

## Why Ag in the Classroom?

In times past, people were very aware of the role agriculture played in their lives. It meant survival! Nearly everyone - men, women and children - worked the land.

Agriculture still means survival. That will never change. But as time goes on, fewer and fewer people have close contact with farming. They're not aware of their own - and the nation's - total dependence on agriculture. Think about it:

- Less than two out of 100 Americans work in production agriculture (farming). This small group meets the food and fiber needs of the nation as well as many people abroad.
- Agriculture, along with its related occupations, is the nation's largest industry. It generates billions of dollars each year; one out of every five jobs depends on it in some way. It has massive impact on the American economy, greatly influences the U.S. international balance of trade and directly affects the number of jobs here at home.

Our citizens must be agriculturally literate in order to make responsible decisions affecting this giant lifeline. Building that literacy in tomorrow's leaders is what Ag in the Classroom is all about.

## Academic Standards Connection

The student Minnesota AgMag and other educational materials from Minnesota Agriculture in the Classroom can meet many of the new academic standards. These materials can serve as a wonderful "real life" connection and supporting piece as you incorporate the standards into your classroom activities. Here are a few examples of potential connections:

**(SOCIAL STUDIES (Geography Strand) Standard:** The student will give examples that demonstrate how people are connected to each other and the environment.

**(Geography Strand) Standard:** The student will identify examples of the changing relationships between the patterns of settlement and land use in Minnesota.

**(Economics Strand) Standard:** The student will understand the concept of interdependence in relation to producers and consumers.

**SCIENCE (Earth and Space Science Strand) Standard:**

The student will investigate the impact humans have on the environment.

**(History and Nature of Science Strand) Standard:** The student will know that science and technology are human efforts that both influence and are influenced by society.

**(History and Nature of Science Strand) Standard:** The student will recognize that science and technology involve different kinds of work and engage men and women of all backgrounds.

**LANGUAGE ARTS (Reading and Literature Strand) Standard:**

The student will use a variety of strategies to expand reading, listening and speaking vocabularies.

## About Your AgMag

Your AgMag is distributed primarily to teachers in grades studying Minnesota (usually fourth or sixth). If the magazine fits better into the curriculum program at another grade level, we encourage you to pass the material on to the appropriate teachers. Offered at no cost to you, the AgMag is a product of Minnesota Agriculture in the Classroom. Here is your third and final Minnesota Agriculture Magazine for the 2008 - 2009 school year. This issue of your AgMag is designed to help you:

- provide students with a base of information for identifying and understanding the connections between agriculture and natural resources
- foster a stewardship ethic toward land, water and air
- develop awareness of Minnesota's water resources, drainage basins and water pollution challenges
- build understanding of renewable energy and how it helps conserve natural resources
- define organic foods, and why farmers and consumers value them
- offer historical insights about Minnesota's food supply from 1970 to 2009
- highlight contributions of immigrants to Minnesota's food industry.

## Hello Out There (Resources)

### MINNESOTA AGRICULTURE IN THE CLASSROOM

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Visit the National Ag in the Classroom web site to find great educational resources available from other state programs.  
[www.agclassroom.org](http://www.agclassroom.org)

Check out these web sites to enhance AgMag Issue 3 content:

- [www.mncorn.org](http://www.mncorn.org)
- [www.mnsoybean.org](http://www.mnsoybean.org)
- [www.mda.state.mn.us/renewable](http://www.mda.state.mn.us/renewable)
- [www.mda.state.mn.us/mngrown](http://www.mda.state.mn.us/mngrown)
- [www.pca.state.mn.us/water/basins/index.html](http://www.pca.state.mn.us/water/basins/index.html)
- [www.mda.state.mn.us/food/organic](http://www.mda.state.mn.us/food/organic)
- [www.umn.edu/iree](http://www.umn.edu/iree)
- [www.windustry.org](http://www.windustry.org)

### AGRICULTURAL LITERACY INSTITUTE 2009

Consider attending this unique and very educational four-day teacher institute to be held June 22 - 25 at South Central College at Mankato. You'll have lots of fun learning a ton about how food and agriculture are part of your every day. Sponsorships available! Call 507-389-7205 for more information. Access the full institute brochure at [www.mda.state.mn.us/maitc](http://www.mda.state.mn.us/maitc)

# Integration

Experienced classroom teachers create your AgMag materials. An Editorial Review Committee of teachers and subject matter experts provides content ideas and reviews each issue for accuracy and relevance.

