**NGSS HS First Aid Kit Activity**

**🔬 Activity Title: “The Burn Bandage Challenge!”**

**Objective:** Use measurement tools to test and improve materials for treating burns using the principles of **thermal energy transfer**, **reaction rates**, and **material properties**.

**🧪 STATION 1: “Rescue Wraps” – Testing Cooling Efficiency of First Aid Materials**

**NGSS Standard: HS-PS3-4**
**Concept:** Investigating how different materials transfer thermal energy and protect injured skin.

**Materials:**

 Resealable plastic bag (filled with warm water — this is your “burned skin”)

 Warm water (40–45°C)

 Ice cubes (1 per trial)

 **Test materials:**
• Wet paper towel
• Aloe gel
• Gauze
• Foil
• Cloth

 Digital thermometer

 Stopwatch or timer

 Ruler (optional: measure material thickness)

**Student directions:**

**Step-by-Step Instructions:**

**Step 1: Prepare Your Simulated Burn:**

* + Fill a resealable bag with warm water (~40–45°C).
	+ Seal the bag tightly — no leaks!
	+ This simulates burned skin.

**Step 2: Apply the Cooling Material:**

* + Wrap one test material completely around the bag.
	+ If using aloe gel, spread a layer over the bag before wrapping.
	+ Optional: measure and record thickness of the material with a ruler.

**Step 3: Add the Ice Cube:**

* + Place a single ice cube on top of the wrapped “burn.”
	+ Start the stopwatch as soon as the ice is placed.

**Step 4: Measure Temperature Over Time:**

* + Use the thermometer to measure the temperature **inside the bag** every **minute** for **5 minutes**.
	+ Record your data in the table below. (Slide the thermometer in carefully without opening the bag too much.)

**Step 5: Repeat with Other Materials:**

* + Empty and refill the bag with warm water each time.
	+ Test all materials using the exact same process.

**📊 Data Table:**

| **Material Tested** |  **Start Temp (°C)** |  **Temp @ 1 min** |  **2 min** |  **3 min** |  **4 min** |  **5 min** |
| --- | --- | --- | --- | --- | --- | --- |
| Wet Paper Towel |  |  |  |  |  |  |
| Aloe Gel |  |  |  |  |  |  |
| Gauze |  |  |  |  |  |  |
| Foil |  |  |  |  |  |  |
| Cloth |  |  |  |  |  |  |

**💬 Analysis & Reflection:**

1. **Which material cooled the “burn” the fastest (largest temp drop in 1–2 minutes)?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. **Which material kept the temperature more stable over time (slower changes)?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **What physical properties made a material better at transferring or insulating heat? (e.g., thickness, texture, moisture)**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. **If you were designing a real burn treatment, which material would you recommend and why?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **STATION 2: “Cream Chemistry” – Temperature and Healing Reactions**

**NGSS Standard: HS-PS1-5**
**Concept:** Investigating how temperature affects the rate of chemical reactions — like those involved in healing creams or medicines.

**Materials:**

 2 clear plastic or glass cups

 Alka-Seltzer tablets **(or baking soda + vinegar)**

 Room-temperature water (~20–22°C)

 Warm water (~35–40°C — body temp range)

 Thermometer

 Stopwatch or timer

 Measuring cup (for equal water amounts)

**Student Directions:**

**Step 1: Measure and Pour Water:**

* + Pour **equal amounts** (e.g., 100 mL) of water into two separate cups.
	+ Use the thermometer to check and label each:
		- One should be room temperature (~20–22°C)
		- One should be warm (~35–40°C, similar to body temp)

**Step 2: Prepare the Reaction:**

* + Get **two tablets** of Alka-Seltzer (or prepare equal scoops of baking soda for vinegar test).
	+ Have your stopwatch ready.

**Step 3: Start the Experiment:**

* + Drop one tablet into each cup **at the same time**.
	+ Immediately start your stopwatch.
	+ Observe and **record the time** it takes for each tablet to fully dissolve.

