

The Canada Science and Technology Museum  
presents

**A Virtual Exploration Guide  
to the  
Canadian Science and Engineering  
Hall of Fame**

**Section 1: About This Guide**



# Introduction

## Background

The Canadian Science and Engineering Hall of Fame was originally established in 1991 as a partnership of the National Research Council of Canada (NRC), the Canada Science and Technology Museum (CSTM), Industry Canada, and the Association of Partners in Education to mark NRC's 75th anniversary.

Since then, it has evolved to become a key part of the Canada Science and Technology Museum. The Hall of Fame was expanded and incorporated into the Museum's new *Innovation Canada* exhibition. The induction of new members into the Hall of Fame has also grown from a simple announcement in the early days to a major event at the Museum.

The objectives of the Canadian Science and Engineering Hall of Fame are twofold:

1. To honour Canadians who have made outstanding contributions to society in developing science and engineering.
2. To promote role models that will help attract young Canadians to careers in science, engineering and technology.

## What this Exploration Guide Can Do For You

This Exploration Guide lets you and your students discover our rich Canadian heritage of scientific and technological achievement using your school's Internet connections. Our activities and worksheets will enrich your exploration of the CSTM's exhibition and Hall of Fame webpages. Blank worksheets and detailed examples can be freely reproduced to use in your classroom. Our activities are modular and can be completed independently.

In addition to learning about Canadian science and technology, the Exploration Guide's activities reinforce other skills such as geography, mathematics or writing. You'll also find suggestions for classroom discussions, class projects and students' special projects.

## Navigating Through the Exploration Guide

Currently, there are five sections to the Exploration Guide. Each section can be downloaded as a separate Adobe PDF file, allowing you to select the sections you want to use. Alternatively, you can download the entire guide as a single Adobe PDF file. The content is identical in either case.

Section	Topic
1	Introduction (This Module)
2	Hall of Fame Members in Canadian Society
3	Science and Ingenuity
4	Intellectual Property
5	Nominating New Members to the Hall of Fame

Throughout the Exploration Guide, distinctive icons indicate features in the text. These help you find your way through the Exploration Guide quickly and efficiently.



Classroom activity



Discussion or essay topic



Deeper study



Site to visit

### Activity 1.1: Discover the History of the Hall of Fame

(Recommended for all grade levels)



Visit the Hall of Fame website and find the answers to the following questions:

- When was the Hall of Fame established?
- Who were the most recently inducted Hall of Fame members?
- Is there a member of the Selection Committee who does not work for a university? If so, who is that Selection Committee member?

### Resources for the Activities

Students will have to do some research into the lives of various Hall of Fame Members to complete these activities. Biographical notes for Hall of Fame Members are available at the Canadian Science and Technology Hall of Fame website at:

[http://www.sciencetech.technomuses.ca/english/about/hallfame/u\\_main\\_e.cfm](http://www.sciencetech.technomuses.ca/english/about/hallfame/u_main_e.cfm)



### Selecting Hall of Fame Members for these Activities

There are many Hall of Fame Members, and more are inducted each year. Choosing Members for these assignments could seem to be a daunting prospect! Some of these remarkable Canadians are well-known, but many are not (yet!) household names.

One approach would be to select Hall of Fame Members to complement particular study programs in your classroom. For example, selecting Members who have worked in the fields of botany or biology could enrich Life Sciences unit. Or, your students could pick Members who worked in fields that they find most interesting.

In this package, you'll find a list of Hall of Fame Members. Each entry shows as many as three fields of study for that particular Member. This will help you choose Members that match the interests of you and your students. This list will be updated annually, and you can download the latest list from the Hall of Fame website.

## **Curriculum Links**

### **Mathematics Curriculum**

Grades 4 to 6: Data Management and Probabilities

Grades 4 to 6: Number Sense and Numeration

Grades 4 to 5: Geometry and Spatial Sense

### **Social Studies Curriculum**

Canada and World Connections Grade 6: Canada's Link to the World

### **Canadian and World Studies Curriculum**

Grade 10: Change and Continuity

Grade 10: Methods of Historical Inquiry and Communication

### **Language Curriculum**

Grades 4 to 8: Reading; Writing; Media Literacy

### **English Curriculum**

Grades 9 to 10: Writing; Language; Media Studies

### **Science and Technology Curricula:**

Research into specific Hall of Fame Members provides rich curriculum links in the full range of Science and Technology curricula at all levels.

## **Resource Information**

Bruno, Leonard C. **Science and Technology Firsts**, Detroit MI, Gale Research ©1997

Black, Harry. **Canadian Scientists and Inventors**, Marathon ON, Pembroke Publishers ©1997

Shell, Barry. **Great Canadian Scientists**, Vancouver BC Polestar Book Publishers, Victoria BC ©1997 ISBN 1-896095-36-4

Shell, Barry. **Great Canadian Scientists Version 1 (CD-ROM)**, Vancouver BC Softshell Systems

## Useful Web Sites

### Notice Regarding Internet Sites

These Internet links are provided as a convenience only. We have taken care to suggest web sites that are appropriate for education, but we cannot guarantee the content of any sites that are not under the direct control of the Canada Science and Technology Museum Corporation. Such web sites may provide information or express opinions that do not necessarily represent the views of the Canada Science and Technology Museum Corporation. Should you choose to visit such web sites, you do so solely at your own discretion.

Since the Internet has a very dynamic nature, web addresses can change without warning.

Canadian Science and Technology Hall of Fame website

[http://www.sciencetech.technomuses.ca/english/about/hallfame/u\\_main\\_e.cfm](http://www.sciencetech.technomuses.ca/english/about/hallfame/u_main_e.cfm)

CSTM **Curator's Choice** web pages

<http://www.sciencetech.technomuses.ca/english/collection/curators.cfm>

CSTM **Innovation Canada: Curator's Choice** web page

<http://www.sciencetech.technomuses.ca/english/collection/innovation.cfm>

CSTM **Kid's Zone** web pages

<http://www.sciencetech.technomuses.ca/english/schoolzone/kidszone.cfm>

CSTM **Kid's Zone Innovations Games** web page

<http://www.sciencetech.technomuses.ca/english/schoolzone/kidszone2.cfm>

Canadian Intellectual Property Office (CIPO) web site

[http://strategis.ic.gc.ca/sc\\_mrksv/cipo/welcome/welcom-e.html](http://strategis.ic.gc.ca/sc_mrksv/cipo/welcome/welcom-e.html)

Science and Technology for Canadians web site

<http://science.gc.ca/>

Canadian Geological Survey

[http://gsc.nrcan.gc.ca/index\\_e.php](http://gsc.nrcan.gc.ca/index_e.php)

National Geographic Map Machine

<http://plasma.nationalgeographic.com/mapmachine/>

World Atlas.com

<http://www.worldatlas.com>

The HyperHistory Online Project

[http://www.hyperhistory.com/online\\_n2/History\\_n2/a.html](http://www.hyperhistory.com/online_n2/History_n2/a.html)

Great Canadian Scientists website

<http://www.science.ca>



The Canada Science and Technology Museum  
presents

**A Virtual Exploration Guide  
to the  
Canadian Science and Engineering  
Hall of Fame**

**Section 2: Members in Canadian Society**



## Introduction

To fully appreciate the contributions of Hall of Fame Members, it's important to understand their times and the world in which they lived. These activities will help students learn about a Hall of Fame Member's place in Canadian geography and history.

### Resources for the Activities

Students will have to do some research into the lives of various Hall of Fame Members to complete these activities. Biographical notes for Hall of Fame Members are available at the Canadian Science and Technology Hall of Fame website at:

[http://www.sciencetech.technomuses.ca/english/about/hallfame/u\\_main\\_e.cfm](http://www.sciencetech.technomuses.ca/english/about/hallfame/u_main_e.cfm)

Worksheets for all activities are included in this file.

### Activity 2.1: Locating Birthplaces and Places of Work

(Recommended for Grades 4 to 6)



Have students locate selected Members' birthplaces and workplaces on copies of the *Member's Birthplace and Place of Work* worksheet, shown as a thumbnail image to the left. Use an atlas or an on-line map service to find the positions of towns and cities on the map.

Remember that not all Members were born in Canada! Their birthplaces could be recorded in the "off-shore" areas of the map. Alternatively, you may want to mark a non-Canadian birthplace on a world map.

