Lesson Title	Measurement: When Degrees Matter
Length of Lesson	One (50 minute) class period
Created By	Rob Thornton, Will McBryde
Subject	General Science
Grade Level	8th grade
State Standards	8th: 1a, b, c, d (Inquiry)
DOK Level	DOK 3
DOK Application	Hypothesize, Investigate, Compare, Draw Conclusions and Develop a Logical Argument
National Standards	5-8: A (Inquiry); D (Earth/Space); E (Technology)
Graduate Research Element	The sun drives the hydrological cycle and water is important to agriculture.

Student Learning Goal:

MS 8th Grade:

1(a)(d) Form explanations and analyze conclusions from an investigation (b) make inferences based on observations (c) Proper use of thermometers, rulers, balances, stopwatches, flasks, beakers, and graduated cylinders.

National Science Education Standards of Content 5-8:

A: inquiry: use appropriate tools and techniques to gather, analyze, and interpret data; think critically and logically to make the relationships between evidence and explanations.

D: students will relate what they see in the lab to the outside world

E: design a solution or product; evaluate completed technological designs or products

Materials Needed (supplies, hand-outs, resources):

PowerPoint file (INSPIRE_Thornton_07.13.10_PP); laptop; projector; thermometers; rulers; balances; stopwatches; flasks; beakers; graduated cylinders; lamps; food coloring; water; guided note taking sheet (INSPIRE_Thornton_07.13.10_Notes)

Lesson Performance Task/Assessment:

Formative:

Observation and checking student data tables for completion

Summative:

Discussion of observations, analysis and conclusions

Lesson Relevance to Performance Task and Students:
The lessons and performance tasks will enhance student's ability in the scientific method through the use of measurement. The scientific method would have been taught in a preceding class period. Scientific method steps (1) ask a question; (2) do background research; (3) make a hypothesis; (4) test hypothesis; (5) analyze data and draw conclusions; (6) publish results. Application of measurement tools to daily experiences. Students will practice critical thinking and problem solving skills.

Anticipatory Set/Capture Interest:
Students will check the temperature of beakers of water before and after a lamp is turned on. One beaker (clear water) will be the control and the other beaker (colored water) will be the experiment. Students will hypothesize the causes of temperature variations.

Guided Practice:
Day One: Set up the experiment; Provide students an opportunity to brainstorm regarding the purpose of the experiment; Direct students to take measurements of water before and after the lamp is turned on; PowerPoint presentation; Students will fill out a guided note taking sheet; Discussion and compilation of results.

Independent Practice:
Students will take and record temperature measurements.

Remediation and/or Enrichment:
Remediation – Individual IEP; Make PowerPoint presentation and measurement materials available to resource teacher.
Enrichment- Relate what students see in classroom by asking them to identify temperature variations and measurement tasks they encounter outside of the classroom.

Check(s) for Understanding:
Observation of students during lab; Review students' data tables and conclusions

Closure:
Assign extra credit opportunity (see Enrichment). Ask students questions about their conclusions and mention the next class period topic.

Question 1: Justify why there's a difference in the temperature of the beakers?

Question 2: Outdoors at your school, predict where would you find examples of temperature differences.

Possible Alternate Subject Integrations:
Math, Physical Science

Teacher Notes:
This activity could apply to all middle school grades and include small group work. Include more variables (i.e. liquids vs. solids) to integrate a variety of measurement techniques. Additional parameters, such as evaporation from the beakers, could be measured.