Human Geography II
Political Geography

_Invisible boundary lines on the earth’s surface divide our world into discrete political entities and have significant influence on the stability and cohesiveness of the countries they define._

**Crossing the Line: A global perspective**
Students will explore the nature and significance of international political boundaries. Through an investigation of contemporary political boundaries, they will identify boundary forms, compare patterns of size and shape, and explore the influence of boundaries on national cohesiveness and economic potential. By comparing world political boundaries in 1992 and 2000, students will observe the evolution of boundary characteristics over time.

**A Line in the Sand: A regional case study of Saudi Arabia and Yemen**
Students will study the creation of a new border between Yemen and Saudi Arabia on the Arabian Peninsula. Using data included in the June 2000 Treaty of Jeddah, they will draw the new boundary described in the treaty and analyze the underlying physiographic and cultural forces that influenced the location of that boundary. In the process they will come to understand how any map of the world must be considered a tentative one, as nations struggle and cooperate with each other.

**Starting from Scratch: An advanced investigation**
Students will use physiographic (physical features) and anthropographic (cultural features) data to redraw some of the world’s international boundaries, thereby creating states characterized by internal cohesiveness and economic parity. By comparing their maps to ones reflecting contemporary political boundaries, students will identify world regions where political boundaries are in conflict with physical and cultural imperatives.
Crossing the Line

A global perspective

Lesson overview

Students will explore the nature and significance of international political boundaries. Through an investigation of contemporary political boundaries, they will identify boundary forms, compare patterns of size and shape, and explore the influence of boundaries on national cohesiveness and economic potential. By comparing world political boundaries in 1992 and 2000, students will observe the evolution of boundaries over time.

Estimated time

Two to three 45-minute class periods

Materials

✔ A world atlas or map of Europe showing mountain ranges and their names
✔ Student handouts from this lesson to be copied:
  • GIS Investigation sheets (pages 265 to 273)
  • Student answer sheets (pages 274 to 279)
  • Assessment(s) (pages 280 to 283)

Standards and objectives

National geography standards

<table>
<thead>
<tr>
<th>GEOGRAPHY STANDARD</th>
<th>MIDDLE SCHOOL</th>
<th>HIGH SCHOOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 How to analyze the spatial organization of people, places, and environments on Earth’s surface</td>
<td>The student knows and understands how to use the elements of space to describe spatial patterns.</td>
<td>The student knows and understands how to apply concepts and models of spatial organization to make decisions.</td>
</tr>
<tr>
<td>13 How the forces of cooperation and conflict among people influence the division and control of Earth’s surface</td>
<td>The student knows and understands the multiple territorial divisions of the student’s own world.</td>
<td>The student knows and understands why and how cooperation and conflict are involved in shaping the distribution of social, political, and economic spaces on Earth at different scales.</td>
</tr>
<tr>
<td>18 How to apply geography to interpret the present and plan for the future</td>
<td>The student knows and understands how varying points of view on geographic context influence plans for change.</td>
<td>The student knows and understands contemporary issues in the context of spatial and environmental perspectives.</td>
</tr>
</tbody>
</table>
Objectives
The student is able to:
- Define and give examples of physiographic, geometric, and anthropographic boundaries.
- Describe the political and economic implications of a country’s size and shape.
- Explain the relationship between boundary characteristics and national cohesiveness.
- Give examples and explain the nature of international boundary changes in the late twentieth century.

GIS skills and tools
- Turn layers on and off
- Expand and collapse legends in the table of contents
- Zoom to a specific area on the map
- Draw a line
- Change the line color
- Identify a feature on the map
- Select a graphic
- Pan to a different section of the map
- Zoom to full extent
- Add layers to the map
- Find a feature in a layer, select it, and zoom to it
- Save the map document
- Turn layers on and off
- Expand and collapse legends in the table of contents

For more on geographic inquiry and these steps, see Geographic Inquiry and GIS (pages xxiii to xxv).
Teacher notes

Lesson introduction

Write the following quotation on the board or on a transparency:

“When you go around the Earth in an hour and a half . . . you look down there
and you can't imagine how many borders and boundaries you cross, again and
again and again, and you don't even see them . . . from where you see it, the thing
is a whole, and it's so beautiful.”

Russell L. Schweickart
Apollo 9, March 3–13, 1969
(As published in The Overview Effect, 1998)

Use this quotation as a springboard to discuss the following questions:

• What are boundaries?
• Who draws the boundary lines?
• What purpose do boundaries serve?
• If boundaries are invisible lines, how do you know when you've crossed one?
• Once you've crossed one of these invisible lines, what has changed?
• Can you think of any problems that boundaries may cause?