There are many atlas and map services accessible on the Internet. Some useful ones are:

Canadian Geological Survey

[http://gsc.nrcan.gc.ca/index\\_e.php](http://gsc.nrcan.gc.ca/index_e.php)

National Geographic Map Machine

<http://plasma.nationalgeographic.com/mapmachine/>

World Atlas

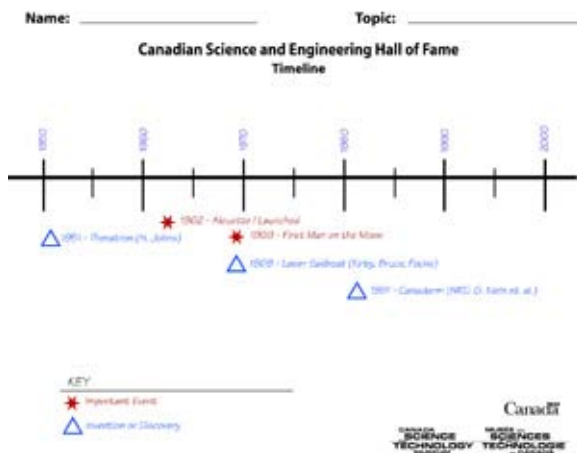
<http://www.worldatlas.com>



## Activity 2.2: Timelines

(Recommended for all grade levels)

Timelines are valuable tools for determining relationships between events in history. Many different types of timelines can be constructed, using the blank timeline worksheet,



shown here as a reduced-size thumbnail. Time intervals can be selected as needed. You can print multiple timeline sheets and attach them end-to-end to form a long, detailed timeline. Additional blank pages can be attached to the bottom of the timeline form to provide space to record more events.

The worksheet kit includes a full-sized example timeline to give you and your students some hints on setting up timelines. We've used one symbol to indicate the dates of discoveries or inventions, and another symbol to indicate important dates. You can

also draw bars showing periods of time, such as a scientist's lifetime.

We also provide a simple data sheet for students, allowing them to record and organize information for their timelines.

### Resources for Building Timelines

The worksheet package includes a list of Hall of Fame Members. This is a good starting point for most timelines you may want to prepare. Another source for Canadian-themed timeline data is the *Time Machine* game at the CSTM web site's **Kid's Zone** web page at: [http://www.sciencetech.technomuses.ca/english/schoolzone/timeline/timeline\\_en.cfm](http://www.sciencetech.technomuses.ca/english/schoolzone/timeline/timeline_en.cfm)

Excellent timelines are available at the HyperHistory Online Project website at:

[http://www.hyperhistory.com/online\\_n2/History\\_n2/a.html](http://www.hyperhistory.com/online_n2/History_n2/a.html)

These timelines can be useful both as examples and as reference resources.

### Suggested Timelines

Here are a few possibilities to get you started:

**Lifetimes:** Choose several Members and mark their lifetimes on your timeline. If you wish, you can add markings showing important events in their lifetimes.

**Lifetimes in History:** Make a timeline with important historical events mark. Decide on a theme for historical events — for example, major advances in transportation (the railroad's "Last Spike," the first powered flight etc.) Add the life spans of several Hall of Fame Members.

**Important Achievements:** Choose several Members and mark the dates of important achievements in their careers.



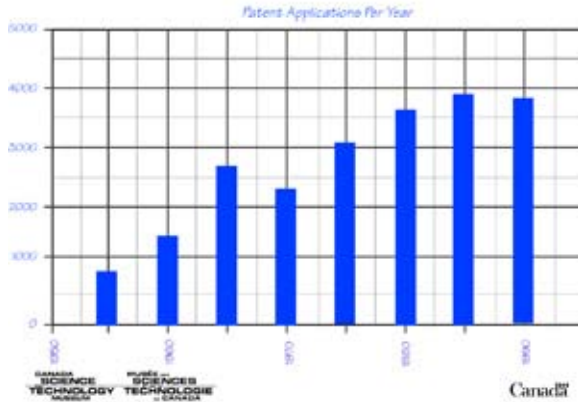


### For More Advanced Students

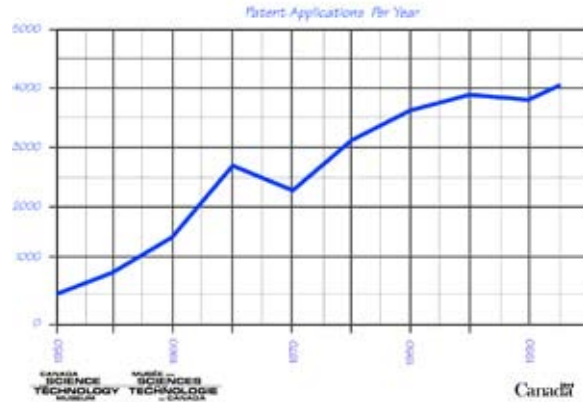
Use the graph worksheets to plot technological trends over your timeline period. You'll find example sheets showing a bar graph and a line graph of some simulated data on patents issued over a period of time.



Name: \_\_\_\_\_ Topic: \_\_\_\_\_  
Canadian Science and Engineering Hall of Fame



Name: \_\_\_\_\_ Topic: \_\_\_\_\_  
Canadian Science and Engineering Hall of Fame



Here are a few suggestions for technological trends to examine:

- Number of patents awarded per year;
- Number of people making use of inventions per year (for example: how many cardiac pacemakers were implanted each year?);
- Number of digital cameras purchased per year;

## Activity 2.3: Biographies

(Recommended for all grade levels)

Choose several Members and prepare biographical dossiers for them, using the *Dossier*

Name: \_\_\_\_\_



**Canadian Science and Engineering Hall of Fame Member Dossier**

**J.Q. Hoffer**  
1923 to 2005  
Inducted in 2006  
Developed the *Alacerta* genetic sequence mapper.

**Biography**  
Born in Littleville Nova Scotia, eldest of four children and served in the Royal Canadian Navy during World War II. Earned B.Sc. degree in chemistry at Maritime University, then M.Sc. and PhD degrees in Biochemistry at Central University. Dr. Hoffer went on to lead the Genetics Mapping Department at Central University. Married P.K. Hoffer in 1947, and had two children, both of whom went on to work in Canadian bio-engineering fields.

**Achievements**  
— Appointed Officer of the Order of Canada in 2001.  
— Holder of six patents for biomedical equipment.  
— Co-founder of the Young Canadian Scientists Foundation.  
— On the Board of the Queen Elizabeth Society for 22 years.  
— Sponsored the Hoffer Scholarship for academic and engineering students from low-income families.

SCIENCE TECHNOLOGY INNOVATION | SCIENCES TECHNOLOGIE INNOVATION | Canada

*Form* worksheet, shown here as a thumbnail image. Basic information and portraits can be found in the Hall of Fame website, or you can search for additional information in encyclopedias or on the Internet. If you'd like a more involved project, this sheet can be the first page of a Member's dossier. Subsequent pages depend on the grade level of your students.



### For junior students

Draw a picture showing a Hall of Fame Member's invention or innovation, or showing how a Member's achievement might have affected Canada.

### For more advanced students


Prepare a short essay on the life and work of a chosen Member.



## Activity 2.4: A Day in the Life of a Hall of Fame Member

(Recommended for all grade levels)

Name: \_\_\_\_\_



**Canadian Science and Engineering Hall of Fame**

**Canada in \_\_\_\_\_ AD**

Prime Minister: \_\_\_\_\_  
Population: \_\_\_\_\_  
Usual Source of Lighting: \_\_\_\_\_  
Local Transportation: \_\_\_\_\_  
Long Distance Transportation: \_\_\_\_\_  
Long Distance Communication: \_\_\_\_\_  
Popular Forms of Entertainment: \_\_\_\_\_  
Other Interesting Details: \_\_\_\_\_

SCIENCE TECHNOLOGY INNOVATION | SCIENCES TECHNOLOGIE INNOVATION | Canada

It's important to understand the times in which Hall of Fame Members lived and worked. Things we take for granted today may not have even existed in their lifetimes!

Have students select a Member and learn about Canada and the world as the Members experienced them. By doing the research needed to fill out the *Canada in xxxx AD* form in the worksheet package, students will form an appreciation of what it was like to live in those times.

This worksheet suggests a few things to consider. For example, how did most people communicate — by telephone, by mail or with the up-to-date methods we're used to? What did people do for fun? Could they have watched TV, or did families gather around the radio? How did people travel long distances — trains, aircraft, cars, or even horses?

Try to imagine how Hall of Fame Members might have worked and lived during their lifetimes and careers. To get you started, here are a few questions to consider:

- What kind of obstacles (e.g. social, economic, physical) might the Member have had to overcome?
- Would the Member's work have been well known in the general population, or known mostly to specialists?



### For More Advanced Students

More advanced students may want to consider statistics, such as:

- Life expectancy;
- Leading cause of death (very revealing with regard to medical sciences);
- Income per capita;
- Proportion of rural to urban population;



It might be useful to use the graph worksheets to plot changes in these indicators over a Member's lifetime.

### Activity 2.5: Impacts on Canadian and International Society

(Recommended for all grade levels)

Hall of Fame Members are chosen not just for their superior abilities in their chosen fields but for their contributions to society as a whole. Select a Member and learn about that Member's work. Write a short essay on how that work made a lasting impact on Canada and the world at large.

Here are a few questions the get you thinking about what kind of effect a Member's work might have had on society.

