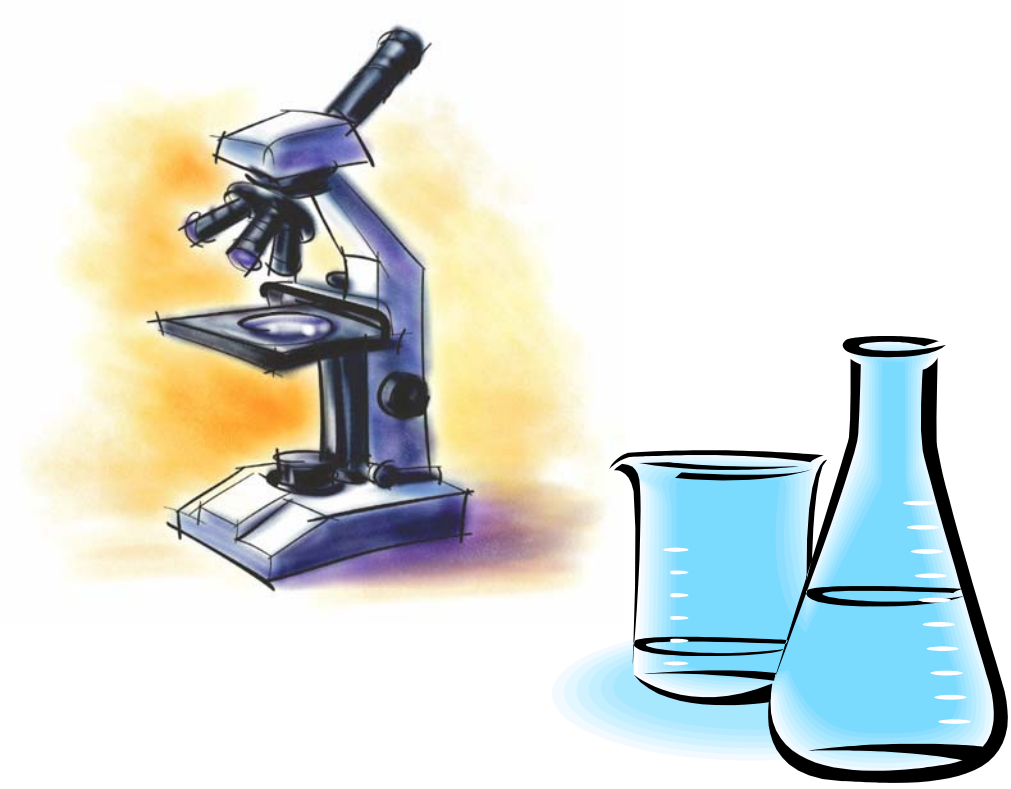
The Canada Science and Technology Museum
presents

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

Section 3: Science and Ingenuity



CANADA SCIENCE AND TECHNOLOGY MUSEUM

Canada

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

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

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: _____

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)

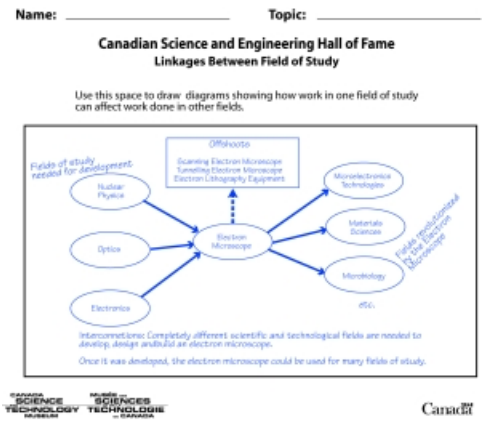
Have students select a development from the list of Hall of Fame Members and see how it might have affected the work of others — perhaps even other Hall of Fame Members.

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.

