

Cold Coffee

You need

- ★ 3 thermometers
- ★ various mugs
- ★ boiling water
- ★ iced water
- ★ newspaper
- ★ tinfoil
- ★ access to a computer spreadsheet/graphing program (optional)
- ★ a classmate

Activity One

I'm always so busy that my morning coffee gets cold before I have a chance to drink it!



Craig and two of his friends do an experiment to see if everyday materials will keep Ms O'Connor's cup of coffee warm.

They get three china mugs the same size and shape and made of the same material. They wrap newspaper around one of the mugs, tinfoil around another, and nothing around the third mug. They fill each mug with the same amount of boiling water. They each look after one mug, using a thermometer to measure the temperature of the water in their mug every 3 minutes.

Here are their results:

Time (minutes)	Temperature (degrees Celsius)		
	Tinfoil	Newspaper	No insulation
0	100	100	100
3	91	90	88
6	87	85	82
9	84	82	78
12	81	79	75
15	79	76	72
18	76	73	68
21	74	71	66
24	72	69	64
27	70	66	62
30	68	64	60
33	67	63	59
36	65	62	57
39	64	60	54
42	63	59	53
45	61	58	52
48	60	57	50



1. Enter the three friends' data into a computer spreadsheet and use it to create a time-series graph.
2.
 - a. Using your graph, describe how the newspaper and tinfoil affected the temperature of the water.
 - b. Do you think Ms O'Connor's complaint about her coffee getting cold too quickly was justified?
 - c. What advice does your graph suggest Craig should give Ms O'Connor?

Activity Two

Work with two classmates on this activity. You need a takeaway mug, a ceramic mug, and a reusable insulated mug. The three mugs should all hold about the same amount of liquid.

1.
 - a. Fill each mug with iced water and take the temperature of the water in each mug every 3 minutes for a total of 45 minutes.
 - b. Enter your data into a computer spreadsheet and create a time-series graph as in Activity One.
2. Compare results for the three mugs. Which mug keeps iced water cold longest? How much longer? Write a paragraph describing what you have found out.
3. Predict what would happen if you continued to measure the temperature for a longer time.
4. What sorts of things could affect the result of this experiment?
5. Discuss why people use different sorts of mugs. Who would find it useful to know what you now know about the insulating qualities of mugs?



Focus

Evaluating experimental data with the help of time-series graphs