

The Canada Science and Technology Museum
presents

**Cycle-ology:
A Virtual Exploration
of the Bicycle**

Section 2: Pedalling Through History



Introduction

The following activities and lessons look at the development of the bicycle from its creation in the 19th century to the present. Students will discover how mechanics and inventors modified the bicycle throughout history in order to improve the vehicle's performance. They will learn how the bicycle became so popular in Canada and how its development had an important influence on society.

Teachers may request an answer package for more detailed Activity Sheets by e-mailing virt_prog@technomuses.ca. Please allow at least a week for us to reply.



Activity 2.1: Discover the Museum's Collection

Suitable for Grades 4 – 6

Purpose: Students will discover the Museum's rich cycle collection and trace the principal changes in bicycle design.

The Canada Science and Technology Museum has been collecting, conserving, preserving, restoring and researching cycles for the past 40 years. The Museum's collection is enriched by many fascinating artifacts ranging from the earliest hobby-horses to bicycles developed in the late 1800s.

Collecting Cycles

Encourage students to explore the Museum's website to discover their rich cycle collection.

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

Using the website as their resource, have students identify the images of historical bicycles found on Activity Sheet 2.1 and ask the students to number the cycles in the order they were invented.

Following the activity, ask the students to list the principle differences between the cycles. Encourage students to analyze the design of the cycles, what looks different between the different cycles? (Have students pay close attention to the bicycle frames, the size of the wheels, the number of wheels, and the presence of pedals, gears and brakes.) List their observations on the board.

This discussion will serve as an introduction to this module as the differences observed by the students will be explored and explained in a variety of activities throughout the Exploration Guide.

Oral Presentation

The following activity will allow each student to familiarize themselves with a historical cycle. Invite students to prepare an oral presentation describing a cycle from the Museum's collection. Students can browse the Museum's website to find the answers to the following questions:

- What year was the cycle invented?
- Who invented the cycle?
- In which country did it originate?
- What was the shape of its frame?
- What materials were used in its fabrication?
- What are its strong and weak points?



- Who would have ridden it and for what purpose?
- How was the cycle ridden?
- Why did this cycle lose its popularity?

In addition, students can draw their selected cycle on a large poster board and demonstrate to their classmates where the pedals, gears and other parts are located. Students can take turn presenting their cycle to the class.

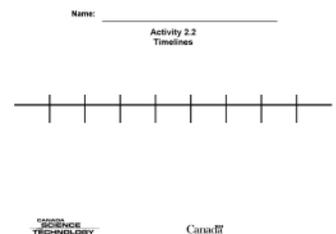
Display the students' posters in the classroom.

Activity 2.2: Timelines

Suitable for Grades 4 – 6

Purpose: Students will create timelines in order to study the progression of the bicycle.

Timelines are valuable tools for determining relationships between events in history. Many different types of timelines can be constructed using the blank timeline provided in Activity Sheet 2.2. Students can customize their very own timeline and determine the time intervals as needed. They 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.



Resources for building timelines:

A great source for Canadian-themed timeline data is the *Time Machine* game at the Canada Science and Technology Museum website's Kid's Zone web page at: http://www.sciencetech.technomuses.ca/english/schoolzone/timeline/timeline_en.cfm

Excellent timelines are also available at the HyperHistory Online Project website at: 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 of timelines to get your students started.

- **Technological Improvements:** Invite students to create a timeline that demonstrate the principal technological modifications that have been made to the bicycle by inventors and mechanics to improve the vehicle's speed and efficiency. Have them include the following events: inventors and makers add gears to the bicycle, introduce pneumatic tires, add pedals, etc.



- **The Canadian Bicycle Story:** Instruct students to list the principal Canadian events associated with the history of bicycles. Students should indicate the following events: the introduction of the cycle in Canada, the beginning and end of the Canadian bicycle boom, the creation of the first Canadian bicycle clubs, the interest for cycles is revived in Canada, Canadian makers develop the mountain bike, etc.
- **Transportation Timeline:** Have students choose several modes of transportation and mark the date of their invention on the timeline. Have them include the invention of the bicycle, the automobile, the train, the motorcycle, the ship and the airplane.
- **Competitive Cycling Achievements:** Have students list important sporting achievements related to the bicycle. Have them include the first recorded *Velocipede* race, the creation of the Tour de France, the introduction of competitive cycling in the Olympics and important world records.

