

# Electricity and Magnetism

Unit 3 in Physics 12 has two options to demonstrate your understanding of the curricular competencies (what you can do.) and the content (What you know) in BOTH sections of electricity and magnetism. The short version of the content is as follows:

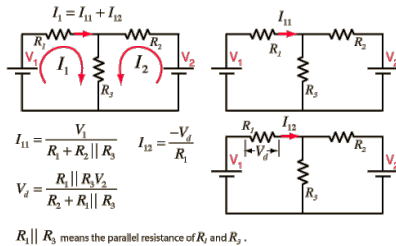
## Electrostatics

- apply Coulomb's law to analyse electric forces
- analyse electric fields and their effects on charged objects
- calculate electric potential energy and change in electric potential energy
- apply the concept of electric potential to analyse situations involving point charges
- apply the principles of electrostatics to a variety of situations

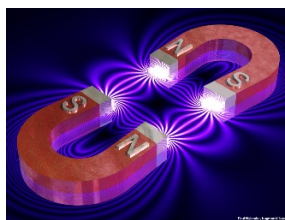


## Electric Circuits

- apply Ohm's law and Kirchhoff's laws to direct current circuits



- relate efficiency to electric power, electric potential difference, current, and resistance



## Electromagnetism

- analyse electromagnetism, with reference to magnetic fields and their effects on moving charges
- analyse the process of electromagnetic induction

The specific outcomes can be found at

<http://www.bced.gov.bc.ca/irp/pdfs/sciences/2006physics1112.pdf>

[https://curriculum.gov.bc.ca/sites/curriculum.gov.bc.ca/files/pdf/10-12/science/en\\_s\\_12\\_phy\\_elab.pdf](https://curriculum.gov.bc.ca/sites/curriculum.gov.bc.ca/files/pdf/10-12/science/en_s_12_phy_elab.pdf)

**Step 1:** Choose one the following options. The ultimate goal is to become an expert in your area of interest for each section at the appropriate level. This will include both curricular competencies (what you can do.) and content (What you know).

#### Option 1

Create one or two large projects that demonstrate your understanding of the core concepts in both electricity and magnetism (the outcomes are listed above). The total school time that should be allocated to these projects should be approximately 39-44 hours plus out of school (homework) time.

#### Option 2

Create one or two smaller projects that demonstrate your understanding of the core concepts in both electricity and magnetism (the outcomes are listed above). The total school time that should be allocated to these projects should be approximately 20-30 hours plus out of school (homework) time. PLUS an exam at the end of the term that includes both electricity and magnetism.

**Step 2:** Watch the following video about the secrets of learning.

<https://www.youtube.com/watch?v=EtJy69cEOtQ>

**Step 3:** Make a plan to complete the unit. This plan and your contact tracking sheet are part of your final grade. The short version of the content goals are in the sections above. The minimum curricular competencies that usually fit this section of the course are as follows:

- Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal, local, or global interest
- Make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world
- Formulate multiple hypotheses and predict multiple outcomes
- Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative)
- Assess risks and address ethical, cultural, and/or environmental issues associated with their proposed methods
- Use appropriate SI units and appropriate equipment, including digital technologies, to systematically and accurately collect and record data
- Apply the concepts of accuracy and precision to experimental procedures and data: — significant figures — uncertainty — scientific notation
- Seek and analyze patterns, trends, and connections in data, including describing relationships between variables, performing calculations, and identifying inconsistencies

- Construct, analyze, and interpret graphs, models, and/or diagrams
- Use knowledge of scientific concepts to draw conclusions that are consistent with evidence
- Analyze cause-and-effect relationships
- Evaluate their methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions
- Describe specific ways to improve their investigation methods and the quality of the data
- Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled
- Demonstrate an awareness of assumptions, question information given, and identify bias in their own work and in primary and secondary sources
- Consider the changes in knowledge over time as tools and technologies have developed
- Connect scientific explorations to careers in science
- Exercise a healthy, informed skepticism and use scientific knowledge and findings to form their own investigations to evaluate claims in primary and secondary sources
- Consider social, ethical, and environmental implications of the findings from their own and others' investigations
- Critically analyze the validity of information in primary and secondary sources and evaluate the approaches used to solve problems • Assess risks in the context of personal safety and social responsibility
- Contribute to care for self, others, community, and world through individual or collaborative approaches
- Co-operatively design projects with local and/or global connections and applications
- Contribute to finding solutions to problems at a local and/or global level through inquiry
- Implement multiple strategies to solve problems in real-life, applied, and conceptual situations
- Consider the role of scientists in innovation Communicating
- Formulate physical or mental theoretical models to describe a phenomenon
- Communicate scientific ideas, information, and perhaps a suggested course of action, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations
- Express and reflect on a variety of experiences, perspectives, and worldviews through place

## Step 4

Complete the plan. The plan may vary over the course of your journey. Your content goals will be evaluated at the end of the project through your final presentation. The curricular competencies will be demonstrated over the course of the entire project through teacher contact, the contact log sheet and a personal reflective journal or some other method please see your teacher before starting.