Some teachers use the magazine as a separate lesson; others integrate magazine content into specific areas of the curriculum. The subject matter and skills listed will help you select appropriate AgMag activities to integrate into other curriculum areas.

**Language Arts, Reading:** Use the articles and activities to develop a variety of skills: outlining, reading for the main idea, vocabulary development and spelling words (bold words).

**Social Studies:** After reading pages 2 and 3, invite students to tell about things they are doing to help the environment. Encourage ideas about things they would like to study or projects they would like to take on to further help and understand the environment. Some of their ideas will bridge into science, environmental education and other areas.

**Geography:** See maps and related activities on pages 2 and 8 in the AgMag and reproducible page 5 in this Teacher Guide.

**Science, Environmental Education:** The entire AgMag is directed toward environmental education. See pages 4 and 5 for science and technology developments in creating home grown energy and page 6 for information about organic farming.

**History:** Page 7 offers some highlights of Minnesota's food history from 1970 through the present.

**Math:** See immigration trends in Minnesota, page 7.

## In This Guide: Don't Miss...

- SHOW WHAT YOU KNOW pretest and post-test on page 6. Check your students' knowledge of key agricultural concepts before and after reading the AgMag.
- Discussion prompts, background information, extended activities and answers.
- Reproducible activities designed to increase understanding of Minnesota's water resources and drainage basins, and a plotting activity that reveals a renewable product.

## Glossary

Each AgMag contains several words that may be unfamiliar to your students. You may wish to preteach these words, or take time to define them as they appear throughout the magazine. In most cases, the words appear in bold type and/or are defined in the magazine. Highlighted words in this issue are: **natural resources, aquatic** (cover); **drainage basin, watershed, photosynthesis** (pages 2 and 3); **ethanol, cooperatives, biodiesel, biomass** (pages 4 and 5); **organic, biology, ecology, biodiversity, erosion, contamination** (page 6).

## Discussion Prompters

**AgMag Cover** (Social Studies, Science, Environmental Studies)

1. Just what are "Minnesota's natural resources"? (*Brainstorm a list; think about all the wonderful things that occupy our air, land and water. Don't forget people!*) Why is it necessary to protect these treasures?
2. Why do we say farmers are some of our most important environmentalists? (*They manage such a large amount of land—over 46% nationally—so the ways they care for and protect resources are very important.*)

**AgMag Pages 2 and 3** (Economics, Social Studies, Science)

1. How many ways do you use water each day? How much water do you use? (*Showering, 5 gal./min; toilet flushing, 6 gal.; brushing teeth, 2 gal.; hand washing, 2 gal.; automatic*

*dishwasher, 15 gal./load; washing machine, 20-30 gal./load.*) NOTE: The 200 gallons of water needed to produce each person's food for a day includes all the water used to grow, clean, process, preserve and get the food to the table.

2. Minnesota is richly blessed with water resources. Our largest lake is Lake Superior.
  - a. Do you think Lake Superior's waters should be for sale to other low-supply states that need it? There is so much water that you could drain the other Great Lakes and refill them from Superior, with enough left over for three extra Lake Eries. (*Several years ago a private company was planning to sell water from the Great Lakes to dry areas of Asia. Many were alarmed about what this might mean to the environment as well as the communities near the lakes. Lots of discussion between leaders of the states and provinces that border the Great Lakes resulted in the Great Lakes Compact.*)
  - b. Why was it important that all eight states and the two provinces agree and sign the Compact? (*Without everyone's participation, the waters could not be preserved and protected.*)
3. What are some causes of water impairment? (*Growing population; greater per capita water use; changing agricultural practices affecting water such as irrigation, stock watering and feedlots; excessive suburban water use; development decisions like cutting trees, human activities around shoreline, leaving trash or pollution that kills fish or destroys their habitat.*)

