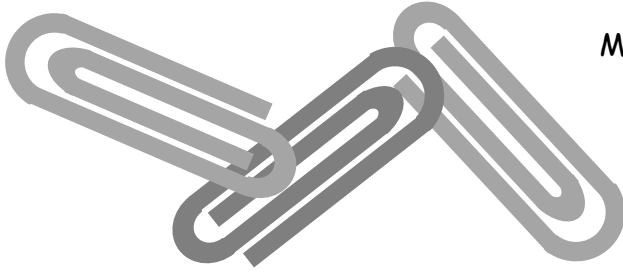


FATIGUE TESTING OF PAPER CLIPS



Materials:

- 3 paper clips per student - smooth and ridged
- Hand lenses
- Journals

HOW STRONG ARE YOU? CAN YOU BREAK A PIECE OF METAL IN TWO?

To understand how materials behave engineers test their mechanical properties.

Failures can occur because:

- The material
- The design, or
- The manufacturing
... was faulty

Failures can occur when:

- The material is loaded beyond its strength ~ **overload**
- Loaded repeatedly overtime ~ **fatigue**

1. Can you break a piece of metal in two?
Write your prediction in your journal.
2. Examine the paper clips. Check for chips or dings.
Document your observations in your journal.
3. Open a paper clip and bend it back and forth - this is one cycle.
How many cycles do you predict will be needed to cause the material to fail? (Brake)
4. Continue bending. Count the cycles.
How many cycles occurred when the material failed? (Broke)
How close to your prediction were you?
5. Chart the results of your testing on a graph.
Compare the smooth and ridged clips. Which broke sooner?
6. What was the paper clip designed to do?
Was it designed to bend as much as you bent it?
What does the fatigue strength say about the relative strength of paper clips?