**Step 4: Record Observations:**

* + Note how quickly bubbles appear and disappear.
	+ Write down how long it takes for bubbling to mostly stop.

**Step 5: Repeat if Needed:**

* + Try again using slightly different water temps (cool, warm, hot) if time allows.
	+ Compare results to confirm your findings.

**Data Table:**

| **Water Temperature** |  **Time to Dissolve (sec)** |  **Bubbling Intensity (low/med/high)** |
| --- | --- | --- |
|  |  |  |
| Room Temp (°C) |  |  |
| Warm (Body Temp) |  |  |

**Analyze & Reflect:**

1. **What does a faster reaction (more bubbles, less time) tell you about how temperature affects chemical reactions?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. **Which cup showed the fastest and most intense reaction? Why do you think that happened?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **If a healing cream needed body heat to activate its ingredients, which water temp represents the best condition for fast healing?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. **How is this experiment similar to what happens inside your body during healing?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**🛡️ STATION 3: “Build-A-Bandage” – DIY Burn Wrap Design Sprint**

**NGSS Standards: HS-PS1-3, HS-PS3-4**
**Concept:** Design and test your own cooling wrap to simulate real-world first aid solutions. Explore how different materials affect **thermal energy transfer** and how chemical/physical properties contribute to healing performance.

**Materials (student choice from a materials bin):**

 Aluminum foil

 Paper towels

 Plastic wrap

 Cotton rounds or pads

 Fabric scraps (cotton, fleece, etc.)

 Medical or masking tape

 Resealable plastic bags (pre-filled with warm water ~40–45°C)

 Ice cubes

 Stopwatch

 Thermometer

 Ruler (optional, to measure wrap thickness)

**Student Directions:**

**Step 1:Set Up the “Burn Site”**

* Fill a resealable plastic bag with warm water (~40–45°C) to simulate burned skin. Seal tightly.
* This will be your *test surface*. Place it flat on the table.

**Step 2: Design Your Wrap**

* Choose 2–3 materials from the bin to build a custom cooling bandage.
* You may **layer** materials (e.g., paper towel under foil, or cloth + plastic wrap) to combine comfort and heat-shielding.
* Use tape to hold the design together if needed.
* OPTIONAL: Use a ruler to measure or record the **thickness** of your wrap.

**Step 3: Test Cooling Efficiency**

* Wrap your DIY bandage around the plastic bag.
* Place an **ice cube on top** of the bandage.
* Start the stopwatch.
* Measure the **internal temperature** of the water in the bag **once every minute for 5 minutes.**
* Record your results.

**📊 Data Table:**

| **Time (min)** |  **Internal Temp (°C)** |
| --- | --- |
| 0 (start) |  |
| 1 min |  |
| 2 min |  |
| 3 min |  |
| 4 min |  |
| 5 min |  |

**💬 Analyze & Reflect:**

1. **Did your design lower the temperature by at least 10°C within 3 minutes?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. **Which material(s) do you think helped most with cooling? Why?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **Was your wrap comfortable to the touch? Could it be used on real skin?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. **If you had to improve this design for field use (limited supplies, fast action), what would you change?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. **Which properties (absorbency, insulation, flexibility) mattered most in your final design?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**🧠 Wrap-Up Reflection:**

Have students reflect in journals or in small groups:

* What makes an ideal first aid wrap?
* How does temperature impact chemical and biological reactions?
* Why is measurement and testing essential in designing real medical products?

**🎯 Bonus Challenge:**

**“First Aid Far From Home” – Design a Survival Wrap Kit**

**Scenario:** You’re designing a **First Aid Cooling Kit** for either astronauts in space or explorers stranded in the wilderness. There's **no hospital nearby**—so your materials need to work fast, be safe, and last.

**🌟 Challenge Goal:**

Design and present a **burn-care first aid kit** that works in **extreme or isolated environments**, such as:

* 🚀 Aboard a spacecraft or lunar base
* 🏕️ Deep wilderness without medical support

You will work in small teams to research, plan, and **present your design**.