**AgMag Pages 4 and 5** (Science, Social Studies)

1. The articles on these pages show some of the leading efforts going on in Minnesota to create "home grown energy." Most are self explanatory.
2. How are each of these products helping ease pressure on the environment? (*Each uses renewable resources.*) How are they creating more income for farmers? (*Farmers have more markets for the things they produce.*) How are they providing more jobs off the farm? (*Each of these products create jobs as the farm products are changed and processed into new uses. Examples: ethanol plant workers, construction workers, electrical plant workers, scientists and researchers developing new ideas, turbine salespeople and installers.*)
3. Minnesota's strong partnerships between environmental and energy groups mean strong public and political support for wind energy. Who owns the wind? Supposedly everyone does. But the machinery and efforts to harvest the wind belong to individual companies and in some cases, farmers. There will be plenty of questions about who has a right to wind (and sun) power in the years ahead. What do students think about this?
4. Encourage students to think about ways the United States is vulnerable if we continue to depend on other countries for oil as a main source of energy. Many countries are researching renewable, clean forms of energy such as wind, solar, water, geothermal and biomass power, which we can produce right here at home.
5. Does your school district set any practices to reduce air pollution near the school? (*Students should never intentionally breathe any vehicle exhaust.*)
6. How does a wind turbine work? How does electricity from wind turbines get to the customers who buy it? (Wind turbines are giant blades mounted on a tower. The blades catch the wind, which turns a shaft. The turning shaft spins a generator, which creates the electricity. The electricity travels down the tower and into underground cables. Some goes to feeder lines and then directly to customers. Some may be stored in transmission substations until it is sent to customers. An electric energy transmission network is called a "grid." The networks use both above – ground high line wires and underground cables.)

**AgMag, Page 6** (Science, Social Studies, and Environmental Studies)

1. Organic food is the fastest growing sector of the American food marketplace. Sales have been growing 15-20% a year for the past decade. What are some reasons? (Several reasons are noted in the article on page 6. Customer demand is the biggest reason. As customers want more organic food, more farmers and processors work to meet the need. That means more foods and a greater variety of organic foods are available.)
2. Why are farmers' markets a good place to shop for organic foods? (Customers can talk directly with the growers to see how the food was produced.)
3. The current American economy means many families have less money for buying groceries. How could this affect the organic foods market?

**AgMag Page 7** (Social Studies, History)

1. How did modern machinery lead to bigger farms? (*Larger, more powerful machines such as tractors, combines, balers and plows with many blades made it possible for a farmer to do much more work in less time. One person could do the work in a day it would have taken whole crews weeks to do a century before. Because the farmer could accomplish so much more, he or she often wanted to get more land and grow more crops or animals. Over time, many farmers bought nearby farms, adding the land to their own. Minnesota has fewer farms today than years ago, but those farms are larger.*)
2. When we walk into a supermarket today, we have thousands of foods to choose from. What is the reason so many new

foods appear every year? (*Consumer demands drive the market to develop new things. Science and technology develop new varieties of foods, such as fruits and vegetables. New uses are continuously created for old foods. (How many different forms of potatoes can you name? Raw, frozen tater tots, potato chips, shoestring potatoes, dried potato flakes are just a few.)*)

3. When today's new immigrants first came into Minnesota, most moved into the Twin Cities, Duluth or Rochester. Other communities such as St Cloud, Moorhead, Willmar, Worthington, Marshall, Owatonna and Albert Lea also became home to thousands of immigrants during the 1990s and early 2000s. Many moved to rural areas to work in agriculture. Jobs at farms, processing plants and meatpacking businesses drew seasonal workers and new immigrants. By 2000, Worthington was Minnesota's third most racially diverse city, after Minneapolis and St. Paul.
  - a. What do you think the toughest part of immigrating has been for our newest immigrants?
  - b. Do you know anyone who has moved to Minnesota from another country? Why did they come to Minnesota? How did they feel about leaving their homeland?
  - c. How would you feel if your family decided to move to a different country far away? What important things would you need to learn?
  - d. What food traditions would you want to take with you to your new home?

