

Benchmarks – Indicators -- Mapping

Electronics

1. **Explain and demonstrate the science of electricity and electronics. (VI)** (January) **CS, LS**
 - A. Explain the nature of matter. **(wt)**
 - B. Demonstrate the law of charges in static electricity. **(pt)**
 - C. Define static electricity applications. **(wt)**
 - D. Explain AC current. **(wt)**
 - E. Explain DC current. **(wt)**
 - F. Illustrate the makeup of an electrical circuit. **(wt)**

2. **Understand and illustrate the use of a multimeter. (I, II, IV, VI)** (January) **CS, LS**
 - A. Demonstrate the multimeter in measuring continuity. **(wt, pt)**
 - B. Demonstrate the multimeter in measuring resistance. **(wt, pt)**
 - C. Demonstrate the multimeter in measuring voltage. **(wt, pt)**
 - D. Demonstrate the multimeter in measuring current. **(wt, pt)**

3. **Understand and illustrate the use of a power supply. (I, II, IV, VI)** (January) **CS, LS**
 - A. Demonstrate the proper hook-up and voltage adjusting for a dc circuit. **(wt, pt)**

4. **Understand and explain basic electronics components. (VI)** (January, February) **CS, LS**
 - A. Explain and demonstrate breadboards. **(wt, pt)**
 - B. Explain and illustrate resistors. **(wt, pt)**
 - C. Explain and illustrate capacitors. **(wt, pt)**
 - D. Explain and demonstrate diodes. **(wt, pt)**
 - E. Explain and demonstrate transistors. **(wt, pt)**

5. **Explain and demonstrate basic circuit principles. (I, II, IV, V, VI)** (February) **CS, LS, HOTS**
 - A. Explain and demonstrate series circuit principles using ohm's law. **(wt, pt)**
 - B. Explain and demonstrate parallel circuit principles using ohm's law. **(wt, pt)**
 - C. Explain and demonstrate combination circuit principles using ohm's law. **(wt, pt)**

6. **Explain and demonstrate basic magnetic principles. (I, II, IV, V, VI)** (February, March) **CS, LS, HOTS**
 - A. Demonstrate the laws of magnetism. **(wt, pt)**
 - B. Demonstrate electric current and magnetism. **(wt, pt)**
 - C. Explain and demonstrate a relay. **(wt, pt)**

Infused Areas

CE = career education
GE = global education
CS = communication skills
HOTS = higher order thinking skills
MCGF = multicultural gender fair
LS = learning skills
TI = technology integration

Assessments

ws = worksheet
wt = written test
to = teacher observation
pt = performance test

Electronics (continued)

- 7. Explain and demonstrate DC motors. (I, II, IV, V, VI)** (March) **CS, LS, HOTS**
- A. Explain motor operation principles. **(wt)**
 - B. Identify and explain the different types of DC motors. **(wt)**
 - C. Demonstrate the building of a simple DC motor. **(pt)**
- 8. Explain and demonstrate transformers. (I, II, IV, V, VI)** (March) **CS, LS**
- A. Explain the principles behind a transformer. **(wt)**
 - B. Explain special transformer applications. **(wt)**
 - C. Demonstrate the use of transformers. **(wt, pt)**
- 9. Explain and demonstrate proper soldering technique. (I, II, III, IV, V, VI)** (March, April) **CS, LS**
- A. Explain and properly and safely use a soldering iron. **(wt, pt)**
 - B. Explain how to “tin” a soldering iron. **(wt)**
 - C. Explain the various types of solder. **(wt)**
 - D. Explain and demonstrate applying solder to a heated breadboard. **(pt)**
 - E. Explain component heat sensitivity and how to avoid over-heating **(wt, pt)**
 - F. Explain and demonstrate how to “de-solder.” **(wt, pt)**
- 10. Construct an AM/FM radio kit. (I, II, III, IV, V, VI)** (April) **CS, LS, HOTS**
- A. Identify and verify all components of the kit. **(pt, to)**
 - B. Establish required test points along the way. **(pt, to)**
 - C. Perform required tests along the way. **(pt, to)**
 - D. Use proper assembly and soldering techniques. **(pt, to)**
 - E. Properly tune the antennas. **(pt, to)**
- 11. Understand and demonstrate basic digital electronics. (I, II, III, IV, VI)** (April, May) **CS, LS HOTS**
- A. Identify the parts of the digital electronics trainer. **(pt, to)**
 - B. Identify individual modules and describe their functions. **(pt, to)**
 - C. Identify the correct wiring procedures necessary for trainer operation. **(pt, to)**

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Electronics (continued)

12. Illustrate binary arithmetic and numbering systems. (IV, VI) (May) HOTS, LS

- A. Illustrate adding, subtracting, multiplying, and dividing binary numbers. (wt)
- B. Illustrate setting numbers into both octal and hexadecimal numbering systems or codes. (wt)

13. Demonstrate logic families and basic gates. (I, II, III, IV, V, VI) (May) CS, LS, HOTS

- A. Demonstrate hooking up and analyzing AND circuitry. (pt)
- B. Demonstrate hooking up and analyzing OR circuitry. (pt)

14. Demonstrate combinational gates used in digital electronics. (I, II, III, IV, V, VI) (May) CS, LS, HOTS

- A. Illustrate using the invert operation to perform the NOT function. (pt)
- B. Illustrate the NOT-AND function and complete the NAND operation with truth tables. (pt)
- C. Illustrate the NOT-OR function in circuits calling for the NOR operation. (pt)
- D. Construct and use the special gates, EX-OR and EX-NOR, and complete truth tables. (pt)

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Resources: 33-In-One training labs, Component handouts, Power supplies, breadboards, digital electronics labs and handouts, am/fm radio kits, learn to solder kits, solder irons, solder, dc motor kits