The Canada Science and Technology Museum
presents

The Science of Sports

Section 1

Introduction

CANADA SCIENCE AND TECHNOLOGY MUSEUM

Canada

Introduction

Whether it is in the schoolyard, during gym class or on television, most elementary school students have had some experience playing and watching sports. Teaching science within the context of sports is a great way to take advantage of students' existing interest in the subject, and to find real-life applications of science theory.

The Science of Sports is a teacher resource package that enables students to explore science concepts and examine their application in sports. This virtual program presents concepts about the human body, forces, and energy in a way that is accessible and interactive—combining hands-on activities, outdoor play and online discovery.

What this Exploration Guide Can Do for You

This exploration guide enables you and your students to explore themes such as human organ systems, forces, and energy, using your school's Internet connections, gymnasium, and outdoor playing field. The included activities and worksheets will enrich your exploration of a number of excellent online resources such as the Canada Science and Technology Museum website. Blank worksheets and detailed examples can be reproduced without cost for use in your classroom. Activities are modular, and can be completed independently of the full resource package.

In addition to addressing scientific concepts, the exploration guide's activities reinforce knowledge and skills in areas such as mathematics, and health and fitness. In addition to activity sheets, you will find suggestions for classroom discussions, class projects, and assignments for independent study. The exploration guide also offers suggestions on how to incorporate twenty minutes of physical activity into science lesson plans.

Teachers may request an answer package, which includes an educator's version of the more complicated worksheets, by e-mailing **virt_prog@technomuses.ca**. Please allow one to two weeks for a reply.

Navigating Through the Exploration Guide

Each section of this exploration guide can be downloaded as a separate Adobe PDF file, allowing you to select the sections that you would like to use. Alternately, you can download the entire guide as a single Adobe PDF file. The content is identical in either case.

While the exploration guide's sections are thematic, they also encourage cross-thematic learning. There are activities within each section to suit the needs of students at a range of grade levels.

The table below lists all activities in this exploration guide.

Distinctive icons throughout the exploration guide indicate key features, helping you to navigate your way through the text quickly and efficiently.

 **Classroom Activity**	 **Discussion or Assignment Topic**
 **Deeper Study**	 **Website to Visit**

Curriculum Links

This guide is cross-curricular. Activities included in the guide focus on human organ systems, forces, and energy. By completing the worksheets and activities in this guide, students will also exercise their numeracy skills, critical-thinking skills and physical skills, fulfilling specific requirements of various curricular areas.

Pan-Canadian Protocol

The *Common Framework of Science Learning Outcomes*, developed by the Council of Ministers of Education, Canada, includes many elementary school links to the integrated themes of human organ systems, forces and energy. Links to the Pan-Canadian Protocol are as follows:

Grades 4 to 6:	104-1,6,7,8; 205-1,3,4,5,7,9; 206-2,3,5; 207-1,2,3,4; 300-19; 302-4,5,6,9; 303-12,14,15,17,18,23
Grades 7 to 9:	307-12; 309-2,3

Ontario Curriculum

Grade 4	Health and Physical Education	A1.1; A2.1(DPA); A2.2; A2.3; B1.1; C1.1; C2.1
	Mathematics	Measurement
		Data Management and Probability
Grade 5	Science	Understanding Life Systems: Human Organ Systems
		Understanding Structures and Mechanisms: Forces Acting on Structures and Mechanisms
		Understanding Earth and Space Systems: Conservation of Energy and Resources
	Health and Physical Education	A1.1; A2.1(DPA); A2.2; A2.3; A2.4; B1.1; C2.1; C3.1

	Mathematics	Measurement
		Data Management and Probability
Grade 6	Science	Understanding Matter and Energy: Electricity and Electrical Devices
	Health and Physical Education	A1.1; A2.1(DPA); A2.2; A2.3; A2.4; B1.1
	Mathematics	Data Management and Probability
Grade 7	Science	Understanding Structures and Mechanisms: Form and Function
	Health and Physical Education	A1.1; A2.1(DPA); A2.3; A2.3; A2.4; B1.1; C2.1; C2.3