**ANSWERS: AgMag**

**Please Note:** If answers are supplied in the AgMag itself, they are not repeated here.

**CONNECTIONS TO AGRICULTURE,**

Cover

Wooden paddle, clothing, vest, seat fabric, water and trees.

**NATURAL RESOURCES, p. 2**

Resources enjoyed: water; soil; air. Wildlife, plants and all living things benefit from healthy resources.

**CARE FOR THE SOIL, p. 2**

soil

**CARE FOR THE WATER, p. 3**

**Did you know?** 250 gallons of water equals one ton.

**What do you know about water?**

1. c
2. b
3. a

**WATER WATCH, p. 3**

Eight states and two provinces that border the Great Lakes:

Minnesota, Wisconsin, Michigan, Illinois, Indiana, Ohio, Pennsylvania, New York

Ontario and Quebec

**HOME GROWN ENERGY, pgs. 4 and 5**

**Think and Discuss**

What do higher corn prices mean? Cattle, hog and poultry farmers will pay more for corn which means they will have to charge more for their products. Food processors will do the same. Many of our common foods are sweetened with corn syrup. Soda pop, bakery goods, ketchup and candy are examples.

**HARVESTING THE WIND, p.5**

1. Wind farms must be placed in open areas where wind blows steadily. Locations must not interfere with other activities in the area or pose a safety hazard.
2. Electricity transmission: Covered in Discussion Question #6 on facing page.
3. It's an advantage to have wind farms near large population centers because it cuts the distance and expense of transmitting the electricity from the wind farm to the consumers.
4. Wind-generated energy saves water because billions of gallons of water a day are used to produce electricity in nuclear and coal-fired power plants. Both nuclear and coal-fired power plants also release emissions into the air.

**IMMIGRANT TRENDS, p. 7**

Most of the new immigrants are from Asia and Latin America.

**CELEBRATE MINNESOTA WATER, p. 8**

- |                |              |
|----------------|--------------|
| 1. Red         | 5. St. Croix |
| 2. Rainy       | 6. Rum       |
| 3. Mississippi | 7. Minnesota |
| 4. St. Louis   | 8. Root      |

**POOP POWER, p. 8**

Fertilizer is spread on cropland to improve and enrich the soils. Improved soils mean better crops.

**NAME THE DAY, p. 8**

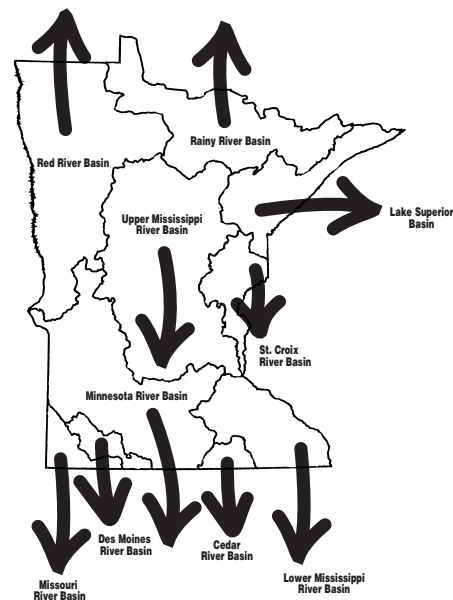
Arbor Day, on Friday, April 24, 2009.

**Teacher Guide**

**SHOW WHAT YOU KNOW!**

1. b; 2. c; 3. b; 4. a; 5. b;
6. d; 7. a; 8. a; 9. d; 10. a.

