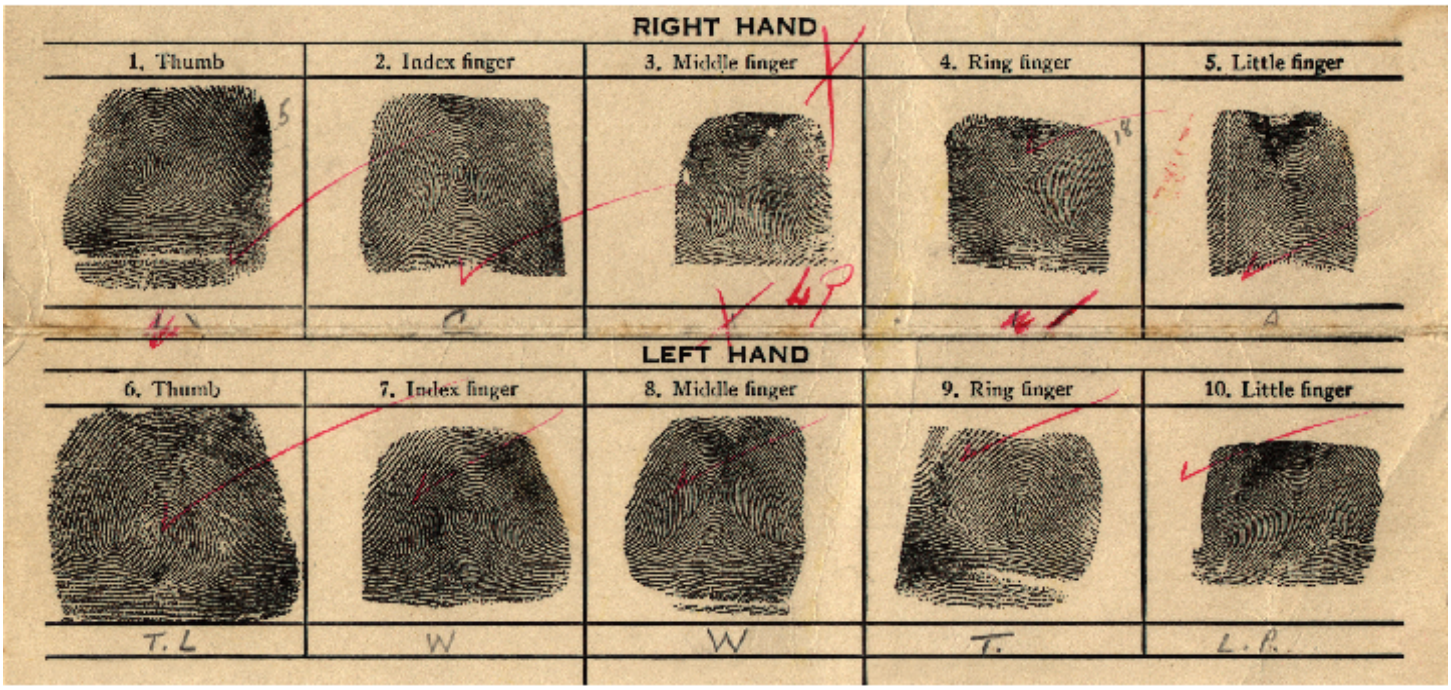
What do fingerprints look like? Why do we have them? How did I get my fingerprints?

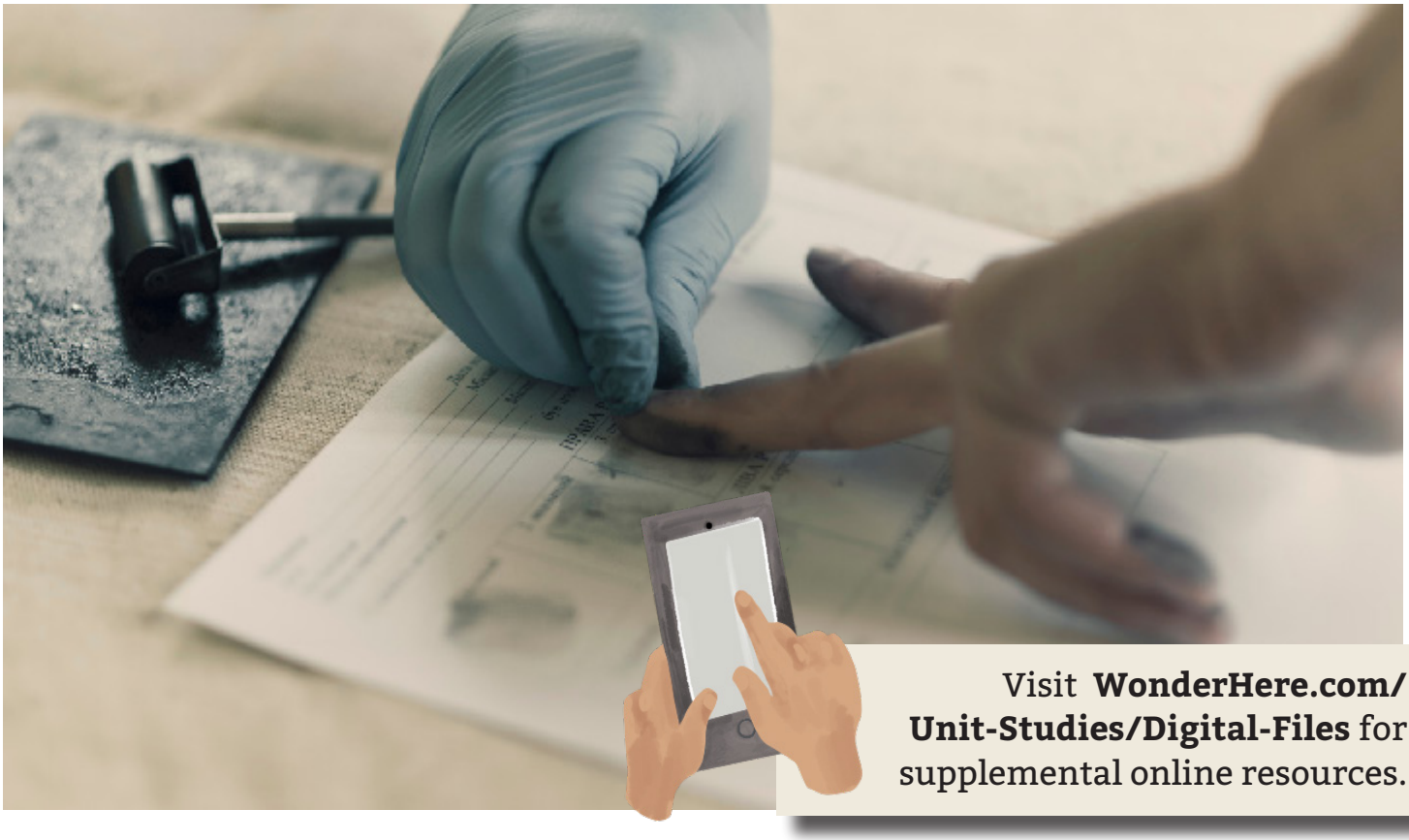
What can fingerprints tell us about a person? Why do you think everyone has a unique set of prints? Do twins also have different fingerprints?

How do forensic scientists use fingerprints? What do you think is the relationship between fingerprints and DNA?

What would the world be like if humans did not have fingerprints?

PBL Fingerprint & Pattern Analysis





Visit **WonderHere.com/Unit-Studies/Digital-Files** for supplemental online resources.

WEEK THREE

Research

Imagine yourself as a forensic scientist. You are called on the scene of a crime. A cupcake shop has been burglarized, many of the cupcakes obliterated by human bite marks. It's your job to find the culprit, so after taking in the scene and collecting as much evidence as you can, you set out to dust for fingerprints.

Your kit includes a soft brush, dark powder, adhesive tape, and index cards. You begin by areas most likely to have fingerprints, like door handles. You use the soft brush to dust dark powder over the print, then press the tape to it to preserve the mark. You carefully pull up the tape and stick it to the index card, jotting down a few notes about where and when you found it. You move on to the cupcake case, which is covered in prints.

What makes fingerprints?

Whether you realize it or not, your fingers are oil-producing machines. Between sweat, oil, and the natural dirt and debris they pick up during the day, your fingers are like paint brushes. Try pressing your thumb against a glass window. Can you see your fingerprints? Try again after washing your hands. Can you still see it?

LOOP

WHORL

ARCH

PBL Fingerprint & Pattern Analysis

Our fingers are constantly leaving their marks on the world. This means that they can be a powerful tool for forensic scientists when it comes to solving crimes.

Why does a forensic scientist need fingerprints?

Every single person has a completely unique fingerprint. In fact, even identical twins have fingerprints unlike each others'. When a scientist pulls a fingerprint they are able to run it against a database. Many people must be fingerprinted for various jobs, and criminals are fingerprinted when they commit their first crime. These fingerprints go into a database, where all the fingerprints are stored for future reference.

When a fingerprint is found, scientists can compare the pattern to every other fingerprint in the database, which will, hopefully, lead them to the culprit.

