STEM 101
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Name: _____
Period: _____

UNIT: FIRST AID

COOL IT! – BURN TREATMENT ENGINEERING

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

2. **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**

3. **Wait for 2 minutes.**
   Use a stopwatch or timer. Do not stir the water.

4. **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

5. **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			

Reflect 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)?

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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?

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STANDARDS ALIGNMENT

NGSS: MS-PS3-3 **STEL:** STEL 1F, STEL 2E, STEL 4E, STEL 7E, STEL 8F, STEL 11F **CCSS:** CCSS.MATH.CONTENT.6.SP.B.5, CCSS.MATH.CONTENT.7.RP.A.2, CCSS.MATH.PRACTICE.MP4, CCSS.MATH.PRACTICE.MP2, CCSS.MATH.PRACTICE.MP6