**MINNESOTA DRAINAGE BASINS!**



# THINK, MAGNIFY, IMAGINE

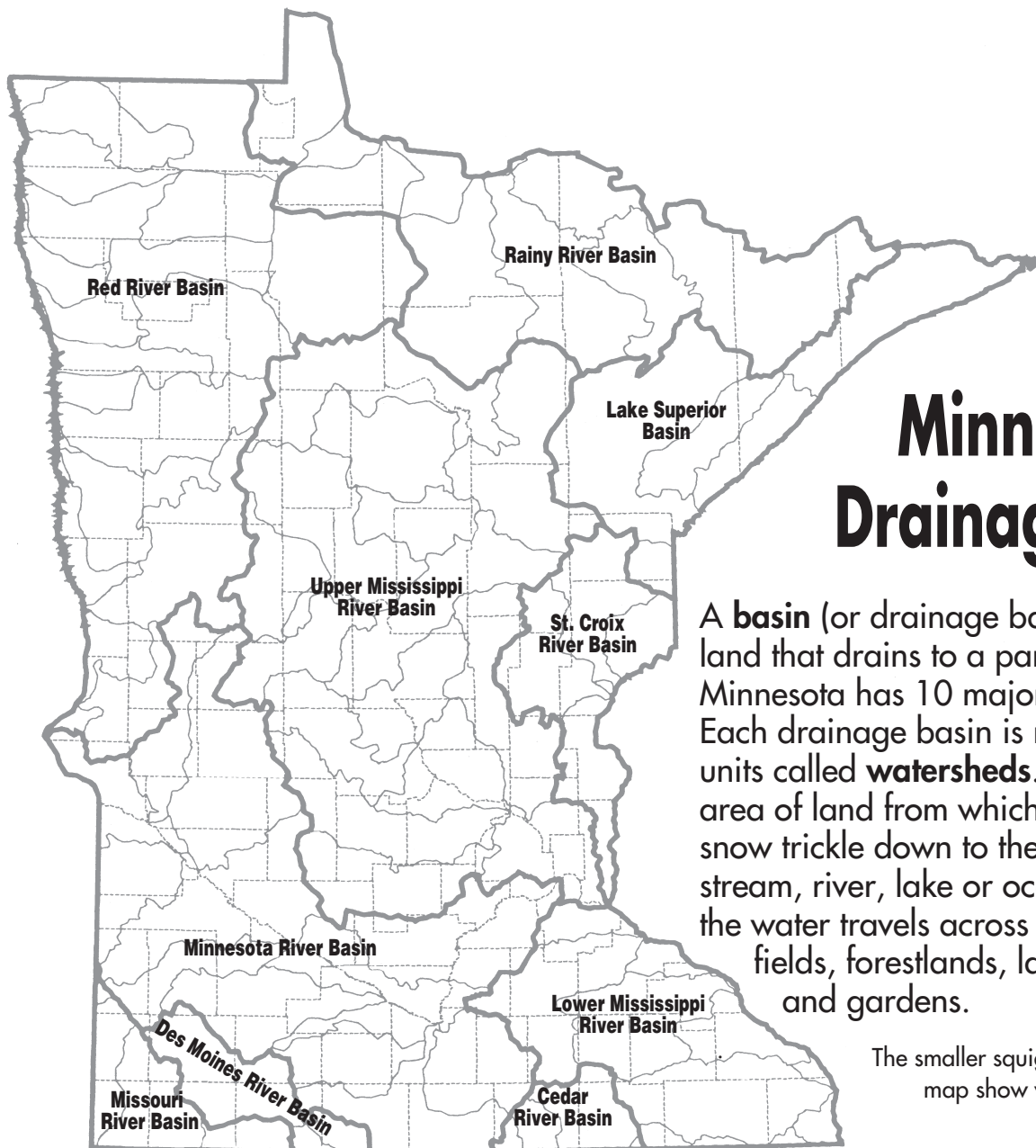
## ... A Process for Learning

When there's too much information (TMI) to deal with, turn TMI into THINK, MAGNIFY, and IMAGINE. Use these sample questions to guide students' learning in class discussions or group research. Dig deeper into the renewable energy topics in this AgMag and today's headlines as you think, magnify and imagine.