**Science Connections**

**NGSS Standard:** HS-PS3-4

* Investigate how energy (thermal) is transferred and controlled
**NGSS Standard:** HS-ETS1-2
* Evaluate competing solutions based on criteria and constraints

**Student Directions**

**Step 1: Choose Your Environment**

As a team, pick one:

* Space (zero gravity, very cold/hot extremes, limited water, no gravity)
* Wilderness (variable temperatures, lots of movement, no electricity)

🔍 Think about what survival would look like in this setting.

**Step 2: Identify Needs**

List the challenges you must solve:

* How will your wrap cool a burn quickly?
* Will it **stay in place** during movement?
* Can it be **reused**?
* What if there’s **no freezer or cold water** available?

Record your key design needs:
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 3: Select Materials**

Brainstorm materials you could **realistically pack or find**:

* Lightweight cloth
* Aluminum foil
* Gel packs
* Natural sponges
* Self-heating or self-cooling compounds
* Water-absorbing polymers
* Sterile wipes or single-use wraps

What properties are important in your material choices?

| **Property** | **Why It’s Important for First Aid** |
| --- | --- |
| Thermal Conductivity |  Helps draw heat away from the skin |
| Reusability |  Saves space and weight in survival gear |
| Safety & Comfort |  Safe to use on human skin; no extra damage |
| Ease of Use |  Simple, fast to apply under pressure |

**Step 4: Draw and Describe Your Kit**

Use a half-page to:

* Sketch your survival wrap and label the materials
* Explain how it cools burns
* Describe how it’s stored and applied
* Include how long it lasts or how it’s reused

 Sketch Space (or use notebook):
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 5: Justify Your Choices**

Answer the following as a team:

1. **Why are your materials effective for this environment?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. **What trade-offs did you make (e.g., comfort vs. reusability)?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **How does your design support patient comfort and healing?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. **If you could only carry 3 items, which would they be and why?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Group Presentations:**

Present your First Aid Kit concept to the class. Focus on:

* Science behind your design
* Why it works in your chosen setting
* How you balanced effectiveness, simplicity, and safety

**NGSS MS First Aid Kit Activity**

Here’s a **creative, hands-on activity** for a **Middle School “Practice First Aid” Unit** aligned with NGSS Physical Science standards. The stations involve common, easy-to-find materials and reinforce key science concepts like chemical reactions, synthetic materials, and thermal energy transfer—perfect for a STEM First Aid kit.

🚑 **Science of First Aid: Lab Stations**
**Name:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_    **Date:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
**Class/Group:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   **Partner(s):** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

🎯 **Your Mission:**
You’re a First Aid Scientist! Rotate through each station to test real-life reactions and materials used in first aid. Use observation, measurement, and engineering thinking to understand what happens when first aid meets science!

📍 **Station 1: Reaction in Action – Disinfecting Wounds**
**Focus:** Chemical Reactions
**NGSS Standard:** MS-PS1-2

Analyze and interpret data on properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

**Investigation Goal:**

Explore how **hydrogen peroxide** reacts with “tissue” to clean a wound, and identify evidence of a **chemical reaction**.

**Background Info:**

Hydrogen peroxide (H₂O₂) is a common first-aid disinfectant. When it touches living tissue, it breaks down and releases oxygen. This bubbling action **helps clean wounds** by removing dirt and killing some germs.

**Materials:**

 1 small cup (plastic or paper)

 Fresh potato slice or a spoonful of yeast solution (your tissue model)

 Hydrogen peroxide

 Water (as a control)

 Dropper or pipette

 Safety goggles and gloves (recommended)

**Student Directions:**

**Step 1: Test the Reaction**

1. **Place the potato slice** (or 1 tsp of yeast solution) into a small cup.
2. **Add 5–10 drops** of **hydrogen peroxide** onto the potato or yeast using a dropper.
3. **Watch carefully for 30–60 seconds.** What do you notice?
	* Do you see **bubbling** or **fizzing**?
	* Does it make a sound or create foam?
4. **Record your observations** in the chart below.