Throughout the discussion, emphasize that although most boundaries are
unmarked and invisible, they determine our perception of spaces and places on
earth. Boundaries between countries help maintain order in the world because
they define internationally recognized and sovereign political entities. Conflict can
result when boundary lines are disputed. Boundaries are also potential sources of
conflict because they are the point of contact between neighboring people.

Challenge students to identify places in the world where international boundaries
have changed or are in conflict. What do students know about the reasons for
those boundary changes and conflicts? Tell the class that they are going to do a
GIS Investigation that will explore the characteristics of modern international
boundaries and investigate recent boundary changes.

Student activity

Before completing this lesson with students, we recommend that you
complete it as well. Doing so will allow you to modify the activity to
accommodate the specific needs of your students.

After the initial discussion, have the students work on the computer component
of the lesson. Ideally, each student should be at an individual computer, but the
lesson can be modified to accommodate a variety of instructional settings.

Distribute the GIS Investigation sheets to the students. Explain that in this
activity, they will use GIS to investigate different types of international bound-
aries, explore the implications of various boundary configurations, and observe
boundary changes in recent years. The activity sheets will provide them with
detailed instructions for their investigations.

In addition to instructions, the handout includes questions to help students focus
on key concepts. Some questions have specific answers while others call for spec-
ulation and have a range of possible responses. In addition, answers to many
questions will vary with student knowledge of current events and contemporary
world political issues.

Things to look for while the students are working on this activity:

• Are the students using a variety of GIS tools?
• Are the students answering the questions as they work through the procedure?
• Are students asking thoughtful questions throughout the investigation?
Student activity (continued)

Teacher Tip: This GIS Investigation contains instructions for students to periodically stop and save their work. These are good spots to stop the class for the day and to pick up the investigation the next day. Be sure to inform your students as to how they should rename their map document and where to save it.

Conclusion

Use a projection device to display the global5.apr in the classroom. As a group, compare student observations and conclusions from the lesson. Students can take turns being the “driver” on the computer to highlight boundaries and observations that are identified by members of the class. Focus on the following aspects of the GIS Investigation in your discussion:

- Where did students observe the coincidence of political and physiographic boundaries?
- What examples of territorial morphology (countries representing categories of different shapes and sizes) did the students find? Ask students to speculate on ways that a country’s size and shape could influence its sense of unity or cohesiveness.
- How can a country’s boundaries influence its economic strength and advantage?
- What kinds of problems are likely to arise when political and anthropographic (cultural) boundaries do not coincide?
- What is the nature of the boundary changes that occurred between 1992 and 2000? Based on student response in step 8, which of the new countries do students believe are in the strongest position today in terms of cohesiveness?

Assessment

Middle school: Highlights skills appropriate to grades 5 through 8

In the middle school assessment, students are asked to identify an international boundary in 2000 that they predict could change in the next 25 years. They are asked to prepare a map of the projected boundary change and describe its impact in terms of the lesson’s concepts.

- What types of boundaries are involved in the projected change?
- How will the territorial morphology of the countries involved be affected by the projected change?
- What will the economic impact of the projected change be?
- How will the projected change affect the internal cohesiveness of all countries involved?

High school: Highlights skills appropriate to grades 9 through 12

In the high school assessment, students are asked to identify two international boundaries in 2000 that they predict could change in the next 25 years. One of their predictions should involve splitting a current country into two or more smaller countries, and one of their predictions should involve merging two or more countries into one larger one. They are asked to prepare a map of the projected boundary changes and compare them in terms of the lesson’s concepts.

- What types of boundaries are involved in the changes?
- How will the territorial morphology of the countries involved be affected by the projected changes?
- What will the economic impact of the projected changes be?
- How will the projected changes affect the internal cohesiveness of all countries involved?
Extensions

• Assign students to conduct research on world boundary changes during the twentieth century. Use ArcView to prepare a sequence of layouts reflecting those changes.

• Explore the nature of political boundaries in your own community and state. What kind of boundaries are they, how does the shape of your town or state affect its cohesiveness, what are the economic advantages and disadvantages of your town or state’s boundary configuration, how have your town or state’s boundaries changed over time?

• Search newspapers and magazines (both on- and offline) for coverage of border conflicts and related issues around the world. Use ArcView to illustrate the nature of these conflicts.