- How long might it have taken for the Member's work to affect "average" Canadians? For example, the CCD (Charge-Coupled Device) image sensor, was invented in 1969. Only in the last few years have digital cameras become widely available at affordable prices.
- Would the Member's work have helped improve Canada's reputation in the world?
- Did the Member become wealthy from the work? Do you think that mattered very much to the Member?



### Special Topic: Women in Science and Engineering

We take it for granted that women can be scientists or engineers. It was remarkably late in the 20<sup>th</sup> century that any significant number of women went into scientific fields. Until quite recently, women who dared to enter such fields faced considerable challenges in their professional and personal lives.

Research the life and times of one of the female Hall of Fame Members. Try to include some of the societal roles expected of a woman during that Member's career.

As one important example, when were Canadian women first permitted to vote? The "Famous Five" (Emily Murphy, Henrietta Muir Edwards, Louise McKinney, Irene Parlby, and Nellie McClung) fought to have women recognized as "persons" under the law. You can discover more about their efforts at the Famous Five website:

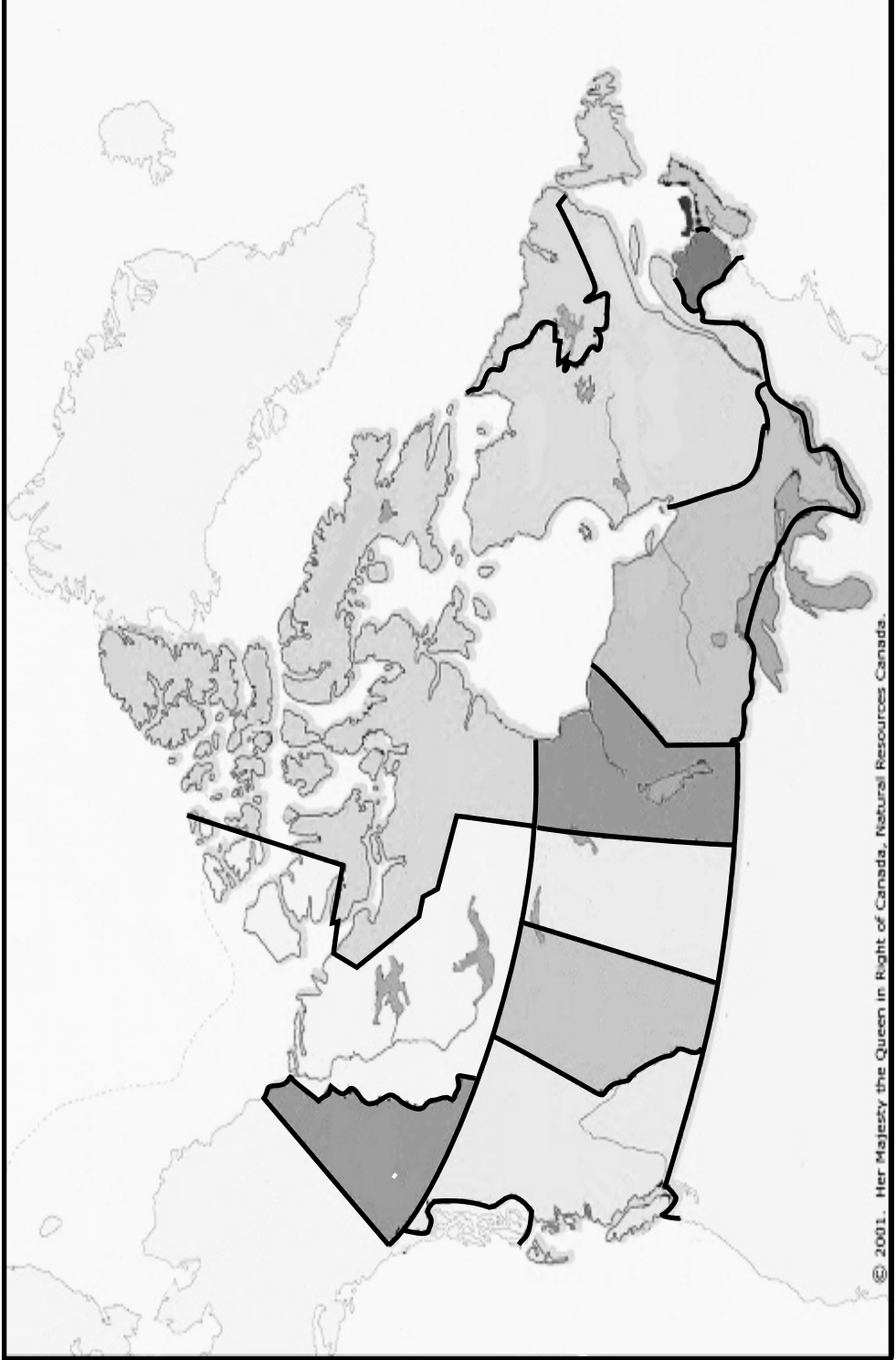
<http://www.abheritage.ca/famous5/>



Name: \_\_\_\_\_ Member's Name: \_\_\_\_\_

# Canadian Science and Engineering Hall of Fame

## Member's Birthplace and Place of Work

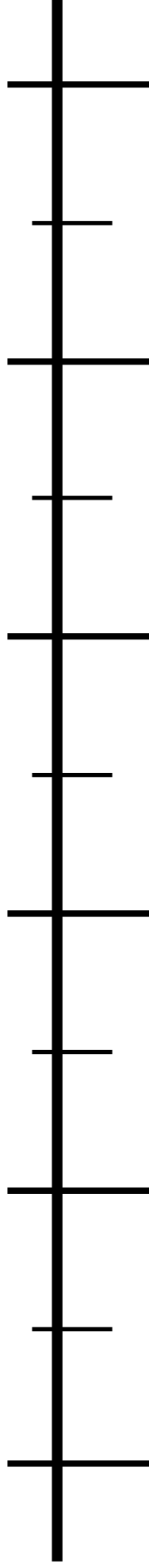


