

Who's Hot? Who's Cold? And Who's Right?

Rich Schramm, Marilyn Bridgan, Deidre Sullivan

BASED ON A SITE VISIT TO: MBARI

LESSON PLAN TIES TO INDUSTRY SKILL GUIDELINES:

- 1. Read follow and understand written procedures**
- 2. Know of parameters being measured- temp.**
- 3. Knowledge of equipment specifications**
- 4. Knowledge and ability to apply electronic and mechanical skills**
- 5. Know and ability to use writing skills**
- 6. Ability to recognize valid data**
- 7. Knowledge of calibration procedures and standards**
- 8. Ability to read schematics and mechanical drawings**
- 9. Knowledge of basic math (algebra)**
- 10. Knowledge of technical terms**

- 1. Ability to use tools**
- 2. Ability to communicate orally**
- 3. Understand of scientific method**
- 4. Understanding of scientific notation?**
- 5. Knowledge of electronic & mechanical test equipment**
- 6. Knowledge of basic physical oceanography**
- 7. Knowledge of quality control procedures**

C. Knowledge of computer skills

OBJECTIVES:

Students will be able to:

- 1. Assemble an instrument to measure temperature.**
- 2. Calibrate their sensor to known standards.**
- 3. Read and understand simple electronic schematics.**
- 4. Convert analog property to a digital (numeric) format.**
- 5. Apply calibrations to convert digital values to engineering units.**
- 6. Understand the relationship and impact of resolution, precision, and accuracy on the measurement of environmental data.**
- 7. State why it is important to measure temperature.**

GRADE LEVELS: 9-14

MATERIALS NEEDED: see CTD lab, hot and cold water

BACKGROUND REFERENCES OR RELATED WEB SITES:

MBARI website on buoy data.

CBL book - temperature

TIME REQUIRED: 3 hours

PROCEDURE:

- **Build probe**
- **Calibrate at 0 degrees & 100 degrees**
 - **graph results**
 - **compute offset and slope**
 - **measure unknown samples**
 - **compare results**
 - **Regraph data analyze source of differences**

DISCUSSION QUESTIONS:

1. **What is the relationship of precision, resolution, and accuracy of physical measurements to the usefulness of numeric data?**
2. **Why do we calibrate instruments?**
3. **What is the difference between relative and absolute accuracy.**
4. **What safety issues should we consider?**
5. **What factors cause variations in data.**
6. **How would you build a better instrument?**
7. **Give examples of the affect of temperature change on some species.**

ASSESSMENT STRATEGY:

Rubric on the lab notebook and instrument.

LESSON EXTENSIONS:

Conductivity Probe

CTD