**Step 2: Compare to Water (Control Group)**

1. In a second cup, place another potato slice (or fresh yeast).
2. Add 5–10 drops of **plain water** instead of hydrogen peroxide.
3. Watch for another 30–60 seconds.
4. Record what happens.

### **Record Your Results:**

| **Test Material** | **What Happened? (bubbles, fizz, nothing?)** | **Chemical Reaction? (Yes/No)** |
| --- | --- | --- |
| Hydrogen Peroxide |  |  |
| Water (Control Test) |  |  |

### Reflect & Analyze:

Answer in complete sentences.

1. **What signs showed that a chemical reaction happened with hydrogen peroxide?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. **Why didn’t plain water cause the same reaction?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **Why might this bubbling reaction be helpful in real first aid situations?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. **Hydrogen peroxide releases oxygen gas when it reacts. What does that tell you about the kind of change it is (physical or chemical)?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

📍 **Station 2: What’s It Made Of? – Synthetic vs. Natural**
**Focus:** Synthetic Materials & Origins
**NGSS Standard:** MS-PS1-3

Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

### **Investigation Goal:**

Learn to **identify whether materials are natural or synthetic**, and explore **why synthetic materials are useful** in medical care.

### **Background Info:**

* **Natural materials** come directly from nature (plants, animals, minerals).
* **Synthetic materials** are **man-made** from natural resources using **chemical processes** (like plastic or petroleum jelly).
* Many first aid materials are chosen based on their strength, flexibility, absorbency, or ability to protect wounds.

**Materials:**

 Cotton bandage

 Adhesive bandage (Band-Aid)

 Gauze pad

 Petroleum jelly or antibiotic ointment

 Magnifying glass

 Optional: “What’s It Made From?” info sheet or product label

**Student Directions:**

1. **Use the magnifying glass** to look closely at each material.
	* What’s its texture like?
	* Is it stretchy? Soft? Sticky?
	* Does it remind you of something natural or plastic-like?
2. **Use your sense of touch and observation** to make an educated guess:
	* Was this material made directly from plants or animals (**natural**)?
	* Or was it made in a factory from processed chemicals (**synthetic**)?
3. **Look at product labels or the info sheet** (if provided) to check your guess. If no label is available, write your best guess based on texture, look, and feel.
4. **Complete the table below** with your group.

### 📋 Record Your Observations:

| **Item** | **Natural or Synthetic?** | **What’s it made from (or your best guess)?** |
| --- | --- | --- |
| Cotton Bandage | ☐ Natural ☐ Synthetic | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Adhesive Bandage | ☐ Natural ☐ Synthetic | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Gauze Pad | ☐ Natural ☐ Synthetic | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Ointment | ☐ Natural ☐ Synthetic | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

### 💬 Reflect & Explain:

1. **Why do we use synthetic materials in first aid instead of only natural ones?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. **Which material surprised you the most? Why?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **Think like an engineer!** What would be one natural material you could use to replace something synthetic? Would it work just as well?
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

📍 **Station 3: Cool It! – Burn Treatment Engineering**
**Focus:** Thermal Energy Transfer
**NGSS Standard:** MS-PS3-3

Apply scientific principles to design, test, and refine a device that minimizes the transfer of thermal energy.

### **Investigation Goal:**

Test how well different first aid materials (like aloe gel, ice, and cloth) **remove heat** from a simulated skin burn.

### **Background:**

When someone gets a minor burn, **cooling the area quickly** helps stop further skin damage. You’ll act like an engineer testing different **cooling materials** to see which one works best.

**Materials:**

 3 small cups (or water balloons or plastic bags with warm water to simulate “skin”)

 Hot water (~40–45°C, safe to handle)

 Aloe vera gel

 Ice pack or frozen sponge in a bag

 Clean cloth (dry or slightly damp)

 Thermometer (or your hand if safe and instructed by your teacher)

 Timer or stopwatch

 Paper towel (to wipe and clean between trials)

**Student Directions:**

1. **Prepare your “burn site”:**
Fill 3 cups with warm water to simulate a mild skin burn. Make sure all cups are at about the same starting temperature. Record the **starting temperature** of one cup.

📍 Start Temp: \_\_\_\_\_\_ °C

1. **Apply the treatments (one per cup):**
	* Cup 1: Cover the surface with **aloe vera gel**
	* Cup 2: Place the **ice pack or frozen sponge** on top
	* Cup 3: Drape with a **clean cloth**
2. **Wait for 2 minutes.**
Use a stopwatch or timer. Do not stir the water.
3. **After 2 minutes**, measure the **end temperature** of each cup using a thermometer (or carefully use the back of your hand to feel warmth if approved). Wipe the thermometer between uses.

🧊 End Temps:

* + Aloe: \_\_\_\_\_\_ °C
	+ Ice Pack: \_\_\_\_\_\_ °C
	+ Cloth: \_\_\_\_\_\_ °C
1. **Record your data** and compare the results. Which material cooled the “burn” fastest?

### 📋 Record It:

| **Treatment** | **Start Temp (°C)** | **End Temp (°C)** | **Temperature Drop (°C)** |
| --- | --- | --- | --- |
| Aloe Gel |  |  |  |
| Ice Pack |  |  |  |
| Cloth |  |  |  |

### 💬 Reflection Questions:

1. **Which material helped cool the water the fastest?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. **Which material would you recommend for burn treatment and why?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **Why is it important to cool a burn quickly in first aid?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. **What are the pros and cons of each material (comfort, availability, effectiveness)?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

🧠 **Wrap-Up Discussion Questions:**

* What kinds of chemical reactions happen during first aid?
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Why are synthetic materials helpful for treating injuries?
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* How can we use energy transfer to help heal burns?
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**NGSS ES First Aid Kit Activity**

🩹 **Junior First Aid Scientists: Exploring Materials & Healing**
**Name:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_    **Date:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
**Class/Group:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   **Partner(s):** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

🎯 **Your Mission:**
Today, you are a **First Aid Investigator!** Your job is to test different materials and cooling methods to see what works best for helping small injuries. You'll explore which bandages stay on best, which materials feel cool, and how to tell what different first aid items are made of. Ready to explore?

📍 **Station 1: Best Bandage Challenge!**
**Focus:** Material Properties for Healing
**NGSS Standard:** 2-PS1-2
**Materials:**

* Different types of bandages (fabric, plastic, gauze, paper towel with tape)
* Spray bottle with water
* Paper "skin" or sponge
* Timer

**Student Directions:**

1. Stick each type of bandage to the paper "skin" or damp sponge.
2. Spray lightly with water to simulate sweat or moisture.
3. Wait 1 minute—Which bandage stayed on? Which one fell off?
4. Gently tug each one. Which is the strongest?

**Record It:**

| **Bandage Type** | **Stayed on when wet?** | **Easy to remove?** | **Strong hold?** |
| --- | --- | --- | --- |
| Fabric | ☐ Yes ☐ No | ☐ Yes ☐ No | ☐ Yes ☐ No |
| Plastic | ☐ Yes ☐ No | ☐ Yes ☐ No | ☐ Yes ☐ No |
| Gauze & Tape | ☐ Yes ☐ No | ☐ Yes ☐ No | ☐ Yes ☐ No |

**Which one would you want on a real cut? Why?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

📍 **Station 2: Cool It Down!**
**Focus:** Heat Transfer & Burn Treatment
**NGSS Standard:** 2-PS1-4

**Goal:**

Test different types of bandages to see which one works **best** when applied to a moist or sweaty wound. You’ll test how well they stick, how strong they are, and how easy (or hard) they are to remove.

**Materials:**

* Fabric bandage (like cloth adhesive)
* Plastic bandage (like standard Band-Aid)
* Gauze + tape
* Paper towel + tape (DIY bandage)
* Spray bottle with water (to simulate sweat or moisture)
* Paper "skin" or a damp sponge
* Timer (or stopwatch)
* Pencil for recording results

**Student Directions:**

**Step 1: Prep your “skin”:**
Lay your paper "skin" flat on the table (or use a moist sponge if instructed).

**Step 2: Stick on your bandages:**
Apply each type of bandage to a separate spot on the "skin" or sponge. Make sure each one is pressed down firmly so it starts out sticking well.

**Step 3: Spray the bandages:**
Use the spray bottle to lightly mist the bandages 3–4 times. This simulates moisture from sweat, rain, or a humid day.

**Step 4: Start your timer:**
Wait **1 minute** without touching the bandages. Observe:

* + Did any start to peel off?
	+ Which one stayed on best?

**Step 5: Do the strength test:**
After 1 minute, gently tug each bandage. Try pulling from the corner.

* + Which one came off easily?
	+ Which one held strong?

**Step 6: Record your results** in the table below. Discuss with your group what each material was good or not so good at.

### 📋 Record It:

| **Bandage Type** | **Stayed on when wet?** | **Easy to remove?** | **Strong hold?** |
| --- | --- | --- | --- |
| Fabric Bandage | ☐ Yes ☐ No | ☐ Yes ☐ No | ☐ Yes ☐ No |
| Plastic Bandage | ☐ Yes ☐ No | ☐ Yes ☐ No | ☐ Yes ☐ No |
| Gauze + Tape | ☐ Yes ☐ No | ☐ Yes ☐ No | ☐ Yes ☐ No |
| Paper Towel + Tape | ☐ Yes ☐ No | ☐ Yes ☐ No | ☐ Yes ☐ No |

### 💬 Think & Reflect:

1. **Which bandage worked the best overall (held tight, stayed dry, felt comfortable)? Why?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. **If you had a real cut or scrape, which bandage would you choose and why?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **What properties make a bandage useful in real life? (Think: water resistance, flexibility, comfort...)**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

📍 **Station 3: Mystery Material Match!**
**Focus:** Identifying Materials by Properties
**NGSS Standard:** 5-PS1-3

### Goal:

Investigate mystery materials from a first aid kit and figure out which one is best for which job—cleaning, covering, or sticking! You’ll use your senses and tools to compare texture, absorbency, and stickiness.

**Materials:**

 Cotton ball

 Gauze pad

 Alcohol wipe (dry/unused)

 First aid tape

 Fabric adhesive bandage

 Magnifying glass

 Tweezers

 Water dropper

 Paper towel (for drying off)

**Student Directions:**

1. **Set up your station:**
Place all five mystery materials in front of you. Use the tweezers to handle them if needed.
2. **Observe each material’s texture:**
	* Use your **hands** and the **magnifying glass**.
	* Is it soft? Scratchy? Smooth? Sticky?
	* Record your texture description in the chart.
3. **Test water absorbency:**
	* Use the **water dropper** to place 1–2 drops of water on each material.
	* Watch what happens—does it soak in quickly, slowly, or not at all?
	* Mark “Yes” or “No” for water absorbency in your chart.
4. **Match each material to a first aid job:**
Think like a scientist! Ask yourself:
	* Which one is best for cleaning a cut?
	* Which one sticks and stays in place?
	* Which one covers or protects the wound?
5. **Complete your chart below.**
Be ready to share your choices and your reasoning!

### 📋 Record It:

| **Material** | **Texture (what does it feel/look like?)** | **Absorbs Water?** | **Best Job in First Aid?** |
| --- | --- | --- | --- |
| Cotton Ball | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ☐ Yes ☐ No | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Gauze | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ☐ Yes ☐ No | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Alcohol Wipe (dry) | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ☐ Yes ☐ No | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Tape | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ☐ Yes ☐ No | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Fabric Bandage | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ☐ Yes ☐ No | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

### 💬 Think & Reflect:

**What clues helped you figure out what each material is best used for?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Why is it important for first aid materials to have different properties?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

🧠 **Wrap-Up Reflection:**

* Which bandage or material would you choose in a real emergency? Why?
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* What happens when you cool a “burn”? Can all changes be undone?
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* What makes a first aid material good for the job?
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_