

Product Archaeology Testing Profiles

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FLASHLIGHTS

- Flashlight “Brightness” Test - create dark environment - determine at what distance(s) to measure with a Light Meter
- Flashlight “Distance” Test - several claimed to have an 800 ft range - go outside and determine how to measure this (Oestreich Section is at night so easily done in Class)
- Flashlight Duration Test - How long will the Flashlight operate on a single set of batteries
 - Upon completion - did it stop illuminating or if just dim - what is a minimum “brightness” level
- Water Resistance Test - place the flashlight into Beaker / Sink of water - start quickly such as 1 second submerge and attempt to expand time until failure
- Flashlight Drop Test - determine appropriate height to ‘drop’ the Flashlight from (5 Gallon Bucket with rocks as opposed to the Tile Floor) - HEIGHT can be critical depending upon User Environment
- Mechanical ON/OFF Displacement Test - Eric / Ian provided a test setup that allows for the flashlight to be inserted and weights place on top to measure the force required to depress the ON/OFF switch
- Voltage Reading / Consumption - measure the Voltage for each Battery (and all in Series) using EXTECH EX310 MultiMeter
- Current Reading / Consumption - measure the Current for each Battery (and all in Series) using EXTECH EX310 MultiMeter
- Assess Power Consumption over time correlated to Brightness

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MUGS AND CUPS

- Heat retention
- Cold retention
- Drop tests (shattering),
- washing durability tests,
- friction tests (force to translate across surface),
- tipping tests (force to tip over),
- spill tests,
- compression tests (horizontal and vertical)

SPEAKERS

- Bluetooth range
- Bluetooth sync/connection time
- Volume as function of distance from speaker
- Volume as function of radial position around speaker
- Frequency fidelity (e.g., if we ask the speaker to play 600 Hz, does it play 600 Hz?)
 - In anechoic chamber
- Range of frequencies produced (using frequency sweep)

PAPER TOWELS

- Absorption capacity (how much water can it absorb upon submersion)
 - Absorption capacity of liquids other than water (olive oil? Soapy water?)
- Absorption speed (how quickly can a given area of towel absorb a given volume of water with no drips?)
- Durability (how many passes along a certain surface under a certain force (applied by a weight, e.g.) can the towel endure before ripping)

SHAMPOO

- pH,
- foaming ability (place given volume of shampoo+water mixture into a graduated cylinder, shake up and down 10 times, measure height of foam at 0, 1, 2, 3, 4 minutes)
- grease-cutting ability (using wool as a hair proxy, prepare wool, place wool in shampoo/water solution, rinse and dry wool)
https://www.sciencebuddies.org/science-fair-projects/project-ideas/Chem_p109/chemistry/make-your-own-shampoo-and-test-how-it-performs#procedure
- percent solids of the shampoos

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DIAPERS

- Absorption capacity (how much water can it absorb without leaking)
 - Absorption of urine simulation
- Absorption speed (how quickly can it absorb a given volume of water with no drips?)
 - Possibly absorption speed with diaper cream on diaper)
- Stretchability (how far does the diaper stretch from neutral (either as a distance or a fraction of resting length)

GLUE

https://www.sciencebuddies.org/science-fair-projects/project-ideas/CE_p021/civil-engineering/strength-of-glues#summary

Could use wood glue, super glue, etc

- Bond strength after different curing times
- Bond strength as function of material choice (same material on both sides of bond)
- Bond strength as function of material choice (different materials... e.g., gluing plastic to wood or ceramic to plastic)

TENNIS BALLS

Official Testing: <https://aapt.scitation.org/doi/abs/10.1119/1.2343088?journalCode=pte>

Measure the circumference of the Tennis Ball with a Caliper and assess against Standards

Do different color Tennis Balls provide intuitive processing for learning the game?

- What kind of experiments could you develop to test?

WRIST MOUNTED BLOOD PRESSURE MONITOR

Have each Student take their own Blood Pressure with repeated measurements (5 each)

- Use Statistical Analysis to determine MEAN/MEDIAN/MODE and Standard Deviation for each Team and then the Class Section