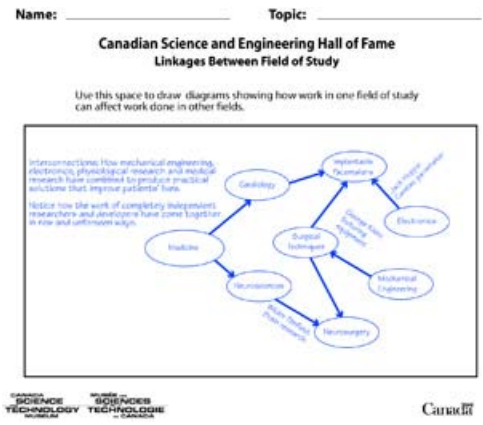
Example 1: The Electron Microscope

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 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



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: _____

_____

_____

CANADA SCIENCE AND TECHNOLOGY MUSEUM

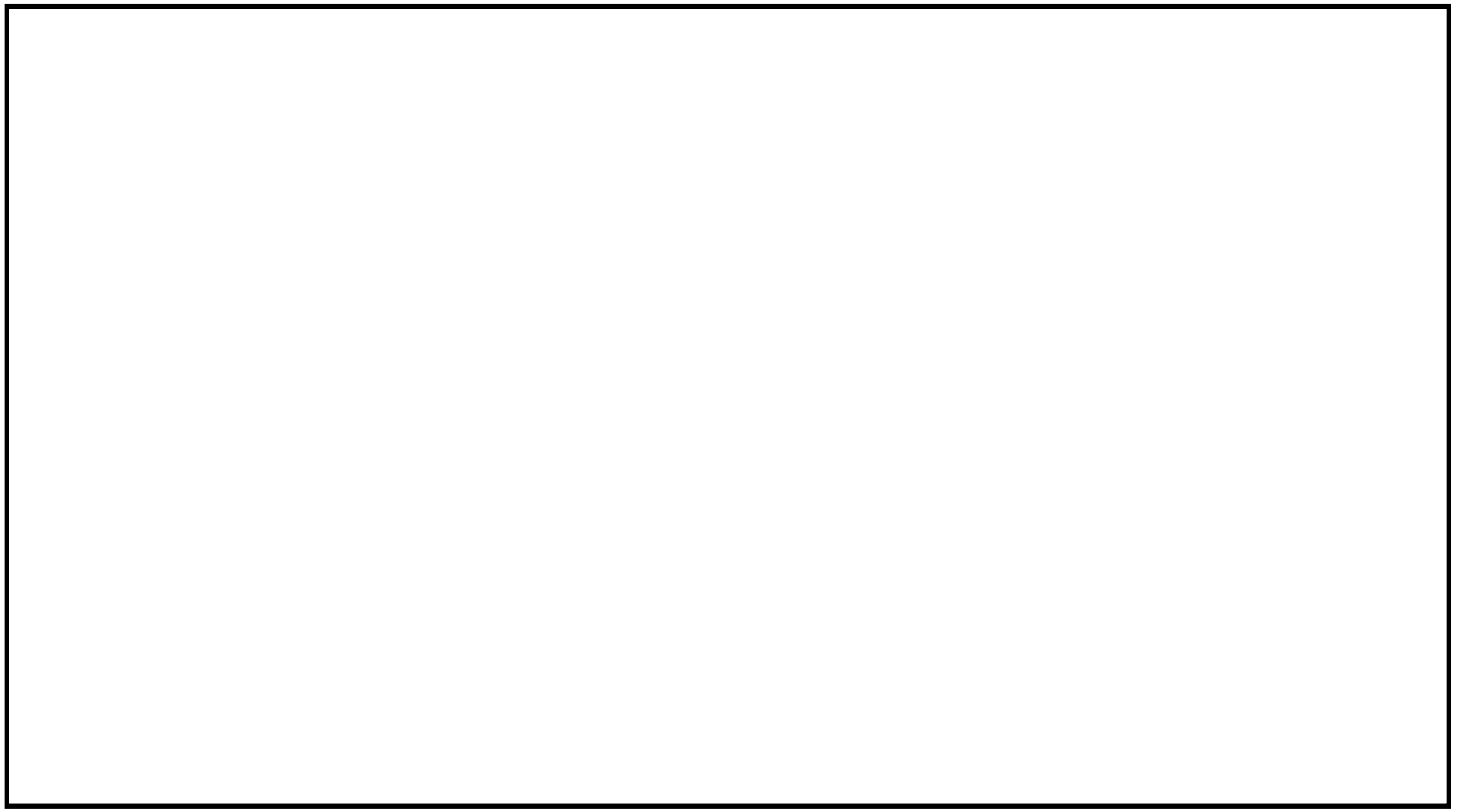
Canada

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.

