

## Visible Elements in Photo



- A black skillet or frying pan on a gas stove burner
- Blue flame from the burner beneath the pan
- A fried egg cooking in the pan (white cooked egg white, yellow liquid yolk)
- A metal spatula resting in the pan
- Heat visibly radiating from the flame (distortion blur in air)

## Reasonable Inferences

- From the blue flame and egg cooking: Heat energy is being transferred from the burner to the pan to the egg, causing a physical change (liquid yolk to cooked state). This demonstrates thermal energy flow and material response to heat.
- From the skillet material and burner contact: Metal conducts heat efficiently, making it an effective medium to transfer thermal energy from the heat source to the food.
- From the spatula placement: A cooking tool must be able to withstand high temperatures without warping or melting, suggesting material selection matters in heat-exposed designs.

## Engineering Task

### K-2 Challenge:

Challenge: Design a nest or holder that keeps a warm object (like a warm plastic ball or beanbag) from cooling down too quickly. You can use materials like cotton, newspaper, foam, or cloth. Build your design so it works for at least 5 minutes. Which materials work best to keep heat in?

### #### 3-5: Design a Heat-Resistant Cooking Tool

Challenge: Design a spatula or cooking utensil that will not bend, melt, or conduct heat to your hand when used over a flame or hot surface for 2 minutes. Your tool must be at least 20 cm long, weigh no more than 50 grams, and successfully flip or move an object on a hot surface without damage. Test three different materials (wood, metal, plastic, foam) and explain which conducts or insulates heat best based on your observations.

### 3-5 Challenge:

Challenge: Design a spatula or cooking utensil that will not bend, melt, or conduct heat to your hand when used over a flame or hot surface for 2 minutes. Your tool must be at least 20 cm long, weigh no more than 50 grams, and successfully flip or move an object on a hot surface without damage. Test three different materials (wood, metal, plastic, foam) and explain which conducts or insulates heat best based on your observations.

## EDP Phase Targeted

Ask / Define Problem

Why this phase fits: The photo shows a real-world thermal challenge (cooking requires controlling heat transfer and tool safety). Students can observe the problem directly—heat is being used to transform food, but tools must survive that heat. This naturally leads to asking: "How can we design something that works near heat?" and "What materials protect us from burning?" Identifying the problem of heat transfer and material limits comes before sketching solutions.

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### Suggested Materials

- Cotton batting or insulation material
  - Aluminum foil and plastic wrap
  - Wooden sticks or dowels
  - Foam sheets or packing peanuts
  - Newspaper or cardboard
  - Metal spoons or utensils (for comparison)
  - Heat source: candle, lamp heat, or warm water bath (supervised)
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### Estimated Time

- K-2 task: 20–30 minutes (5 min setup, 10 min building, 10 min testing and discussion)
  - 3-5 task: Two 40-minute sessions (Session 1: design and material testing; Session 2: full tool testing and data analysis)
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### Why This Works for Teachers

This task directly addresses NGSS 3-5-ETS1-1: Define a simple design problem that can be solved by applying scientific ideas about materials and their properties, while allowing students to see thermal energy transfer and material behavior in action before designing solutions.