

Destination Cinema's Niagara: Miracles, Myths and Magic TEACHER'S GUIDE

A note about the learning materials



Dear Teachers,

These materials are designed to be used with students in the late primary year through junior high level. However, many of the activities may be adapted to any grade level. They are intended to be used in conjunction with the viewing of the IMAX film "Niagara: Miracles, Myths and Magic" and historical exhibits to enhance the students educational experience.

Objectives

- To use Niagara: Miracles, Myths and Magic to encourage the development of literature, art, writing and science skills.
- To provide the opportunity for students to practice the scientific processes of observing, communicating, comparing, organizing and relating.
- To encourage critical thinking
- To integrate computer technology skills

Organization

Niagara-Background Information

Communicating Ideas: Activities in Literature, Art and Writing

Examining Ideas: Scientific Activities

Checking for Understanding

Supplementary Activities

List of Resources

Niagara Miracles, Myths & Magic
A Large-Format Film
Produced by Destination Cinema

INDEX OF LESSONS

Lesson	Grade Level
1 Readers Theatre: The Legend of Lilawala and follow up activities	Grades 3 to 6, but some of the supporting activities are suitable for students in the upper Grades.
2 Be An Artist	Grades 2 up
3 Debate	Grades 4 to 9
4 Mirette on the High Wire Mirette and Bellini Cross Niagara Falls	The stories are suitable for students k to 4, but can be used successfully with older students to introduce the outlined themes.
5 Be A Tourist	Grades 1 up
6 Scientific Experiments · Slope Power · Water Power	Grades 4 to 7
7 The Retreat of Niagara Falls Analysis of the data and Graph preparation on graph paper	Grades 6 to 9, but the graphs can be prepared by students in grade 4 up.
8 Mastering the Facts	Grades 4 to 7

BACKGROUND INFORMATION

Great Thundering Waters

Some 12,000 years ago, the glaciers from the last great Ice Age covered large portions of North America. As the glaciers melted, the waters formed a large inland sea. As the inland sea grew larger, it overflowed its banks forming Niagara Falls.

While only the 49th highest waterfall, Niagara Falls is the most famous waterfall on earth. Four of the Great Lakes, Superior, Michigan, Huron, and Erie all feed water into the Niagara River. So much water flows over the falls, some 1,500,000 gallons every second, that only two other falls in the entire world carry more water.

Niagara comes from a Neutral Indian word meaning “thundering waters.” Other tribes had other names for the

falls. Some sources claim the Seneca Indians named the river and falls for “great throat” while the Iroquois Indians called them Onguiaahro, meaning “the strait”. All were right, and their names reflected their point of view and culture.

Niagara Falls actually consists of two falls: American Falls in New York on the United States side, and Horseshoe Falls in Ontario on the Canadian side of the Niagara River. After it drops over the falls, the

Niagara River turns north, flowing swiftly through a narrow, 7 mile (11 km) gorge. The gorge is rarely more than 1/4 mile (0.4 km) wide but the water ranges from 200 to 500 feet (60 to 150 meters) deep.

Whirlpool Rapids is located just below the falls, formed as the river scoured out a deep basin. The waters swirl violently in the whirlpool reaching speeds of 26 miles (43 km.) per hour. Downstream rapids form before the Niagara River empties quietly into Lake Ontario.

NIAGARA FALLS FACTS AND FIGURES

	HORSESHOE FALLS	AMERICAN FALLS
Height of falls	54 m (176 ft)	56 m (184 ft)
Plunge basin	55 m (180 ft)	
Total drop	109 m (356 ft)	56 m (184 ft)
Width	675 m (2215 ft)	320 m (1050 ft)
Water flow (average)*	5214 m ³ /sec (180,200 cu ft/sec)	919 m ³ /sec (31,800 cu ft/sec)

**data from several sources*

COMMUNICATING IDEAS: ART, LITERATURE AND WRITING

The Legend of Lilawala-Maid of the Mist

Readers Theater

This recreation of the tale of the Indian maiden who, with the help of the Thunder Being, saved her people from the sickness that haunted them, is written for children in grades 3 to 6.

