

On January 28, 1986 the space shuttle Challenger exploded. Seven astronauts died because two large rubber O-rings leaked during takeoff. These rings had lost their resiliency because of the low temperature at the time of the flight. The air temperature was about 0° Celsius, and the temperature of the O-rings about 6 degrees below that.

The link between O-ring damage and ambient temperature had been established prior to the flight. The engineers at Morton Thiokol, Inc had recommended that the flight be delayed. Unfortunately their argument wasn't persuasive enough, and the launch proceeded with disastrous consequences.

The engineers had failed to display the link between ambient temperature and O-ring damage in a clear and unambiguous fashion. All that was needed was a simple scatterplot. The data is given below. What recommendation would you have made for a flight if the forecast was for below 0° Celsius?

Task. Your assignment is to do whatever you need to investigate this data set and then write a brief article for the newspaper describing your findings and conclusions. Be sure to include in your article: a statement of the problem, the data, and any plots or graphs you construct. Be sure to discuss patterns and trends but also be sure to explain any deviations to the patterns. As part of the assignment, the Science editor wants you to predict the damage index that would have occurred if the temperature was 13° C and 0° C.

Mode. You may work on this assignment individually, or you may work with one partner (not more than one) in the class.

Report. Try to keep graphs and your commentaries about these graphs together on the same page, if possible, so the reader won't have to flip back and forth when reading your report. If you worked with a partner on this Special Problem, then both must contribute equally, and both names must appear on the article. When you write your article, assume that your readers will be reasonably intelligent, but they may not be as statistically literate as you. If you use any technical terms, you may want to briefly explain these terms as part of your story.

Grading. The score awarded for this Special Problem will depend on the quality of your analyses, the clarity of your explanations, the appropriateness of your conclusions, and whether you adhered to the general guidelines for Special Problems.

Deadline. Special Problem 3E is due on _____.

Data from Previous Flights	
Temperature ($^{\circ}$ C)	Damage Index
12	11
14	4
14	4
17	2
19	0
19	0
19	0
19	0
19	0
20	0
21	4
21	0
21	4
21	0
21	0
22	0
23	0
24	4
24	0
24	0
26	0
26	0
27	0