

Hypothesis

Based on your observations, answer the “problem question” with your best guess. (Which color, black or white, reflects energy better? Which color absorbs energy better?) Your hypothesis should be written as a statement.

My hypothesis: _____

Materials

Per group

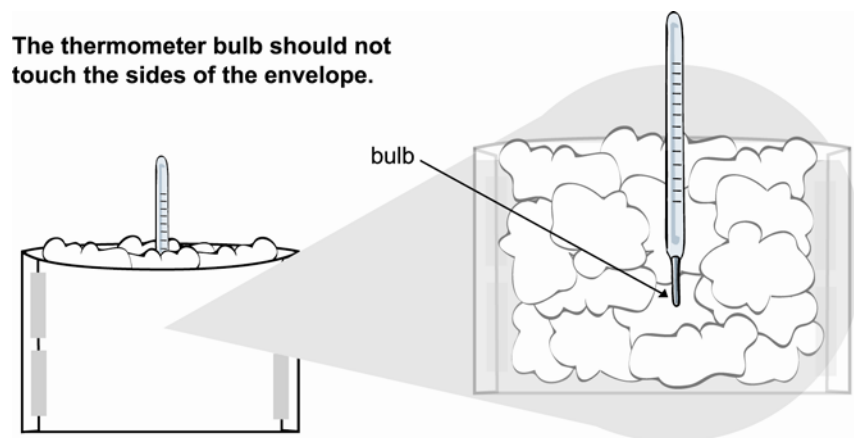
- 2 thermometers (calibrated in units of 1-2 degrees Celsius)
- 2 envelopes: one made of black construction paper and one made of white construction paper
- cotton balls or tissue paper
- 1 small box (shoe box, lid not needed)
- stopwatch, watch or clock

Safety

Review your classroom and lab safety rules.

Test Procedure

1. Put both envelopes inside a small box to hold them upright while you are working with them.
2. Stuff cotton balls or tissue paper inside the envelopes and then carefully place a thermometer inside each envelope. The thermometers should be upright in the envelope and the bulb of the thermometer should touch the cotton or tissue, not the envelope. See the diagram below.



3. Let the thermometers rest in the envelope for about 1 minute to record the temperature of the new environment. Then check the temperature in degrees Celsius. Record this data at 0 minutes in the Cool Suits Data Sheet. Also, record the temperature from the control thermometer, which your teacher will have.
4. Take each envelope from the box and place them in the “test site” (windowsill or outside) where they will receive direct sunlight. Make sure that both envelopes receive the same amount of sunlight.
5. Predict how many degrees the temperature will change in each envelope over the 5-minute period. Record the predicted temperatures on the Cool Suits Data Sheet. Discuss your predictions with your group.

- After 5 minutes, collect and record data by reading and recording the temperature of the thermometers on the Cool Suits Data Sheet. Discuss the data with your group.
- Every 5 minutes for the next 30 minutes, repeat steps 5 and 6.
- After taking all measurements, study the data and draw conclusions by answering the questions following the Cool Suits Data Sheet.

Record Data

Cool Suits Data Sheet

| Record Thermometer Readings (Celsius) | | | | | | | | | | | | | |
|----------------------------------------|------|---------|------|---------|-------|---------|-------|---------|-------|---------|-------|---------|-------|
| | 0min | Predict | 5min | Predict | 10min | Predict | 15min | Predict | 20min | Predict | 25min | Predict | 30min |
| Black Envelope | | | | | | | | | | | | | |
| White Envelope | | | | | | | | | | | | | |
| Control (check with teacher) | | | | | | | | | | | | | |

Study Data

- What changes did you see in the temperature of the different envelopes? Which envelope had more change in temperature?
- What conclusions can you make about color and how it reflects or absorbs energy?
- Does this data support your hypothesis? Why or why not?
- How do your results compare to class results?

5. Based on your findings, what would you suggest to NASA researchers designing new space suits?

6. How might you change this experiment to find out whether different materials affect energy absorption and reflection?

Conclusion

- Update the LEARNED column in your KWL chart.
- Restate your hypothesis and explain what happened during testing.