

Subject: 6-8th grade Science Exploration

Basic Electrical Concepts and Exposure to Construction Plans

Lesson Overview

This lesson is specifically designed to incorporate real world procedures and demonstrate the skills of finding important information on the Architectural drawings as it relates to an electrical contracting business. Students will also have fundamental understanding of a basic circuit system.

Students will have the opportunity to learn a general overview about how to read and locate important information from a construction plan and piece together what the overall job entails. They will read and convert measurements as they relate to a blue print/mini blue print.

Materials Included in this Lesson

- Blueprints or “Minis” -individual mini -group mini
- Cornell notes/Notebook/Loose leaf binder paper
- Pencils
- Highlighter
- Overhead Projector for Power Point Presentation
- A real “mini” for a home
- Butcher paper
- Video Camera

Skills Students will Learn

Student Deliverables

- | | |
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| <ul style="list-style-type: none">• Students will verbally communicate electric concepts.• Student will learn ratios• Students will learn how to read a basic construction plan | <ul style="list-style-type: none">• Lesson Notes• Calculated worksheet• Lesson Evaluation |
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Length of Lesson: 1 Week (A/B schedule)

Specific Objectives:

- Students will be able to verbally communicate information regarding Electric concepts
- Students will learn/relearn ratio and scale concept
- Students will take notes and learn electrical vocabulary
- Students will research career in the electrical industry

Anticipatory Set:

Teacher tells students they have the opportunity read and find important information from actual blue prints. In addition to some applied math; students will explore basic circuit system.

Activity Day One:

- Students will learn about the Electrical Contracting Business.
- Students will have a chance to dialogue in a class discussion format of how Electricity is part of our live hood
- Write and Draw (per group) what students heard and learn during the discussion. Outcome will be posted on butcher paper.

Activity Day Two:

Walk on Campus

- Students will walk around the school and identified items that use Electricity.
- Students will write down the items and describe them and their usage.
- Students will watch a video on Electricity (Brain-Pop).
- Students will complete video quiz.

Activity Day Three & Four:

- Recap what we saw in our walk (Group of 2-3) Verbal Activity
- Form groups for Poster Board on selected topics
- Become an expert on this topic (Brain pop)

Activity Day Five:

- Present Poster Board (Oral Presentation)
- Research Career Path in Electrical and other careers.

Activity Day Six:

- Students also get a chance to look at a blueprint and read the key/legend.
- Complete a worksheet activity regarding blueprint.

Activity Day Seven:

- Students will learn about writing proportions and using a scale factor. Students will receive a blueprint or worksheet and use proportional reasoning to calculate the actual measurements of the building.

Activity Day Eight & Nine:

- Student will submit a video (< 2 minutes) of what they learn.
- Students will edit video

Enrichment Suggestions:

- Student can create a brain pop type of video with Electricity Concept
- Students can create a model of a basic electric circuit
- Students can create a poster of a career and the path it would take to reach it.

Student Resources

Notes developed through discussion and PowerPoint notes.

Common Core Standards:

Number Sense

- 1.1 Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation.
- 1.7 Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest.

Mathematical Reasoning

- 1.2 Formulate and justify mathematical conjectures based on a general description of the mathematical question or problem posed.
- 1.3 Determine when and how to break a problem into simpler parts.
- 2.1 Use estimation to verify the reasonableness of calculated results.
- 2.2 Apply strategies and results from simpler problems to more complex problems.

CTE Pathway Standards:

4.0 Technology

Use existing and emerging technology to investigate, research, and produce products and services, including new information, as required in the Building and Construction Trades sector workplace environment. (Direct alignment with WS 11-12.6)

- 4.1 Use electronic reference materials to gather information and produce products and services.
- 4.3 Use information and communication technologies to synthesize, summarize, compare, and contrast information from multiple sources.

5.0 Problem Solving and Critical Thinking

Conduct short, as well as more sustained, research to create alternative solutions to answer a question or solve a problem unique to the Building and Construction Trades sector using critical and creative thinking, logical reasoning, analysis, inquiry, and problem-solving techniques. (Direct alignment with WS 11-12.7)

- 5.1 Identify and ask significant questions that clarify various points of view to solve problems.