To complete this lesson, have students compare their timeline with the one developed by the Exploratorium on the theme of bicycles at:

<http://www.exploratorium.edu/cycling/timeline.html>



Activity 2.3: Improving the Bicycle over Time

Suitable for Grades 4 – 6

Purpose: Students will identify the principal changes in the design of the bicycle made by inventors and makers in order to improve the bicycle.



Class Discussion

Discuss the following questions with the class:

- Why do you ride your bicycle?
- What are the principal criteria you look at when selecting a bicycle?



List their answers on the board. (Possible answers: security, comfort, efficiency, speed, style, colour, weight, specific brand and cost) Have students rank the criteria listed on the blackboard from the most important to the least important when choosing a bicycle.

Invite a few students to share their top three answers with the class and have them describe why each factor is important to them.

Ask students which criteria were the most important to inventors and makers developing the first bicycles. Would these factors be the same as the ones you have listed? Many factors have influenced the evolution of the bicycle but three criteria have been the most

prevalent. Have students guess which three factors have contributed the principal modifications of bicycles throughout time.

Historically, the changes made to the bicycle have focussed around improving the **safety**, **comfort** and **speed** of the bike. Ask students why they think inventors and makers concentrated primarily on these elements when improving the bicycle.

Web Exploration

Using the *Cycles* page on the Canada Science and Technology Museum website at:

<http://www.sciencetech.technomuses.ca/english/collection/cycles.cfm> have students describe the elements and features of security, comfort and speed found on the principal bicycles developed in the 19th century. Identify how inventors and mechanics improved the security, comfort and speed of each cycle.

List the advantages and disadvantages of the features found on each cycle.

Have students write their answers in the grid provided in the worksheet for this activity.



Name: _____

Activity 2.3
Improving the Bicycle over Time
Can you describe the elements and features of security, comfort and speed found on these different bicycles? What improvements did each offer? List the advantages and disadvantages of the features.

	Velocipede	Velocycle	High-Wheel	Safety Bicycle
Security Features				
Comfort Features				
Speed Features				

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Activity 2.4: Cycle Inventors, Mechanics and Makers

Suitable for Grades 4 – 6

Purpose: Students will discover the stories of the people behind the creation of the bicycle — the inventors, mechanics and makers who contributed to its evolution.

The bicycle was not developed overnight; it took many inventors, mechanics and makers almost a century to come up with the modern bicycle. Since the early 19th century, these people have experimented with various devices and their creations have all contributed to the development of the bicycle that we know of today.

To learn more about the fascinating individuals who have played an important role in the technological advancement of the bicycle, invite students to prepare a biography sheet of one or more contributors. Using the internet, encyclopaedias and your school's resources, have students complete the biography sheets provided in Activity Sheet 2.4. Ask students to choose from the inventors, mechanics or makers from the list below:

- Baron von Drais
- Denis Johnson
- Pierre Michaux
- James Starley

Suggested website for the student's bibliography and photo research:

Canada Science and Technology Museum web pages

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

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



Name: _____

Activity 2.4
Cycle Inventors, Mechanics and Makers

Name: _____
Level: _____
Country of origin: _____

Write in each box the following (printed):

Copy	Paste

Other names inventors: _____

Biography: _____

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Canada



Activity 2.5: The Canadian Bicycle Boom

Purpose: Students will characterize the Canadian bicycle boom and identify its principal causes.

The *Safety* bicycle was so popular in Canada it created a period in history called the “bicycle boom.” This term was used to describe a very rapid growth of manufacturing and sales of the device. The *Safety* was an appealing, efficient, affordable product and combined with effective promotion, the craze for this bicycle took off.

Web Exploration

Suitable for Grades 4 – 6

Invite students to visit the Canada Science and Technology Museum’s web page describing the Canadian bicycle boom:

<http://www.sciencetech.technomuses.ca/english/collection/cycles14.cfm>

Have them find the answers to the following questions:

- When was the Canadian bicycle boom? (*1895-1900*)
- Why were bicycles so popular during this time? (*The bicycle became safer, more efficient, affordable and comfortable to ride.*)
- Why did the Canadian bicycle boom end? (*Too many makers were fabricating bicycles, price competition was fierce, and the automobile was gaining popularity.*)

Using Activity Sheet 2.5, students will paint a portrait of Canada during the Canadian bicycle boom. They will describe Canadian society and identify the principal means of transportation and communication used during this period.

Additional Activity: Bicycle Boom Advertisement

Suitable for Grades 5 – 6

To encourage Canadians to purchase the new, improved *Safety* bicycle, many manufacturers in the late 19th century and early 20th century used catalogues and even colourful posters for advertisements.

In small teams, have students design their own catalogue cover or poster to advertise bicycles during this same time period. Students should include: a Canadian manufacturer’s name and city (students should refer to the Museum’s website to locate this information), an image of the cycle and any other relevant information they wish to incorporate.

Encourage students to explore the web for information on this time period. Have students research the design of the cycles during the era, the fashion people wore and the look and style of the catalogues and posters at the end of the 19th century (colours, font style, illustration style, etc.)



Name: _____

Activity 2.5
The Canadian Bicycle Boom

Can be used as a guide or model for students when they create their own.

Year of the bicycle boom	
Causes that led to the boom	
Reasons why it ended	
Canadian production	
Canadian transport/communication	
Means of transportation	
Means of communication	
Principal industry and manufacturing activities	

Canada Science and Technology Museum Canada



These websites present examples of historic Canadian and American bicycle catalogues and posters:

Canada Science and Technology Museum web pages:

<http://www.sciencetech.technomuses.ca/english/collection/cycles16.cfm>

<http://www.sciencetech.technomuses.ca/english/collection/cycles21.cfm>

Selwood Cycle — Vintage Bicycle Poster Gallery

http://www.sellwoodcycle.com/gallery/view_album.php?set_albumName=posters&page=1



Activity 2.6: Bicycles Contribute to Social Change

Suitable for Grades 4 – 6

Purpose: Students will describe the social impacts of the development of the bicycle.

The previous activities demonstrated how people changed the bicycle over many years, but the opposite is also true, the bicycle changed people too.

Background Information for the Teacher

When the *Safety* bicycle appeared, the middle class could get bicycles and now ride beside wealthy club members. Young people had a way to emerge out of their neighbourhoods. Etiquette rules were in question. (Should a man tip his hat to a lady passing by on a bicycle?). The 1890s was an era of health fads and eventually the bicycle became part of the package but at first it was considered a source of health problems. Some doctors warned that children could damage their nervous systems by riding a bicycle. In due time the bicycle was recommended for losing weight, exercise and "calming the insane".

Some American writers (Murphy and Pridmore) consider the most lasting social consequence of the bicycle craze was the effect it had on women (Murphy, *The Exploratorium*). They believe the bicycle was instrumental in getting women's liberation rolling. Riding schools were established exclusively for women and by 1894 they were often riding alone. Women quickly realized the benefits of the bicycle. Women could experience a freedom and independence they had never known before the bicycle.



Writing more recently, Babaian, a Historian from at the Canada Science and Technology Museum, believes the influence of the bicycle in social change has been exaggerated (Babaian, *The Most Benevolent Machine*). Whereas others claim the bicycle revolutionized women's clothing, she states the bicycle was more an indication of the changing role of women in society. She believes the bicycle was a well suited agent for

expressing already emerging changes. The changes in women's clothing to accommodate the bicycle were reflecting the new woman of the 1890s. For instance, some women were discarding corsets altogether and launching themselves into a new styled life. Dressing to ride the bicycle was a natural argument to advance their cause. For easier riding, skirts were shortened (from floor to ankle). Trousers eventually became acceptable as "rational dress".

Activity: Who Said This?

The following quotes were made by three people living back in the late 1900s: a woman cyclist, a doctor giving medical advice to a cyclist and a bicycle manufacturer. Read out the three quotes and have the class guess who is speaking.



“It never talks back, it responds quickly to the slightest touch, it never growls when its meals are not ready, it does not swear or smoke.” *

A woman cyclist

“You should stop riding the bicycle. You have developed a bicycle hump.”*

A doctor giving medical advice to a cyclist

“Doctors are saying the rough ride *Velocipede* is causing "nerve death". I will make a cane seat that is more comfortable and will attract people to buy my bicycle.”*

A bicycle manufacturer

*Source: (Pridmore, The American Bicycle).

The Bicycle and Women's Fashion

It is difficult to imagine a lady in the late 1900s riding a bicycle in all the clothes she typically wore. Undergarments consisted of a corset, special cycling knickers made of wool and a long full petticoat (an undergarment worn underneath a skirt or dress). On top of this she wore a high-necked blouse, long skirt and a narrow waisted jacket. Her large hat was held on with half a dozen long hatpins.



Discuss the challenges women in the late 1900s may have encountered by wearing layers of constricting clothing when riding a bicycle. Ask students the following questions:

- What type of clothing do you wear when you ride your bicycle? What type of clothing do you not wear?
- Why did women wear layers of constricting clothing to practice this activity?
- Imagine riding your bicycle dressed in the fashions women wore in the late 19th century. How comfortable would you be? How difficult would it be to ride a bicycle? How long could your bicycle trip last?

To ride her bicycle a woman needed to wear more practical clothing and as time moved on the corsets and petticoats disappeared and were replaced by bloomers (a baggy trouser tightened at the knee) and button-down boots. Invite students to compare the women's fashion by visiting the following website:

<http://womenshistory.about.com/library/weekly/aa050900a.htm>

- Take a look at the illustration of the two women riding their bicycles. What are the principal differences between the women's clothing?
- How did the change in fashion make cycling easier for women?
- How do you think women of the time felt about this change?



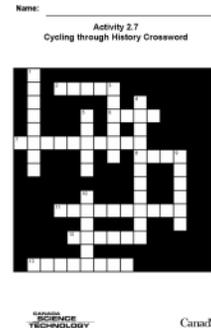
Activity 2.7: Cycling through History Crossword

Suitable for Grades 4 – 6

Purpose: Students will use their web searching skills in order to complete this word search and learn various facts about the history of cycles.

Have students explore the Canada Science and Technology Museum's web page on the history of cycles to complete this word search.

The clues are included in the activity sheet package to allow for copying and distribution of the sheets to your students. For your own reference, the clues and solutions are also included here.



Across

- 2 In the mid 1880s, this part was added to the *Facile* cycle to compete with the more popular *Kangaroo* type. (5) *gears*
- 6 This material was used to make the first bicycle frame. (4) *wood*
- 7 Developed by Denis Johnson, this vehicle was also known as the *Hobbyhorse* or *Dandyhorse*. (10) *Velocipede*
- 8 This cycle, developed in the USA around 1885, had a small wheel in front and a large one behind. (4) *Star*
- 11 This was the first bicycle developed by Baron von Drais in Paris in 1818. (10) *Draisienne*
- 12 Added in the 1860s, this bicycle part marked the beginning of a new cycle craze. (6) *pedals*
- 13 This cycle was created to respond to concerns about the safety of the *High-Wheel* cycle. (8) *tricycle*

Down

- 1 Canada's first cycling club was established in 1878 in this city. (8) *Montreal*
- 3 This inventor designed a very popular *Quadricycle* enjoyed by the wealthy class in the 1850s. (6) *Sawyer*
- 4 This name was given to *Velocipedes* by the British in the 1860s (11) *boneshakers*
- 5 Developed in 1870, this cycle had a 127 cm front wheel. (5) *Ariel*
- 9 This material was used to cover the rims of wheels to increase the comfort of the bicycle. (6) *rubber*

10 This cycle helped launch the bicycle boom in the late 19th century. (6)

Safety

Activity 2.8: What's in a Name?

Suitable for Grades 4 – 6

Purpose: Students will explore the various name variations given to the bicycle throughout time and identify their origin.

Throughout time, inventors and mechanics have transformed the bicycle and with each variation the invention has collected different names: the *Draisienne*, the *Dandyhorse*, the *Bonshaker*, the *Velocipede*, the *High-Wheeler*, the *Safety*, the *Tricycle* and even the *Human Powered Vehicle*. The name *Bicycle*, which first appeared in 1869, has remained in common use.

Web Exploration

To explore these name variations, have students explore the Canada Science and Technology Museum's web pages on the history of cycles:

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

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

Have students identify the root or the inspiration behind the names of this invention by completing Activity Sheet 2.8a.

Name: _____

Activity 2.8a
What's in a Name?

Circle (initially) the root or inspiration that the name seems given to their cycle. (highlight in red)

Name	Root or inspiration behind the name
Draisienne	
Velocipede	
Dandyhorse	
Bonshaker	
Velocipede	
High Wheeler	
Safety Bicycle	
Tricycle	
Human Powered Vehicle	

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Getting to the Root of the Word

Of all these names, the *Velocipede* and the *Bicycle* have been the most popular in identifying this invention as they relate to the function and character of the machine.

Using the school's library resources as well as the internet, have students find the roots of these words. What do the words *Velocipede* and *Bicycle* signify? Have students complete Activity Sheet 2.8b.

Name: _____

Activity 2.8b
Getting to the Root of the Word

Find the root of the following words.

BICYCLE	VELOCIPEDE
Bi = _____	Veloc = _____
Cycle = _____	Pede = _____

Circle (initially) other words that have similar roots!

Bi: _____

Cycle: _____

Veloc: _____

Pede: _____

Bi: _____

Pede: _____

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Naming Inventions

The name you give an invention is very important as it will be the reference the public will use to identify your device. Have students research ways in which inventions are named by exploring NASA's website:

http://scifiles.larc.nasa.gov/text/kids/Research_Rack/tools/naming_inventions.html.

Using the various methods researched on the web; invite students to propose alternate names to the bicycle. If you lived in the 19th century and had just invented a human propelled vehicle what would you have named it?



Name: _____

Activity 2.1 Collecting Cycles

Can you identify these cycles from the Canada Science and Technology Museum's collection and place them in the order that they were invented?

Use this website as a reference:

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













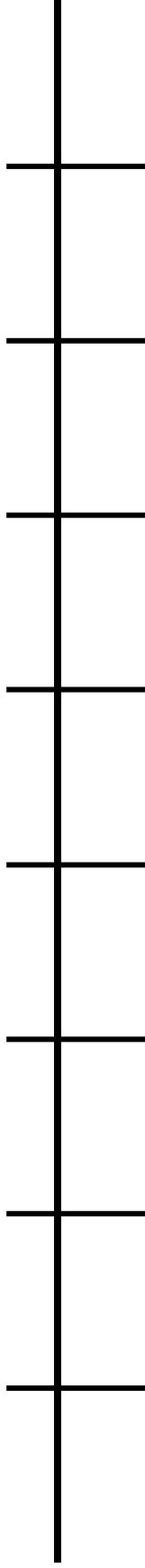






Name: _____

Activity 2.2 Timelines



Name: _____

Activity 2.3 Improving the Bicycle over Time

Can you describe the elements and features of security, comfort and speed found on these historical bicycles? What improvements did each offer? List the advantages and disadvantages of the features.

Bicycle	<i>Hobbyhorse</i> 	<i>Velocipede</i> 	<i>High-Wheel</i> 	<i>Safety Bicycle</i> 
Safety Features				
Comfort Features				
Speed Features				

Name: _____

Activity 2.4 Cycle Inventors, Mechanics and Makers

Name: _____

Lived: From _____ to _____

Country of origin: _____

Known to have invented the following cycle(s):

Cycle	Photo

Other known inventions:

Biography:

Name: _____



Activity 2.5 The Canadian Bicycle Boom

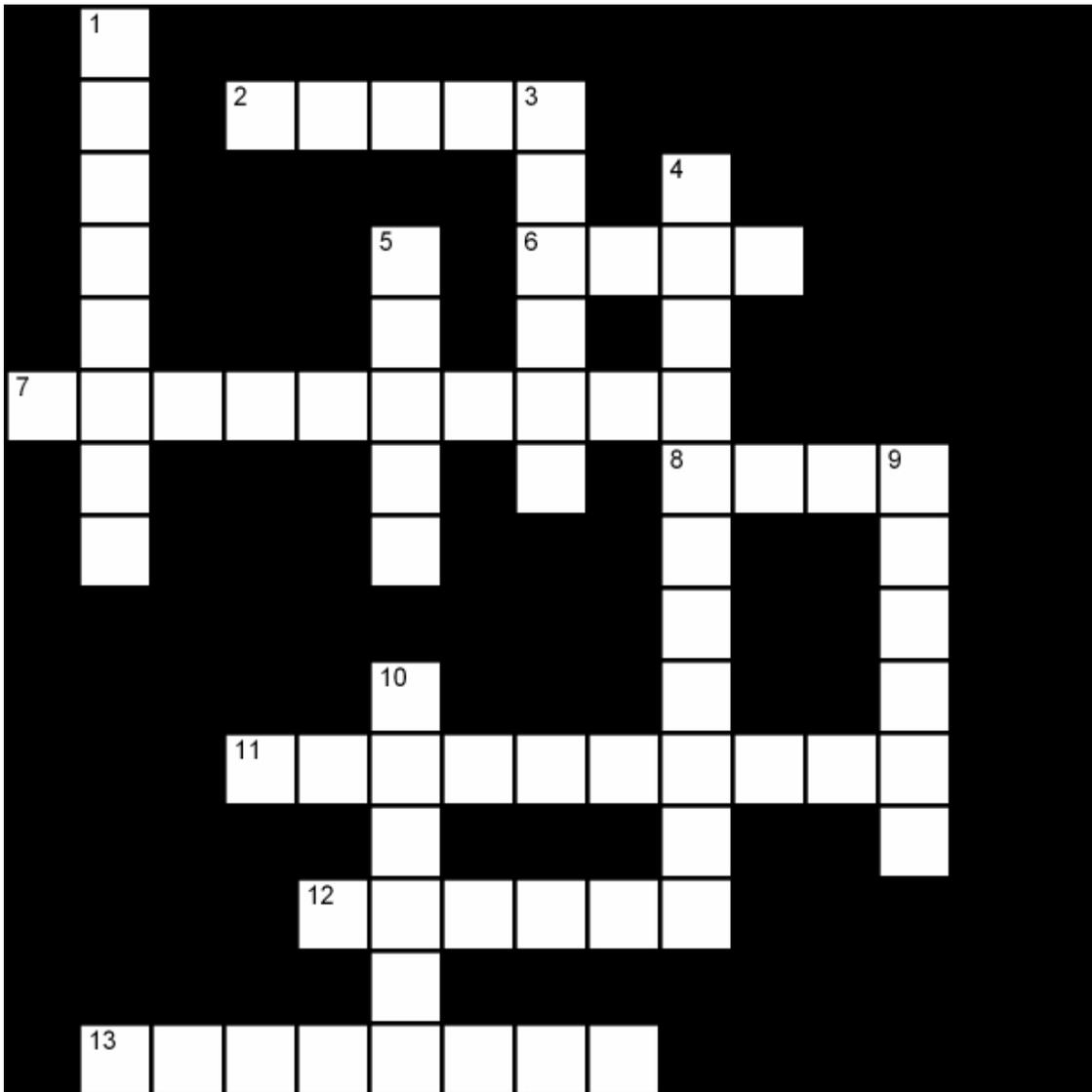


Can you paint a portrait of Canada during the bicycle boom?

Years of the bicycle boom	
Canadian Prime Ministers in office during these years:	
Provinces and territories in the Canadian Confederation by the end of the bicycle boom:	
Canadian population:	
Canadian historical context:	
Means of transportation:	
Means of communication:	
Principal leisure and entertainment activities:	

Name: _____

Activity 2.7 Cycling through History Crossword



Cycling through History Crossword Clues

Across

- 2 In the mid 1880s, this part was added to the *Facile* cycle to compete with the more popular *Kangaroo* type. (5)
- 6 This material was used to fabricate the first bicycle frame. (4)
- 7 Developed by Denis Johnson, this vehicle was also known as the *Hobbyhorse* or *Dandyhorse*. (10)
- 8 This cycle, developed in the USA around 1885, had a small wheel in front and a large one behind. (4)
- 11 This was the first bicycle developed by Baron von Drais in Paris in 1818. (10)
- 12 Added in the 1860s, this bicycle part marked the beginning of the new cycle craze. (6)
- 13 This cycle was created to respond to concerns about the safety of the *High-Wheel* cycle. (8)

Down

- 1 Canada's first cycling club was established in 1878 in this city. (8)
- 3 This inventor designed a very popular *Quadricycle* enjoyed by the wealthy class in the 1850s. (6)
- 4 This name was given to *Velocipedes* by the British in the 1860s (11)
- 5 Developed in 1870, this cycle had a 127 cm front wheel. (5)
- 9 This material was used to cover the rims of wheels to increase the comfort of the bicycle. (6)
- 10 This cycle helped launch the bicycle boom in the late 19th century. (6)

Name: _____

Activity 2.8a What's in a Name?

Can you identify the root or inspiration behind the various names given to these cycles throughout time?

Name	Root or inspiration behind the name
Draisienne	
Hobbyhorse	
Dandyhorse	
Boneshaker	
Velocipede	
High-Wheel	
Safety Bicycle	
Tricycle	
Human Powered Vehicle	

Name: _____

Activity 2.8b
Getting to the Root of the Word

Find the root of the following words.

BICYCLE

VELOCIPEDE

Bi = _____

Veloci= _____

Cycle = _____

Pede= _____

Can you find other words that have similar roots?

Bi

Cycle

Veloci

Pede

(or

Ped)