• Check out the Resources by Module section of this book’s companion Web site (www.esri.com/mappingourworld) for print, media, and Internet resources on the topic of political boundaries.
Crossing the Line
A GIS investigation

Answer all questions on the student answer sheet handout

Boundaries are invisible lines on the earth’s surface. They divide the surface area into distinct separate political entities. In this activity, you will use GIS to investigate different types of international boundaries, explore the implications of various boundary configurations, and observe boundary changes in recent years. When you have completed the activity, you will use your knowledge of boundary dynamics to speculate on world boundaries that are likely to change in the future.

Step 1 Start ArcMap

a  Double-click the ArcMap icon on your computer’s desktop.

b  If the ArcMap start-up dialog appears, click An existing map and click OK. Then go to step 2b.
Step 2  Open the Global5.mxd file

a  In this exercise, a map document has been created for you. To open it, go to the File menu and choose Open.

b  Navigate to the module 5 folder (C:\MapWorld9\Mod5) and choose Global5.mxd (or Global5) from the list.

c  Click Open.

The map document opens and you see a composite satellite image of the world. The check mark next to the layer name tells you the layer is turned on and visible in the data frame.

Step 3  Explore mountain ranges as physiographic boundaries

As astronaut Russell L. Schweickart said, if you could view the world from space, you would see no boundary lines. Boundaries are human-made lines that define the world's political entities.

There are several types of boundaries between countries. One type of boundary is called a physiographic boundary. They are based upon natural features on the landscape such as mountain ranges or rivers.

a  Click the box next to the Boundaries 2004 layer to turn it on. A check mark appears and the red lines show the international boundaries for the year 2004.

b  Click the Zoom In tool. On the map, click and drag a box around Europe. The view is now centered on Europe.
c  Drag another box around Europe to zoom in more so you can see the physical features in greater detail.

d  Turn off Boundaries 2004 by clicking the check mark next to the layer name.

Locate Europe’s mountain ranges in the satellite image. Notice that ranges such as the Pyrenees Mountains in northeastern Spain form a natural boundary. You will use the Draw Line tool to draw lines where you see a mountain range forming a natural boundary between different parts of the continent. First, you will select a symbol type and color for drawing.

e  On the Draw toolbar click the drop-down arrow to the right of the New Rectangle tool and select the New Line tool.

f  On the Draw toolbar click the down arrow key to the right of the Line Color button and change the color to yellow.

Now you are ready to draw a physiographic boundary in Europe.

g  Click the westernmost edge of the Pyrenees Mountains to start your line. Continue clicking along the path of the mountain range until you reach its easternmost edge. Double-click to end the line.

h  The yellow line is displayed in the map. Click on the map away from the yellow line to make the blue selection box disappear.

i  Turn on the Boundaries 2004 layer. You see that your line corresponds to a border between two countries.

j  Click the Identify button. Move the Identify Results window so you can see the map.

k  Click the country that borders the Pyrenees Mountains to the north.

The left side of the window shows the layer name and below it the country name. You can also see all the attributes for that country that are in the attribute table.

l  Click on the country on the other side of the border.

*The Pyrenees Mountains are the border between which two countries?*
Step 4  Explore bodies of water as physiographic boundaries

a  Turn off the Satellite Image layer and turn on the Rivers, Lakes, Countries 2004, and Ocean layers.

Wherever countries have physiographic boundaries based on rivers, the red boundary line disappears beneath the blue river on the map. Look closely at Europe to see if you can find any boundaries that are rivers. The different colored countries will help you find these places.

b  In the Identify Results window click the Layers box and make Countries 2004 the active layer. (If the Identify Results window is closed click the Identify button to open it.)

c  Click a country that has a river as all or part of a boundary. You may need to zoom and pan to see the rivers that are aligned with the country boundaries. Make sure you click the Identify tool again when you are in a location that you like.

\[\text{Note: Refer to the ArcMap Toolbar Quick Reference for a brief explanation of the Zoom and Pan tools.}\]

In the table on the answer sheet, record the names of three sets of countries that share a boundary that is a river.

\[\text{Note: In order to identify the names of the rivers, you must make Rivers the active layer in the Identify Results window.}\]

Coastlines are also physiographic boundaries. Countries that do not have a coastline are said to be landlocked.

d  Zoom or pan so that Western Europe is in your full view.