2.0 Communications

Acquire and accurately use Building and Construction Trades sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats. (Direct alignment with LS 9-10, 11-12.6)

- 2.1 Recognize the elements of communication using a sender–receiver model.
- 2.2 Identify barriers to accurate and appropriate communication.
- 2.3 Interpret verbal and nonverbal communications and respond appropriately.
- 2.4 Demonstrate elements of written and electronic communication such as accurate spelling, grammar, and format.
- 2.5 Communicate information and ideas effectively to multiple audiences using a variety of media and formats.
- 2.6 Advocate and practice safe, legal, and responsible use of digital media information and communications technologies.

C. Mechanical Systems Installation and Repair Pathway

- C7.0 Demonstrate a practical knowledge of basic electricity
- C7.1 Explain the principles and properties of electricity.

D. Residential and Commercial Construction Pathway

- D2.0 Apply the appropriate mathematical calculations used in the construction trades.
- D2.8 Apply Ohm’s Law to calculate resistance, current flow, and voltage in series, parallel, and combination circuits.
- D3.0 Interpret and apply information from technical drawings, schedules, and specifications used in the construction trades.

Lesson Plan Relevance To Externship

Spending time with the 3rd year Apprenticeship at WECA (Western Electrical Contractors Association, Inc.) was great because I was able to talk to the student who work out in the field. The electricians I spoke with shared that many interns had trouble calculating the math to correctly place the fixtures on the project. They also state communicating is key to being successfully.

This externship gave ideas for excellent job opportunities and career choices for interested students. This lesson could help develop a confidence level for future speaking engagements. This lesson also guides their career choice after high school or their educationally direction in college.

Rubric for the “Electrical” Project

Student Deliverables	3 Exceeds Expectations	2 Meets Expectations	1 Approaches Expectations	0 Fails to meet Expectations
Blueprint worksheet (Conversions/Questions)	90-100%	70-89% accuracy	60-69% accuracy	No attempt or 0 to 1 conversions correct
Poster Drawing	All measurements are perfectly accurate and placed with precise exactness and color coded.	Outline is complete w/correct measurements. All fixtures, switches and plugs are correctly placed	Outline is complete but may not be correct measurements. Some fixtures, switches and plugs but missing 1 or 2	No attempt to complete drawing
Brain Pop Quiz	Perfect score	9-8 points	7-6 points	5 and Below
Video	Spoke clearly Video (1.5 -2 minutes) Accurate Information	Pauses, um’s , unclear to understand Video (Under 1.5 or over 2) Information not too clear	Pauses, um’s , unclear to understand Video (Under 1.5 or over 2) Information clear Information not accurate	Little Effort: Pauses, um’s , unclear to understand Video (Under 1.5 or over 2) Information clear Information not accurate

Questions to Discuss:

Why does anyone need an electrical contractor?

- Safety must be maintained and rules must be followed because electricity is dangerous and should be manipulated by trained individuals
- Building homes and businesses or any other work spaces that rely on electricity to function in today's society and economy

What does an electrical contracting business do exactly?

- Provide electricity to buildings both commercial and residential
- Install lighting and various electrical outlets
- Work alongside other contractual businesses every day in community and business developments
- Allow safe and regulated usage of electric power.

When and where are electrical contractors needed?

- Whenever a home or community is being built
- Whenever a business is established
- Wherever there is a need to power appliances or electrically dependent machinery
- Where roads, railways, or airways needing lights or accessible electricity

How do electrical contractors work?

Electrical Contract work can be consolidated into 3 simple steps:

- Step 1 Employer/Builder proposes job to several contractors
- Step 2 Contractors design/submit bids
- Step 3 Employer hires a contractor for the job

Assessment Ideas

Presentation:

- Student should give a (1.5- 2-minute) video of what they learned. Rubric is shown on next page.
- Present a poster board of a specific topic