Quebec Curriculum

Primary Cycle 2	Science and Technology	Material World B. Energy 1. Forms of energy 3. Transformation of energy C. Forces and motion 3. Gravitational attraction on an object 5. Characteristics of motion 6. Effects of a force on the direction of an object D. Systems and interactions 2. Simple machines E. Techniques and instrumentation Living Things A. Matter 1. Characteristics of living things 2. Organization of living things B. Energy 1. Sources of energy for living things

Primary Cycle 3	Science and Technology	Material World B. Energy 2. Transmission of energy C. Forces and motion 3. Gravitational attraction on an object 4. Pressure 7. Combined effects of several forces on an object E. Techniques and instrumentation Living Things A. Matter 1. Characteristics of living things
Primary Cycle 2	Mathematics	Statistics 4. Displays of data using tables and graphs
Primary Cycle 3	Mathematics	Arithmetic: Operations involving numbers A. Natural numbers 7. Develops processes for written computation 12. Performs a series of operations in accordance with the order of operations 15. Uses a calculator Measurements E. Capacities 2. Measures capacity using conventional units F. Masses 2. Measures mass using conventional units Statistics 5. Understands and calculates arithmetic mean
Primary Cycles 2 and 3	Physical Education and Health	Competency 1: Performing movement skills in different physical settings Competency 3: Adopting a healthy, active lifestyle
Secondary Cycle 1	Physical Education and Health	Competency 1: Performing movement skills in different physical settings Competency 3: Adopting a healthy, active lifestyle

Resource Information

Moyes, Christopher D. and Patricia M. Schulte. ***Principles of Animal Physiology***. San Francisco: Benjamin Cummings, 2005. ISBN-10: 0805353518

Ontario Science Centre. ***Sportworks: more than fifty fun games and activities that explore the science of sports***. Massachusetts: Addison-Wesley Publishing Company, Inc, 1989. ISBN 0-201-15296-7

Coulter, G. ***Science in Sports***. Vero Beach, Florida: Rourke Publishing Group, 1995. ISBN 978-0866255172

Useful Websites

Note regarding Internet sites

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

Given the dynamic nature of the Internet, website addresses can change without notice.

Canada Science and Technology Museum—Online Resources

Canada Science and Technology Museum
www.sciencetech.technomuses.ca

Background Information about Energy
http://www.sciencetech.technomuses.ca/english/schoolzone/Info_Energy.cfm

For general information about energy visit:
Let's Talk Energy – Engaging Ideas for Canada's Future
http://www.energy.technomuses.ca/english/index.html

Background Information about Structures and Shapes
http://www.sciencetech.technomuses.ca/english/schoolzone/Info_Structures.cfm

Background Information about Simple Machines
http://www.sciencetech.technomuses.ca/english/schoolzone/Info_Simple_Machines2.cfm

Canada Science and Technology Museum YouTube Video: Crazy Kitchen
http://www.youtube.com/watch?v=aAkw8p5oszI&blend=1&lr=1&ob=5

Do Try This At Home: Build a Tension-Powered Car
http://www.sciencetech.technomuses.ca/english/schoolzone/try-this-out-intense-science.cfm

Do Try This At Home: Magnet-Mobile
http://www.sciencetech.technomuses.ca/english/schoolzone/try-this-out-magnet-mobile.cfm

Other Online Resources

National Geographic: Human Body
http://science.nationalgeographic.com/science/health-and-human-body/human-body/

Canadian Space Agency: Understanding Air Pressure
http://www.asc-csa.gc.ca/eng/educators/resources/spacesuit/pressure_life.asp

KidsHealth: Your Heart and Circulatory System
http://kidshealth.org/kid/htbw/heart.html

KidsHealth: Bones, Muscles and Joints
http://kidshealth.org/parent/general/body_basics/bones_muscles_joints.html

Exploratorium: Science of Hockey
http://www.exploratorium.edu/hockey/save1.html

Olympics.ca
http://olympic.ca/sports

Official Website of the Olympic Movement
http://www.olympic.org/

Canadian Heritage: National Sports Organizations
http://www.pch.gc.ca/pgm/sc/fed/index-eng.cfm

Canada's Food Guide
http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/myguide-monguide/index-eng.php

The Science of Sports was developed by a team of experienced educators at the Canada Science and Technology Museum.

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