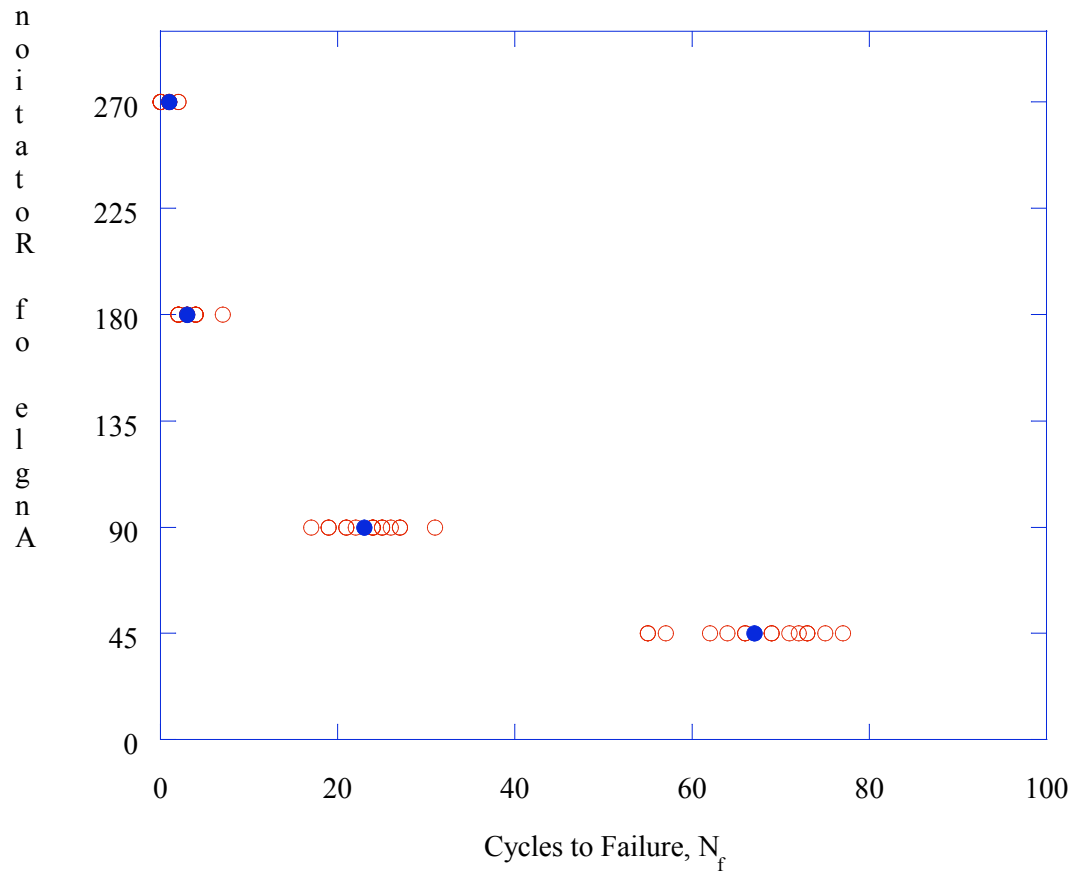


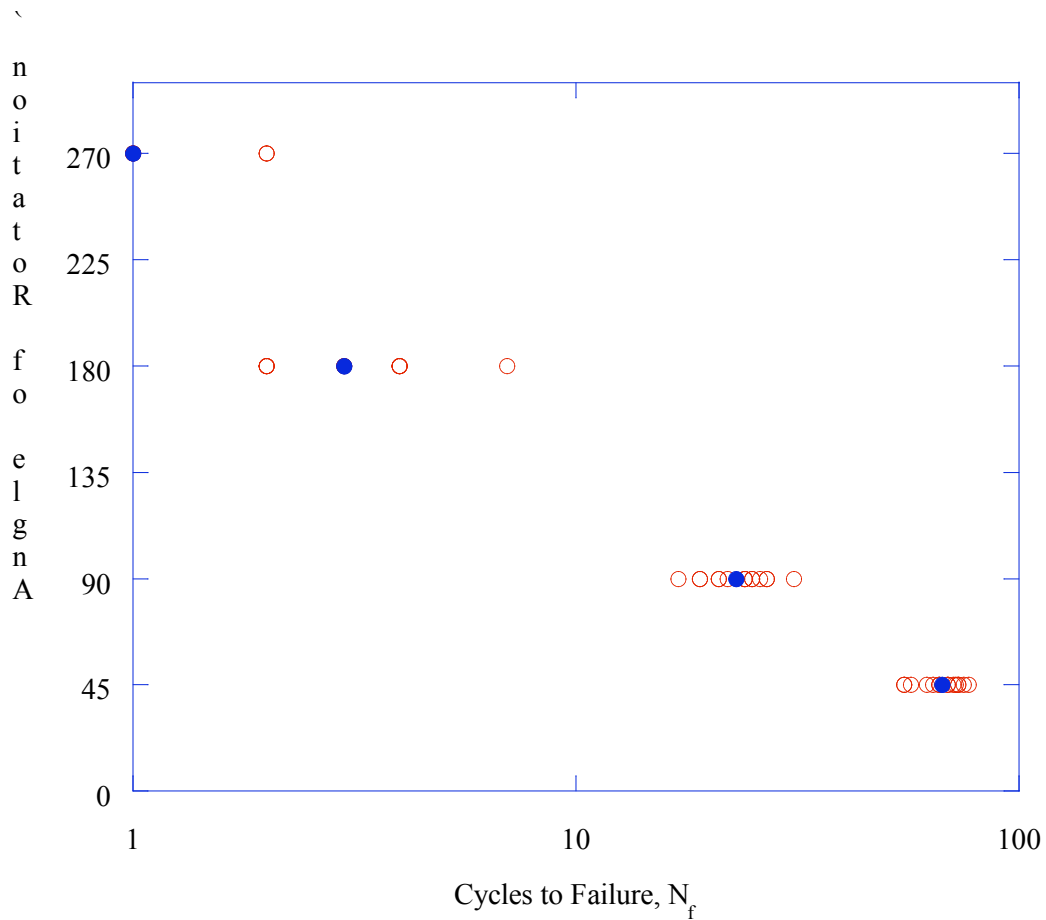
Teachers' Guide:

While we have done our best to guide you through every step of the experiment, we suggest you try to follow the guide by yourself to see which points your students might need clarification on, as well to get a sense of which parts of the experiment are more difficult.

The experiment can be run in a variety of ways. Students can each test one variable and share data, or each group can test both rotation angle and type of paper clip.

Example Linear and Logarithmic Graphs:





Answers to Analysis Questions:

1. Results will vary.
2. Results will vary- should be 270°.
3. Results will vary.
4. Results will vary. However, the largest rotation angle should yield the largest shear stress.
5. Results will vary. However, the smallest rotation angle should yield the smallest shear stress.
6. There are numerous sources of error associated with this experiment. The following is a short list of errors which may affect the experimental data:
 - Not every paperclip is the same
 - Angle of rotation is not consistent between cycles or groups
 - Where the paper clips is held changes the location of the torsion force
 - Temperature and humidity of the room can affect the fatigue
 - Metric ruler error
 - Human error
7. Results will vary.