

## Directions

Read this article about an interesting Icelandic phenomenon. Then do Numbers 43 through 53. You may look back at the article as often as you like.



Imagine a huge sheet of ice, covering 8,300 square kilometers<sup>1</sup> of land. That's about the size of Rhode Island and Delaware combined. It's also the size of Vatnajökull (pronounced VAT-na-yer-kull), the largest glacier in Europe and the third largest in the world. (Only Antarctica and Alaska boast larger glaciers.)

Vatnajökull, which covers much of southeastern Iceland with ice 400 to 800 meters deep, normally grinds slowly toward the sea. Beneath the glacier, heat generated by friction melts some of the ice, which gathers as water in lakes under the glacier. These lakes are held back by dams also made of ice. Small rivers and

streams carry some of this lake water out from under the glacier to the ocean.

But sometimes the ice melts too quickly for the drainage system to work effectively. A lake gets too full, and the pressure of the ice above breaks down the ice dam that holds the lake in place. The water surges out from beneath the glacier, flooding across the countryside. The flood is called a *jökulhlaup* (Icelandic for glacier flood or glacier burst and pronounced JER-kull-hloip). Jökulhlaups occur in Iceland every few years and can cause havoc. But when a second melting factor is added to the jökulhlaup formula, the result can be disaster.

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<sup>1</sup>kilometers: one kilometer equals .62 of a mile

In October 1996, a volcano broke through a cauldron in Vatnajökull glacier, Iceland's largest. Meltwater from the glacier filled Grimsvötn Lake to overflowing, creating a jökulhlaup that destroyed everything in its path (see illustration, right).

## Fire Meets Ice

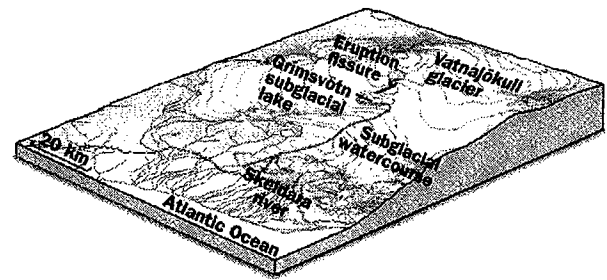
Iceland sits on top of a rift between continental plates.<sup>2</sup> Its glaciers, including Vatnajökull, flow over active volcanoes. When one of those volcanoes erupts, hot magma mixes with ice; the result is lots of water, very quickly.

As the ice melts underneath the glacier, its surface sinks down to form a large bowl-shaped depression, called a cauldron. Then the volcano breaks through the thin layer of ice at the cauldron's base, shooting steam and dark ash high in the air. The lakes beneath the glacier fill and swell with heated water. Whole sections of the glacier are lifted up and float on the lakes.

Icequakes follow, which break apart huge slabs of the glacier and form dangerous crevasses many meters deep. The quakes can also weaken an ice dam holding back a lake.

Since the dam is under pressure from the weight of the glacier above, it suddenly gives way. As the water rushes out, what was once a small drainage river suddenly swells to a massive one. (In 1996, the flow of a jökulhlaup river for several hours was reported to be equivalent to that of the Congo River, which has the second highest volume of flow of any river in the world. Water and ice spread across Iceland's plains in a massive flood that destroyed everything in its path.)

According to Helgi Björnsson, a geologist at the Science Institute of the University of Iceland, Icelanders avoid building homes in areas at high risk of a jökulhlaup. "The flood pathway is predictable, because we know the topography of the glacier bed and the thickness of the ice exerting pressure on the glacier base," Björnsson says. "The drainage route is determined by the slope of the base and the pressure of the water.



If seismological<sup>3</sup> observations pinpoint the site of a volcanic eruption, then we can predict the pathway and the regions at risk. Some of the areas may be inhabited, but others have been so frequently flooded through the centuries that they are not inhabited anymore." Björnsson is one of many scientists who monitor the glaciers and volcanoes of Iceland in order to better predict and understand eruptions and jökulhlaups.

## The BIG One!

Beginning on September 29, 1996, a series of earthquakes, detected by seismographs all around the country, gave the first warnings of an active volcano. Hundreds of small earthquakes showed on scientists' instruments over the next few days. The site of the actual eruption was first spotted by an observer flying over the glacier, who saw two cauldrons about 1-2 kilometers across appearing on the ice surface. Using aerial photographs and radar images from airplanes flying over the cauldrons as they grew to about 50 meters deep in four hours, scientists monitored the progress of the eruption. As the glacier water melted, it flowed into Grimsvötn, a large lake under the ice. The amount of water collecting in Grimsvötn was determined by a Global Positioning Satellite measurement that recorded the height of the glacier. As the ice floated on the lake, it rose about 15-20 meters each day.

Most of the activity was hidden below the ice, but on October 2, the volcano broke through one of the cauldrons and sent a column of

<sup>2</sup>continental plates: sections of Earth's crust in constant yet almost imperceptible motion

<sup>3</sup>seismological: having to do with vibrations of the earth



Vatnajökull in Iceland is Europe's largest glacier and the third largest in the world.

smoke, ash, and steam flying 4–5 kilometers high. Although the eruption ended on October 19, observers knew there was more to come as water continued to melt and flow. The depression in the ice continued to expand to about 9 kilometers long and 3–4 kilometers wide, and the level of the lake continued to rise. By late October, scientists warned that the water level at Grimsvötn was almost high enough to breach the ice barrier that held the lake in place. The road around southeastern Iceland was closed. This flood was going to be a BIG one!

On November 4, seismographs detected a tremor that indicated the ice barrier was beginning to break up. Over the next three days, about 3.5 cubic kilometers of water rushed out from under the glacier, carrying rocks, huge chunks of ice, and volcanic ash across the plains.

The *Iceland Review* described this jökulhlaup as “a tidal wave of black meltwater and huge chunks of ice, hurtling southward under and

over Europe's largest glacier, sweeping away everything in its path.” The flood caused major damage to the only road between eastern and southern Iceland, carrying away three bridges. It destroyed the main phone line connecting the country's cities and villages. After the flood, the scoured land was covered with chunks of ice as large as buildings, many of them colored black by a coating of volcanic ash, called *tephra*.

But when you live in a country covered by ice hundreds of meters thick resting on top of an active volcanic rift, you learn to recover quickly from this type of disaster. Although the damage would cost about \$1.5 billion (Icelandic) to repair, Icelanders set to work right away. The road was rebuilt with new bridges that were designed to stand up better against a jökulhlaup. New fiber-optic communication cables were installed, and the phone system was working again. Within a few months, the massive flood was a thing of the past—and—you can be sure—the future!

**44**

Write **two** reasons why the author may have written this article. Include a detail to support **each** reason.

- 1) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- 2) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**SESSION 4 Reading**  
**THE JÖKULHLAUP**  
**Item 44 (Page 39)**

Write **two** reasons why the author may have written this article. Include a detail to support each reason.

**Exemplary Response**

- 1) The author wants to explain how jökulhlaups are formed. Jökulhlaups result when natural ice dams underneath glaciers cannot contain the meltwater from the glacier.
  
- 2) The author also wants to describe the serious danger Icelanders face when a jökulhlaup occurs. If a volcanic eruption occurs under a glacier, the volume of meltwater is much greater and results in a dangerous flood which can destroy everything in its path and cost billions to repair.

**Other Acceptable Reason:**

- To inform readers about Iceland's unusual geological features and events.

**Other Acceptable Details:**

- Jökulhlaups are formed when volcanoes beneath glaciers erupt and cause ice to melt into a great volume of water.
- Ice melts too quickly and the resulting water breaks the dams holding back the water.
- Icequakes weaken the ice dams holding back the water.
- Jökulhlaups are dangerous because they can destroy roads, bridges, and phone lines.
- The resulting damage disrupts lives and costs billions of dollars to repair.
- any relevant, text-based reason

*Revised - ok*  
*pen*  
*4/10/09*

**Score Points**

- 3 points** Response mentions two reasons for the article with a detail supporting each reason.
- 2 points** Response mentions either one reason with a supporting detail for that reason **OR** two reasons with a supporting detail for only one of them.
- 1 point** Response mentions one or two reasons with no details.
- 0 points** other

This item appeared at only one grade level.

**Grade 9**

Standard 4: Students apply thinking skills to their reading, writing, speaking, listening, and viewing.

Benchmark 4.a: Identify an author's purpose and the text's historical/cultural context from information presented in the text.

Subcontent Area: nonfiction

44

Write two reasons why the author may have written this article. Include a detail to support each reason.

- 1) To inform readers of Vathaj & Kull and the dangers and destruction that it caused. "sweeping away everything in its path."
- 2) To have people know how these things happen and inform that they WILL happen again in the future. "the massive flood was a thing of the past and - you can be sure - the future!"

Grade 9

Rib 7, Item 44

3 Point ANCHOR

Response includes 2 reasons with supporting details:  
to inform of the dangers & destruction caused  
"sweeping away everything in its path";  
inform that this will happen again "the massive flood  
... a thing of the past and...the future".

Anchor  
3 pts

JED  
4/10/07

44

Write two reasons why the author may have written this article. Include a detail to support each reason.

- 1) one reason may be because he used/does live  
there. "But when you live in a country covered by  
ice resting on an active volcanic rift you learn to  
recover quickly from this type of disaster."
- 2) Another could be because he wants to inform people.  
"The flood caused major damage to the only road, southern  
Iceland, carrying away three bridges. It destroyed the  
main phone lines connecting villages."

Grade 9

Rib 7, Item 44

2 Point ANCHOR

Response includes 1 reason with a supporting detail: To inform about the damage caused by this event: "It destroyed the main phone lines...."

Anchor  
2 pts.  
JEO  
4/10/07

44

Write two reasons why the author may have written this article. Include a detail to support each reason.

- 1) To inform people that flooding from glacial melting can be highly destructive.
- 2) To help scientists or future scientists better understand the glacier Vatnajökull

Grade 9

Rib 7, Item 44

1 Point ANCHOR

Response includes 2 reasons with no details: To inform that flooding from glacial melting can be destructive; to help scientists understand Vatnajökull

Anchor  
1 pt.  
JSD  
4/10/07



44

Write two reasons why the author may have written this article. Include a detail to support each reason.

1) The Author could have witnessed some of these events.

2) The author could just be very interested in this kind of stuff.

Reading Grade 9  
Item 44  
0 ANCHOR  
Response does not include any valid reason

Anchor  
opts.  
yes  
4/10/07

47

Complete the chart to show five major events that contributed significantly to the Icelandic jökulhlaup of 1996. Write the events in the order in which they occurred. Two events have been provided.

1	A series of earthquakes were detected by seismographs all around Iceland.
2	
3	
4	
5	
6	
7	In early November, 3.5 cubic kilometers of water rushed out from under the glacier and swept away everything in its path.

**SESSION 4 Reading**  
**THE JÖKULHLAUP**  
**Item 47 (Page 40)**

Complete the chart to show **five** major events that contributed significantly to the Icelandic jökulhlaup of 1996. Show the events in the order in which they occurred. Two events have been provided.

**Exemplary Response**

1	A series of earthquakes were detected by seismographs all around Iceland.
2	<ul style="list-style-type: none"><li>• Eruptions were spotted by an observer flying over the glacier.</li><li>• Two cauldrons appeared on the ice surface.</li></ul>
3	<ul style="list-style-type: none"><li>• Scientists took photos and radar images of the cauldrons.</li><li>• Scientists monitored the progress of the eruptions by taking photos and radar images.</li></ul>
4	<ul style="list-style-type: none"><li>• The glacier water melted and flowed into an underground lake (OR Grimsvötn).</li><li>• The amount of melting glacier water in the underground lake was determined by a Global Positioning Satellite.</li><li>• The ice on the underground lake/Grimsvötn rose 15–20 meters a day because of melting glacier water.</li></ul>
5	<ul style="list-style-type: none"><li>• A volcano broke through the ice on October 2.</li><li>• A volcano broke through and sent ash and steam 4–5 kilometers skyward.</li></ul>
6	<ul style="list-style-type: none"><li>• The depression grew to 9 kilometers long and 3–4 kilometers wide.</li><li>• The underground lake continued to rise and the road around southeastern Iceland was closed.</li></ul>
7	In early November, 3.5 cubic kilometers of water rushed out from under the glacier and swept away everything in its path.

**SCORING NOTE:** Events may come from any of the above boxes as long as they appear in chronological order.

**Score Points: 3 points possible**

**3 points** Response includes five of the events listed above in correct order.

**2 points** Response includes four or three of the events in correct order.

**1 point** Response includes two events listed above in correct order.

**0 points** other

This item appeared at only one grade level.

**Grade 9**

Standard 1: Students read and understand a variety of materials.

Benchmark 1.e: Sequence events, procedures, and ideas.

Subcontent Area: nonfiction

47

Complete the chart to show five major events that contributed significantly to the Icelandic jökulhlaup of 1996. Write the events in the order in which they occurred. Two events have been provided.

1	A series of earthquakes were detected by seismographs all around Iceland.
2	Two cauldrons were spotted along the surface of the ice and grew about 50 meters deep in 4 hours.
3	Melting glacier water began flowing into Grimsvötn.
4	Floating ice on the lake rose about 15-20 meters each day and activity began.
5	on October 2nd, a volcano broke through a cauldron sending debris (smoke, ash, steam) flying.
6	The depression in the ice kept expanding and water levels kept rising.
7	In early November, 3.5 cubic kilometers of water rushed out from under the glacier and swept away everything in its path.

Grade 9  
Rib 8, Item 47  
3 Point Anchor  
Response includes 5 events in correct order.

Anchor  
3 pts  
JPD  
4/10/07

47

Complete the chart to show five major events that contributed significantly to the Icelandic jökulhlaup of 1996. Write the events in the order in which they occurred. Two events have been provided.

1	A series of earthquakes were detected by seismographs all around Iceland.
2	hundreds of small earth quakes
3	2 cauldrons 1-2 km wide formed.
4	Glacier water flowed to Grimsvötn
5	Eruption of ash 4-5 km high
6	Grimsvötn's water level was high enough to overflow the ice dam
7	In early November, 3.5 cubic kilometers of water rushed out from under the glacier and swept away everything in its path.

Grade 9  
 Rib 8, Item 47  
 2 Point Anchor  
 Response includes 4 events in correct order.  
 The information in Box 2 is a repetition of Box 1.

Anchor  
 2pts.  
 JDO  
 4/10/07

47

Complete the chart to show five major events that contributed significantly to the Icelandic jökulhlaup of 1996. Write the events in the order in which they occurred. Two events have been provided.

1	A series of earthquakes were detected by seismographs all around Iceland.
2	Volcanofall, which covers much of southern Southwestern Iceland with ice 400 to 900 meters
3	lake gets to full ice above it breaks.
4	Jökulhlaup occurs every few years in Iceland
5	Volcano burns the thin ice then shoots up ash up.
6	Beginning sep. 29 may a big earthquake came
7	In early November, 3.5 cubic kilometers of water rushed out from under the glacier and swept away everything in its path.

Grade 9

Rib 8, Item 47

1 Point ANCHOR

Response includes 2 major events in order:  
lake gets full (Box 2); volcano breaks through ice & shoots ash up (Box 5).

Anchor  
1 pts.  
J.P.S.  
4/10/07

47

Complete the chart to show five major events that contributed significantly to the Icelandic jökulhlaup of 1996. Write the events in the order in which they occurred. Two events have been provided.

1	A series of earthquakes were detected by seismographs all around Iceland.
2	damage would cost 1.5 billion dollars
3	Iceland sits on top of a rift
4	There are hundreds of small earthquakes
5	Ice floated a lake and now it rose 15-20 meter everyday
6	Europe's largest glacier sweeping away everything in its path
7	In early November, 3.5 cubic kilometers of water rushed out from under the glacier and swept away everything in its path.

Reading Grade 9  
Item 47  
ANCHOR  
Box 5 contains the only major event  
Box 6 is a repeat of box 7  
Boxes 2, 3 & 4 are inconsequential

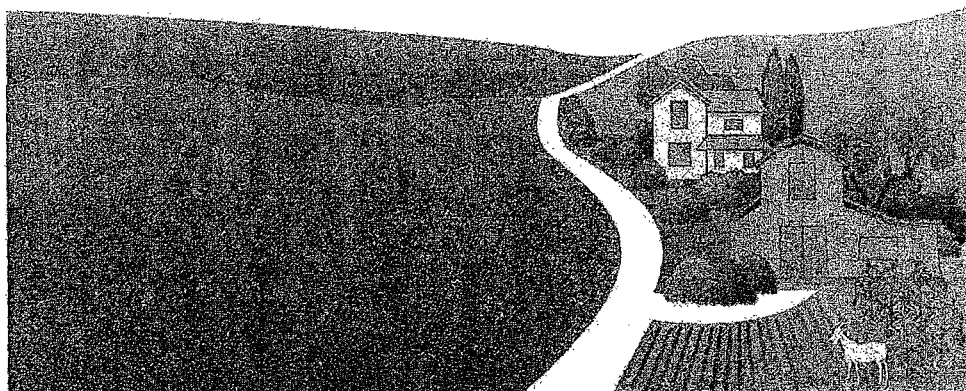
Anchor  
opts.  
JPO  
4/10/07

## Session 6

# Reading

### *Directions*

Read this poem. Then do Numbers 93 through 99. You may look back at the poem as often as you like.



## MOUNTAIN ROAD

by Mary Oliver

My grandfather kept no  
Unicorns in his gray barn,  
But hurly-burly slant-eyed goats  
That nimbled through the stacks  
of hay  
And filled the milk pails  
every day.  
My grandmother kept in her  
scriptures  
No potions drained from  
the moon,  
Kept no recipes in her gray head  
To change the shape of men  
or wolves.  
But I remember on her shelves  
Apple butter and new bread.  
Enchantment is a distant time.

Their farm was recent, filled  
with truth,  
With buttered bread and milk  
in bowls,  
And he and she were  
simple souls.  
And yet I say, in all the earth  
I have not found a place  
so sweet.  
So it may be some charm did lay  
Its arm across their small estate.  
In any case when it dissolved—  
Sank with their age into  
the wind  
And woods again—we found  
it was  
A story time could not repeat.



**SESSION 6 Reading**  
**MOUNTAIN ROAD**  
**Item 93 (Page 57)**

On the lines below, write **one** contrast the speaker makes between imaginary things and those that actually existed on the grandparents' farm. Explain the effect this contrast has on the meaning of the poem.

**Exemplary Response**

The speaker says that the grandmother's recipes could not change the shape of men or wolves, but she does remember the grandmother's apple butter and fresh bread. The speaker makes these contrasts to show that the grandparents did not need to have strange and unusual things in order for their farm to be captivating.

**Other Contrasts**

Imaginary things

- unicorns
- potions drained from the moon
- enchantment of distant times
- magicians or magical creatures
- other relevant, text-based contrast of an imaginary thing and a real occurrence from the farm

Real things

- hurly-burly slant-eyed goats
- grandmother's scriptures
- recent truth-filled farm
- grandparents were simple souls

**Score Points**

- 2 points** Response provides one contrast between imaginary and real things **AND** explains that there was no need for unusual things in order for the farm to be fascinating.
- 1 point** Response provides one contrast with no explanation **OR** explains that there was no need for unusual things in order for the farm to be fascinating, without an example.
- 0 points** Other -

This item appeared at two adjacent grade levels.

**Grade 8**

Standard 6: Students read and recognize literature as a record of human experience.  
Benchmark 6.a: Read and respond to a variety of literature that represents perspectives from places, people, and events that are familiar and unfamiliar.  
Subcontent Area: poetry

**Grade 9**

Standard 6: Students read and recognize literature as a record of human experience.  
Benchmark 6.a: Read and respond to a variety of literature that represents perspectives from places, people, and events that are familiar and unfamiliar.  
Subcontent Area: poetry

93

On the lines below, write one contrast the speaker makes between imaginary things and those that actually existed on the grandparents' farm. Explain the effect this contrast has on the meaning of the poem.

"My grandmother kept in her scriptures, No potions drained from the moon, kept no recipes in her grey head, To change the shape of men or wolves." The contrast between what the grandmother actually wrote and the potions creates a feeling that the life was real, but it had a charming and enchanting touch to it. It makes the farm more than simply a farm.

9 Reading, Item 93

2 Point Anchor

Response provides one contrast the speaker makes between imaginary things and those that actually existed in the poem.

Real - grandmother's scriptures

Imaginary - potions drained from the moon

Response provides an explanation on the effect this contrast has on the meaning of the poem.

Explanation - creates a feeling that life was real, but it had a charming and enchanting touch to it.

OK  
K  
4/10/06

93

On the lines below, write one contrast the speaker makes between imaginary things and those that actually existed on the grandparents' farm. Explain the effect this contrast has on the meaning of the poem.

When he said my grandfather kept no unicorns  
in the grey barn just hurly-burly slant-eyed  
goats.

9 Reading, Item 93

1 Point Anchor

Response provides one contrast the speaker makes between imaginary things and those that actually existed in the poem.

Real - hurly-burly, slant-eyed goats

Imaginary - unicorns

Response provides no explanation on the effect this contrast has on the meaning of the poem.

OK  
K. Ryland  
4/10/06

93

On the lines below, write **one** contrast the speaker makes between imaginary things and those that actually existed on the grandparents' farm. Explain the effect this contrast has on the meaning of the poem.

they were saying that somethings  
were good on life and some were  
not.

9 Reading, Item 93  
0 Point Anchor  
Response does not contrast an imaginary thing with one that actually exists from the poem. The explanation provide is too vague for credit.

X  
4/10/06