Characters	Narrator 3/ Old Wise Man
Chief	
Narrator 1	Narrator 4
Narrator 2	Hinu Lilawala

Narrator 1	In those days the Native people who inhabited the area around Niagara Falls referred to their homeland as the Land of The Thundering Waters.
Narrator 2	They believed that the greatest beings, The Thunder Beings, lived in a cave behind the great falls.
Narrator 3	They were lead by Hinu, the most powerful Thunder Being.
Narrator 4	The Falls were an important and sacred place for the people.
Narrator 1	Life was good in the Land of the Thundering Waters except for one problem. A great sickness came upon the people who lived in the village and no one knew what to do about it. Many villagers died each year.
Narrator 2	The chief of the people was strong and courageous.
Chief	I am proud to lead the people of the thundering waters , but there is one problem... the sickness that kills many of my people. What to do?? What to do??
Narrator 3	The chief of the people had a lovely daughter named Lilawala. She was a pleasant girl with long flowing hair.
Lilawala	My name is Lilawala and I love our village. I try to do my share of the work, and I give thanks to the spirits for the abundance of food that we have and for the Great Thundering Waters

Narrator 4	One day the chief called his daughter to him.
Chief	Lilawala, I have decided that it is time for you to marry.
Narrator 1	Lilowala was happy to hear the news.
Lilawala	Oh, how wonderful father, which of the young braves will I marry?? Will it be the brave Running Deer or the handsome Hunter of the Rabbit?
Narrator 2	Lilawala was particularly hopeful about Hunter of the Rabbit, she liked him.
Narrator 3	The chief answered sternly.
Chief	You will not marry one of those unworthy men. Particularly in these difficult times, you must have a man of wisdom. You will marry the oldest and wisest man in the village.
Narrator 4	Lilawala was shocked to hear her father's words. She felt that she could not marry the old, wise man, and she pleaded with her father to change his mind.
Lilawala	Oh father please, change your mind. I cannot marry a man who SMELLS so disagreeable and IS disagreeable.
Narrator 1	But the chief and the old wise man insisted that this was the best option for her.
Old, Wise Man	Oh Lilawala, you will be my bride and together we will live for many moons.
Narrator 2	The chief insisted that Lilawala carry out his wishes.
Chief	Lilawala do not be foolish. Marry the wisest man in the village in these troubled times.
Narrator 3	Lilawala pleaded with her father.
Lilawala	I cannot love him father, please don't force me to marry him.
Narrator 4	But the chief remained firm
Chief	You WILL marry him!!
Narrator 1	Lilawala did not want to disobey her father or bring dishonour on her people.
Narrator 2	She decided that she had to leave her village. Sadly she ran away, and when she had put some distance between her and the village, she sat down and cried for she did not know where to go or what to do.
Narrator 3	The chief had two big problems now, sickness in the village and a disobedient daughter. What could he do?? What could he do??
Narrator 4	After a while she began to run again, this time in the direction of a mysterious voice that seemed to be calling her.
Hinu	Lilawala, Lilawala, follow me
Narrator 1	She walked and walked following the voice which lead her to the edge of the great river.
Hinu	Lilawala, Lilawala, follow me.
Narrator 2	The voice continued to call her.
Hinu	Lilawala, Lilawala follow me.
Lilawala	I am following though I am frightened. Oh, who is calling me?
Narrator 3	She jumped into the swiftly flowing river that led to the thundering waters.
Narrator 4	The river took control of Lilawala and forced her closer to the falls.
Narrator 1	Down she fell over the falls and into the turbulent water.
Narrator 2	She was bounced, and buffeted by the water. Lilawala was terrified
Narrator 3	Suddenly, she landed softly and she heard the voice more clearly.
Hinu	I have saved you, Lilawala. The Great Thundering Waters have taken away your life, but you are safe here. You can live in the cave behind the Falls with the Thunder Beings.

After reading the story, the students can

- sequence the events
- create a story board with illustrations and dialogue
- turn this story board into a slide show on the computer
- identify the story type (legend, folk tale, fairy tale, fable, myth) and explain its components
- compare this story with another story of the same type
- perform this readers theatre as a puppet play
- Read another version of the legend of Lilawala entitled "The Wife of Thunderer" in Iroquois Stories: Heroes and Heroines Monsters and Magic, by Joseph Bruchac Notice the similarities and differences in the details of the story. Make a Venn Diagram showing these similarities and differences.
- Write your own tale that explains another aspect of Niagara Falls or some other mystery of nature. Tell your story. Decorate a paper bag as your prop or storyteller's bag and choose appropriate items as your props to help tell or illustrate the story as native storytellers did. Some simple prop suggestions are belts, beads, strings of beads, flowers, sticks, pipes, rattles, feathers, bark, masks, and drawings or small figures of animals.
- Videotape the story.
- Write your own readers theatre based on Bruchac's version of the tale of Lilawala or another tale that interests you.

Some suggested strategies

Encourage the children to read the script silently and then to rehearse the script in small groups. After the groups have had the opportunity to practice, they can present to the entire class. Remind students that in readers theatre they speak to the audience rather than to each other and they say their lines as they think the character would say them.

Props or costumes are not necessary, but may be used if they do not interfere with the students' reading. Some suggested costumes/props are headdresses, necklaces, and drums.

Narrator 4	Lilawala lived happily in the Land of the Thunder Beings.
Narrator 1	Although she never returned in person to her village, she continued to be concerned about the villagers, so she whispered in her father's ear the secret that she had learned from Hinu.
Hinu	Your people are dying because a giant snake is poisoning the water they drink.
Lilawala	Don't drink the water. Lead all of the villagers out of the village, and when the giant snake emerges from the river, kill him, father.
Narrator 2	The villagers moved from the village, and they fought the snake.
Narrator 3	When the snake was injured, it wriggled in pain and as it was dying it formed a great arc shape.
Narrator 4	That great snake in its great arc shape formed the Horseshoe Falls.
Narrator 1	The chief and villagers were happy. The sickness was gone and they had a beautiful new falls.
Chief	I miss Lilawala, but I know she is near for it was her voice that warned me and saved the village.
Narrator 2	The chief and the villagers believed that Lilawala's spirit continued to live happily behind the falls keeping a close look on her people.
Narrator 3	Many insisted that they saw her in the mist at the base of the falls.
Narrator 4	If you ever go to Niagara Falls, look for the Great Thundering Waters, the arc shaped Horseshoe Falls and for Lilawala, the Maid of the Mist, emerging from the falls with her long hair flowing.

Be an Artist

The first Europeans to see Niagara Falls were awed by it and wanted to recreate it so others who couldn't witness it could appreciate some of its splendour. Father Hennepin, in the first eyewitness account of Niagara Falls in 1678, described the 170 ft. waterfall as 500 ft high, so the first drawings were inaccurate. However, many artists chose to visit what Hennepin called "an incredible cataract or waterfall which has no equal" and to paint the site from their own perspective. One example appears here.

What medium would you choose to illustrate Niagara Falls? One suggestion is finger painting with acrylic paint in the style of the great French Impressionist, Renoir. After examining a few paintings by Renoir

such as Moulin Huet Bay, Guernsey, 1884, The Seine at Champrosay, 1876 and Treboul, near Douarnenez, 1895, draw the students' attention to the colour choices and the amount of paint used in each painting. Encourage them to dab the paint onto paper or cardboard and then spread it with a finger or fingers to form an impression of the scene they

are depicting. Be sure that they clean their fingers between the application of different colours. Once there is enough paint on the page, use the end of a paintbrush or comb to create texture.

Examine photos of other waterfalls to paint or draw in the medium of your choice.



*Left: Robert Hancock-Engraving, 1794, after a sketch by Father Hennepin
 Photo: National Archives of Canada, c-014586*

Daredevils: Debate Niagara Falls

Niagara Falls has attracted its share of daredevils. Their death defying feats can be examined in the following web sites:

- www.infoniagara.com/d-dare.html
- www.infoniagara.com/d-fast.html
- www.iaw.on.ca/~falls/daredevils.html
- www.iaw.com/~falls/devil_frame.html

These types of activities have been illegal since 1911. There are those who feel that it is the human right of each individual to risk their lives to test themselves against the falls in anyway that they wish. There are others who remind us that these types of activities not only endanger the lives of the participants, but of those involved in the rescue operations as well. Some of the rescue operations can involve

Niagara Parks Police, The Coast Guard, Niagara County Sheriff's Marine Patrol, helicopters and jet boats. You may wish to consult the American Bill of Rights, the Canadian Charter of Rights and Freedoms and the United Nations' Universal Declaration of Human Rights while preparing your argument.

- Debate whether or not people should be allowed to risk their lives trying such feats.
- Following the debate, you may wish to cast your vote on this issue at the Niagara Parks Commission site at www.Niagara-info.com/debat.html

Be it resolved that any individual should have the right to challenge Niagara Falls in any way he may choose.



- Design a broadside or advertisement for one of the daredevils.
- Write a letter from the point of view of Annie Taylor at the end of her life. Tell about your adventure and how you feel about it at the end of your life.
- Be a reporter at the scene and report on one of the death defying events.



Above: The Niagara Falls Public Library (Ontario) William Hunt using the name Signor Farini walks across the falls carrying a wash tub on his back, 1860. He lowered the tub to fill it with water, washed some items and then hung them on his balance pole.

Left: The Public Library of Niagara Falls (Ontario) Inscription on her Gravestone Annie Edson Taylor First to go over the The Horse Shoe Fall In a Barrel and Live October 24, 1901

Read a Story about Niagara Falls

Read *Mirette on the High Wire* by Emily Arnold McCully, and/or *Mirette and Bellini Cross Niagara Falls*. Mirette is a daredevil who begs Bellini, a high wire walker to teach her how to do it. After much effort she attains her goal and assists Bellini in recovering his courage as well. She then travels with him to North America where they experience an extra challenge when attempting to cross Niagara Falls.

- Have you ever had to work hard to learn how to do something? Tell about one of your accomplishments. How long did you practice and how did you feel once you could do what you wanted to accomplish. For

example, how did you feel the first time you tried to ride a bike, inline skate or snowboard?

Design a poster advertising your accomplishment(s).

- Bellini is based on the true to life character Jean Francois Gravelet, known as Blondin. He was a tightrope walker who crossed Niagara Falls on one occasion with his manager on his back, on another with his assistant on his back and on still another occasion he cooked a meal while on the wire.

Mirette admires Bellini and she wants to emulate (be like, or copy) him. His great ability on the high wire inspires

her to work toward acquiring this skill.

Is there anyone who inspires you?

What has this person accomplished that makes you want to emulate him or her? What difficulties or challenges did he/she encounter? Or...Bellini is Mirette's teacher. Describe a person who has taught you how to do something that you thought was very difficult. What special qualities did this good teacher have?

- The question of good sportsmanship is raised in the story about Niagara Falls. What is good sportsmanship? What are examples of it in the sporting world today and/ or in the history of sport?

Be A Tourist at Niagara Falls

In the years between the end of the War of 1812-1814 and before the American Civil War, 1861-65, tourists began to flock to Niagara Falls in larger numbers. Once the American Civil war was over, tourism flourished again. Along with the tourists came those who viewed the falls as the greatest place to entertain crowds by trying death defying feats. In addition, the number of inns, taverns and tour guides increased on both sides of the border.

- You are one of the sightseers in the photo. Write a post card to a friend from Niagara Falls describing what you have seen on your visit. Draw the event on the other side of the post card.

- Write a radio play or newspaper story about your visit. When making your choice of subjects to discuss, remember the story of seven year old Roger Woodward's adventure or misadventure over the Falls reenacted so realistically in the film *Niagara: Miracles, Myths and Magic*



Niagara: Miracles, Myths and Magic

- Prepare a travel brochure advertising the wonders of Niagara Falls.

Above: The National Archives of Canada, PA-147956. Man and woman seated on a bench before the falls.

SCIENCE

Materials:

Slope Power and Water Power.

1. A plastic trough fashioned from plastic pipe cut in half lengthwise or wallpaper tray (cut out).
2. gravel/sand mixture.
3. Two plastic buckets, three to five-quarts in size.

A. Advance preparation: Slope Power - Investigating the Effect of Slope on Stream Erosion.

Cautions:

Students will be using water during this investigation. Have sponges, towels, and mops available for spilled sand and water. Several trials may be made before the catch bucket becomes full; remind students to empty the buckets often. When the trough angle is low the gravel may not move; try tapping gently on the side of the trough to get the gravel moving. When investigating the effect of stream slope, students must keep the water volume the same.

Range of results:

Quantitative results are likely to vary widely: if students average their data it will take from 5 to 30 seconds to erode the gravel/sand mixture.

Answers to questions:

1. Students should mention the data and point out that the gravel eroded faster when the slope was steepest .

2. The greater the slope, the greater the rate of erosion.
3. The slope of a stream changes continuously through erosion and/or deposition.
4. The slope of Niagara Falls is 90° or vertical, the steepest slope possible. Erosion occurs rapidly from the force of the pounding water.

B. Duplicate and distribute Water Power- Investigating the Effect of Water Volume on Stream Erosion.

Materials:

Materials are identical to those in **Slope Power** discussed above.

Cautions:

Same as those for Slope Power except when investigating the effect of water volume, students must keep the slope the same.

Range of results:

Quantitative result will vary widely. Typical student data will range from 5 to 30 seconds to erode the gravel.

Answers to questions:

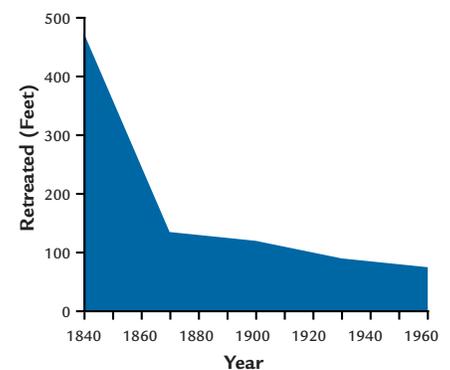
1. Answers should indicate that the sand/gravel mixture eroded fastest when the volume of water was highest.
2. The greater the volume, the greater the rate of erosion.

3. Small particles were carried away fastest. Rounder, smoother particles were carried away faster.
4. During dry months, water volume decreases. Volume can increase with rain, melting snow, or tributaries.
5. Erosion is occurring very rapidly at Niagara Falls. The tremendous volume of water combined with a nearly vertical slope contributes to rapid erosion at the crest and base of the falls. Numerous blocks of rock that have tumbled into the gorge can be seen at the base of the falls.

C. Duplicate and distribute The Retreat of Niagara Falls.

Answer to questions:

1. The Niagara River flows north.
2. The falls are retreating to the south toward Lake Erie
3. Students should describe the steep slope during the first interval and then the flattening of the line. In general, the retreat has slowed with time.



4. The falls retreated 470 feet (143m.) in the first interval. They retreated another 80 feet (25m.) during 1906 to 1926. This question is designed merely to have students examine their graphs. Caution students that a better comparison would be to compare rate of retreat since each interval is a different number of years.
5. The falls have retreated 865 feet (264m.) in 185 years.

6. $R=D/T$; $R = 865 \text{ feet}/185 \text{ years} = 4.7 \text{ feet/year. (264m.}/185 \text{ years}=1.425\text{m./year)}$
7. $R=D/T$; $R= (7 \text{ miles} \times 5,280 \text{ feet/mile})/12,000 \text{ years} = 36,960 \text{ feet}/12,000 \text{ years} - 3.08 \text{ feet/year. (11km.} \times 1000\text{m./km.}/12,000 \text{ years}+11,265\text{m.}/12,000 \text{ years}-0.94\text{m/year)}$
8. At the present rate of retreat, the falls would retreat to Lake Erie in 25,000 years. Lake Erie would be

completely drained and in its place would be a river connecting Lake Huron and Lake Ontario. Some scientists have stated that the land under the Niagara region is slowly rising and could raise the riverbed above the surface of Lake Erie. If this happens Lake Erie would have to seek another outlet to the sea, perhaps southward through the Mississippi River drainage basin.

Slope Power: Investigating the Effects of Slope on Stream Erosion

Objectives:

To determine the effect of slope on stream erosion.

Materials needed:

(Per team of three to six students)
 Plastic trough, tubing and clamp for siphon supports to raise one end of trough, gravel/sand mixture, 500 ml (2cups) 2 to 3 buckets to catch water timer, water, protractor.

Procedure:

1. Place the trough so it is sloped only slightly. Raise one end about 5° . Be sure the lower end drains into a catch bucket.
2. Place a second bucket Filled with water at the highest end of the trough. Insert the siphon tube into the water-filled bucket.

3. Place about 500 ml (2 cups) of the gravel/sand mixture in the trough about 15 cm (6inches) from the edge of the highest end.
4. Release the clamp and let the water run onto the trough and then into the gravel/sand mixture. Do not put the water from the tube directly onto the gravel/sand.
5. Measure the time it takes the gravel to be washed into the catch bucket
6. Record your observations. Record the time in the Data Table.
7. Repeat two more times and average your results.
8. Repeat the investigation but change the slope of the trough. Use angles of 10° and 15° . Make sure the same amount of water is released each time.

Data:

Observations

Analysis:

1. Examine your data and write what the data means.
2. What is the relationship between stream slope and the rate of erosion?
3. How can the slope of a stream or river change in nature?
4. After viewing the film NIAGARA: Miracles, Myths & Magic, describe the slope of the Niagara River at Niagara Falls? What effect do you think this has on erosion of the riverbed?

Sample Data Table:

Slope	Trial 1	Trial 2	Trial 3	Average
5°				
10°				
15°				

Water Power: Investigating the effect of water volume on stream erosion.

Objectives:

To determine the effect of water volume on stream erosion.

Materials needed:

(Per team of three to six students)

Plastic trough, tubing and clamp for siphon, supports to raise one end of trough, gravel/sand mixture, 500 ml (2 cups) 2 to 3 buckets to catch water timer, water, protractor.

Procedure:

1. Place the trough at an angle of 5°. Be sure the lower end drains into a catch bucket.
2. Place a second bucket filled with water at the highest end of the trough. Insert the siphon tube into the water filled bucket.

3. Place about 500 ml (2 cups) of the gravel/sand mixture about 15 cm(6inches) from the highest end of the trough.
4. To simulate a low volume of water flow, release the clamp only partially so that the flow of water is restricted. Let the water run onto the trough.
5. Measure the time it takes the gravel to be washed into the catch bucket. (You may have to tap the trough lightly to start the gravel/sand moving.)
6. Record your observations in the space provided. Record the time in the Data Table.
7. Repeat two additional times and average your results. Remember to

let the water flow at the same rate each time.

8. Repeat the investigation but change the volume of water. To simulate “normal” water volume, open the clamp all the way. For high volume of water flow you can have another team place its bucket near your equipment setup and allow water from both buckets to flow down the trough.

Data:

Observations

Analysis:

1. Examine your data and write what the data indicates about volume of water and erosion.
2. What is the relationship between water volume and rate of erosion?
3. What did you notice about the movement of different size particles? Different shape particles?
4. How can the volume of water carried by a stream be changed in nature?
5. After viewing the film NIAGARA: Miracles, Myths and Magic do you think erosion is occurring rapidly at Niagara Falls? Explain your answer.



Sample Data Table:

Volume	Trial 1	Trial 2	Trial 3	Average
Low				
Normal				
High				

The Retreat of Niagara Falls

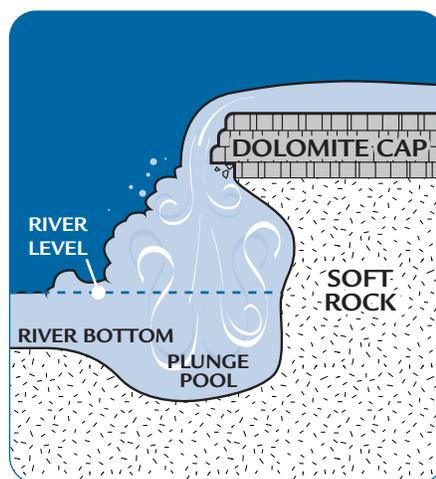
Background Information

Niagara Falls has not always been where it is today. Since the falls were formed they have been moving south. If we do not interfere Niagara Falls eventually will move all the way to Lake Erie. Since the time Niagara Falls was formed about 12,000 years ago, they have moved steadily upstream. This process is called head-ward erosion because the falls are moving toward the head waters or origin of the river.

As the tremendous volume of water in the Niagara River rushes over the falls it wears away at the rock that forms the river bottom. This rock is a hard, black rock called dolomite. The dolomite lies

on top of soft, flaky shale. Dolomite is more resistant to erosion than shale.

Moving water and winter ice cause the shale to erode. Because shale is softer it erodes faster, undermining the more



resistant dolomite above. Eventually so much shale is removed that the overhanging dolomite collapses and tumbles to the base of the falls. As the dolomite is removed the position of the falls moves a little bit farther back upstream.

Engineers have been recording the position of the falls since 1764. The data in the table below shows how much Niagara Falls moved upstream between 1764 and 1949.

The fast flowing water causes the soft rock to weaken underneath the stronger dolomite cap. Eventually the unsupported cap falls off and the waterfall recedes.

Procedure and Analysis

1. Locate Niagara Falls on a map which shows the New York/Ontario area. In which direction does the Niagara River flow? If the falls are moving upstream, in which direction are the falls retreating?
2. Plot the data provided for Dates and Retreat of Falls on a graph. (NOTE: Use the last year listed for each interval. For example, when you plot the data for the interval 1764-1842 use 1842 as the year.)
3. Connect the points and describe the slope or shape of the line.
4. During what interval did the falls retreat the most? Least?
5. How much have the falls retreated since they have been measured? How many years has this taken?
6. The rate at which the falls have retreated can be determined from the data. Rate (in feet or metres per year) can be calculated by dividing total distance (in feet or metres) by total time (in years). According to the data in the table, what is the rate at which the falls have retreated during the interval?
7. The original falls formed 12,000 years ago about 7 miles (11km) downstream from the present falls. What is the rate at which Niagara Falls migrated since they were formed? (HINT: There are 5,280 feet in one mile and 1000m. in one kilometre)
8. In recent years the rate of erosion of the falls have been slowed as a result of the diversion of some of the water flow to the hydro

electric generating plants and modifications such as the installation of iron rods to strengthen the rock underneath the falls. The present rate of retreat of Horseshoe Falls is about 1 foot (30cm.) per year. American Falls retreat at a miniscule rate because of human modifications. What would happen if the falls retreated all the way to Lake Erie?

Date	Interval (Years)	Retreat of Falls (Feet-Metres)	Total Retreat (Feet-Metres)
1764-1842	78	470 ft. (143m.)	470 ft. (143m.)
1842-1875	33	133ft. (41m.)	603 ft. (184m.)
1875-1906	31	110 ft. (34m.)	713 ft. (217m.)
1906-1926	20	80 ft. (24m.)	793 ft. (242m.)
1926-1949	23	72 ft. (22m.)	865 ft. (264m.)

Comprehension - Mastering Facts

Use these clues to complete the puzzle below. Answers may be found in the Student Handouts and by viewing the film *NIAGARA: Miracles, Myths & Magic*.

1. Jesuit priest who wrote one of the earliest accounts of a European expedition to Niagara Falls
2. Cause of the retreat of the falls upstream
3. School teacher who survived a ride over the falls in a barrel in 1901
4. Name of the river that flows over Niagara Falls
5. Of the two falls making Niagara Falls, the one in the United States
6. Lake from which the water flows before tumbling over Niagara Falls
7. Famous boat which takes tourists to the base of Niagara Falls
8. Of the two falls, the one that is in Canada
9. Lake into which the water flows after falling over Niagara Falls
10. Hard, erosion-resistant type of rock capping Niagara Falls
11. Indian woman who sacrificed her life to the “Thunder Beings”
12. Soft, easily eroded rock type found in the cliffs of Niagara Falls

	1	_ _	N	_ _ _ _ _
	2	_ _ _ _ _	I	_ _ _
	3	_ _ _ _ _	A	_ _ _ _ _
	4	_ _ _ _	G	_ _ _ _ _
5	_ _ _ _ _	_ _	A	_ _ _ _ _
	6	_	R	_ _ _
	7	_	A	_ _ _ _ _
8	_ _ _ _ _	_ _	F	_ _ _ _ _
	9	_ _ _ _	A	_ _ _ _
	10	_ _	L	_ _ _ _ _
11	_ _ _ _ _	_ _	L	_ _ _
	12	_	S	_ _ _ _ _

- | | | | |
|----------------|-------------------|---------------------|--------------------|
| 1. Hennepin | 4. Niagara River | 6. Erie | 9. Ontario |
| 2. Erosion | 5. American Falls | 7. Maid of the Mist | 8. Horseshoe Falls |
| 3. AnnieTaylor | 10. Dolomite | 11. Lelawalla | 12. Shale |

History & Geography

- Examine the vital role of Niagara Falls in the early history of North America.
- Study one of the earliest park builders. Examine the role of Frederick Law Olmstead in the development of green spaces and parks in major cities in 19th century North America, particularly Niagara Falls.
- Investigate how a canal works, and the significance of the Welland Canal.
- Study the culture of the Native groups that inhabited the area around Niagara Falls.
- Examine the development of the St. Lawrence Seaway and its affect on commercialism in North America.

Resources

Books

Berton, Pierre

Niagara: A History of the Falls.
McClelland and Stewart, 1992

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A Picture Book of Niagara Falls.
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Bruchac, Joseph.

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Niagara Falls: Nature's Wonder.
Holiday House, 1996.

Granfield, Linda

All About Niagara Falls. Morrow, 1988

McCully, E. Arnold

Mirette and Bellini Cross Niagara Falls. Putnam, 2000.

Mirette on the High Wire. Putnam, 1992. (picture books)

McGreevy, Patrick.

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Wishinsky, Freda

The Man Who Made Parks: The Story of A Parkbuilder Frederick Law Olmstead. Tundra Books, 1999. (picture book)

Wood, Jenny

Waterfalls: Nature's Thundering Splendour. Gareth Stevens, 1991.

Videos

Canada: A People's History (video series) Episode 5. A Question of Loyalties. Canadian Broadcasting Corporation, c. 2001.

The Challenge of Niagara Falls (25 Min) Lafayette California: International Video Network c. 1985

Naturally Niagara Falls (30 min) Lockport New York: Video Vacation c. 1991

St. Lawrence Seaway to the Sea (96 min) National Film Board of Canada, 1986.

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