

## Grade 6 Design Challenge Quick Guide: Designing Test Procedures– Cycle 1

**Lesson Objective(s):** Students will design three testing procedures, one for each of the following: luster, conductivity, and malleability.

### Materials:

*For teams of 2-3 students*


- Students will use commonly available materials from home to create these tests.
- Design logs
- “Properties of Metals and Nonmetals” handout
- “Scaffolded Concept Map” handout
- “Metals Nonmetals Metalloids Venn” handout
- “Metals and Nonmetals Concept Map” handout
- “Steps in a Process” handout
- “Think-Pair-Share” handout
- “Project Planner” handout
- “Math Path” handout
- “Step-by-Step Process” handout
- “Evaluation” graphic organizer
- Graduate cylinder
- Water
- String
- Periodic tables
- 21<sup>st</sup> Century Skill rubric to grade student project


### Websites

- <http://www.everythingmaths.co.za/science/grade-10/02-classification-of-matter/02-classification-of-matter-05.cnxmlplus>
- <http://www.technologystudent.com/joints/conduct1.html>
- <http://chemistry.tutorvista.com/inorganic-chemistry/metals-non-metals-metalloids.html>
- <http://answers.yahoo.com/question/index?qid=20090209224355AAAbmDu>
- [http://wiki.answers.com/Q/What\\_are\\_the\\_characteristics\\_of\\_metal\\_nonmetal\\_and\\_metalloid](http://wiki.answers.com/Q/What_are_the_characteristics_of_metal_nonmetal_and_metalloid)
- <http://chemistry.about.com/od/analyticalchemistry/a/flametest.htm>
- [http://www.engineerstudent.co.uk/thermal\\_conductivity.php](http://www.engineerstudent.co.uk/thermal_conductivity.php)
- <http://cosketch.com/>
- <http://teacher.depaul.edu/Documents/MathPath.pdf>
- <http://www.education.com/science-fair/article/which-metal-conducts-heat-best/>
- <http://www.arborsci.com/cool/thermodynamics-the-heat-is-on>


### TEKS:


#### Science

 SCI 6.4A- Use appropriate tools to collect, record, and analyze information, including journals/notebooks, beakers, Petri dishes, meter sticks, graduated cylinders, hot plates, test tubes, triple beam balances, microscopes, thermometers, calculators, computers, timing devices, and other equipment as needed to teach the curriculum.

\* SCI 6.6A- Compare metals, nonmetals, and metalloids using physical properties such as luster, conductivity, or malleability.

#### Math

 MATH.6.1A Apply mathematics to problems arising in everyday life, society, and the workplace.

 MATH 6.1C Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.

ELPS	CCRS Science	CCRS Math	CCRS Cross-disciplinary
C1C, C1E	7A1A, 7A2B	8C1C, 8C3A	1C2A, 1C3D

**Engineering Design Loop:** *For more details, refer to the overview page.*

**Identify the Need:** Teams of students will be challenged to design testing procedures for luster, conductivity, and malleability.

**Research the Problem** Teams will conduct research on possible testing procedures.

**Develop Possible Solutions:** Teams will use their researched information to brainstorm two testing procedures for each type of test.

**Select the Most Promising Solution:** Teams will decide which of the 2 for each type of test to develop into their final luster, electrical conductivity, and malleability testing procedure for a total of 3 finalized tests.

**Construct a Prototype:** Teams will assemble their finalized tests, test the mystery items, and reflect on their results.

**Test & Evaluate:** Teams will evaluate their testing methods through a self-assessment.

**Communicate their Design:** Teams will present their tests and share their results with the class.

**Redesign:** Teams will design an additional test to evaluate the thermal conductivity of items.

**Math Connection:** Students will use mathematics to calculate the specific gravity of a mystery metal object to determine what it is.