Name three landlocked countries in Western Europe. Use the Identify tool if you don’t know the name of a specific country. (Remember to set Countries 2004 as the active layer in the Identify Results window.)

Step 5  Explore geometric boundaries

Another type of boundary is a geometric boundary. Geometric boundaries consist of straight or curved lines that do not correspond to physical features on the earth’s surface.

a  Click the Full Extent button to see all the continents.

b  Click the Zoom In tool. Use it to zoom in on Africa.

You see many rivers that overlap boundaries throughout the African continent.

c  Look at the map and locate countries that have geometric boundaries.
GIS investigation

MODULE 5 • HUMAN GEOGRAPHY II: POLITICAL GEOGRAPHY

Step 6  Explore anthropographic boundaries based on language and religion

A third type of boundary is an anthropographic boundary. This boundary marks the transition between cultural characteristics on the landscape. Anthropographic boundaries are based on characteristics such as language, religion, or ethnicity.


b  Click the Add Data button.

c  Navigate to the LayerFiles folder within the module 5 Data folder (C:\MapWorld9\Mod5\Data\LayerFiles).

d  Select Language.lyr. Hold down the Ctrl key and click Religion.lyr. Click Add.

e  Drag the Boundaries 2004 layer above the Language and Religion layers in the table of contents.
Global perspective: Crossing the Line

GIS investigation

Step 7  Review physiographic, geometric, and anthropographic boundaries

a Find additional examples of physiographic, geometric, and anthropographic boundaries between countries. Record your findings in the table on the answer sheet.

b Close the Identify Results window when you are finished.

Step 8  Explore the impact of boundary shape, cultural diversity, and access to natural resources

Boundaries determine the size and shape, or territorial morphology, of countries. Size and shape can exert a powerful influence on the cohesiveness of a country. Small compact nations or ones that are circular or hexagonal, for example, are more easily united than ones that are elongated or fragmented.

a Click the Full Extent button to see the whole world again. Turn off all layers except for Countries 2004 and Ocean and collapse the Languages and Religions legends in the table of contents (click the minus sign next to the layer title).

b Click the Find button.
c In the Find box type **Chile**. Select Countries 2004 from the drop-down list.

![Find dialog](image)

*d* Click Find. A results box appears at the bottom of the Find dialog and Chile is listed. Move the Find dialog to the side so you can see the map.

*e* Right-click on the highlighted row for Chile and click Zoom to feature(s). Then right-click again and click Flash feature to locate Chile in the map.

The table in the answer sheet illustrates six types of countries based on shape and gives an example of each. Chile is listed as an example of an elongated country.

*f* Use the Find, Zoom, and Pan tools to locate another example of each type of country. Record them in the table on the answer sheet in the Example 2 column. Remember, you can use the Identify tool to find the names of countries that you do not know.

Another factor that influences cohesiveness is the extent of cultural diversity.

*g* Click the Full Extent button. Turn off the Countries 2004 layer. Turn on Boundaries 2004 and Language.

1. **By using language groups as an indicator of cultural uniformity, identify three countries that reflect cultural uniformity.**

2. **By using language groups as an indicator of cultural diversity, identify three countries that reflect cultural diversity.**

Boundaries also influence economic activities. Earlier in this GIS Investigation, you identified landlocked countries in Western Europe. Historically, these countries were limited in their ability to trade directly with other nations because imports and exports had to pass through other countries en route to their destination.

*h* Click the Full Extent button. Turn off Boundaries 2004 and Language. Turn on Countries 2004.

*i* Use the ArcMap tools and buttons you’ve learned in this investigation to find an example of a landlocked country on each continent listed in the table on the answer sheet. For a continent that does not have a landlocked country, write “none.”

Close the Find dialog if it is still open.

Boundaries also influence economic activities by establishing a country’s access to natural resources.

*k* Click the Full Extent button.
Click the Add Data button. Navigate to the LayerFiles folder within the module 5 Data folder (C:\MapWorld\Mod5\Data\LayerFiles). Double-click Oil and Gas.lyr.

The locations of oil and natural gas sources around the world are displayed on the map.

Use the Zoom In tool to focus on Southeast Asia.

Use the Pan, Zoom, and Identify tools to help you answer the following questions.

1. Name two Southeast Asian countries that do not have any oil and gas resources within their borders.
2. Name two Southeast Asian countries that have oil and gas resources within their borders.

Turn off the Oil and Gas layer.

Click the Full Extent button. Turn off Countries 2004 and Ocean, and turn on Boundaries 2004 and Satellite Image.

Step 9 Explore boundary changes in the 1990s

Political boundaries can change in many ways. Large countries may split into several smaller ones, small countries may combine to produce larger ones, territories that were once part of one country may be incorporated into another.

Click the Add Data button. Navigate to the LayerFiles folder within the module 5 Data folder (C:\MapWorld\Mod5\Data\LayerFiles) and add Boundaries 1992.lyr.

The international boundaries from 1992 display as yellow lines.

Note: Because the 1992 boundaries cover the 2004 boundaries on the map, the 2004 boundary lines are not visible when they are in the same location as they were in 1992. The only 2004 boundary lines (red) that are visible are those that did not exist in 1992.

Observe the map closely to see the difference between 1992 and 2004. What kind of changes to you see? (Use your Zoom and Pan tools to get a good look at these changes.)

1. Describe three political boundary changes you see between 1992 and 2004.
2. Name two countries that existed in 1992 but do not exist in 2004.

If you have already saved this map document at the end of step 5, click the Save button to save your work. Otherwise, ask your teacher for instructions on where to save this map document and how to rename it. If you do not need to save the map document, continue to the next step.

Write the new name you gave the map document and where you saved it.
**Step 10  Compare new countries**

Countries in groups A and B below are new countries that have emerged since 1992.

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>Russia</td>
</tr>
<tr>
<td>Slovakia</td>
<td>Belarus</td>
</tr>
<tr>
<td>Slovenia</td>
<td>Ukraine</td>
</tr>
<tr>
<td>Croatia</td>
<td>Moldova</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>Armenia</td>
</tr>
<tr>
<td>Serbia and Montenegro</td>
<td>Azerbaijan</td>
</tr>
<tr>
<td>Macedonia</td>
<td>Georgia</td>
</tr>
<tr>
<td>Eritrea</td>
<td>Kazakhstan</td>
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<tr>
<td></td>
<td>Uzbekistan</td>
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<tr>
<td></td>
<td>Tajikistan</td>
</tr>
<tr>
<td></td>
<td>Turkmenistan</td>
</tr>
<tr>
<td></td>
<td>Kyrgyzstan</td>
</tr>
</tbody>
</table>

*Select three countries from group A and three from group B and complete the table on the answer sheet. Use the information and GIS skills you learned in this investigation to answer the questions.*

**Step 11  Exit ArcMap**

In this exercise, you used ArcGIS to explore the various types of political boundaries and their impact on the countries they define. You added layers and used the Find, Identify, Zoom, and Pan tools to investigate the maps. You observed and analyzed boundary changes between 1992 and 2004.

*Click the File menu and click Exit. When asked if you want to save changes to the map document, click No.*
Student answer sheet

Module 5
Human Geography II: Political Geography

Global perspective: Crossing the Line

Step 3  Explore mountain ranges as physiographic boundaries

i. The Pyrenees Mountains are the border between which two countries?

ii. Complete the table below (consult an atlas to find the names of unknown mountain ranges):

<table>
<thead>
<tr>
<th>COUNTRIES THAT HAVE MOUNTAIN RANGES AS POLITICAL BOUNDARIES</th>
<th>MOUNTAINS THAT FORM THE BOUNDARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>and</td>
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<td>and</td>
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<td>and</td>
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</tbody>
</table>

Step 4  Explore bodies of water as physiographic boundaries

c. In the table below, record the names of three sets of countries that share a boundary that’s a river:

<table>
<thead>
<tr>
<th>COUNTRIES THAT HAVE RIVERS AS BOUNDARIES</th>
<th>RIVER THAT FORMS THE BOUNDARY</th>
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</thead>
<tbody>
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<td>and</td>
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<td>and</td>
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<td>and</td>
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</tbody>
</table>

d. Name three landlocked countries in Western Europe. Use the Identify tool if you don’t know the name of a specific country.

   ____________________________________________
   ____________________________________________
   ____________________________________________
Step 5  Explore geometric boundaries
e  Record three sets of countries in the table below:

<table>
<thead>
<tr>
<th>COUNTRIES THAT ARE SEPARATED BY GEOMETRIC BOUNDARIES</th>
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<tbody>
<tr>
<td>and</td>
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<tr>
<td>and</td>
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<tr>
<td>and</td>
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</tbody>
</table>

h  Write the new name you gave the map document and where you saved it.

______________________________________ ______________________________________  
(Name of map document. For example: ABC_Global5.mxd)  (Navigation path to where map document is saved. For example: C:\Student\ABC)

Step 6  Explore anthropographic boundaries based on language and religion
h  Determine the principal language groups in the regions listed below.
  South America: ____________________________________________________________________________
  Western Europe: __________________________________________________________________________

j  Locate three examples in the world where political boundaries coincide with anthropographic boundaries based on language.

<table>
<thead>
<tr>
<th>ANTHROPOGRAPHIC BOUNDARIES BASED ON LANGUAGE COINCIDE WITH POLITICAL BOUNDARIES BETWEEN</th>
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<tbody>
<tr>
<td>and</td>
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<td>and</td>
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</tbody>
</table>

n  Determine the principal religions in the following regions:
  North America: _________________________________________________________________________
  Africa: ______________________________________________________________________________

p  Locate three examples in the world where political boundaries coincide with anthropographic boundaries based on religion.

<table>
<thead>
<tr>
<th>ANTHROPOGRAPHIC BOUNDARIES BASED ON RELIGION COINCIDE WITH POLITICAL BOUNDARIES BETWEEN</th>
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</tbody>
</table>
Step 7  Review physiographic, geometric, and anthropographic boundaries

a. Find additional examples of physiographic, geometric, and anthropographic boundaries between countries. Record your findings in the following table:

<table>
<thead>
<tr>
<th>CONTINENT</th>
<th>PHYSIOGRAPHIC BOUNDARIES SEPARATE THE FOLLOWING COUNTRIES</th>
<th>GEOMETRIC BOUNDARIES SEPARATE THE FOLLOWING COUNTRIES</th>
<th>ANTHROPOGRAPHIC BOUNDARIES SEPARATE THE FOLLOWING COUNTRIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>North and Central America</td>
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<td>South America and the Caribbean</td>
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</tr>
</tbody>
</table>
Step 8  Explore the impact of boundary shape, cultural diversity, and access to natural resources

f Locate another example of each type of country. Record them in the following table in the Example 2 column. Remember, you can use the Identify tool to find the names of countries that you do not know.

<table>
<thead>
<tr>
<th>TYPE OF COUNTRY</th>
<th>EXAMPLE</th>
<th>EXAMPLE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elongated</td>
<td>Chile</td>
<td></td>
</tr>
<tr>
<td>Fragmented</td>
<td>Philippines</td>
<td></td>
</tr>
<tr>
<td>Circular/Hexagonal</td>
<td>France</td>
<td></td>
</tr>
<tr>
<td>Small/Compact</td>
<td>Bulgaria</td>
<td></td>
</tr>
<tr>
<td>Perforated</td>
<td>South Africa</td>
<td></td>
</tr>
<tr>
<td>Prorupted</td>
<td>Namibia</td>
<td></td>
</tr>
</tbody>
</table>

g-1 By using language groups as an indicator of cultural uniformity, identify three countries that reflect cultural uniformity.
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

g-2 By using language groups as an indicator of cultural diversity, identify three countries that reflect cultural diversity.
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

i Use the ArcMap tools and buttons you’ve learned in this investigation to find an example of a landlocked country on each of the following continents. For a continent that does not have a landlocked country, write “none.”

<table>
<thead>
<tr>
<th>CONTINENT</th>
<th>LANDLOCKED COUNTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America (including Central America)</td>
<td></td>
</tr>
<tr>
<td>South America</td>
<td></td>
</tr>
<tr>
<td>Africa</td>
<td></td>
</tr>
<tr>
<td>Asia</td>
<td></td>
</tr>
</tbody>
</table>

o-1 Name two Southeast Asian countries that do not have any oil and gas resources within their borders.
____________________________________________________________________________________
____________________________________________________________________________________

o-2 Name two Southeast Asian countries that have oil and gas resources within their borders.
____________________________________________________________________________________
____________________________________________________________________________________
Step 9  Explore boundary changes in the 1990s

c-1  Describe three political boundary changes you see between 1992 and 2004.

___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________

c-2  Name two countries that existed in 1992 but do not exist in 2004.

___________________________________________________________________________________
___________________________________________________________________________________

d  Write the new name you gave the map document and where you saved it.

____________________________________  ______________________________________
(Name of map document.  
For example: ABC_Global5.mxd)  (Navigation path to where map document is saved.  
For example: C:\Student\ABC)

Step 10  Compare new countries

a  See next page.
10a Select three countries from group A and three from group B and complete the following table. Use the information and skills you learned in this GIS investigation to answer the questions.

<table>
<thead>
<tr>
<th>GROUP</th>
<th>COUNTRY</th>
<th>WHAT TYPE OF BOUNDARIES DOES IT HAVE?</th>
<th>HOW WOULD YOU CHARACTERIZE ITS SHAPE?</th>
<th>WHAT ECONOMIC ADVANTAGES OR DISADVANTAGES DO YOU SEE?</th>
<th>DO THE CURRENT CHARACTERISTICS OF THE COUNTRY PROMOTE COHESIVENESS OR SPLITTING APART?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

| B     |         |                                      |                                       |                                                       |                                                                                        |
|       |         |                                      |                                       |                                                       |                                                                                        |
|       |         |                                      |                                       |                                                       |                                                                                        |
|       |         |                                      |                                       |                                                       |                                                                                        |


Crossing the Line
Middle school assessment

In this assessment activity, you must predict the future! Instead of using a crystal ball, you will use a GIS to see 25 years into the future of the world.

1. Use the information you learned in this GIS Investigation to identify a current international boundary that you think will change in the next 25 years.

2. Draw a map (in ArcMap or with paper and pencil) to illustrate what this boundary will look like in 25 years. Be sure to include a legend, north arrow, scale, and date of creation on the map.

3. Write an essay that describes the consequences of the change you predict. Address the following questions in your essay:
   • What types of boundaries are involved in the projected change?
   • How will the territorial morphology of the countries involved be affected by the projected change?
   • What will the economic impact of the projected change be?
   • How will the projected change affect the internal cohesiveness of all countries involved?
Crossing the Line

Assessment rubric

Middle school

<table>
<thead>
<tr>
<th>STANDARD</th>
<th>EXEMPLARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student knows and understands how to use the elements of space to describe spatial patterns.</td>
<td>Creates a digital map using GIS to illustrate a predicted international boundary change. The student takes into account a variety of data when developing his/her new map.</td>
</tr>
<tr>
<td>How cooperation and conflict among people contribute to economic and social divisions of Earth’s surface.</td>
<td>Uses maps and written description to illustrate how the proposed boundary changes will affect the countries involved, including their role in the global economy. Provides sufficient data to support ideas.</td>
</tr>
<tr>
<td>The student knows and understands how varying points of view on geographic context influence plans for change.</td>
<td>Describes the perspectives of the countries involved in the proposed boundary change. Addresses a variety of issues including political, cultural, and so on.Also addresses how this will affect the global community.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MASTERY</th>
<th>INTRODUCTORY</th>
<th>DOES NOT MEET REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creates a map to illustrate a predicted international boundary change. Takes into account a variety of data when developing his/her new map.</td>
<td>Attempts to describe how the proposed boundary changes will affect the countries involved, but does not address effect on global economy. Provides some data to support ideas.</td>
<td></td>
</tr>
<tr>
<td>Attempts to describe how the proposed boundary changes will affect the countries involved, including their role in the global economy. Provides sufficient data to support ideas.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attempts to describe the perspectives of the countries involved in the proposed boundary change. Addresses only one issue in their description.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This is a four-point rubric based on the National Standards for Geographic Education. The “Mastery” level meets the target objective for grades 5–8.
Crossing the Line

High school assessment

In this assessment activity, you must predict the future! Instead of using a crystal ball, you will use a GIS to see 25 years into the future of the world.

1. Use the information you learned in this GIS Investigation to identify two current international boundaries that you think will change in the next 25 years. One prediction must involve splitting a current country into two or more smaller countries, and the other must merge two or more countries into one larger one.

2. Draw a map (in ArcMap or with paper and pencil) to illustrate what these boundaries will look like in 25 years. Be sure to include a legend, north arrow, scale, and date of creation on the map.

3. Write an essay that describes potential consequences of the change you predict. Address the following questions in your essay:
   - What types of boundaries are involved in the changes?
   - How will the territorial morphology of the countries involved be affected by the projected changes?
   - What will the economic impact of the projected changes be?
   - How will the projected changes affect the internal cohesiveness of all countries involved?
## Crossing the Line

### Assessment rubric

#### High school

<table>
<thead>
<tr>
<th>STANDARD</th>
<th>EXEMPLARY</th>
<th>MASTERY</th>
<th>INTRODUCTORY</th>
<th>DOES NOT MEET REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student knows and understands how to apply concepts and models of spatial organization to make decisions.</td>
<td>Creates a digital map using GIS to illustrate a predicted international boundary change. Takes into account a variety of data when developing his/her new map.</td>
<td>Creates a map to illustrate a predicted international boundary change. The map illustrates two types of changes: the merging of countries together, and the splitting of countries apart. Takes into account a variety of data when developing his/her new map.</td>
<td>Creates a map to illustrate a predicted international boundary change. The map shows only one type of change. Provides some data to support ideas.</td>
<td>Describes a change in a border, but does not provide a map and has little or no data to support ideas.</td>
</tr>
<tr>
<td>The student knows and understands why and how cooperation and conflict are involved in shaping the distribution of social, political, and economic spaces on Earth at different scales.</td>
<td>Uses maps and written description to illustrate how the proposed boundary changes will affect the countries involved, including their role in the global network. Provides sufficient data to support ideas.</td>
<td>Describes how the proposed boundary changes will affect the countries involved and their role in the global network. Provides sufficient data to support ideas.</td>
<td>Attempts to describe how the proposed boundary changes will affect the countries involved, but does not address the effect on the countries involved. Provides some data to support ideas.</td>
<td>Does not address any specific issues for the countries involved in the boundary changes.</td>
</tr>
<tr>
<td>The student knows and understands contemporary issues in the context of spatial and environmental perspectives.</td>
<td>Describes the perspectives of the countries involved in the proposed boundary change. Addresses a variety of issues including political, cultural, and so on. Also addresses how this will affect the perspective of the global community.</td>
<td>Describes the perspectives of the countries involved in the proposed boundary change. Addresses a variety of issues including political, cultural, and so on.</td>
<td>Attempts to describe the perspectives of the countries involved in the proposed boundary change. Addresses only one issue in their description.</td>
<td>Describes only one country's perspective on the proposed boundary change.</td>
</tr>
</tbody>
</table>

This is a four-point rubric based on the National Standards for Geographic Education. The “Mastery” level meets the target objective for grades 9–12.
A Line in the Sand

*A regional case study of Saudi Arabia and Yemen*

Lesson overview

Students will study the creation of a new border between Saudi Arabia and Yemen on the Arabian Peninsula. Using data included in the June 2000 Treaty of Jeddah, they will draw the new boundary described in the treaty and analyze the underlying physiographic and cultural forces that influenced the location of that boundary. In the process they will come to understand how any map of the world must be considered a tentative one, as nations struggle and cooperate with each other.

Estimated time

Three to four 45-minute class periods

Materials

✔ Student handouts from this lesson to be copied:
  - GIS Investigation sheets (pages 291 to 304)
  - Student answer sheets (pages 305 to 309)
  - Assessment(s) (pages 310 to 313)

Standards and objectives

National geography standards

<table>
<thead>
<tr>
<th>GEOGRAPHY STANDARD</th>
<th>MIDDLE SCHOOL</th>
<th>HIGH SCHOOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective</td>
<td>The student understands how to use maps to analyze spatial distributions and patterns.</td>
<td>The student understands how to use geographic representations and tools to analyze and explain geographic problems.</td>
</tr>
<tr>
<td>4 The physical and human characteristics of places</td>
<td>The student understands how physical processes shape places and how different human groups change places.</td>
<td>The student understands the changing human and physical characteristics of places.</td>
</tr>
<tr>
<td>13 How the forces of cooperation and conflict among people influence the division and control of Earth’s surface</td>
<td>The student understands the multiple territorial divisions of the student’s own world.</td>
<td>The student understands why and how cooperation and conflict are involved in shaping the distribution of social, political, and economic spaces on Earth at different scales.</td>
</tr>
<tr>
<td>18 How to apply geography to interpret the present and plan for the future</td>
<td>The student understands how various points of view on geographic context influence plans for change.</td>
<td>The student understands contemporary issues in the context of spatial and environmental perspectives.</td>
</tr>
</tbody>
</table>
Standards and objectives (continued)

Objectives
The student is able to:
• Describe the physical and human characteristics of the Arabian Peninsula.
• Define and describe the Empty Quarter.
• Explain major elements of the Treaty of Jeddah boundary agreement between Saudi Arabia and Yemen.
• Identify physical and cultural characteristics of the Arabian Peninsula that are reflected in the new Saudi–Yemeni border agreement.

GIS skills and tools
• Use a bookmark
• Use MapTips to identify features
• Turn layers on and off and expand and collapse their legends
• Activate a data frame
• Export a layer to a shapefile
• