

Name: _____ Date: _____

1. How high has Earth's average temperature risen since 1880?
2. How will farmers and ranchers be affected by changes in Arctic weather?
3. How much ice was there in the Arctic 2012 compared to 1980?
4. What are two factors that influence how big an area the Arctic Sea ice covers?
5. How much has the lower half of the atmosphere grown since 2000?

6. What is the "jet stream"? Why is it described as a "river"?

7. Why do farmers need a predictable climate?

8. Compare the storm that occurred in Florida in April 2014 to the weather in California.

Science News *for* Students

WEATHER & CLIMATE ENVIRONMENT

Arctic sends weird weather south

Big changes in the Arctic are affecting weather across North America, Europe and Asia

BY **SID PERKINS** MAY 5, 2014 — 9:50 AM EST



This not a healthy stand of growing corn. Excessive rains flooded this field, severely damaging the chance this crop will deliver the harvest farmers had been expecting. And weird weather, fostered by a warming Arctic, will make weather prediction increasingly uncommon for farmers well south of the polar regions.

[jschmutz/iStockphoto.com](https://www.iStockphoto.com/jschmutz/iStockphoto.com)

CHICAGO — Earth is getting warmer. Since 1880, when scientists began collecting accurate global measurements, the average temperature across our planet has risen about 0.85° Celsius (1.53° Fahrenheit). Careful, though: The figure is just an average. Some areas have gotten even warmer during that time. One of those areas is the Arctic.

Normally we associate the far north with extreme cold. However, Arctic temperatures have risen about twice as much as the global average since 1880. That abnormal rate of warming is shaking things up at the North Pole. It also may be causing problems much farther south, in more populated regions that are important for farming, scientists say.

These experts believe that changes in the Arctic may explain some of the weird weather affecting the mid-latitude regions. These are the areas that lie midway between Earth's tropical and polar regions. They are home to most of the people on Earth. They also produce most of Earth's wheat, corn, rice and other crops.

In the Northern Hemisphere, this region includes Europe, North America and most of Asia. The processes linking Arctic changes with the weather across this broad region are complicated, scientists say. Still, evidence suggests many worrisome changes are underway.

In fact, experts warn that changes in the Arctic soon could be felt in homes around the world. That is because the effect of those changes on weather patterns could lead to big troubles for farmers and ranchers, new research suggests. Many of their crops won't be as plentiful. Plus, the prices for things such as meat, eggs and milk will be much less predictable — and possibly much higher.

"Even though it might seem otherwise, the Arctic is not a faraway place," says Mark Serreze. He's an environmental scientist and the director of the National Snow and Ice Data Center (NSIDC) in Boulder, Colo. "What happens there does affect us in the mid-latitudes."

Serreze and other experts met February 15 to discuss the wide-ranging effects of climate change in the Arctic. Their discussion took place here at the annual meeting of the American Association for the Advancement of Science, or AAAS.

The lid comes off

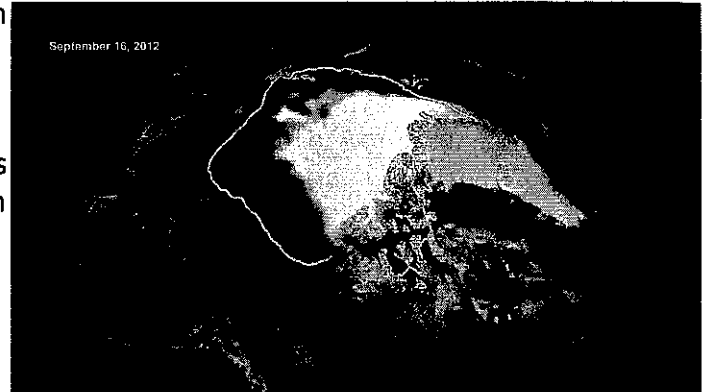
The first step in the chain of events leading to weird weather across North America, Europe and other mid-latitude regions is the loss of Arctic sea ice. (Unlike the Antarctic, which is a continent, the Arctic contains an ocean.)

As of September 2012, ice covered about 3.41 million square kilometers (1.32 million square miles) of the Arctic Ocean. That's about twice the size of the state of Alaska. This may sound like a lot of ice. However, it was a record low — at least since satellites started measuring the sea ice in 1979. In September 1980, notes Serreze, sea ice covered more than twice as much of the Arctic Ocean.

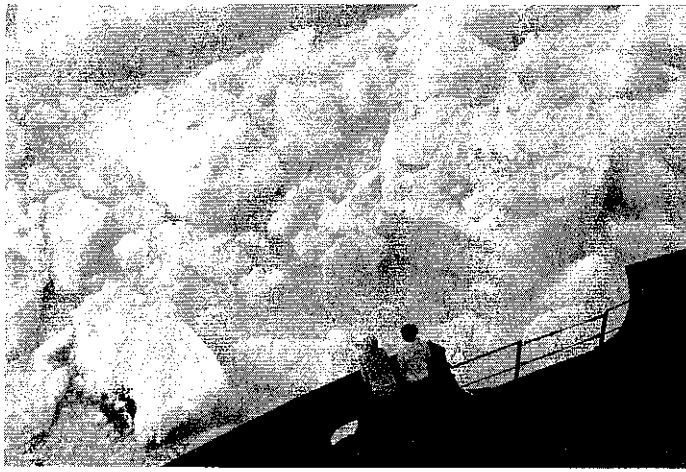
Many factors influence how big an area the Arctic sea ice covers. Warmer air temperatures certainly play a role. Some researchers have suggested that changes in winds and ocean currents also affect the extent of the ice. Recently, other experts have noted that the rivers flowing into the Arctic Ocean are carrying much more warm water than they did a few decades ago. That has an effect on the ice cover too. And open water is darker than ice. So when ice disappears, the surface waters can absorb more solar energy. That, in turn, warms up the Arctic even more.

It is difficult to pinpoint any one reason for the loss of Arctic sea ice. Regardless, the overall effect is dramatic.

"Getting rid of Arctic sea ice is like removing a big lid between the warm ocean and the cold air above it," says Serreze. (Even though surface waters of the Arctic Ocean are near freezing, the air



On September 16, 2012, the ice covering the Arctic Ocean shrank to its smallest extent since satellite measurements began in 1979. In this satellite image, the yellow line depicts the average ice cover on September 16 throughout the two decades ending in 2000. National Snow and Ice Data Center



above the intact ice is often much colder, especially in winter months.)

When that lid comes off, the ocean's heat can more easily escape into the air, says Jennifer Francis. She's an atmospheric scientist at Rutgers University in New Brunswick, N.J. That's the second step in the chain leading to weird weather: When the air gets warmer, it expands. Since 2000, scientists have noted that the lower half of the atmosphere (where weather happens) has grown more than 1 kilometer (0.6 miles) thicker over the Arctic, Francis reported at the AAAS meeting.

Arctic sea ice that has survived more than one summer (such as the thick, multi-layered pieces seen near this icebreaker) is becoming increasingly rare. The effects of Arctic warming aren't just felt where it's happening. They are shaking up things much farther south too.

NASA/Kathryn Hansen

As the atmosphere over the Arctic thickens, it slows the overall flow of air from the tropics to the North Pole. That, in turn, leads to the third step in the weather-making process: When airflow toward the North Pole slows down, a high-altitude river of wind that flows from west to east also slows. That river is often called the jet stream.

When the jet stream slows as it circles the North Pole, it behaves like a real river. Usually it flows relatively straight. But it will start to wander back and forth, or meander, as it slows. That's the fourth step in the parade toward weird weather. When the jet stream gets wavier, its wiggles become larger. They also extend farther north and south than normal.

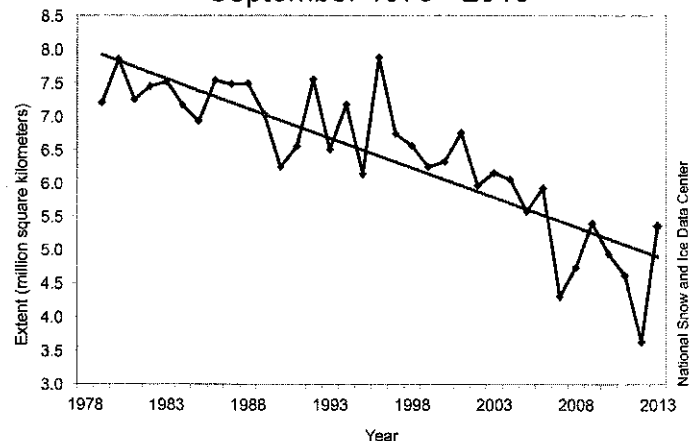
Those unusually big wiggles affected weather this past winter, says Francis. One after another, cold air masses — each one a so-called "polar vortex" — meandered south to chill the lower 48 U.S. states. Elsewhere, at the same time, warm air masses marched northward. That movement made for exceptionally warm winters in Alaska and Sweden, Francis notes.

Most importantly, she says, when all this happens, the abnormally large waves in the jet stream move eastward more slowly than normal. That change leads to the fifth step. These waves help steer weather systems. And when weather systems in the mid-latitude regions move eastward more slowly, normal weather can turn miserable.

What once might have been two days of warm, sunny weather can drag on into an extended dry spell, says Francis. At the other extreme, what once might have been a short spate of rain could turn into a week of drenching downpours. That in turn increases the risk of floods. In short, weather tends to become more persistent. While it may be more predictable in the short term, it also can become more variable from year to year. And that's a problem.

Big problems down south

Average Monthly Arctic Sea Ice Extent
September 1979 - 2013



Sea-ice coverage in the Arctic Ocean is highly variable. Overall, it has been falling ever since satellites began monitoring the sea ice in 1979. Here, the blue line shows the average trend.

Farming requires a predictable climate. Farmers need to anticipate when the weather will grow warmer or turn colder, how much rain will fall and how long the growing season will last. That helps them decide what crops to plant and when to plant them. When climate remains consistent from one year to the next, farming is much less risky and harvests tend to be bigger.

Unfortunately, the changes in the Arctic are introducing new risks to farming across the Northern Hemisphere. The region is often called the world's breadbasket. That is because it produces so much wheat and other vital crops that are eaten globally.

Recently, the weather across this broad region has become more chaotic, says Jerry Hatfield. He works for the U.S. Department of Agriculture in Ames, Iowa. As an agricultural climatologist, Hatfield studies how climate and weather affects farmers and ranchers. "When the weather is more chaotic, it's difficult for farmers to plan," he explained at the AAAS meeting.

One recent example: A massive storm system dumped huge amounts of rain throughout the southern and eastern United States in late April 2014. Many regions saw 30 centimeters (12 inches) of rain. The deluge dropped more rain on Pensacola, Fla., in two days than Los Angeles has logged throughout the entire past 2 years (40 centimeters), the Associated Press reported. Although farmers need rain, this was too much at once to be helpful. In fact, the resulting floods can waterlog fields, damaging crops. Meanwhile, California — whose farmers produce huge amounts of U.S. fruits and vegetables — is suffering a prolonged drought.

Increasingly unpredictable weather has become a worldwide problem, Hatfield says. In India, for example, long-term shifts in weather patterns have left farmers struggling to meet the demand for food. Because India's population of 1.2 billion continues to grow, in coming years that nation might not be able to produce all the food it needs, Hatfield says. In other words, India will need to start importing food. Unfortunately, there might not be enough surplus food for it to buy at affordable prices.

That is because the world's population is growing outside India, too. There are more than 7.1 billion people on Earth right now. As that number rises even higher, it will take even more food to keep everyone fed. That will make everyone more dependent on a stable food supply, says Hatfield.

Based on expected temperature changes alone, harvests are expected to decline, Hatfield says. Studies suggest substantial effects on the U.S. harvests of a variety of crops in coming years. For example, experts forecast that by 2050, harvests of corn, rice, peanut and other crops will drop by 4 to 12 percent. The United States is a major producer of these crops. Any drop in its production can therefore affect the price and availability of these foods worldwide.

Many farmers already are feeling the effects of weird weather. Crop insurance payouts for poor harvests set records in 2011 and 2012, according to Iowa farmer Matt Russell. He's also a State Food Policy Project coordinator at Drake University in Des Moines, Iowa. "We're getting the wrong weather at the wrong time," he says in a May 4 story in The Gazette newspaper in Cedar Rapids, Iowa. His state's croplands are a major part of the U.S. breadbasket. And last year, they experienced the wettest May on record, one of the coldest Julys and one of the driest Augusts, he told the newspaper.

Normally, sea ice cover reaches its minimum for the year in September.
National Snow and Ice Data Center

Video: The Polar Vortex Explained

(<http://www.youtube.com/watch?v=5cDTzV6a9F4>)

But these aren't just problems for farmers in Iowa or other parts of the United States. "Everybody's going to be affected by this," Hatfield says. "People don't really appreciate all the things that can be disrupted" by climate change. And the impacts will be felt globally.

Now add in the unpredictability caused by climate shenanigans that get their start in the Arctic, these scientists say, and disruptions to daily life could become far more severe than had been expected.

Power words

air masses Large volumes of air, sometimes covering many hundreds or thousands of square kilometers (square miles), that typically have a consistent temperature or water-vapor content. Air masses are often classified by their source, such as continental, arctic or tropical. Air masses and other weather systems are steered across Earth's surface by jet streams and by differences in atmospheric pressure.

breadbasket A colloquial term for a region where many cereal grains — corn, rye, wheat and sorghum — are grown.

climate The weather conditions prevailing in an area in general or over a long period.

climate change Long-term, significant change in the climate of Earth. It can happen naturally or in response to human activities, including the burning of fossil fuels and clearing of forests.

climatology The study of weather conditions prevailing in an area in general or over a long period. Scientists who work in this field are called climatologists.

jet stream A fast-flowing, high-altitude air current. On Earth, the major jet streams flow from west to east in the mid-latitude regions of the Northern and Southern Hemispheres.

mid-latitudes That part of the globe that lies midway between Earth's tropical and polar regions. Most people live in these temperate regions and most of the world's food is produced here.

polar vortex A semi-permanent weather system involving a large air mass in Earth's upper atmosphere. It consists of an area of low atmospheric pressure. In the Northern Hemisphere, this tends to center near Canada's Baffin Island and over northeast Siberia. Winter strengthens the vortex, because that's when the temperature difference between the poles and mid-latitudes is greatest.

weather Conditions in the atmosphere at a localized place and a particular time. It is usually described in terms of particular features, such as air pressure, humidity, moisture, any precipitation (rain, snow or ice), temperature and wind speed. Weather constitutes the actual conditions that occur at any time and place. It's different from climate, which is a description of the conditions that tend to occur in some general region during a particular month or season.



As the population of India (here) and other nations continues to mushroom, such countries may find themselves increasingly unable to harvest enough home-grown foods. Much will then have to be imported from other big grain producers — if such breadbasket nations have enough to spare. JeremyRichards/iStockphoto.com

Word find ([click here to enlarge for printing](#))

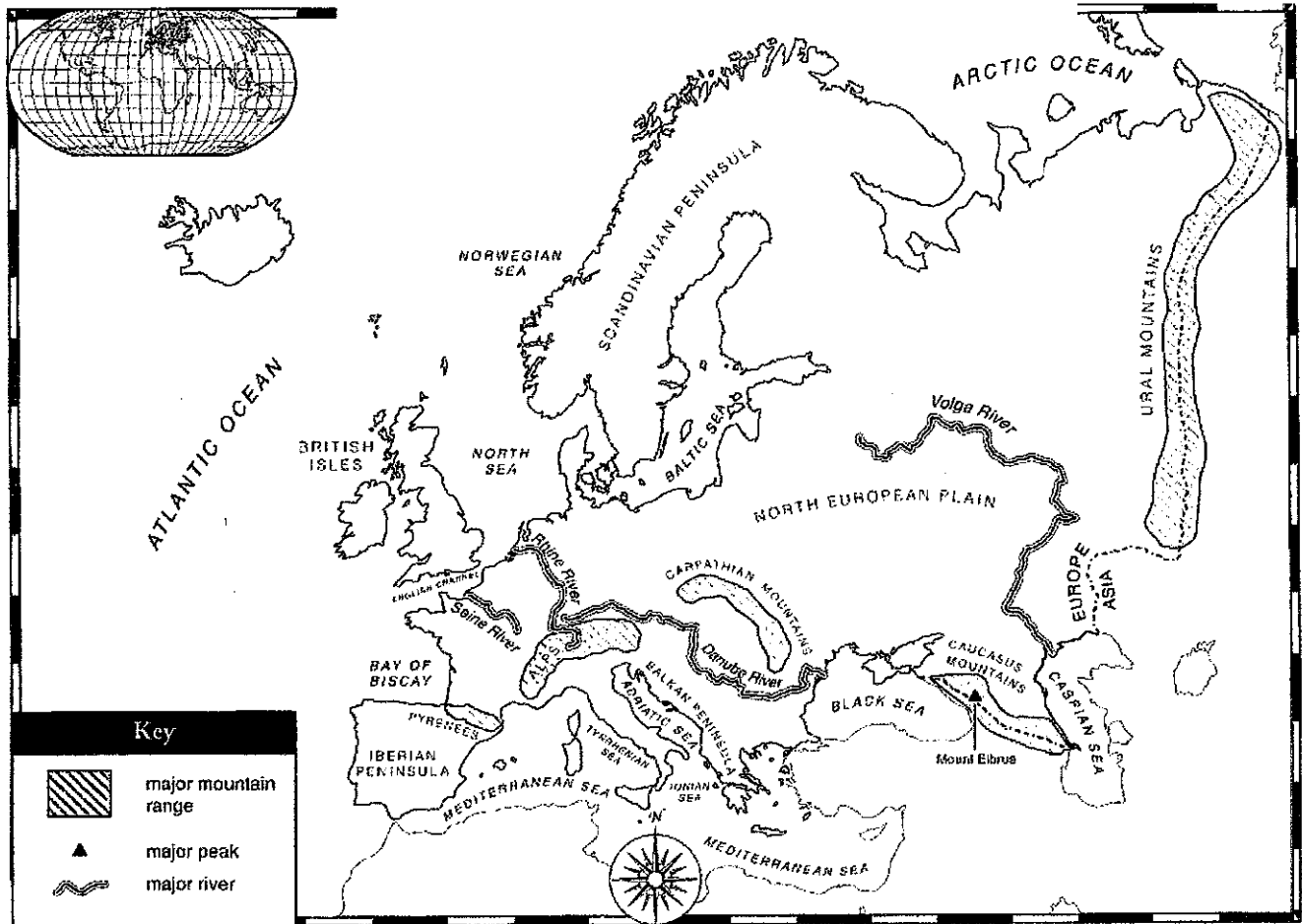
Geography DBQ (Document-Based Question)

Historical Context: Maps are cool. They can communicate all kinds of information about places. Physical maps tell you about landforms and political maps tell you about boundaries between governments. There are maps that communicate what people eat or what they do for a living. There is almost no limit to the types of maps you can create.

Writing Task: AFTER you have answered questions 1-12 in the packet, using the documents and your own knowledge of geography and history, write a short essay (at least 6 sentences) explaining:

At least three (3) different types of information that can be shown on a map.

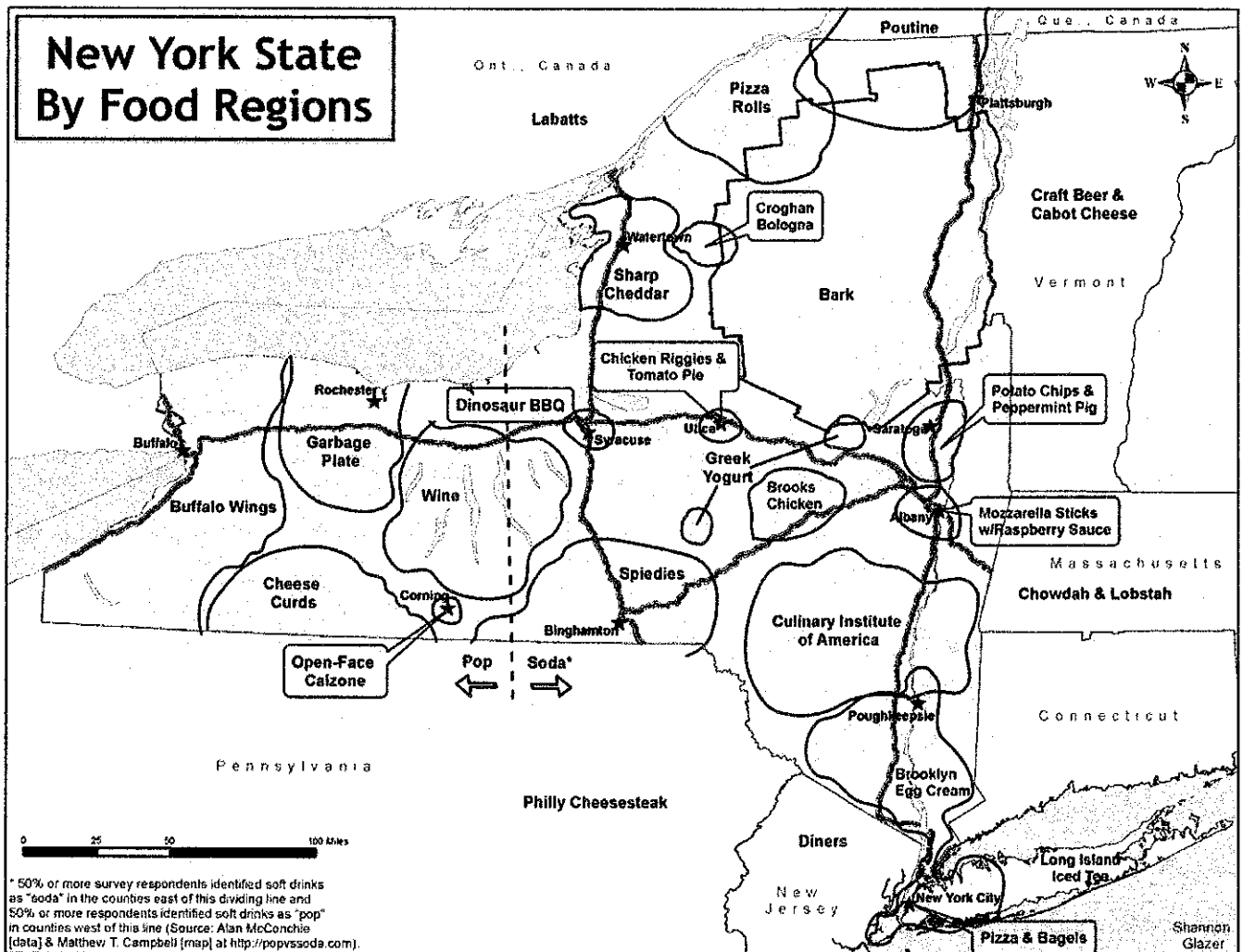
Document 1 – A physical map of Europe



1. Five mountain ranges are labeled on this map. Name them:

2. Why do you think the border between Europe and Asia is located where it is?

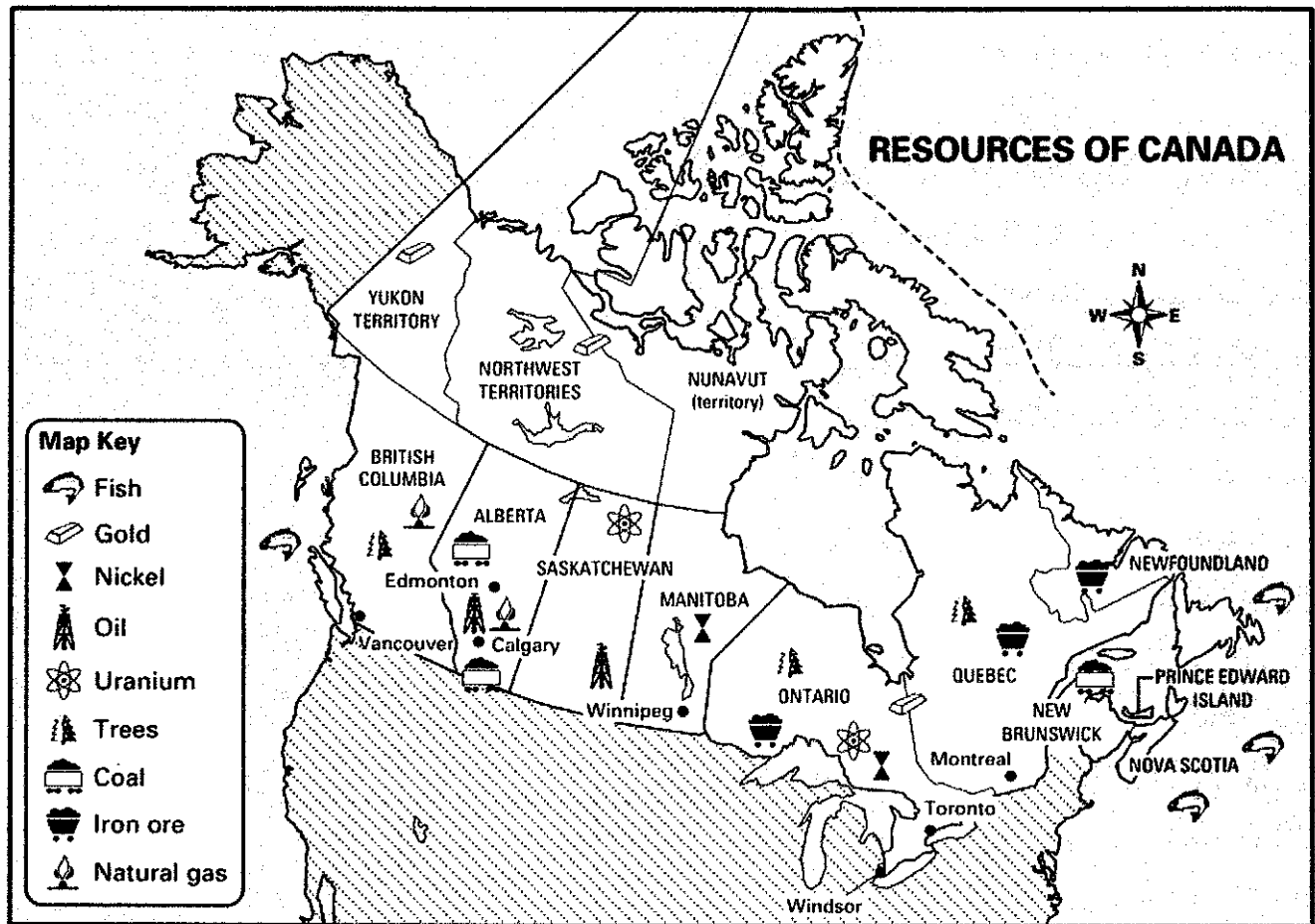
Document 2 – A map created by Shannon Glazer to (humorously) illustrate regional food favorites in New York state



3. Based on the map, how do you think buffalo wings got their name?

4. What three (3) major cities in New York use the term "pop" (instead of "soda")?

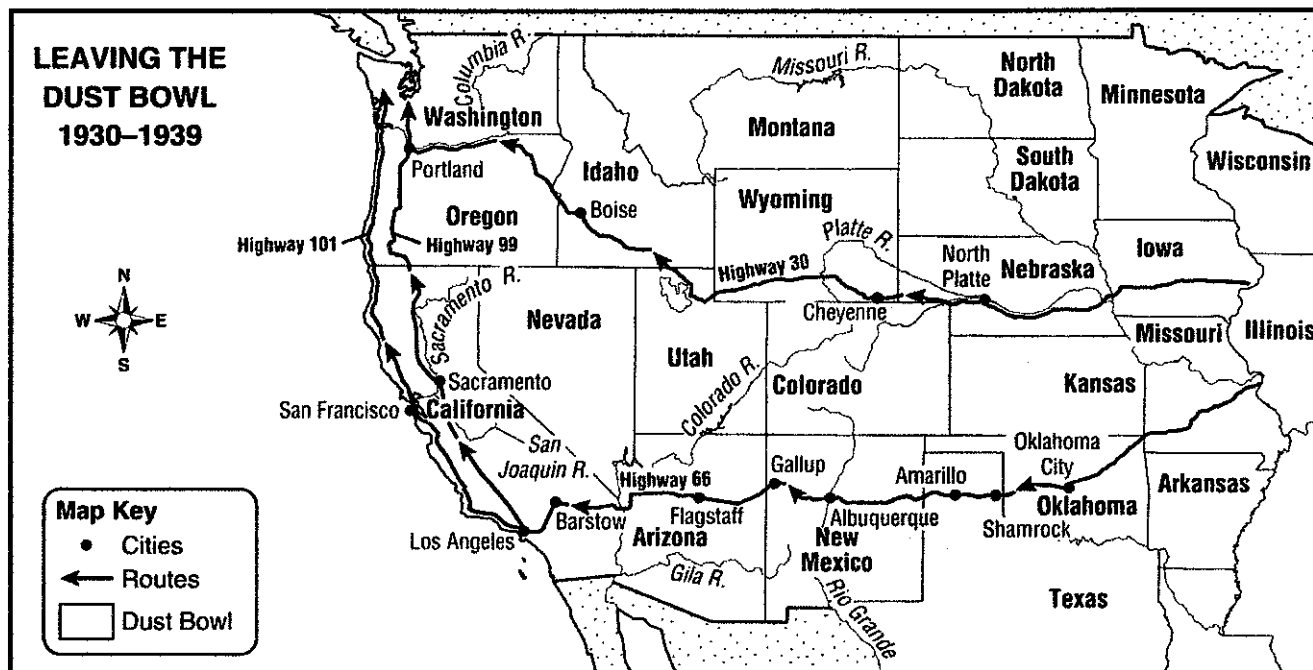
Document 3 – A map of natural resources in Canada and where these resources can be found



5. Which province has the most different kinds of resources?

6. Do you think the Yukon, Northwest Territories, and Nunavut have large or small populations compared to other parts of Canada? Why?

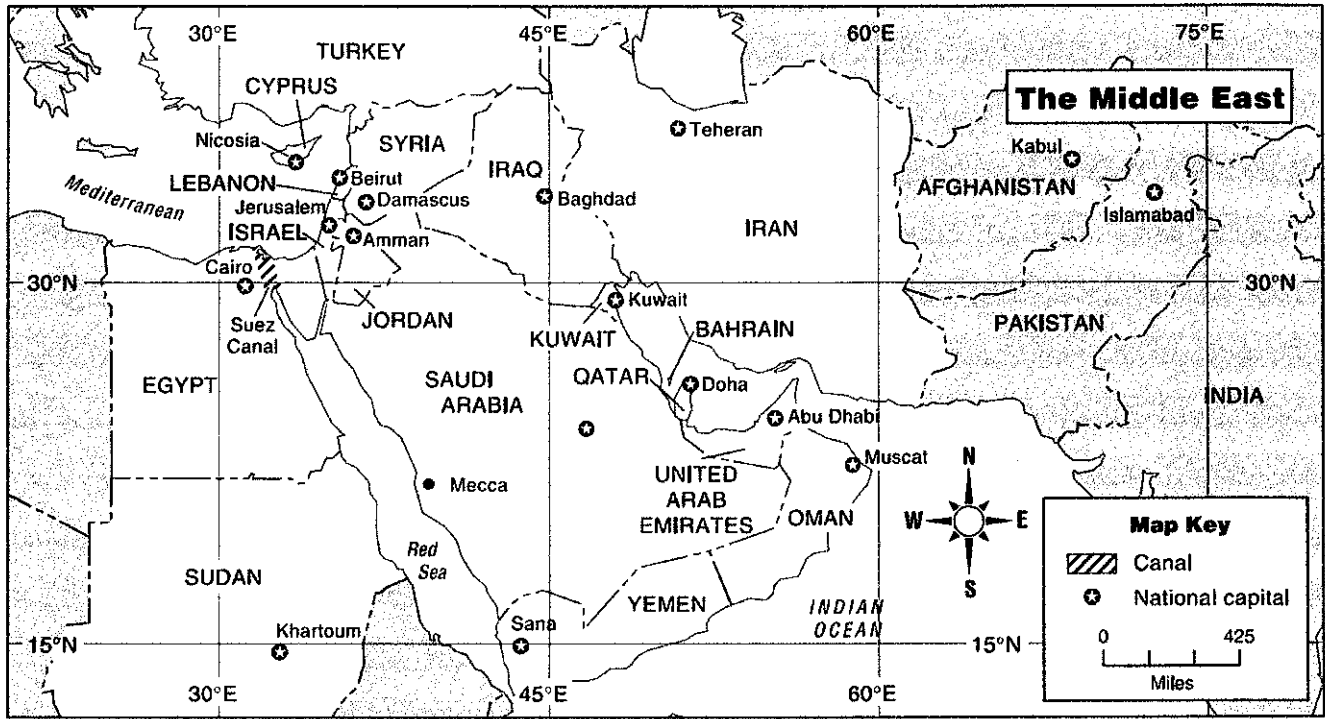
Document 4 – A map of the routes people took between 1930-1929 to leave their homes in the Dust Bowl (an area experiencing severe drought, or lack of water)



7. What method of transportation do you think people used to travel these routes? Why?

8. Why do you think many of the routes end along the west coast (California, Oregon, Washington)?

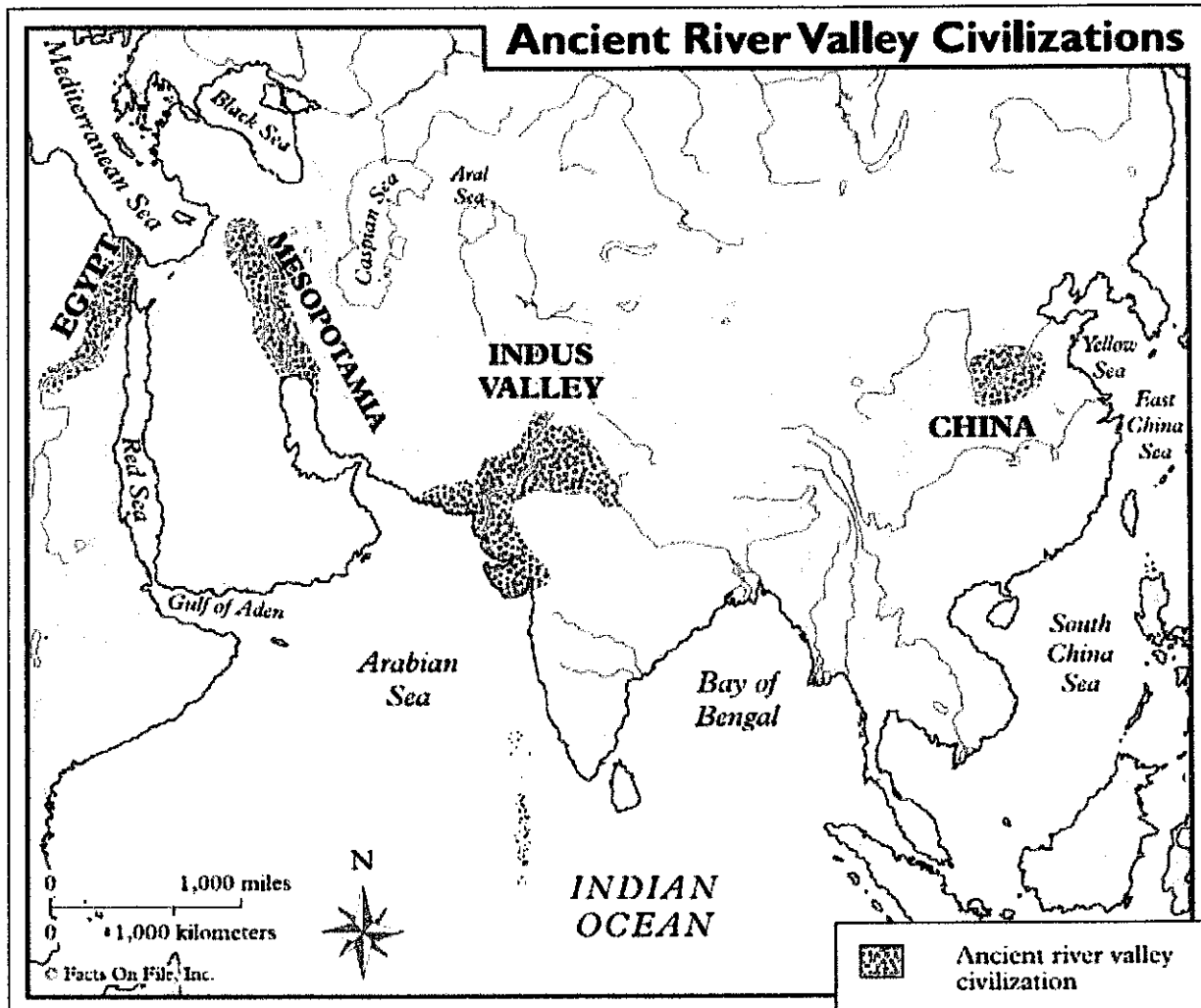
Document 5 – A political map of the Middle East



9. Which countries labeled on this map does the mapmaker NOT consider part of the Middle East region? How can you tell?

10. Why do you think the Suez Canal was built?

Document 6 – A map showing the location of ancient River Valley civilizations



11. What do you think a river valley is?

12. Why do you think early civilizations were built in these locations? What makes them good places to build settlements?

Name:
Ms. Cleary

12/21/16
Literary Analysis

End of Module 1: Unit 2 Assessment -- Literary Analysis

1st Draft Due: Tuesday, January 3rd, 2017

Students will write a literary analysis essay responding to the following prompt:

How does Percy Jackson's character transform throughout the novel? Provide textual evidence from **both** *The Lightning Thief* and "A Hero's Journey" to support how he responds to internal and external conflict, using your knowledge of typical hero stages.

Your Literary Analysis Draft must:

1. Include an introduction with a claim (thesis), at least three body paragraphs, and a conclusion.
2. Use Textual Evidence: (Quotes and Paraphrasing) from *The Lightning Thief* and "A Hero's Journey" including citations.
3. Demonstrate Percy's character development
4. Show an understanding of "A Hero's Journey"
5. Be at least 3 handwritten pages or 2 double-spaced typed pages.

Name:
Ms. Cleary

Class:
12/16/16

Literary Analysis Graphic Organizer

In preparation for your literary analysis essay, complete the second and third columns of the graphic organizer below. This will help you organize your evidence from both texts and trace the growth of Percy Jackson throughout the novel.

Stage of "A Hero's Journey"	Passage in <i>The Lightning Thief</i> (include page #)	How would you describe Percy Jackson as a character during this stage? (think adjectives!)
The Ordinary World		
The Call to Adventure		

Entering the Unknown		
Menting a Mentor		
Allies/Helpers		
Road of Trials		

The Supreme Ordeal		
The Magic Flight		
Confronting the Father		
Master of Two Worlds/Restoring the World		

Box and Bullet Plan: Literary Analysis

Introduction:

Hook:

Summary:

Thesis: (Answers the question: How does Percy Jackson's character transform throughout the novel?)

Body Paragraph #1 (Beginning of *The Lightning Thief* and Act #1 of "A Hero's Journey")

- Topic Sentence: (*Answers the question: How would you describe Percy at the beginning of the novel?*)

- Evidence #1: Quote or paraphrase to support topic sentence
 - Explain Evidence: Referring to stages in Act #1 of "A Hero's Journey"

- Evidence #2: Quote or Paraphrase to support your topic sentence
 - Explain Evidence: Referring to stages in Act #1 of "A Hero's Journey"

Body Paragraph #2 (**Middle** of *The Lightning Thief* and **Act 2** of “A Hero’s Journey”)

- Topic Sentence: (*Answers the question: How would you describe Percy in the middle of the novel?*)

- Evidence #1: Quote or paraphrase to support topic sentence
 - Explain Evidence: Referring to stages in Act #2 of “A Hero’s Journey”

- Evidence #2: Quote or Paraphrase to support your topic sentence
 - Explain Evidence: Referring to stages in Act #2 of “A Hero’s Journey”

Body Paragraph #3 (**End** of *The Lightning Thief* and **Act 3** of “A Hero’s Journey”)

- Topic Sentence: (*Answers the question: How would you describe Percy at the end of the novel?*)

- Evidence #1: Quote or paraphrase to support topic sentence
 - Explain Evidence: Referring to stages in Act #3 of “A Hero’s Journey”

- Evidence #2: Quote or Paraphrase to support your topic sentence
 - Explain Evidence: Referring to stages in Act #3 of “A Hero’s Journey”

Conclusion

Restate Answer to Essay Question: (Paraphrases Thesis)

Summarizes Character Development in Beginning, Middle, End of *The Lightning Thief*

Closing Sentence: Final statement about Percy Jackson’s character growth

Name: _____

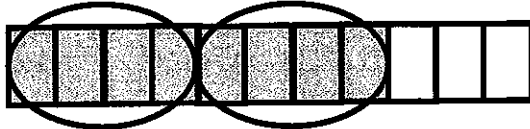
Date: _____

Winter Break HW

Class: _____

- Jennifer was writing an essay. She has $\frac{10}{12}$ of an hour to write the essay. It takes her $\frac{3}{12}$ of an hour to write each page. How many pages can she write?
 - Use a model to represent the quotient
 - Compute the quotient without models

- Neida drew the following model on the board then left:

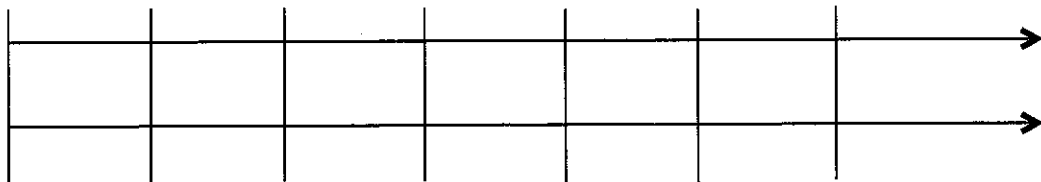


Deborah saw the model on the board and wrote the division expression that matched the model.

If Deborah was correct, what expression did she write?

Deborah's expression: _____

- Wells College in Aurora, New York was previously an all-girls college. In 2005, the college began to allow boys to enroll. By 2012, the ratio of boys to girls was 4 to 9. If there were *500 more girls than boys* in 2012, how many boys were enrolled that year? Use a table, graph, or tape diagram to justify your answer.
- Most television shows use *13 minutes of every hour* for commercials, leaving the remaining 47 minutes for the actual show. One popular television show wants to change the ratio of commercial time to show time to be 3:7. Create two ratio tables, one for the normal ratio of commercials to programming and another for the proposed ratio of commercials to programming. Use the ratio tables to make a statement about which ratio would mean fewer commercials for viewers watching 2 hours of television.
- Rubi is about to buy tiles for the floor in her home. For every 3 rooms she needs 13 tiles. The store has 30 tiles. How many rooms would she be able to provide new flooring for? Your answer can be written as a fraction.



WRITE A RATIO WORD PROBLEM

WRITE A DIVIDING FRACTIONS WORD PROBLEM

PRACTICE MULTIPLICATION TABLES