There are three distinct patterns on fingerprints that are arranged in different ways on each person. These patterns include **arches, whorls,** and **loops**. See the photo on the previous page for examples of these patterns.

Take a look at your own fingerprint and compare it to the other members in your family. Notice any differences?

Some criminals don't leave fingerprints, but forensic scientists are able to use other pattens as well.

Shoe prints, tire treads, and bullet holes all leave patterns that can be used to narrow down some specifics about the crime.

While shoe prints can't tell a forensic scientist who committed the crime, they can tell the scientist which size shoe the culprit wore, which can indicate their height, weight, and perhaps even whether they are male or female. These are important details that can help eliminate innocent suspects. While patterns aren't as powerful as fingerprints in finding a criminal, both are important tools in forensic science.

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continue the learning...

- **Revisit the Wonder section.** Can your child answer questions they couldn't before?
- **Explore the Thematic Tub.** This is a great hands-on learning opportunity that will give visual and kinesthetic reference to some of the concepts they just learned.
- **Do more research.** Visit WonderHere.com/Digital-Files to access kid-friendly websites where they can learn more. Remember to take notes!

WEEK THREE

Create

If this deep-dive into fingerprints and patterns doesn't make your child a forensics expert, we don't know what will! Only kidding, but giving your child room to create out of what they just learned *will* make them feel like an expert!

Now that we are almost halfway through this unit study, challenge your child to create on this week's topic. How can they show off what they learned about fingerprints and pattern analysis? Remind them that the sky is the limit!

If they don't quite have a vision for that they want to create, here are some fun ideas:

- Practice stamping your fingerprint on playdough or clay.
- Create a pattern out of random household items (like white sock, black sock, white sock, black sock) and then take a picture of it.
- Play with the Thematic Tub.

Share

Challenge your child to take a video of themselves explaining their creation, and send it to a relative or friend (with your permission, of course).

Fingerprint & Pattern Analysis

Nature Journaling

Explore Patterns in Nature

For as wild as the natural world can be, it is not without order and patterns. You'd be surprised at how many patterns you can find if you only pay attention.

Butterfly wings, honeycomb, leaves, insect eyes, shells, water droplets, flower petals, snake skin, and tree bark are comprised of detailed, structured patterns and design that, when observed, can reveal the beautiful complexity of the natural world.

This week, don't go far. Walk into your own yard or walk down to a local park. Take your color pencils and a notebook in order to sketch what you see. By recreating the patterns you find in nature, you and your child will be more attentive to the patterns around you.

Instead of just walking and sitting, find new angles to look at the world with your child. Get on their eye level, try crawling, look at the world upside down. These fresh perspectives will delight your child and allow you to notice the minute details that bring so much color and beauty to the world.

WEEK THREE

Invitation to Play

Fingerprint Expansion & Matching

Fingerprints are unique to each individual person on the planet. Even identical twins have unique fingerprints.

Forensic scientists use fingerprints as a tool to determine who was in a room, touching a certain object. Residue from oil, dirt, or dust can perfectly preserve and protect fingerprints on surfaces. By collecting fingerprints and analyzing them, scientists can find out a lot about the events of a crime, all of which can be used in court as evidence towards a conviction.

For this activity, your child will get to take a deeper look at the uniqueness of their own fingerprint, comparing it to others in the family. They will practice matching fingerprint data to evidence through the use of balloons.

By printing the finger on the balloon and blowing it up, the fingerprint expands, allowing greater detail to be clear. It may be difficult for a young child to be able to find the differences between multiple fingerprints. For younger children, you may want to expand one fingerprint at a time, pointing out then patterns and designs you notice and how they match the fingerprint reference card.

How to Play

What You Need:

- Index Cards
- Ink Pad
- Pencil or pen
- Balloons

How to Play:

1. Begin by having every member of the family make an index card with their thumbprint for reference.
2. To do this, they will need to press their thumb to the ink pad, turning it from side-to-side so that the ink covers the whole finger.
3. Then, they will repeat the motion on the index card, leaving their print.
4. Each index card should be labeled with the name of the family member it belongs to.

5. Repeat the process with the same finger, this time pressing the thumb to the deflated balloon, rather than the index card. Do not label.
6. After everyone has placed their finger print on a balloon, blow the balloons up. The fingerprints will expand, revealing the loops, whorls, and arches that are individual to each member.
7. Examine the balloons and try to match the fingerprint cards to the balloons to identify each fingerprint.

Middle & High School Extension Activities

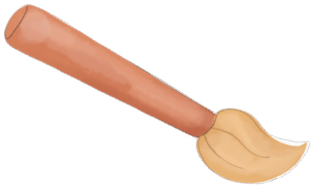
Middle and high schoolers will love to experiment with dusting for fingerprints.

You will need:

- Drinking glass
- Cocoa powder
- Soft brush (camel hair or fiberglass)
- Clear adhesive tape

Press a finger to the glass. Lightly dust the surface of the glass cocoa powder. Use the soft brush to remove excess powder. This should leave powder just over the fingerprint.

Press the clear tape over the fingerprint. The tape will remove the powder while maintaining the pattern. Analyze the tape to match fingerprints to suspects.



WEEK THREE

Invitation to Create Fingerprint Art

You don't need a brush between your hand and the paper in order to create something beautiful. This activity will have your child leaving their individual mark all over a paper to create something beautiful.

For this activity, your child is invited to draw anything. They may be fascinated with landscape scenery or funny faces. They may like animals, abstract art, or to tell true stories of their day through pictures. Whatever their interest, this activity allows your child to think outside the box.

Your child can use their fingerprints as the primary medium for a design, or can work with fingerprints to add color and texture to the picture. Let them use their imagination and explore their creativity.

While your child may want to go wild with the fingerprinting, it is important to encourage intentionality in their artwork when possible. By taking a moment to pause and make a plan, children can surprise themselves with what they create.

How to Create

What you need:

- Ink pads of various colors
- Cardstock or white paper
- Ink pens or fine line Sharpies
- Wet wipes

Instructions:

1. Plan out your design by talking through possible ideas with your child. You may want to practice making fingerprints on scrap paper until they are comfortable with the process.
2. They may want to use the ink pens first to create a design over which they will add fingerprints. This is especially effective if using fingerprints as leaves of a tree.

3. Some may want to work with the fingerprints first, using ink pens later to enhance details. This is especially effective in the case of using fingerprints as characters with unique expressions or outfits.
4. Remember to clean your fingers between colors to protect your ink pads.
5. Go back over with a pen or marker to create details you weren't able to capture with your prints.

Don't forget to check out our First Things First guide for more on the importance of art and creativity in your child's learning.

Middle + High School Extension Activities

Your older child may be interested in paying closer attention to detail. In this case, they may want to make one finger print on a spare card for reference. Then, they can use whatever supplies works best to recreate their fingerprint in a large scale. They can expand their fingerprint to cover an entire page.

They might think about the characteristics that make them unique, drawing or writing in little details that are specific to them. This project allows them to consider their identity, in addition to increasing the complexity of the art project.

WEEK THREE

Literature *The Deductive Detective*

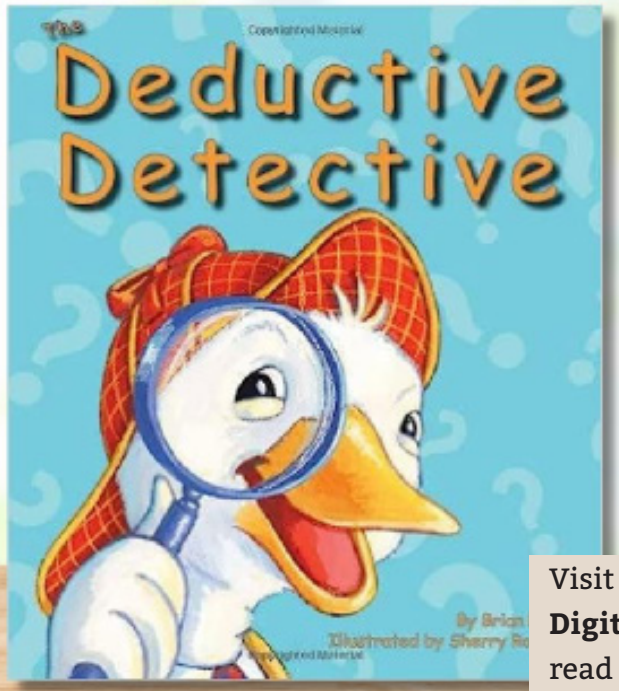
We are just one book away from being halfway done with this unit study! Now let's dive into this SWEET mystery.

About This Book

"Someone stole a cake from the cake contest who could it be? Twelve animal bakers are potential suspects but Detective Duck uses his deductive reasoning skills to quack the case. After all, the thief left hairs behind so the thief wasn't a bird. Follow along as he subtracts each suspect one at a time to reveal just who the culprit was. This clever story will have children of all ages giggling at the puns and the play on words."

Reading Tip of the Week: Echo Read

Echo reading is a practice strategy that works for all readers, novice and expert alike! As you read this book, choose one page to echo read with your child. To do this, read once sentence and then have your child repeat the sentence, or echo it back, matching your tone and pace. Have them keep their eyes on the words as they echo. Make this challenging for independent readers by reading two or more sentences at a time and having them repeat from memory. See how many sentences they can echo before they stumble!



Visit **WonderHere.com/Digital-Files** for a video read aloud of this book.

Fingerprint & Pattern Analysis

Questions to Ask

Before Reading

- Look at the front and back cover of the book. What do you wonder?
- What does the title tell you about the book?
- What do you think this book will be about? Why do you think that?
- What would you like to ask the author before you read this book?
- Is this story fiction or nonfiction? How do you know?
- What do you think the word *deductive* means? If you do not know, look it up!
- Are you interested to read this book? Why or why not?

During Reading

- Why did Mouse get eliminated (removed) as a suspect?
- Why did Rooster get eliminated as a suspect?
- Why did Elephant get eliminated as a suspect?
- Why did Swan get eliminated as a suspect?
- Why did Horse get eliminated as a suspect?
- Why did Moose get eliminated as a suspect?
- Why did Pig get eliminated as a suspect?
- Why did Cow get eliminated as a suspect?
- Why did Tiger get eliminated as a suspect?
- Why did Kangaroo get eliminated as a suspect?
- Why did Racoon get eliminated as a suspect?
- What was the reason the culprit stole the cake?

After Reading

- If this story had a sequel, what do you think it would be about?
- What questions would you like to ask the author right now?
- If you could have a conversation with one of the characters in the story, which character would you choose and what would you talk about?
- Did this book remind you about anything in your life? Anything in another book, movie, or TV show? Anything in happening the world right now?
- What changes would you make to the story?
- What is your opinion of the book? Did you enjoy reading it? Explain.
- Create a new ending for the story.

WEEK FOUR

We are officially at the halfway point of this unit study! Take a minute to reflect back on all that you and your child have learned so far. Now, imagine *doubling* that amount of knowledge and experience. Because that is what we are about to do!

Trace Evidence

This week is we will be learning about Trace Evidence. Every single person leaves behind some sort of trace evidence every day, so this is a very relevant topic, even if your child is indifferent to forensic science.

Take a moment to review last week's notes. Did your child show interest in the topic? Do you see them growing in knowledge and confidence? How has project time been going? Let these reflections guide you into this next week.

As you review the following pages, encourage your child to record what they wondered, researched, and created about Trace Evidence in the "Project Time" section of their Workbook. Now that they can more easily anticipate the routines of this unit study, they may become more eager to get started!

Wonder

Trace Evidence is a pretty ordinary phenomena that can become extraordinary if found under the right (or should we say, *wrong*) circumstances... those circumstances being a crime scene!

Before we go any further, it's time to get our wonder on! Allow your child a moment to look over the photos on the following pages. Then, ask them the following questions, encouraging them to think critically about each one.

You can say the italicized words directly to your child, or you can paraphrase:

What is considered trace evidence? Where can trace evidence be found?

How does a forensic scientist use trace evidence to help solve a crime?

What tools do forensic scientists use to analyze trace evidence?

How does a forensic scientist collect trace evidence?

Is there always trace evidence at a crime scene?

PBL Trace Evidence

Visit **WonderHere.com/Unit-Studies/Digital-Files** for supplemental online resources.

WEEK FOUR

Research

Have you ever given someone a hug, only to pull away and notice one of your stray hairs on their shirt? Any time a person comes into contact with another object or person, they leave little particles called **trace evidence**.

Trace evidence can be hairs, dirt particles, chips of glass, paint chips, or fibers from clothes or plants.

Forensic scientists collect evidence from the crime scene. In the case of our cupcake ruffian from Week One, this evidence could include the cupcake skirt or the rock used to smash through the window. These objects would be taken into a lab and viewed under a powerful microscope.

From there, forensic scientists would collect any trace evidence they find. This includes hairs, fibers, glass or dirt particles, and even paint chips or makeup. The trace evidence is then placed under a microscope to be further identified.

While trace evidence cannot tell the scientist who committed the crime, it can help them determine who was there, where they were before, or give other clues as to what happened during the crime.

Visit **WonderHere.com/Digital-Files** for supplemental online resources.

PBL Trace Evidence

Again, in the case of the Red Velvet Ruffian, the forensic scientists might find a stray hair on the cupcake skirt discarded on the floor. From there, they could analyze the hair to determine if it belongs to a human or animal, as well as a few other identifying features that can help them narrow down the suspect (hair color, texture, length).

The scientist might also collect glass and dirt particles from around the broken window. After analysis, they might discover that the dirt on the floor contains seed particles specific to a nearby botanical garden. They can then surmise that the criminal was recently at the botanical garden, and look up employee and ticket data in order to narrow down their suspects.

Perhaps, on the rock that was used to break the glass, the forensic scientist is able to collect small fibers of a wool material. They would analyze the color and chemical makeup of the material to discover which clothing was worn as the criminal entered and exited the smashed window.

Again, these small pieces of evidence cannot alone prove that a certain person committed the crime, since we all leave behind some remnant of ourselves everywhere we go. However, trace evidence can slowly remove reasonable doubt, allowing a jury to convict a suspect.

continue the learning...

- **Revisit the Wonder section.** Can your child answer questions they couldn't before?
- **Explore the Thematic Tub.** This is a great hands-on learning opportunity that will give visual and kinesthetic reference to some of the concepts they just learned.
- **Do more research.** Visit WonderHere.com/Digital-Files to access kid-friendly websites where they can learn more. Remember to take notes!

WEEK FOUR

Create

Now that we are working our way through the second half of this unit study, your child might want to consider choosing a topic for their overall unit project. This culminating project is optional and great for learners who can work somewhat independently. Your child can start their big project now or save it for Week Seven (which we call the "week of rest").

This unit project can be approached many different ways. It can be on a subtopic that your child has found particularly interesting. It can be a sampling of all topics covered. It can be somewhere in between! Your child can create a model, a digital presentation, a poster board, a brochure, an artwork, a written report... anything they'd like!

Another option is to continue working on "mini projects" each week like you have been doing so far. There is no right or wrong way to approach project time!

Share

If working on a unit project, start thinking about how your child might want to present in a few weeks! It can be as formal or informal as they'd like.

Trace Evidence

Nature Journaling

For this week's nature experience, you'll want to put on your best walking shoes. Travel to a local nature center, preferably one with hiking trails other geographical features, like hills, water, and woods.

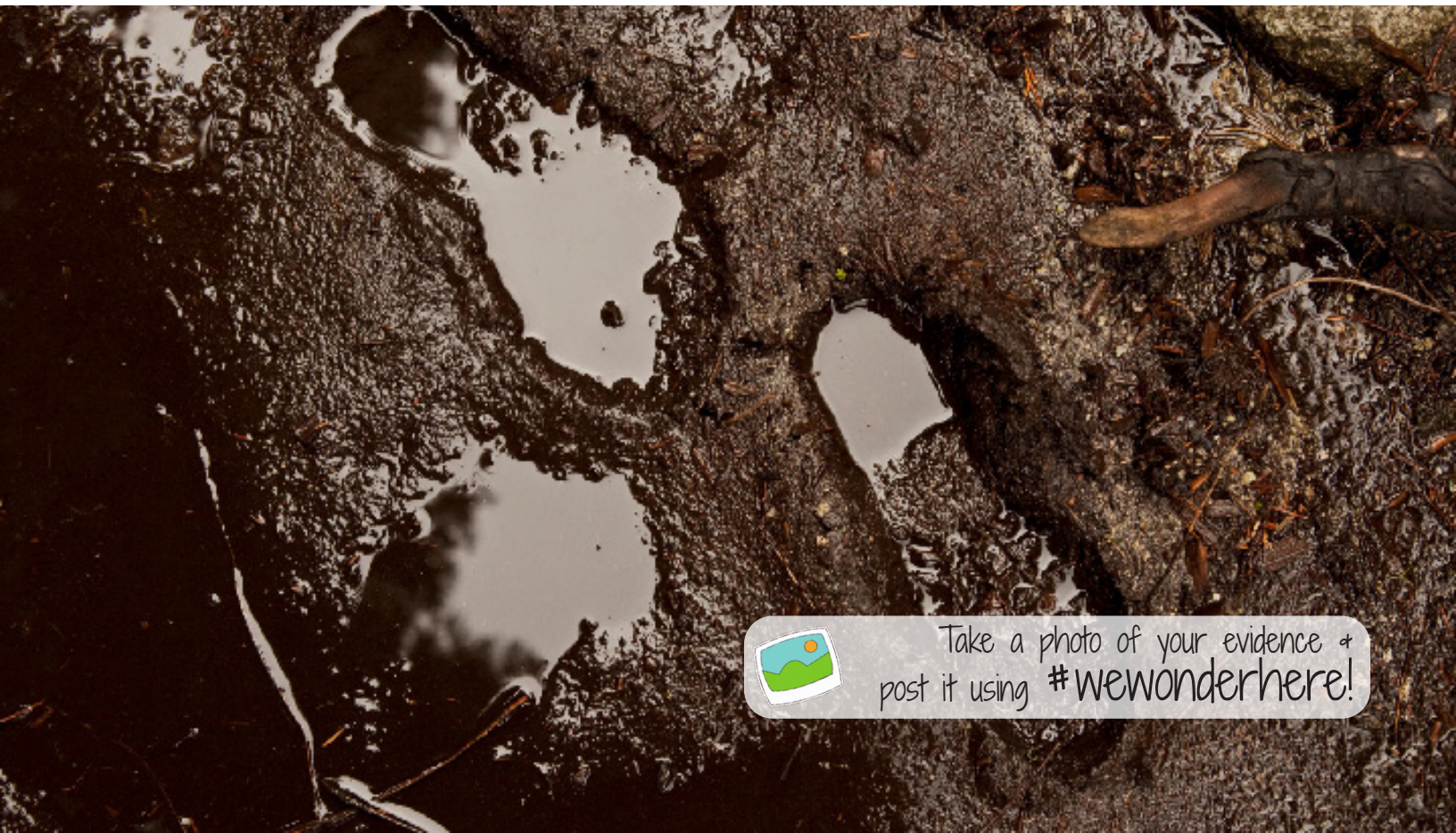
Have the family spread out and explore the park, moving in different directions. Prearrange teams or pairs, as well as a time and place to meet back up.

For this activity, you'll need to go off-road. Wander down by the shores of the river, or hike through forest trails. Stomp over gravel paths or run through wood-chipped playgrounds.

When you're finished exploring, come back together and examine the bottoms of your shoes.

Dirt, rocks, leaves, and other soil can indicate where each person has been. Try to guess where your family members have been through the trace evidence on their shoes. Forensic scientists use this sort of information to verify the location of certain people at certain times.

Explore Forensic Geology



WEEK FOUR

Invitation to Play

Although not quite as effective as fingerprints, footprints can also provide important information to a forensic scientist.

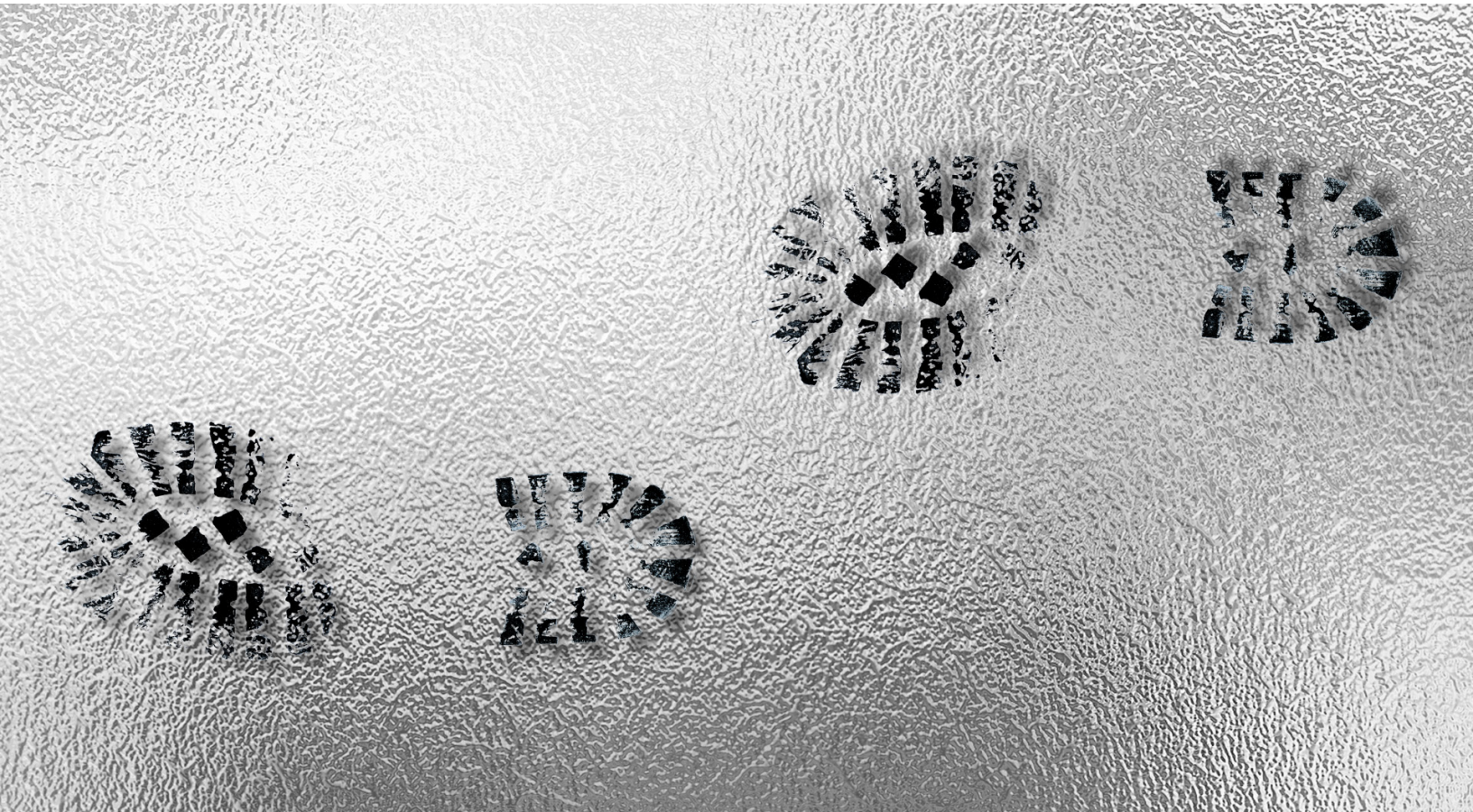
Because people wear shoes, footprints can't tell us exactly who was at a crime scene, but they can give us clues as to who was there. Details like the size of the shoe can indicate whether the suspect was likely a man, woman, or child, and how tall they might be.

The shoe might also leave specific patterns from the tread. This can help forensic scientists determine which brand of shoe was worn.

Footprint Impressions Hopscotch

In addition to this, scientists might be able to use environmental factors to help them find more evidence. Snowy or muddy terrains can reveal how deep a person's tread is, indicating their weight or speed. Prints might reveal patterns of how a person walks, like if they primarily press on their heel or toe. It could also indicate how fast they were moving, depending on the length of stride.

This week, make some footprints of your own. Test out different speeds, walks, and pressures to see if the prints change according to your travel. Then, play Footprint Hopscotch!



How to Play

What You Need:

- A few towels
- Roll of aluminum foil
- Shoes
- Permanent marker
- Sidewalk chalk (optional)

Instructions:

1. Place a towel on the floor.
2. Lay a strip of aluminum foil over the towel.
3. Step on the aluminum foil.

Once everyone makes their footprints, examine the shoes and try to match the footprint to the shoe. While size can be a primary indicator, you can also test out different shoes from the same child, and allow them practice differentiating each shoe pattern from another.

After investigating your footprint, it's time to play Footprint Hopscotch!

1. Roll out more aluminum foil (enough for the length of a hopscotch game).
2. Using the permanent marker, draw out the hopscotch squares (use the photo below as a guide).
3. Place towels underneath the foil to give it cushion.
4. Stand at the first square, and hop along the length of the hopscotch game.
5. When you reach the end, observe your footprints on the foil. Did you remain inside the squares the whole time?
6. Alternative: Make a hopscotch game outside with chalk. Rub a generous amount of chalk on your bottoms of your shoes. Play hopscotch and see if you leave chalky footprints behind.

WEEK FOUR

Invitation to Create **Ransom Letters**

Because it is possible to analyze handwriting and dust for fingerprints, ransom letters became a means of communicating without leaving a trace.

This week, try out making ransom letters with old scraps of magazines. In order to avoid leaving any marks, your child may want to put on gloves for this activity.

The goal is to communicate without leaving fingerprints, hair, or crumbs behind. Take turns tucking these letters into envelopes and secretly delivering them to your family members. When you receive a letter, try to determine who wrote it using any clues you can find.

Since these letters won't have fingerprints or handwriting evidence to analyze, you'll need to think about delivery, word choice, and the organization of the letter to make your best guess about who sent it to you.

Your children will love making and sending letters to each other! Keep it exciting by reminding them to not leave ANY trace evidence behind!

How to Create

What you need:

- Magazines
- Glue sticks or white glue
- Heavy paper (cardstock)
- Scissors

Instructions:

1. Plan your ransom letter will and count up all the letters you will need. If your letter will say, “Hi mom! I Love you!” you will need two i’s, three o’s and so on.
2. Look through a magazine for the letters.
3. When you find them, cut them out and glue them onto the paper.
4. Once the letter dries, fold it and place it in an envelope. Make sure not to leave fingerprints on the envelope!
5. Finally, deliver the letter without giving away who wrote it!

Middle & High School Extension Activities

Invite your child to participate in this Blood Splatter Analysis Experiment with “blood” falling from various heights to practice blood splatter analysis.

What You Need:

- Chart Paper
- Fake Blood
- Metric Ruler
- Yardstick or Meter Stick
- Disposable Pipette
- Chart Markers

Instructions:
Using the markers, make a table on the chart paper. The rows should be labeled according to the height at which the blood will be dropped. The columns should be labeled for Trials 1-3, with the final column labeled for the average size of the splatter.

Once your chart is complete, measure the distance according to the chart, and let three drops of blood fall from that distance (into their individual cell on the chart). Repeat this for each height on the chart.

Once you have collected all the blood splatters, measure the width of each splatter with a metric ruler and determine the averages.

WEEK FOUR

Literature *Who Pushed Humpty Dumpty?*

Enjoy these classic fairy tales from a different perspective!

About This Book

"Break-in at the Three Bears family home? It could only be one dame. Wicked witch gone missing from her candied cottage? Hansel and Gretel claim it was self-defense. Did Humpty Dumpty really just fall off that wall, or was he pushed? Here are five fairy-tale stories with a twist, all told from the point of view of a streetwise police officer called Binky, who just happens to be a toad in a suit and a fedora.

When Snow White doesn't make it to the beauty pageant, Officer Binky is the first to find the apple core lying by her bed. When an awful giant mysteriously crashes to the ground, upsetting the whole town, Binky discovers exactly who is responsible."

Reading Tip of the Week: Read Outside

Sometimes a change of scenery is just what we need to really enjoy a good book! Lay on a hammock or porch swing, have a picnic in your backyard, or read on a bench at your favorite park. And then... read!

Visit **WonderHere.com/Digital-Files** for a video read aloud of this book.

Trace Evidence

Questions to Ask

Before Reading

- Look at the front and back cover of the book. What do you wonder?
- What does the title tell you about the book?
- Make a prediction: Who do you think pushed Humpty Dumpty?
- What do you think this book will be about? Why do you think that?
- What other fairy tales do you think will be featured in this book?
- Is this story fiction or nonfiction? How do you know?
- Are you interested to read this book? Why or why not?

During Reading

- What evidence did Goldilocks leave behind?
- What was the conclusion of the Goldilocks case?
- What was the conclusion of the Hansel and Gretel case? Do you agree with the verdict?
- What was the conclusion of the Humpty Dumpty case?
- What was the conclusion of the Snow White case?
- What clue in Snow White gave away the suspect?
- What was the conclusion of the Jack and the Beanstalk case?
- Whose perspective was this book told by?

After Reading

- Which of these stories was your favorite?
- If your favorite story had a sequel, what do you think it would be about?
- What questions would you like to ask the author of this book?
- What questions would you like to ask the illustrator of this book?
- If you could have a conversation with one of the characters in the story, which character would you choose and what would you talk about?
- What changes would you make to the story?
- What is your opinion of the book? Did you enjoy reading it? Explain.
- Write a new short story like this based on Little Red Riding Hood.

WEEK FIVE

Week Five is here... are you ready?! We have learned so much but we have so much still to learn. Let's get to it!

Digital Evidence

This week your child will learn about a type of evidence they cannot necessarily hold in their hands... Digital Evidence! If you are a parent reading this in the 2020's, then you most likely remember a time before the Digital Age (some of you may barely remember!). But can you believe that your children will never know a life pre-internet? It's insane!

Take time to review last week's notes. Is your child showing strong interest in a particular subtopic which they can focus on for a culminating project? If so, great! If not, that's completely fine! This may be the week that sparks their interest. Keep going strong on your weekly routines. This establishes habit!

As you review the following pages, encourage your child to record what they wondered, researched, and created about Trace Evidence in the "Project Time" section of their Workbook. Now that they can more easily anticipate the routines of this unit study, they may become more eager to get started!

Wonder

Digital Evidence can be difficult to understand because it is not tangible. It lives in emails, social media, text messages, websites, hard drives, and other places that cannot be initially discovered by means of observation.

Let's consider how forensic science benefits from a better understanding of digital evidence. Probe your child's curiosity be asking them the questions below. Take your time and allow room for them to ask their own questions.

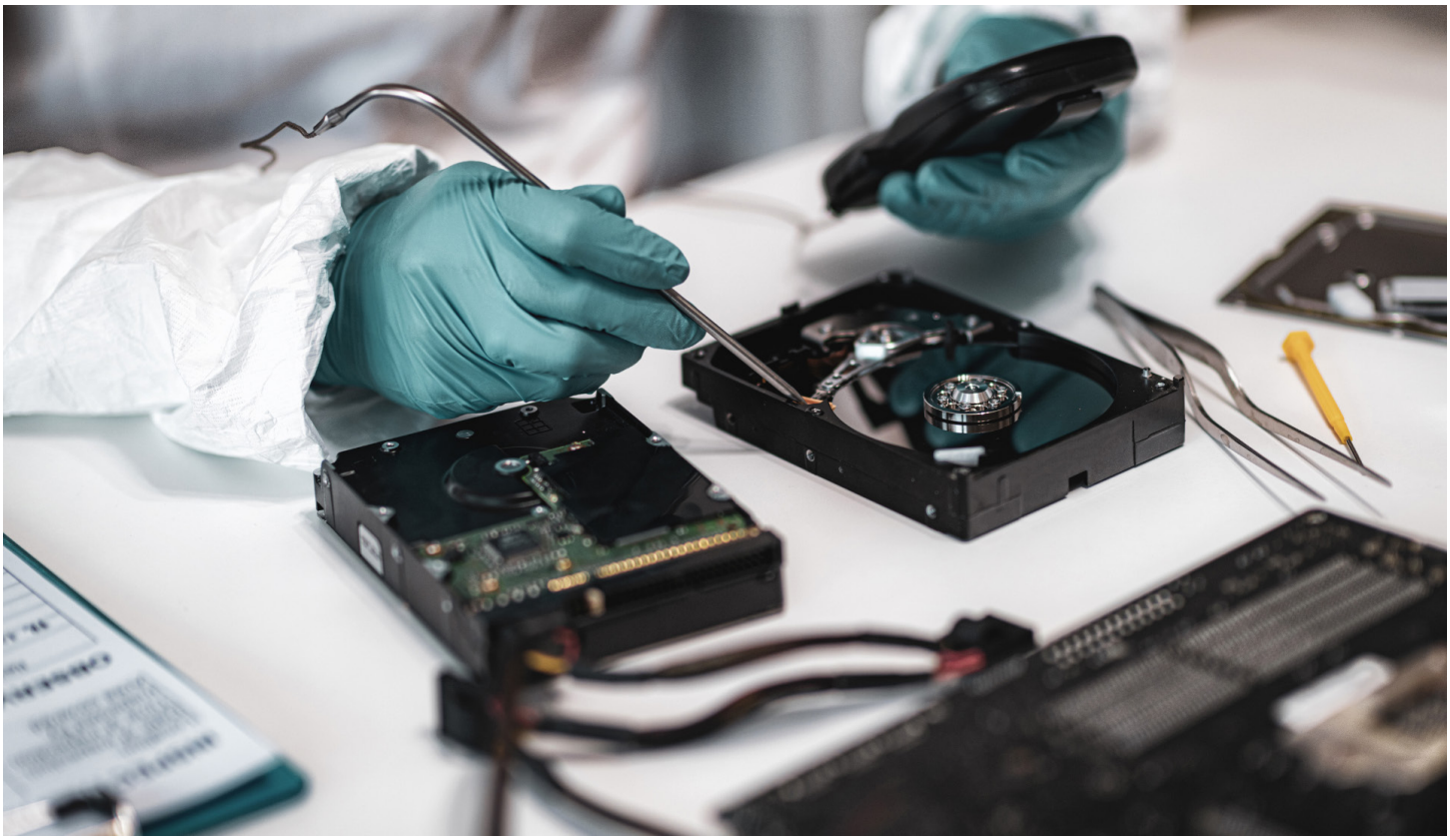
You can say the italicized words directly to your child, or you can paraphrase:

What do you think of when you hear the term digital? What items in your house are digital?

What is digital evidence? Why is digital evidence necessary?

How does a forensic scientist use digital evidence in their case? How much does digital evidence actually reveal? What is digital evidence pulled from? Do you think forensic work was easier or more difficult before the Digital Age?

PBL Digital Evidence



Visit **WonderHere.com/Unit-Studies/Digital-Files** for supplemental online resources.

WEEK FIVE

Research

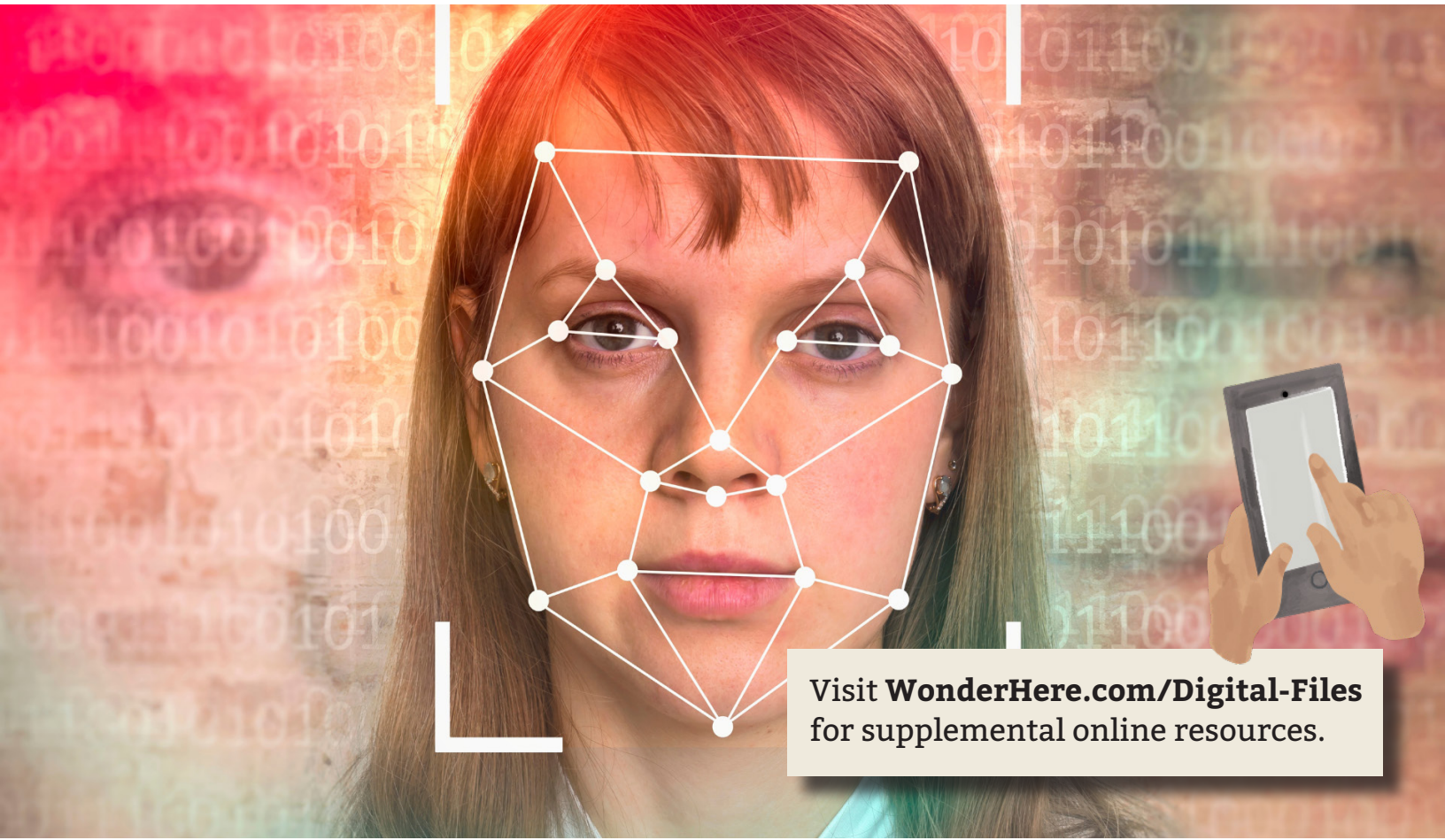
Digital evidence is a newer field in forensic science, as it refers to any information that is stored digitally. This can include social media, email addresses, internet search history, company databases, and much more.

Did you know that everything posted online can be accessed again? Even posts marked as "private" or that have been deleted are accessible in some cases.

For example, detectives are able to pull records of every text message ever sent on a phone, even if the messages were deleted. They can also find logs of which calls were made, when, and to whom.

Sometimes, a court will need to access phone data, like messaging or phone logs, in order to gain more information about their suspects. They may need to know who they talked to, what was said, or if there were any threats in the chat history.

*However, phone data isn't all that is useful in court cases. In some lawsuits, digital evidence like email records or virtual time cards can be used to determine the likelihood of **fraud** (deceiving or tricking others for your*



Visit **WonderHere.com/Digital-Files** for supplemental online resources.

PBL Digital Evidence

own gain). Even bank statements and credit card transactions can be used as evidence.

One of the coolest ways digital evidence can be used is through facial recognition software. When a computer sees a picture, it doesn't see it like you or I do. Instead of seeing a mouth, two eyes, and a nose, the computer sees the person in thousands of tiny blocks of color. Some computer programs are masters at finding patterns in colors, lines, and ratios. This means that when grandma posts the family picture on her Facebook account, all the faces register as data to the facial recognition program. When she tags Aunt Sue, this data becomes connected to Aunt Sue's name. In the future, any photo Grandma posts will bring up Aunt Sue's name. The computer knows the face in the picture belongs to Aunt Sue without any person telling it that. As more and more pictures are updated, this facial recognition becomes more perceptive (even learning to identify people from a side profile in the background of a picture).

In court cases, this evidence can be used to show that the person caught on camera busting into a cupcake shop and devouring thirty cupcakes was, in fact, Aunt Sue. While some film evidence could be ***doctored*** *(or changed to look like it was Aunt Sue), it is a rare occurrence.*

But digital evidence moves even further. GPS signal, phone towers, delivery logs, and hidden or encrypted files can all be used as evidence in a court case. Forensic scientists can pull this data from many sources to support their conclusions and provide the most accurate information possible to the jury.

Remember, a person cannot be convicted of a crime if there is reasonable doubt that they committed it. While the fingerprints, tread marks, and trace evidence point to Aunt Sue as the Red Velvet Ruffian, the addition of digital evidence, like a video of her breaking in and eating cupcakes on the security camera, can have a major impact on the decision of the jury.

continue the learning...

- **Revisit the Wonder section.** Can your child answer questions they couldn't before?
- **Explore the Thematic Tub.** This is a great hands-on learning opportunity that will give visual and kinesthetic reference to some of the concepts they just learned.
- **Do more research.** Visit WonderHere.com/Digital-Files to access kid-friendly websites where they can learn more. Remember to take notes!

WEEK FIVE

Create

Hopefully your child is feeling like a project time pro by now! They may be fully invested in their big culminating project by now, or they might be taking it week-by-week to see what new topics come up. There is no wrong way to approach project time! Your job is to cheer them on, show interest in their work, help them generate ideas, and boost their self confidence.

If your child is not yet ready to begin working on their culminating project, here are some fun ways they can engage with the concept of digital evidence:

- Take apart an old computer or device, like forensic scientists with a specialty in digital evidence often have to do.
- Write a mystery story in which the culprit gets caught by means of digital evidence like text messages.
- Take out the Thematic Tub and play with it contents.

Share

Write down notes about your project on note cards. Then, practice speaking about your project in front of a mirror using your notes. Do this several times to build confidence!

Digital Evidence

Nature Journaling

Solve the Mushroom Mystery

Did you know that mushrooms can be hunted like treasure? Many mushrooms appear and disappear overnight, depending on the weather conditions in the area. This makes finding and identifying mushrooms an exhilarating, new adventure each time.

This week, wait until after it rains, or go out early in the morning while the dew is still on the ground and hunt for mushrooms! You'll want to look for decaying wood, where they are most likely to be found. When you find your treasure, take a few pictures from various angles.

Later, you will want to print out and reference these photos as you search the internet to identify the mushrooms you found. By collecting data using a computer, you are collecting digital evidence. You can use this evidence to name and learn about your mushroom pals.

Just please be mindful not to touch or eat mushrooms if you aren't absolutely sure they're safe. Also remember to use safe internet searching practices with the supervision of an adult.

WEEK FIVE

Invitation to Play

Solve a Crime

For this week's Invitation to Play, your child will take on the role of detective through a dramatic, role-playing twist on a classic fairy tale. Take any beloved fairy tale you want, and develop the story of a crime. You may even mimic one of the books you have read through this unit study. Set the scene and invite your child to use the skills they have been practicing to solve the crime.

You will want to set the scene using stuffed animals, props, crime scene tape, tape outlines, and other details. You might also pull in fingerprints from the previous weeks or tread marks so that your child can practice using evidence to solve the mystery.

It is important to let the child invest in the role playing of this activity. They might want to dress up, use a magnifying glass, or stage other family members in order to create an elaborate story.

It is important to play into this world with them, as they are trying on the role of an adult and applying the learning they have been gathering to a real life scenario.

Take turns creating new mysteries and crimes to solve. Continue to use fairy tales or create your own story. Most importantly, allow the child to experiment with forensic science.

How to Play

What You Need:

- White tape
- Crime scene tape
- Evidence (think fingerprints, ransom notes, photographic evidence, or any of the other evidences you and your child have practiced this year)
- A fairy tale
- Other props (use the Thematic Tub!)

Instructions:

For this activity you will want to take a beloved fairy tale and turn it into a crime scene. For example, you could recreate the Three Little Pigs.

Set the scene. Scatter some hay or sticks. Use tape to draw the outline of a little piggy on the ground. Add clues, like notes from the Big Bad Wolf, trace evidence, fingerprints, or other clues and invite your child to solve the crime. Get creative with this activity, as it will allow your child to step into the role of detective or forensic scientist. They will enjoy looking for evidence and using the skills they have been practicing for the last four weeks.

Alternatively, you can encourage your child to set the scene for you. Give them the tools they need and clear instructions to create a crime scene with evidence you can use to solve the crime. Spending time with your child on these silly mysteries will develop their deductive reasoning, problem solving, and conflict resolution.

Middle & High School Extension Activities

Your middle or high schooler might enjoy creating their own WhoDunIt short story. They need to set the scene of a crime and plant adequate evidence to send their reader on many twists and turns. They will need to take time to plan ahead. They'll want to know:

- What crime occurred?
- When did it occur?
- Who are the suspects?
- What is the evidence and how does it point to each suspect?

After working out their plan, they will be able to add in details, fascinating characters, and plenty of figurative language.

WEEK FIVE

Invitation to Create

Facial Recognition Portraits

Facial recognition is a computer software that scans visual data from posted photos and videos to recognize a person's face. This technology is used to unlock phones by scanning one's face, and also to create photo albums based on facial patterns.

Forensic scientists might receive video or photographic evidence of a person at a crime scene. While they may not know who that person is, they can sometimes run the image of that person's face through a facial recognition database to find possible matches.

In fact, when a witness is able to describe a suspect to a **police illustrator** (someone that sketches suspects based off what witnesses tell them), they can also run that image through the database to see if there are any matches.

This week, try your hand at drawing your own portrait to practice facial recognition. Use a photo for reference and draw it out section by section to see yourself as a computer sees you. While you are drawing, consider which details stand out, making you unique.

How to Create

What you need:

- Grid paper (1 inch grids or larger)
- Pencil
- Eraser
- Ruler
- Photograph of suspect

Instructions:

1. Place the photograph in front of you. Use your ruler to divide it into one inch squares, to match your grid. Draw lines lightly with your pencil so that the reference photo is visible and divided.
2. Move to your graph paper. Pick a square and look at the same square on the reference photo. Try to draw exactly what you see in that square.
3. Continue this process in the next square, and the next, until the portrait is complete.

This style of drawing can be difficult to pick up, as the artist has to move from focusing on the whole picture to focusing on small details.

Talk with your child about how computers see the small details, rather than the big picture, and are able to pull facial recognition data from these details.

Discuss the benefits and difficulties of this method of drawing.

Middle & High School Extension Activities

For middle and high school students, try cyber-research. Pick a famous person (preferably one they know nothing about) and print out or show your child their social media page. Work together to collect as many details as you can about that person from what they have posted.

Use this as an opportunity to discuss how nothing we post online is every truly private or gone. Talk about how much we reveal about ourselves online when we're not mindful.

Make sure to work with your child to ensure they are not exposed to inappropriate content.

WEEK FIVE

Literature *Goldilocks and the Three Dinosaurs*

This mash up story will have you looking at a classic tale from a whole new perspective!

About This Book

"Once upon a time, there were three hungry Dinosaurs: Papa Dinosaur, Mama Dinosaur . . . and a Dinosaur who happened to be visiting from Norway.

One day—for no particular reason—they decided to tidy up their house, make the beds, and prepare pudding of varying temperatures. And then—for no particular reason—they decided to go . . . someplace else. They were definitely not setting a trap for some succulent, unsupervised little girl."

Reading Tip of the Week: Choral Reading

Choral reading is a practice strategy that helps kids practice fluency. As you read this book, choose one page to choral read with your child. Read the page aloud together, as if you were in a chorus. Slow down or speed up your pace to meet your child's ability. Add a fun twist by reading the page again with a silly voice, a whisper voice, a yelling voice, and any other voices you have!

Visit **WonderHere.com/Digital-Files** for a video read aloud of this book.

Digital Evidence

Questions to Ask

Before Reading

- Look at the front and back cover of the book. What do you wonder?
- What does the title tell you about the book?
- What do you think this book will be about? Why do you think that?
- What would you like to ask the author before you read this book?
- Is this story fiction or nonfiction? How do you know?
- What do you already know about this topic?
- Are you interested to read this book? Why or why not?

During Reading

- Where was the third dinosaur visiting from?
- What kind of trap do you think the dinosaurs are setting for Goldilocks?
- Goldilocks came across three bowls of delicious _____.
- Describe the furniture in the dinosaurs' home.
- What clues should have informed Goldilocks that she was being set up to be trapped?
- What made Goldilocks stop and think?
- Describe the end of this story.
- Do you think the dinosaurs were good trap-setters?

After Reading

- If this story had a sequel, what do you think it would be about?
- What questions would you like to ask the author right now?
- If you could have a conversation with one of the characters in the story, which character would you choose and what would you talk about?
- Did this book remind you about anything in your life? Anything in another book, movie, or TV show? Anything in happening the world right now?
- What changes would you make to the story?
- What is your opinion of the book? Did you enjoy reading it? Explain.
- Create a new ending for the story.

WEEK SIX

We made it to the sixth and final week! Can you believe it?! You are your child are not the same learners you were six weeks ago, and that is something to celebrate. Now, let's give it our all as we cross the finish line!

Toxicology

This week is we will be learning about **Toxicology**, the branch of science concerned with the nature, effects, and detection of poisons. Poison is not a common occurrence (regardless of what fairy tales would have us think!), but getting poisoned would certainly require the involvement of a forensic scientist.

Take a moment to review notes from this entire unit study. Take a moment to be proud of yourself and your learner. Where have you seen them grow the most? What about yourself? As you encourage them to choose a PBL Project topic, what do you think they will choose? (If they haven't already). Where did they show the most interest?

As you review the following pages, encourage your child to record what they wondered, researched, and created about Toxicology in the "Project Time" section of their Workbook.

Wonder

For the final time in this unit study, it is time to WONDER!

Allow your child a moment to look over the photos on the following pages. Then, ask them the following questions, encouraging them to think critically about each one.

You can say the italicized words directly to your child, or you can paraphrase:

_____

What kind of substances do you think are poisonous to humans? How about to animals?

What is toxicology?

What does a toxicologist do? Where do toxicologists gather their evidence?

How do toxicology reports help forensic scientists?

How do toxins (or poisons) exist in nature? Have you ever seen a poisonous plant or animal up close?

Do you know of any poison remedies? Tell about what you know!

PBL Toxicology

Visit **WonderHere.com/Unit-Studies/Digital-Files** for supplemental online resources.

WEEK FOUR

Research

One of the interesting roles of a forensic scientist is that of toxicology. A scientist studying toxicology is interested in the way certain chemicals or substances effect the human body, be it for good or bad.

Sometimes, a forensic scientist will do a toxicology report to determine whether or not someone has been poisoned. The most common way to test this is through blood or urine samples, which reveal chemicals in the blood, including medicine the person may have recently taken.

Toxicologists can also gather this information through the collection of samples like hair, fingernails, and air from the lungs.

Each sample has a standard ecosystem that is consistent to that person. While scientists can determine whether a substance is or is not toxic, the level of reaction does depend on the make up of that person.

Think of allergies. For some people, peanut butter is a smooth delight, for others, it is a butter of death. A forensic scientist would have to use this information to help them determine if the person was exposed to toxins purpose-

Visit **WonderHere.com/Digital-Files** for supplemental online resources.

fully or on accident, which will affect how the perpetrator might be sentenced through the court system.

In fact, many of the foods you eat every day can be toxic in large quantities. Even candy can be considered toxic depending on the amount of sugar per serving (and how many servings you eat all at once).

Toxicity doesn't mean someone will die from the substance, but does mean it can cause them harm. Think: food poisoning. Food poisoning happens when food that is normally good for you is exposed to harmful bacteria. When you ingest this bacteria, your body must expel it, creating a painful, unpleasant illness for a short period of time. This means that the human body was exposed to toxins and was able to protect itself.

Toxicology can help forensic scientists determine the cause of a reaction. It could be the cause of death, or the cause of illness. In some cases, toxicology reports can help determine if large companies are harming those nearby through pollution or the dumping of toxic waste.

In addition, a toxicology report can prove or disprove alibis. By verifying the chemicals that are in a person's body, the jury would be able to ensure that what they are saying is true.

A toxicologist can even work in the pharmaceutical industry. Their job is to check whether or not new medicines do their job, as well as determining which harmful symptoms they might cause, and whether or not that medicine is safe.

In looking at the case from Week One, the forensic scientist could include data from which ingredients were in the cupcakes to compare to the results in the bloodstream of the suspect. Higher than usual blood sugar levels could indicate that the defendant did, in fact, consume copious amounts of sugar. While it can not alone prove their guilt, it is one of the many puzzle pieces that can be tied together to convince a jury that a conviction is necessary.

continue the learning...

- **Revisit the Wonder section.** Can your child answer questions they couldn't before?
- **Explore the Thematic Tub.** This is a great hands-on learning opportunity that will give visual and kinesthetic reference to some of the concepts they just learned.
- **Do more research.** Visit WonderHere.com/Digital-Files to access kid-friendly websites where they can learn more. Remember to take notes!

WEEK SIX

Create

Now it's time to kick it into project time high gear! Your child has built up six weeks' worth of forensic science knowledge and it is time to share that knowledge with the world! (Or at least those closest to them).

Having your child complete an end-of-unit culminating project about an aspect of forensic science has so many benefits. It help develop ownership of learning, attention to detail, celebration of ideas, growth mindset, confidence, established knowledge, and more. Here are some ideas of what they can create:

- Poster board
- PowerPoint
- Speech
- Written report
- 2D or 3D model
- Diorama
- Illustration
- Magazine
- Fiction Story
- Informational video
- Brochure
- Informational video
- Stop Motion Video

The possibilities are endless!

Share

Have your child save the sharing of their project for Week Seven... the week of rest. Have them instead take time to practice sharing and prepare!

Toxicology

Nature Journaling

Many plants are partially, if not wholly, toxic to consume. Even common fruit, like apples, belong to trees in which eating the leaves or seeds might be harmful to humans.

Some plants only create a reaction in humans if consumed, but others can cause a reaction by touch alone, like poison ivy.

This week, do a little research about toxic plants in your area. You may want to check out some field guides at your local library to practice identifying plants.

Toxic Plant Identification Hike

Many hiking trails have a list of common plants you might see on your journey, as well.

Go on a hike together as a family, and try to identify as many toxic plants as you can. You may want to use a camera to record what you find, or you may encourage your child to sketch the plants they find.

By researching ahead of time, your children will be much more interested in the toxic plants around them and will be able to discuss their knowledge with the family.

WEEK SIX

Invitation to Play

PH Cabbage Experiment

Did you know that many of the natural foods we eat can be toxic to the body? One of the primary ways a food can be toxic is through its pH balance, which measures how acidic or basic the substance is.

Citrus fruits like tomatoes, oranges, and grapefruit are all acidic, but ingredients like baking soda are basic.

Acid is important to add to our diet nutritionally, but there can be too much of a good thing. Too much acid can burn through the stomach and cause damage from the inside out!

In fact, some animals can be negatively affected by acid content in foods that are healthy for humans. Every species has a stomach made specifically for the diet they were intended to eat.

For this week's Invitation to Play, invite your child to experiment and discover the acidity of various household ingredients. You don't need any fancy pH strips or kit. A red cabbage will do the trick.

Some children may want to test this out with household cleaners, like bleach. It is extremely important to label your text materials in order to stay safe.

How to Play

What you need:

- Red cabbage (chopped up)
- Large pot
- Bowl
- Strainer
- Coffee filters
- Baking soda, lemon juice, milk, and water (or anything else you want to check the pH of)
- Plastic cups
- Sharpie (to label)

Instructions:

1. Cut up cabbage and place in pit. Cover with water and boil until water becomes a dark purple color.
2. Strain out the cabbage chunks, keeping the water in a large bowl, allowing the water to cool.
3. Label your cups with the substance you will be mixing in.
4. Pour an equal amount of cabbage water into each cup.
5. Pour each substance you are testing into the cup with it's label.
6. Watch how the liquid in each cup changes color!

Cabbage is an indicator of the pH scale, meaning that if the mixture turns into a pinkish color, it is an acid. If the mixture becomes a sort of green, it is a base. The closer the color is to the initial cabbage water color, the more neutral it is. This is a perfect example of how the nature around us can help us investigate instead of using chemicals.

Middle & High School Extension Activities

Middle and high school students can be encouraged to research common poisons and toxic substances. They'll be fascinated to learn about the origin of poisons like arsenic.

Encourage them to take notes and compile their research in a meaningful way, be that creating a poster, a slide show, a vlog, or an animated film.

Your child will love researching and learning about the rich history that surrounds poisons and toxic substances.

WEEK SIX

Invitation to Create

Create an Apothecary

An apothecary is similar to what a pharmacist is today. Before modern medicine, people relied on natural materials, like plants and herbs, for medicines. Some plants and herbs can be toxic to humans, especially when too much has been consumed, but in small portions, these herbs can be medicinal for people.

In fact, much of the modern medicine we have today comes from plants and what scientists have been able to learn from how plants treat ailments of the body.

This week, you will be creating a tincture. A **tincture** is an extract of a plant. This process takes a long time, as the plant needs to soak in vinegar or alcohol to release all the important medicinal properties.

It is important to remember that what you are making is the equivalent to medicine. It is not to be used for play. If you want to make play tinctures, you can get water, food coloring, or other non-toxic ingredients to place inside dropper bottles.

How to Create

What you need:

- Glass jar with lid
- Dried herbs, like chamomile
- Alcohol (80-120 Proof) or vinegar
- Parchment paper
- Cheesecloth
- Large bowl
- Glass bottle with dropper

Instructions:

1. Place chamomile or other herb into glass jar.
2. Pour alcohol or vinegar over herb, so that the ratio is 3:1 (herb to liquid).
3. Cover the jar with parchment paper and screw on lid.
4. Shake the jar daily for at least a week. The tincture will take 4-6 weeks to be ready.
5. Once the 4-6 weeks have passed, open the jar and use the cheesecloth to strain the liquid into a bowl.
6. The strained liquid should be poured into a glass bottle with a dropper and labeled.
7. To use, place one or two drops on tongue. Do not use too much, or it could make you sick.

Chamomile is best used for treating worry and anxiety. Be sure to keep the tincture in a child-safe location to avoid overconsumption.

Middle & High School Extension Activities

Middle and high schoolers might enjoy the process of making tinctures and can look up other recipes that include roots, bark, berries, or other ingredients.

They may enjoy experimenting with the different options, but should be very careful to research the ingredients they are using in order to avoid creating a toxic tincture that could harm them.

Have your child write down their process and exploration to reflect on as they create an apothecary.

WEEK SIX

Literature *What Really Happened to Humpty?*

The final book of this unit study! If your child has learned anything in these six weeks, it would be about using their deductive reasoning - using the clues around them to come to conclusions and solve crimes.

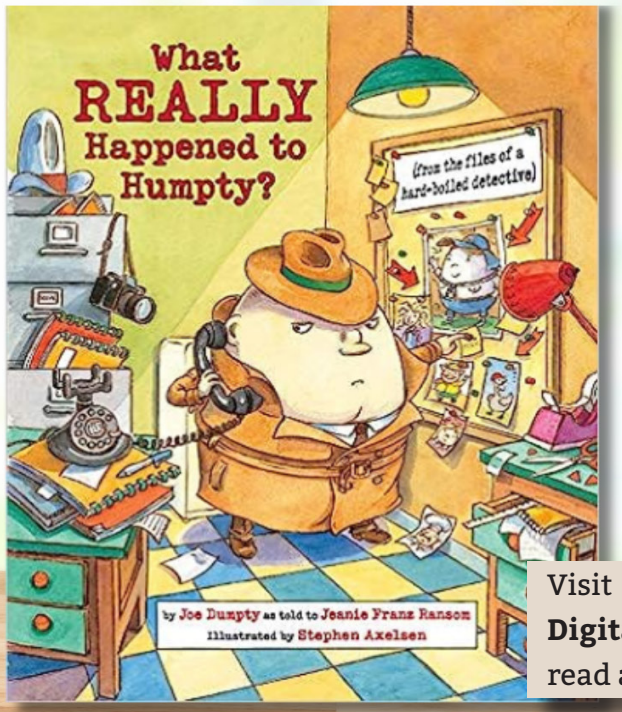
About This Book

"A scrambled mess . . . Humpty Dumpty had a great fall. Or--as his brother Detective Joe Dumpty thinks--was he pushed? This case isn't all it's cracked up to be. Suspects are plenty (as are the puns) in this scrambled story of nursery rhyme noir. Was it Little Miss Muffet? There's something not right about her tuffet.

Or could it have been Chicken Little, who's always been a little cagey? Or was it the Big Bad Wolf, who's got a rap sheet as long as a moonless night? Joe's on the beat and determined to find the truth."

Reading Tip of the Week: Book Reviews

One of the best ways to gauge whether your child comprehended the book or not is to have them give a book review. Children want their opinions to be heard, and this is a great way to do that! Reviews can be written down or said aloud. Encourage your child to give a summary of the book then their opinion of it using specific details.



Visit **WonderHere.com/Digital-Files** for a video read aloud of this book.

Toxicology

Questions to Ask

Before Reading

- Look at the front and back cover of the book. What do you wonder?
- What does the title tell you about the book?
- What do you think REALLY happened to Humpty Dumpty?
- What would you like to ask the author before you read this book?
- Is this story fiction or nonfiction? How do you know?
- Take a picture walk through the book. Make predictions on what you think will happen based on the illustrations.
- Are you interested to read this book? Why or why not?

During Reading

- Describe what was going on the morning Humpty fell off the wall.
- What were the main pieces of evidence in this mystery?
- Go through every character in this book. What was each character's reason for not being the culprit? (i.e. Spider couldn't have scared Humpty, causing him to fall, because Humpty was not afraid of spiders).
- What role did Mrs. Muffet play in the story?
- What was the conclusion of the mystery? Did you see it coming?
- What was the culprit's motive?

After Reading

- If this story had a sequel, what do you think it would be about?
- What questions would you like to ask the author?
- What questions would you like to ask the illustrator?
- If you could have a conversation with one of the characters in the story, which character would you choose and what would you talk about?
- What changes would you make to the story?
- What is your opinion of the book? Did you enjoy reading it? Explain.
- What was your favorite part of the story?
- Create a new ending for the story where a different character is the culprit.

WEEK SEVEN

Write a brief summary of your family's experiences during this unit:

What did your child do well with?

What did your child struggle with (or where would you like to see growth)?

Time to Reflect

What really caught your child's attention, interests, and passions this unit?

What are some things you'd like to do to continue the learning and interest / wonders gained from this unit?

How did your family grow in togetherness these last seven weeks?