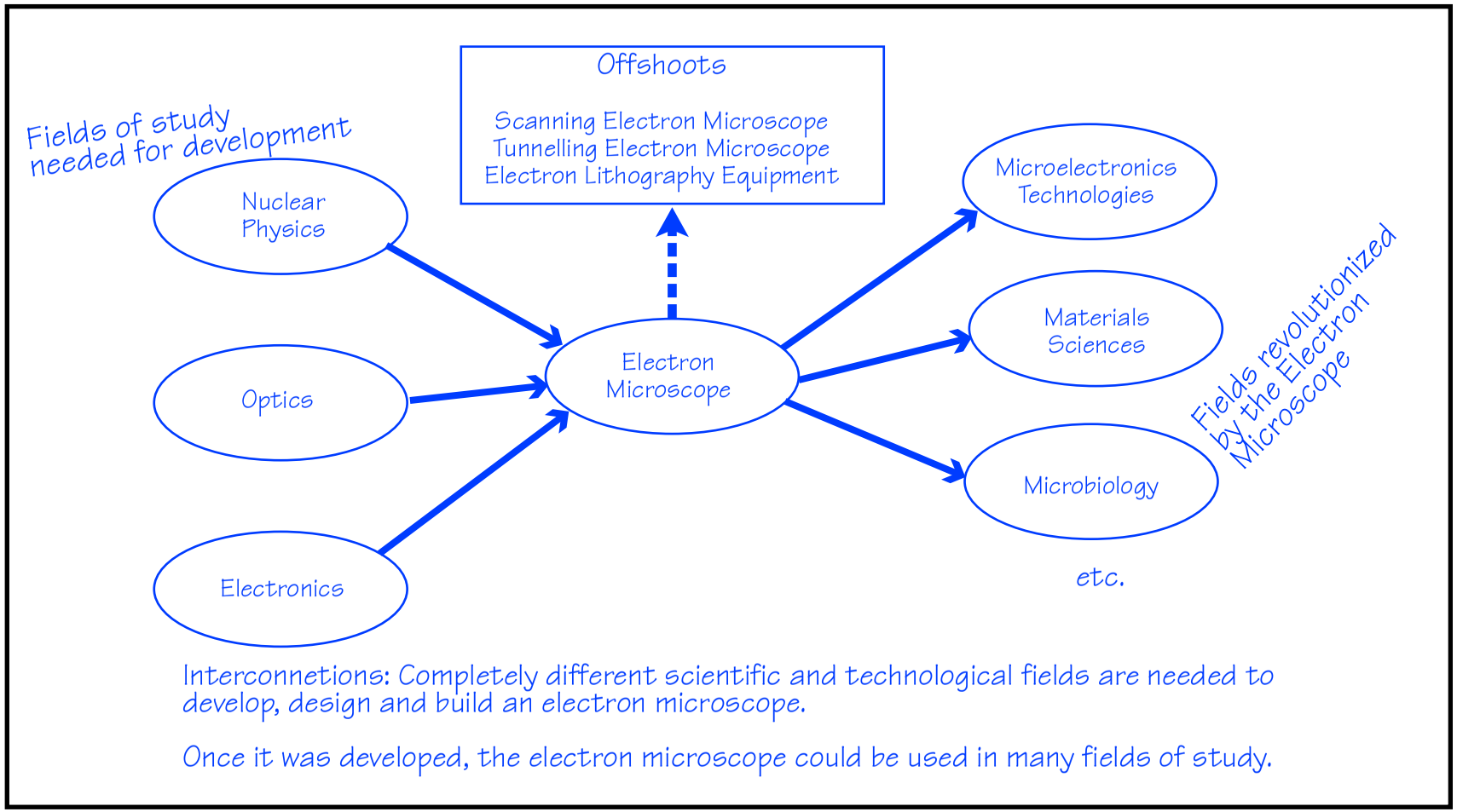


Name: _____ **Topic:** _____

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 unforseen ways.