

(40 pts) Approx. 4 days

The first part of this unit is all about materials and material properties. We'll spend a little bit of time looking at some materials that already exist, and brainstorming new uses for them. Then you'll get to design your very own materials research, plan an experiment, and collect some data! We'll wrap things up with a short report and even some statistics.

1. Start things out by watching the overview video on our website *Materials Research*.
2. Then watch each of the four videos on unique materials. For each of them, take some notes about what the material can and can't do.
3. Then, for each of the four materials, brainstorm at least 10 new applications for those materials. How else could they be used (beyond what is suggested in the video) to make something new? Altogether, you should have at least 1 full page of notes and brainstorms on the various materials.
4. Now, think about the materials in the lab and pick one that you think would be fun to work with. Here are some ideas:

Acrylic *Lexan* *3D Printer Filament* *Carbon Fiber* *Vinyl* *Glues*
Sheet Metal *Woods (various kinds)* *Rubber* *Foam (various kinds)*

5. Once you've chosen your material, design some research that can be done on it to understand it better. Maybe you want to know how well it cuts in the laser. Maybe you need to know how strong it is, or how best to apply it in different circumstances. (Have Mr. Benshoof approve your research design)
6. Conduct your research. Be sure to record your process and results in your engineering notebook. Also be sure to include at least one drawing of your data collection apparatus.
7. Write a full-page summary of your findings in your engineering notebook. Include a statistical analysis for a bonus achievement!

Part 1: Materials Tasks	10-7 points	6-3 points	2-1-0 points
 Materials Notes & Brainstorm	+ You took a page of notes on the 4 different materials videos. + You brainstormed at least 10 ideas for material applications	- You took less than a page of notes - You brainstormed less than 10 ideas for each	- No notes - Little or no brainstorming
 Plan Materials Research	5 points + You selected an appropriate material that we have available + You designed a study to test a property of that material	4-3 points - You picked a basic material - Your design is not well thought out	2-1-0 points - Your plan is missing
 Conduct Materials Research	15 points + You conducted your experiment multiple times + You followed your procedure + You collected as much data as you could in a reasonable time	14-10 points - You did not repeat your experiments many times - Your research is lacking - Your procedure is not consistent	9-0 points - You did not collect any data - Your results are noticeably wrong
 Research Notes & Summary	10 points + You took detailed notes on your research + Your notes include a picture of the data collection apparatus + You wrote a full page summary of your work and your results	9-5 points - Your notes are missing important parts - Your notes do not include any pictures - Your summary is less than a page	4-0 points - Your notes are significantly lacking - Your summary is missing
 Achievement	+ Include a statistical analysis (graphs, descriptions of distributions, tests, or intervals) that is appropriate for your understanding of AP Statistics.		