Legend \_\_\_\_\_

Name: \_\_\_\_\_

Topic: \_\_\_\_\_

## Canadian Science and Engineering Hall of Fame Timeline



KEY \_\_\_\_\_





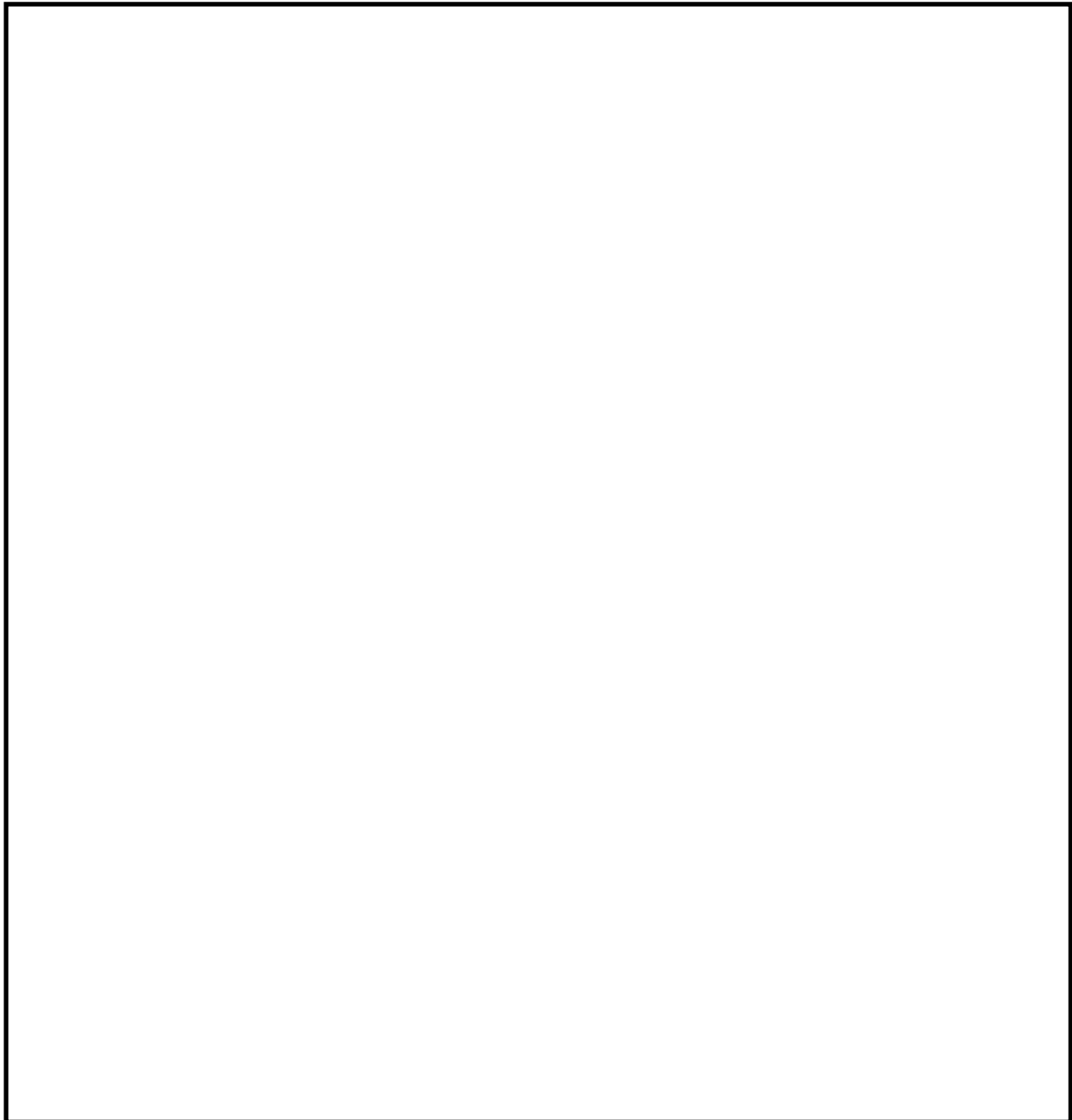
**Name:** \_\_\_\_\_

## **Canadian Science and Engineering Hall of Fame**

*Member's Name* \_\_\_\_\_

*Member's Achievements* \_\_\_\_\_

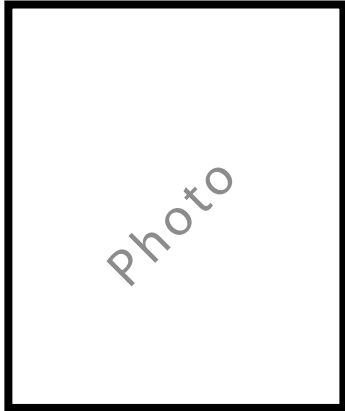
Use this space to sketch the member's development or to show how the member's work affected Canada.





Name: \_\_\_\_\_

## Canadian Science and Engineering Hall of Fame Member Dossier



\_\_\_\_\_  
\_\_\_\_\_  
Inducted in \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Biography

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Achievements

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Name: \_\_\_\_\_

## Canadian Science and Engineering Hall of Fame

Canada in \_\_\_\_\_ AD

Prime Minister: \_\_\_\_\_

Population: \_\_\_\_\_

Usual Source of Lighting: \_\_\_\_\_

Local Transportation: \_\_\_\_\_

Long Distance Transportation: \_\_\_\_\_

Long Distance Communication: \_\_\_\_\_

Popular Forms of Entertainment:

---

---

---

---

Other Interesting Details

---

---

---

---

---

---

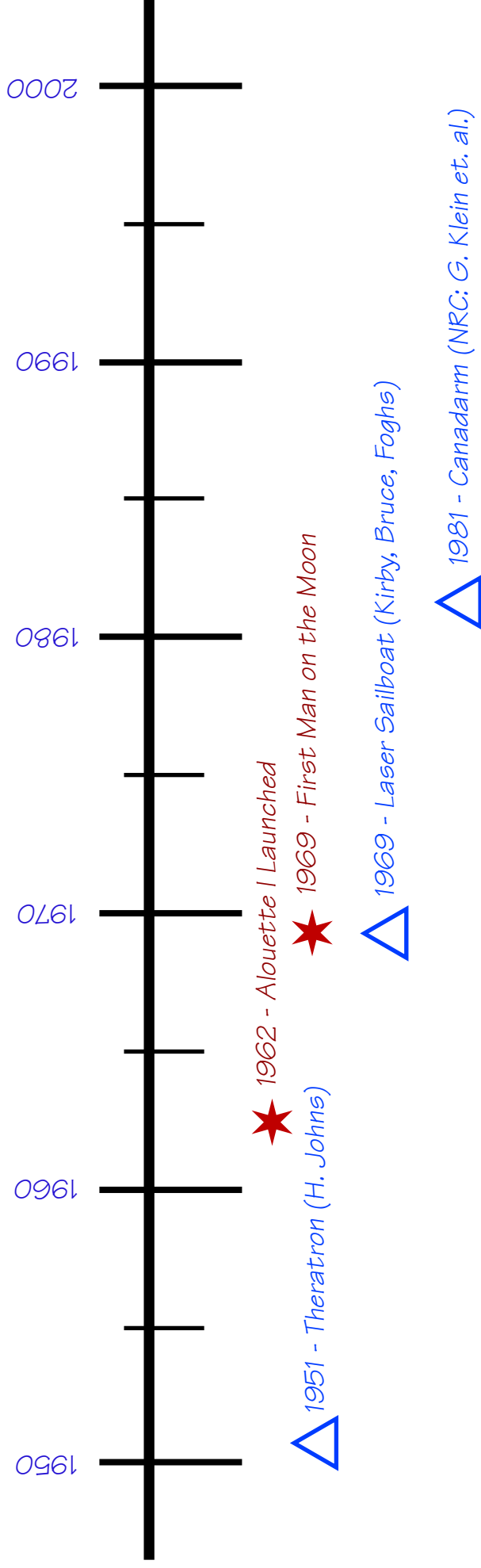
---

Name: \_\_\_\_\_

Topic: \_\_\_\_\_

# Canadian Science and Engineering Hall of Fame

## Timeline



### KEY

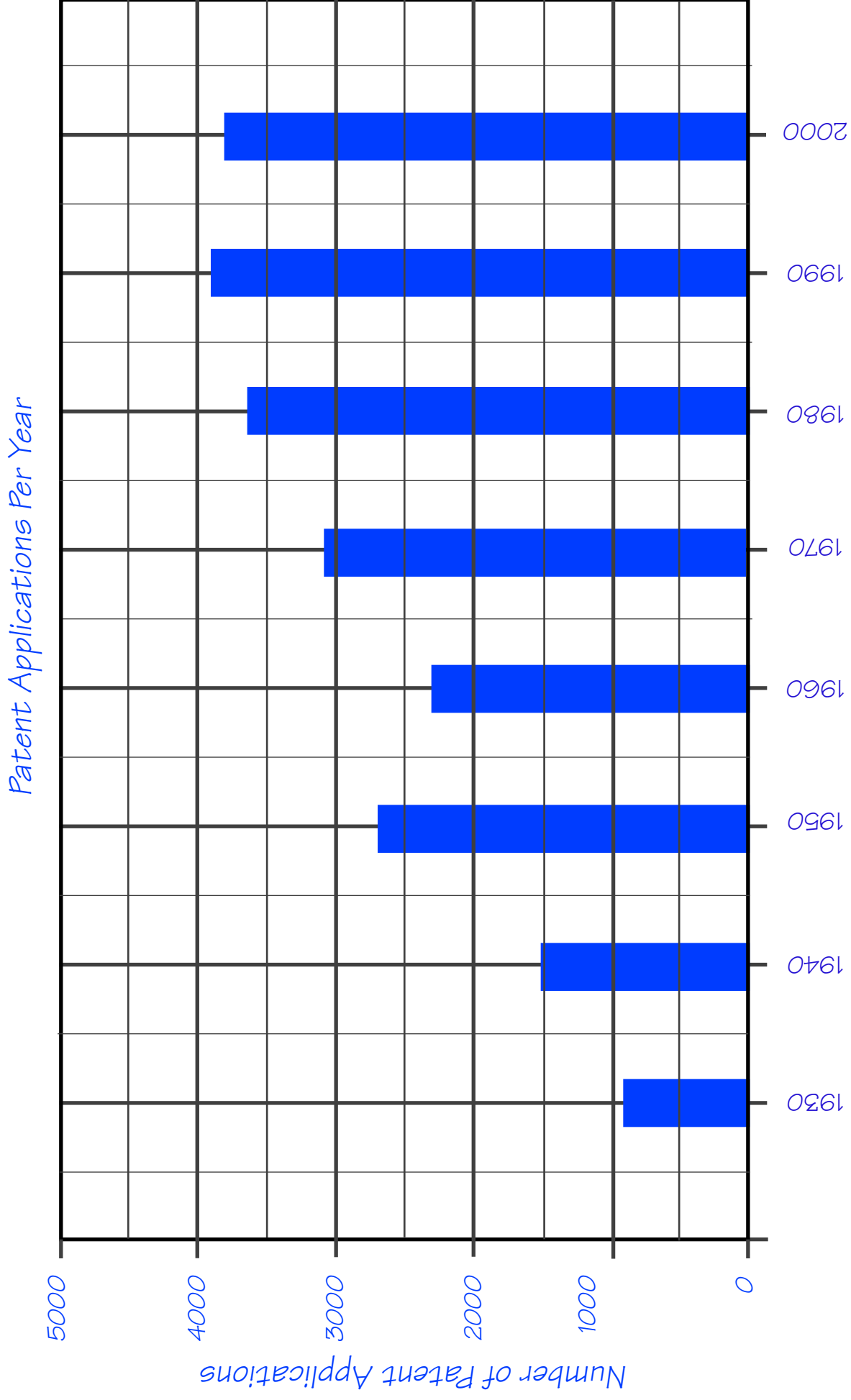
★ Important Event

△ Invention or Discovery

Name:

Topic:

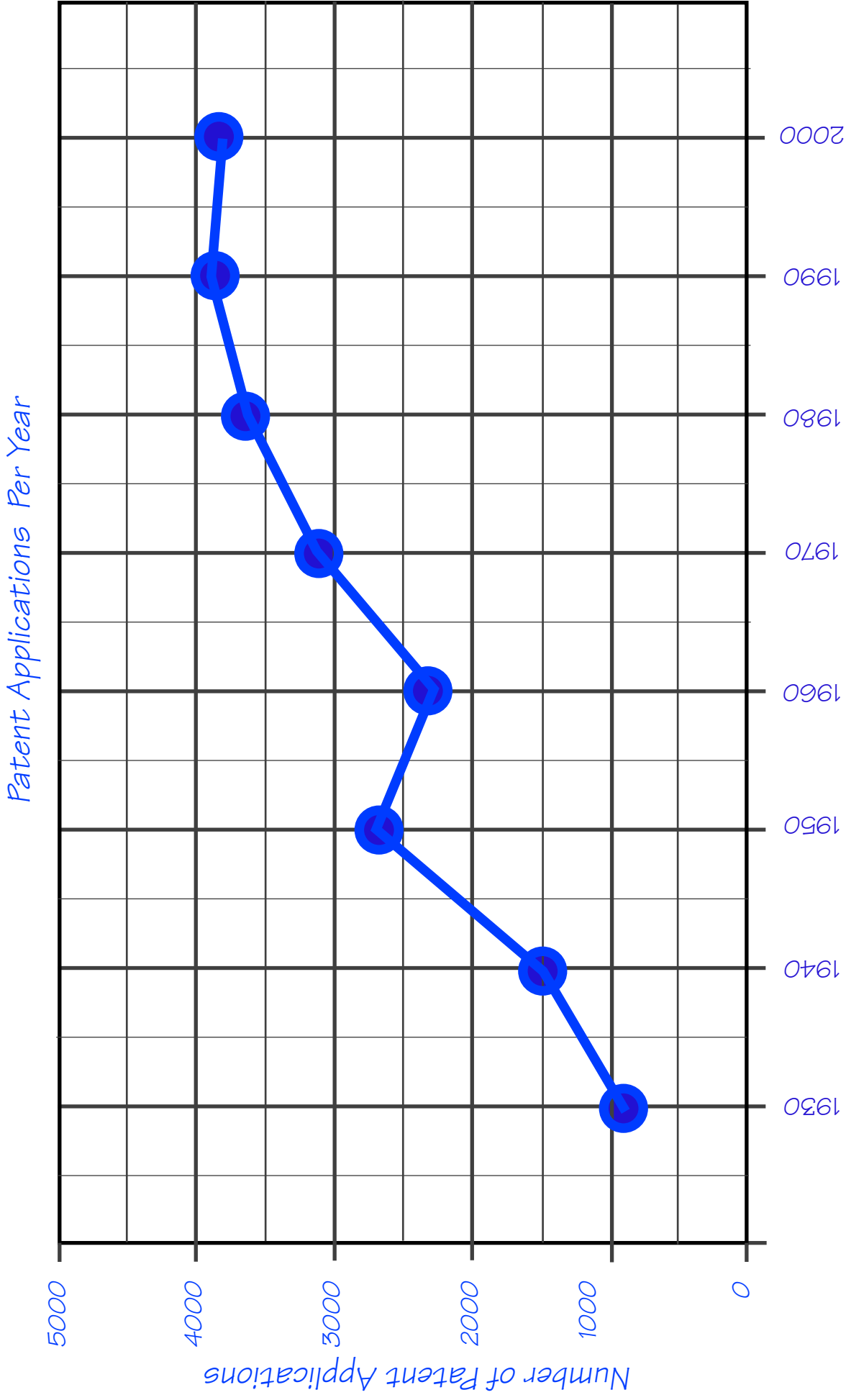
# Canadian Science and Engineering Hall of Fame



Name: \_\_\_\_\_

Topic: \_\_\_\_\_

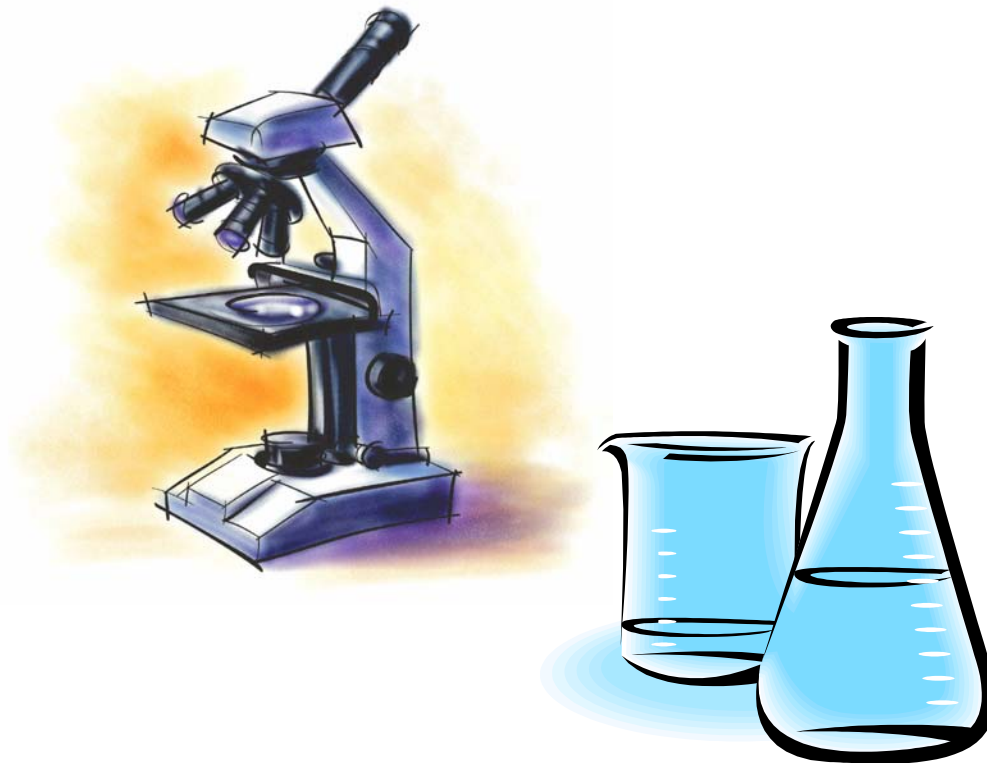
## Canadian Science and Engineering Hall of Fame



The Canada Science and Technology Museum  
presents

**A Virtual Exploration Guide  
to the  
Canadian Science and Engineering  
Hall of Fame**

**Section 3: Science and Ingenuity**



# Introduction

No scientist or engineer ever works in isolation. Even so, work in any particular field can often produce unexpected improvements in seemingly unrelated fields. The worksheet package for this section includes a list of Hall of Fame Members with a brief description of the achievements that lead to their induction. You'll find more details on the Hall of Fame website at:

[http://www.sciencetech.technomuses.ca/english/about/hallfame/u\\_main\\_e.cfm](http://www.sciencetech.technomuses.ca/english/about/hallfame/u_main_e.cfm)

In addition to the Canadian Science and Engineering Hall of Fame, the Museum's *Innovation Canada* exhibition showcases a wide range of Canadian technological achievements. The Curator's Choice web pages provide some fascinating views of several notable Canadian achievements:

<http://www.sciencetech.technomuses.ca/english/collection/innovation.cfm>

Several games in the CSTM web site's **Kid's Zone** section provide safe and fun ways to learn about Canadian inventors and their innovations. The CSTM **Innovations Games** web page leads to four interactive games: *House of Innovation*, *Innovation in Canada*, *Made in Canada* and *Time Machine*. The home page for these games is at:

<http://www.sciencetech.technomuses.ca/english/schoolzone/kidszone2.cfm>



## Activity 3.1: Canadian Inventions and Innovations

(Recommended for Grades 4 to 6)

Using the CSTM Innovations Games, have teams of students identify at least three Canadian inventions or innovations. Explain each one's value, using no more than a sentence or two. Use the *Inventions and Innovations* worksheet (shown as a thumbnail) to record your findings.



Name: \_\_\_\_\_

Canadian Science and Engineering Hall of Fame  
Inventions and Innovations

<b>1</b> Invention: _____ Inventor's Name: _____ Why It's Great: _____ _____
<b>2</b> Invention: _____ Inventor's Name: _____ Why It's Great: _____ _____
<b>3</b> Invention: _____ Inventor's Name: _____ Why It's Great: _____ _____

SCIENCE TECHNOLOGY INNOVATION CANADA MUSEUM OF SCIENCE TECHNOLOGY INNOVATION CANADA Canada

### Here are a few points to consider:

- What job does the invention do?
- How would that job have been done without the invention?
- How often do you see (or hear of) that invention being used? If it's not used in everyday life, can you imagine how specialists might find the invention valuable?

### Activity 3.2: Interconnections: How Science Reinforces Itself

(Recommended for Grades 6 and up)

Have students select a development from the list of Hall of Fame Members and see how it might have affected the work of others — perhaps even other Hall of Fame Members.



Here are a few points to consider:

- Look at what scientific and technological advances had to exist before that particular development could occur.
- Look at what fields might benefit from that development.
- Think of offshoots that have come from the original development. They might be improved versions or different developments that use similar principles.

#### Example 1: The Electron Microscope

The example shown here as a reduced-size thumbnail shows some of the science and technology interrelationships inherent in the development of the original electron microscope. In order to develop such an instrument, we had to understand the nature of

Name: \_\_\_\_\_ Topic: \_\_\_\_\_

**Canadian Science and Engineering Hall of Fame**  
Linkages Between Field of Study

Use this space to draw diagrams showing how work in one field of study can affect work done in other fields.

Canadit

the electron (nuclear physics), understand how to focus a stream of electrons (optics) and be able to build the necessary control and display devices (electronics).

Once the electron microscope had been perfected, offshoots began to emerge. Different types of electron microscopes (such as the scanning electron microscope) were developed. The ability to form and focus electron beams was key to the development of electron beam lithography, a technique used in the manufacturing of some types of microelectronic devices.

#### Example 2: The Cardiac Pacemaker

Name: \_\_\_\_\_ Topic: \_\_\_\_\_

**Canadian Science and Engineering Hall of Fame**  
Linkages Between Field of Study

Use this space to draw diagrams showing how work in one field of study can affect work done in other fields.

Canadit

Another example, shown here as a thumbnail, shows how ongoing research in electronics and cardiology led to the development of implantable cardiac pacemakers. Improved surgical techniques reduced complications during surgery. One important technique was based on George Klein's blood vessel suturing device, currently a topic in the Curator's Choice pages.

These seemingly disparate research fields combined in completely unexpected ways. The result was that implanting of cardiac pacemakers has become routine. A fortuitous convergence of science,

engineering, medicine and ingenuity has saved hundreds of thousands of people around the world and allowed them to lead nearly normal lives.



### **How to Sketch Interactions**

There's no right (or wrong) way to do it. The idea is to simply record your ideas about the relationships without a lot of lists and writing. The "floating blob" method works well for many people.

One very effective way to draw these charts is to start with your central topic (e.g., a pacemaker, an electron microscope etc.) in the middle of a chalkboard, a whiteboard or just a large piece of paper.

Start thinking about things that might be necessary to make the idea possible, and sketch "blobs" to the left. Think about things that the idea would make possible or easier to do. Sketch these as "blobs" to right. Sketch in arrows, and if you like, add notes to them as we've done. These notes can remind you of why you think there's a linkage, how the linkage works or why it's important.

As you go, you might see interactions between other "blobs." Mark those linkages too, but focus on the central topic. (Perhaps you'll want to draw another chart to plot out those secondary interactions later on.)

If you find you've drawn interactions that don't seem to make sense any more, cross them out. Don't erase them! Keeping track of your work can help you avoid rediscovering ideas you had earlier. Many times, ideas that seem to be silly might inspire new ideas, or even turn out to be sensible after all.

When you're done, copy your work to a fresh sheet of paper. This process is exactly how our examples were sketched. The diagrams you see here are just neater than most, making printouts and copies more legible.

Name: \_\_\_\_\_

## Canadian Science and Engineering Hall of Fame Inventions and Innovations

**1**

Invention: \_\_\_\_\_

Inventor's Name: \_\_\_\_\_

Why It's Great: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**2**

Invention: \_\_\_\_\_

Inventor's Name: \_\_\_\_\_

Why It's Great: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**3**

Invention: \_\_\_\_\_

Inventor's Name: \_\_\_\_\_

Why It's Great: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

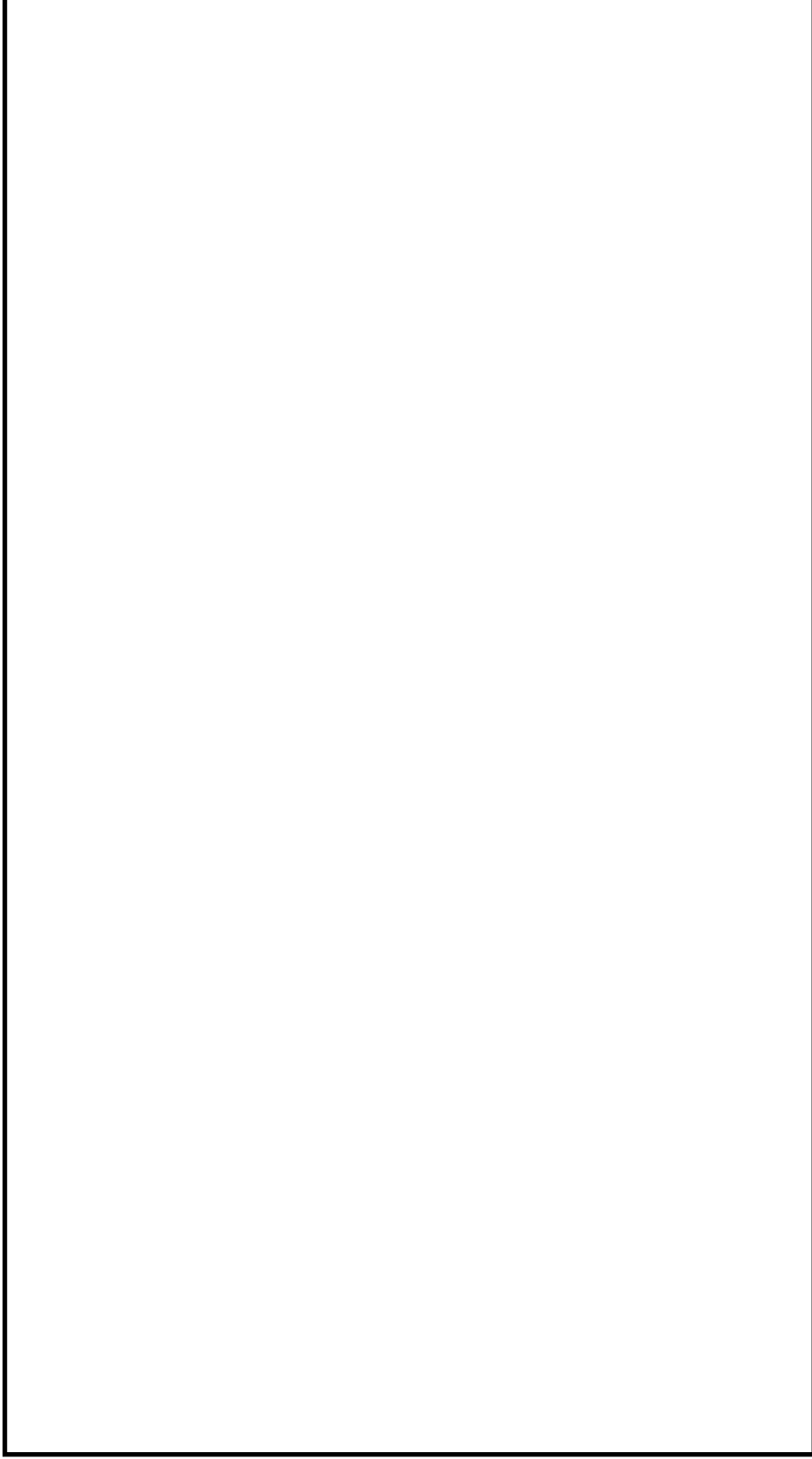
Name: \_\_\_\_\_

Topic: \_\_\_\_\_

## **Canadian Science and Engineering Hall of Fame**

### **Linkages Between Fields of Study**

Use this space to draw diagrams showing how work in one field of study can affect work done in other fields.

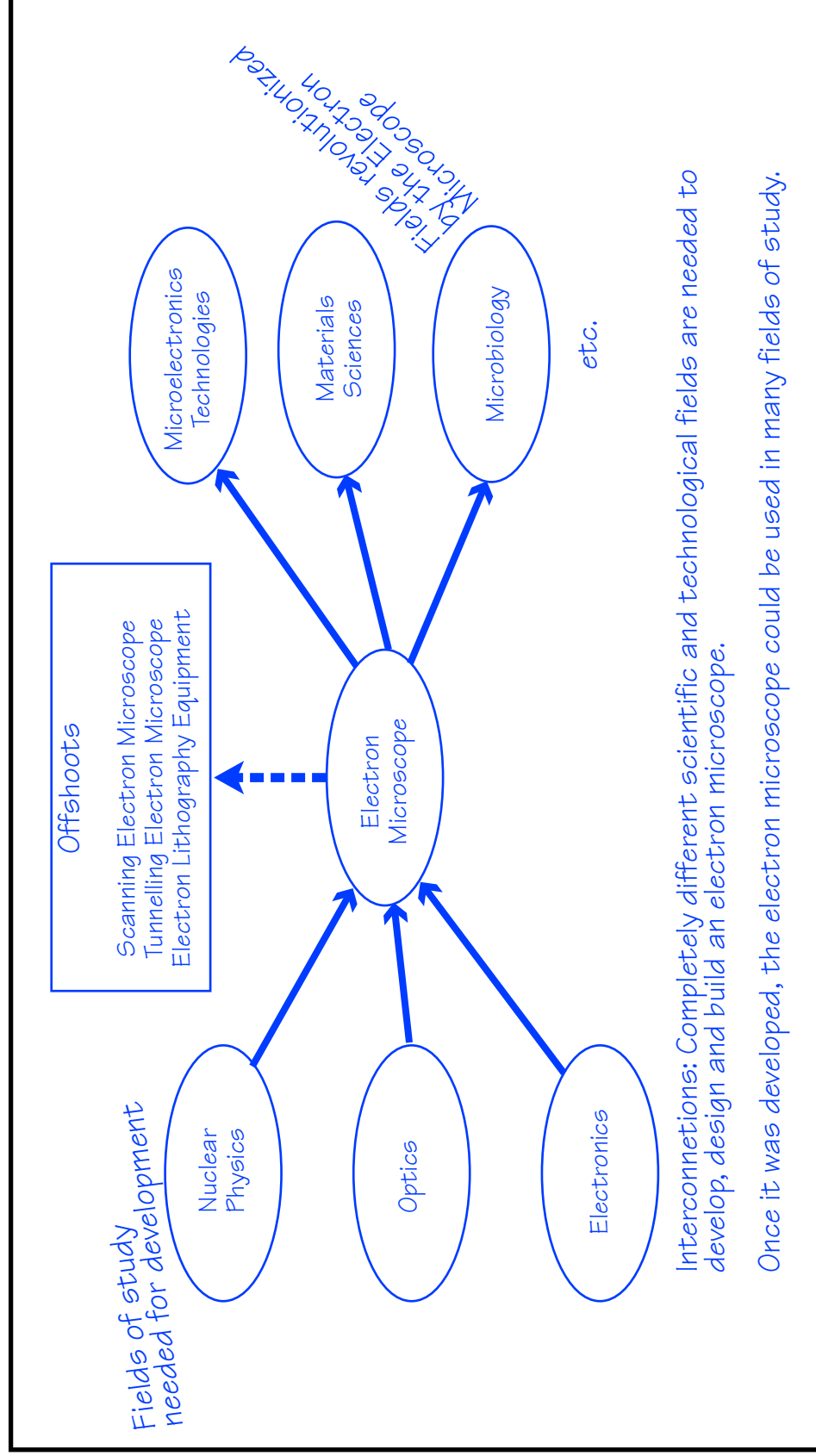


Name: \_\_\_\_\_

Topic: \_\_\_\_\_

## Canadian Science and Engineering Hall of Fame Linkages Between Fields of Study

Use this space to draw diagrams showing how work in one field of study can affect work done in other fields.



Name: \_\_\_\_\_

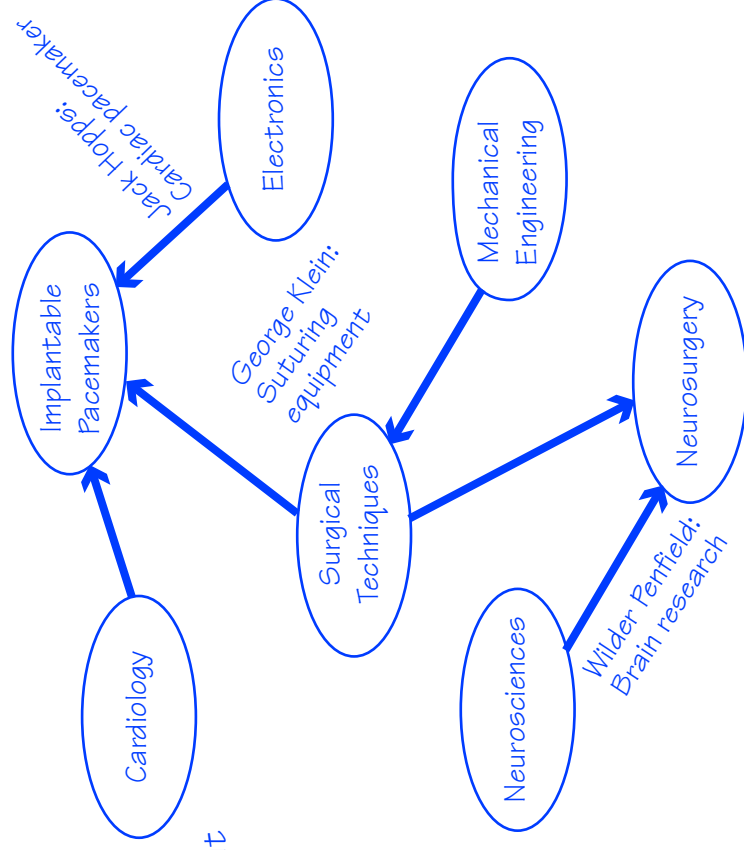
Topic: \_\_\_\_\_

## Canadian Science and Engineering Hall of Fame Linkages Between Fields of Study

Use this space to draw diagrams showing how work in one field of study can affect work done in other fields.

Interconnections: How mechanical engineering, electronics, physiological research and medical research have combined to produce practical solutions that improve patients' lives.

Notice how the efforts of completely independent researchers and developers have come together in new and unforeseen ways.



The Canada Science and Technology Museum  
presents

**A Virtual Exploration Guide  
to the  
Canadian Science and Engineering  
Hall of Fame**

**Section 4: Intellectual Property**



# Intellectual Property

How do you ensure that creators of new ideas get credit for their work? The term *Intellectual Property* comprises ideas, designs and creativity. These are all vital in a prosperous, thriving society. Intellectual property is what lets us improve our technologies and industries, and to compete in world-wide trade. Sensible protection of intellectual property rights encourages innovators by helping them receive the rewards and recognition they deserve.

In Canada, the Canadian Intellectual Property Office (CIPO) oversees the registration of most forms of intellectual property. These forms of intellectual property are:

patents

trademarks

copyrights

industrial designs

integrated circuit topographies.

The CIPO website describes their role and responsibilities, and it also has a great deal of useful background information on intellectual property. Visit their website at

[http://strategis.ic.gc.ca/sc\\_mrksv/cipo/welcome/welcom-e.html](http://strategis.ic.gc.ca/sc_mrksv/cipo/welcome/welcom-e.html)



## Patents

A patent is the official recognition of the ownership of an invention. The patent formally states that the invention is original, and grants the patent holder exclusive rights to that invention for a set period of time. (In Canada, this 20 years from the date of filing.) The patent holder is usually the inventor, but it could also be the inventor's employer, or someone who has bought the rights to the invention.

Patents cover a wide range of new inventions, or any new and useful improvements of existing inventions. It's important to realize that a patent merely states that the invention had never been registered before and indicates who has the rights to that invention. A patent doesn't *guarantee* that the invention is valuable. Few patented inventions are actually manufactured, and few of those are commercially successful.

So what's the point of a patent? The idea is to encourage developers to share their work with the world. Once an invention is patented, *anyone* can get all the details from the Patent Office. The patent allows the developer to safely share that information. Before you could make any commercial use of the patent, or even invent anything else based on that patent, you'd have to get permission from the patent holder. That usually means paying fees or royalties.

Many patents are for inventions that improve on previously patents. If you invented an improvement, you'd need permission to use the earlier patent in your invention. You'd have to negotiate a license and royalties with the owner of that patent. This demonstrates one of the most important features of the patent system. You were able to find all the information about another inventor's work and use that to develop a new (and hopefully

better!) invention. In exchange for that, you provide your fellow inventor with recognition and financial benefits.

### **Activity 4.1: How Do You Get A Patent?**

(Recommended for all grade levels)

Using your school library or the CIPO website, find out the steps an inventor needs to take to get a patent.

Here are a few things to consider:

What do you need to do to apply for a patent?

What does the CIPO look at when they examine a patent application?

What does the patent provide to you, the inventor?

#### **For more advanced students:**

One of the problems facing would-be inventors is precedence: someone else might have gotten there first. Set up discussion groups or assign essays to have students explore this issue. Here are a few points to get you started.

1) When the Patent Office receives several submissions for similar inventions, the owner of the first submission to be received will be awarded the patent, provided all the requirements are met.

**Question:** Is it fair that the first person to submit should get the patent? If not, how else could (or should) it be done?

2) If an application is made for an un-patented invention, a patent can be awarded, even if the invention is already being manufactured and sold. What could happen to a business that is manufacturing a product that is patented by someone else?

**Question:** Is it fair for the manufacturer to have to start paying royalties? On the other hand, would it be fair for the patent holder to be *prevented* from collecting royalties?

What would (or should) happen if a manufacturer were able to show that the product had been developed before the new patent holder started developing the idea? How could you establish this fact?

#### **Teacher's Note:**

This is a hypothetical question to get your students thinking about the importance of patents. While the scenario we've described here is possible, it is very uncommon. It's the responsibility of the manufacturer to secure all the intellectual property rights necessary to produce its products. Any responsible manufacturer would start by searching the Canadian Patent Database for existing patents and applications.

### **Activity 4.2: Discovering the Value of Patents**

(Recommended for Grades 6 and up)

Use resources such as the CIPO website to discover the benefits of patents. Don't forget to consider the benefits to both the developer and society as a whole. This could be done





as a classroom discussion, a project for small groups of students or as an assignment for individual students.

**For more advanced students:**

Instead of applying for patents, some developers prefer to protect their products by keeping the details of their manufacture secret. These techniques are called *trade secrets*.



Here are a few questions to consider:

- What products might be protected with trade secrets? (Several products might come to mind, such as soft drinks or a particular variety of fried chicken.)
- What happens if someone discovers a trade secret? Could anything be done?
- Why might a producer take a risk on a trade secret? (Here's a hint: patents eventually expire.) Do you think it's more prudent to obtain a patent for a new idea (which publicizes your invention) or to keep it secret? Can you think of situations where one approach might be better than the other?

To research this question, your students may want to consult the CIPO publication *What's In a Name?* at [http://strategis.gc.ca/sc\\_mrksv/cipo/tm/wian-e.pdf](http://strategis.gc.ca/sc_mrksv/cipo/tm/wian-e.pdf).



**Activity 4.3: The Student “Patent Office”**

(Recommended for all grade levels)

The student Patent Office is simply a closed box and (optionally) a date/time stamp. You can serve as the Chief Patent Clerk, responsible for marking the date and time on submissions and placing them in the Patent Office box.



Set up an *Invention Festival*, a short period over which small groups of inventors come up with inventions. Whenever each group feels it's ready, it submits its invention to the Chief Patent Clerk (i.e. you!). Submissions remain sealed in the box until the Invention Festival is over. You can either post the Patent Applications or have each group make a short presentation.

**For More Advanced Students)**

*Patent infringement* is the unauthorized use of a patented invention. Here are a few questions to consider.

- What would happen if someone were to use your patented invention without your permission?
- How do you stop someone who's infringing on your patent?
- Why would someone infringe on your patent? Think of some possible reasons, such as coincidence or outright theft. (Remember, it's not uncommon for someone to re-invent something that's already been patented.)



## Copyrights

A copyright is the authorization to print or reproduce a work, or to permit someone else to print or reproduce it. Copyrights apply to *original* creative works, such as textbooks, novels, paintings, movies and so on. You can't copyright something someone else wrote (or painted or filmed), or something that is clearly just a minor variation of someone else's work.

The concept is simple, but there are a lot of practical details to consider. The CIPO section on copyrights is a good place to discover some of the issues:

[http://strategis.ic.gc.ca/sc\\_mrksv/cipo/cp/copy\\_gd\\_main-e.html](http://strategis.ic.gc.ca/sc_mrksv/cipo/cp/copy_gd_main-e.html)

Another important difference between copyrights and patents is in how they are granted. Any original creative work is considered to have a copyright the instant it has been created. In other words, the copyright exists automatically. You don't need to *apply* for a copyright, but you can register your copyright with the CIPO. Registering a copyright gives you an official statement that you are the rightful owner.

Virtually all books include a *copyright notice* in the first printed page. An international agreement called the Universal Copyright Convention specifies that the copyright notice include the standard copyright symbol '©', the name of the copyright owner and the year of first publication. For example: "© J.R. Wrighter, 2001."

Some of the countries of the Universal Copyright Convention require copyright notices. In Canada, there is no legal obligation to include a copyright notice, but it's always a good idea to do it.

You can learn more about registering copyrights at this CIPO web page:

[http://strategis.gc.ca/sc\\_mrksv/cipo/cp/copy\\_gd\\_regis-e.html](http://strategis.gc.ca/sc_mrksv/cipo/cp/copy_gd_regis-e.html)

### Activity 4.4: Learning about Copyrights

(Recommended for Grades 4 and up)

Assume you have written a novel. Visit the CIPO website section on copyrights and answer the following questions:

- What do you have to do to get a copyright?
- What do you have to do to register your copyright?
- How long does the copyright for a printed work generally last?
- What are the possible terms of copyright protection for a photography?



### Activity 4.5: What Can Be Copyrighted?

(Recommended for Grades 5 and up)



Writers often create characters that appear in several books in a series. What happens if you decide to write a story based on someone else's character? Assume your *story* is completely original. Even the writer who created that character agrees that your story is original.

**Question:** Do you have to get permission from the writer to publish your story?

Have your class research this question at the CIPO website (or elsewhere) and discuss the issues. One way to do this is to set up a mock court case.

Have a team of students prepare an argument that you *don't* need permission to publish your story. Have another team of students prepare an argument for the writer: that you *do* need permission. Both teams will present their arguments to the Classroom Court (i.e. the rest of the class).

**Teacher's Note:**

This particular question is very contentious. However, it does address a fundamental problem of balancing the rights of creative artists.

The Canada Science and Technology Museum  
presents

**A Virtual Exploration Guide  
to the  
Canadian Science and Engineering  
Hall of Fame**

**Section 5: Nominating a Potential Member**



## Hall of Fame Nomination Process

The Canadian Science and Engineering Hall of Fame is a central part of the *Innovation Canada* exhibition at the Canada Science and Technology Museum. Here, we honour individuals whose outstanding scientific or technological achievements have made significant contributions to Canadian Society.

Over thirty scientists, engineers and innovators are recognized in the Hall of Fame. The achievements of these individuals have been so remarkable and their contributions to society so great that the Museum hopes that one day that all Canadians will be aware of their accomplishments.

### Selection of Inductees

The Selection Committee invites scientific and engineering societies and associations, university and college departments, private enterprises, as well as individuals to submit nominations for new inductees to the Hall of Fame.

Nominations should include supporting evidence, such as a description (500 words maximum) of the nominee's work and contributions and may be further supported by copies of documentary evidence or testimonials. We actively seek nominations that reflect the diversity of Canadian science, engineering and technology.

### Selection Criteria

The nominees must have contributed in an exceptional way to the advancement of science and engineering in Canada.

Their work must have brought great benefits to society and their communities as a whole.

They must possess leadership qualities that can serve as an inspiration to young Canadians to pursue careers in science, engineering or technology.

Visit the Hall of Fame and Innovation Canada web pages at:

Canadian Science and Technology Hall of Fame website

[http://www.sciencetech.technomuses.ca/english/about/hallfame/u\\_main\\_e.cfm](http://www.sciencetech.technomuses.ca/english/about/hallfame/u_main_e.cfm)

CSTM Curator's Choice web pages

<http://www.sciencetech.technomuses.ca/english/collection/curators.cfm>

CSTM Innovation Canada: Curator's Choice web page

<http://www.sciencetech.technomuses.ca/english/collection/innovation.cfm>



### **Activity 5.1: Set up a “Classroom Hall of Fame”**

(Recommended grade levels 4 and up)

Make a display honoring your students’ selections of notable Canadian scientists and engineers.

Divide your class into student teams who will focus on particular fields of study. For example, one team could look at medical advances, another team on astronomy and so on. Have each team suggest a Canadian scientist or engineer who has made significant contributions and prepare a short presentation about their choice to the rest of the class.

Here are few suggestions to get you started:

- Remember that your nominee doesn’t have to be a present-day Canadian. If you examine histories of Canadian achievements, you’ll find many scientists and engineers who’ve done top-notch work.
- Look into newspaper articles and popular science magazines to find Canadians who’ve made a difference.



### **Activity 5.2: Nominate a New Member for the Hall of Fame**

(Recommended grade levels 4 and up)

Select an outstanding Canadian scientist or engineer to nominate for induction into the Canadian Science and Engineering Hall of Fame. This is a challenging job, but you could start with your Classroom Hall of Fame as a short list of candidates. As a class, select one or two candidates and prepare the applications to the Hall of Fame Selection Committee. Perhaps *your* class’s choice will be in the next list of new inductees!