<b>AgMag Topic</b>	<b>THINK</b> <i>Question, Predict, Connect</i>	<b>MAGNIFY</b> <i>Take a Closer Look, Find Facts</i>	<b>IMAGINE</b> <i>Analyze Data, Envision Possibilities</i>
<b>HOME GROWN ENERGY INTRODUCTION</b>	How is your day powered by energy?	What is energy? What are some different types of energy? What are renewable and nonrenewable energy sources?	Why is it important to find/use renewable energy sources?
<b>ETHANOL: FUEL from CORN</b>	What makes corn such a valuable crop?	Food, feed, fuels ... how does corn help us meet our energy needs?	Why is it important to find and use clean fuels to power our vehicles?
<b>BIODIESEL: FUEL from SOYBEANS</b>	Why is there an urgent need for alternative fuels?	What kinds of fuels power various methods of transportation?	Why are soybeans a valuable crop in the field of energy?
<b>ENERGY From MANURE</b>	What do cows (and turkeys) have to do with electricity?	How are cow manure and turkey litter helping us generate electricity? What's the process?	What other waste products could be recycled to generate energy? In the future, what do you imagine happening in the field of energy?
<b>ENERGY from BIOMASS</b>	What natural materials are burned to generate energy?	What is biomass?	Why are water issues central to the production of energy from crops?
<b>ENERGY From WIND</b>	What is a wind farm?	How do we "farm" the wind?	How do wind farms benefit local communities in which they are built?

\* Adapted from Teacher Guide for Ag in the Classroom's "Fields of Energy" DVD, free of cost to teachers. Go to [www.mda.state.mn.us/maic](http://www.mda.state.mn.us/maic)





# Minnesota Drainage Basins

A **basin** (or drainage basin) is the area of land that drains to a particular river or lake. Minnesota has 10 major drainage basins. Each drainage basin is made up of smaller units called **watersheds**. A watershed is an area of land from which rain and melted snow trickle down to the lowest point ... a stream, river, lake or ocean. On its way, the water travels across and under farm fields, forestlands, lawns, city streets and gardens.

The smaller squiggly lines on the map show watersheds

## Show the *Flow!*

The water in Minnesota's drainage basins flows in three directions. Mark arrows on the map to show the direction each basin flows:

1. The Red River of the North Basin and the Rainy River Basin flow *north* to Hudson Bay.
2. The Lake Superior Basin drains east to the Atlantic Ocean.
3. The remaining seven basins drain *south* to the Gulf of Mexico. This includes the Minnesota, Missouri, Des Moines, Root and St. Croix Rivers. All are part of the greater Mississippi River Basin.

## Think & DISCUSS

- Mark your area of your basin. In which direction does your drainage basin flow?
- In which smaller rivers and lakes does the water from your drainage basin end up? For example, the major watersheds of the Lake Superior Basin are the St. Louis River, the Cloquet River, Lake Superior (North) and Lake Superior (South).
- If you pollute water in your community, who is affected? (HINT: Remember your answer to the question above.)

**Note to Teachers:**

You are encouraged to send the Pretest and Post-test results to Ag in the Classroom to help document student learning. Use the attached postage-paid evaluation card.

Name \_\_\_\_\_

Check one  Pretest  Post-test

# Show What You Know!

Take this short quiz before you read your AgMag, then again after reading the magazine. See the improvement!

**1.**

The Great Lakes Compact protects water from

- a. too much boat traffic.
- b. being sent to other states or countries.
- c. being used for fishing.

**2.**

Two main natural resources affected by agriculture are

- a. iron ore and minerals.
- b. air and natural gas.
- c. soil and water.

**3.**

Organic food is

- a. grown without soil.
- b. grown without pesticides and herbicides.
- c. grown only in greenhouses.

**4.**

The water we use today is the same water that was here when dinosaurs roamed the earth.

- a. True
- b. False

**5.**

Nearly three-fourths of the land in Minnesota is owned by

- a. Native Americans.
- b. farmers and other private landowners.
- c. banks.

**6.**

Trees and plants help the environment by

- a. releasing oxygen.
- b. holding soil.
- c. providing habitat for animals.
- d. a, b, and c.

**7.**

Fossil fuels include

- a. coal, natural gas and petroleum.
- b. ethanol.
- c. manure.

**8.**

A watershed is

- a. an area of land from which rain and melted snow trickle down to the lowest point: a river, lake or ocean.
- b. a small building protecting a well.
- c. a new kind of raincoat material.

**9.**

By protecting soil and water, we protect

- a. wildlife.
- b. the human food supply.
- c. trees and plants.
- d. a, b, and c.

**10.**

Minnesota's Arbor Day is always the last Friday in April.

- a. True
- b. False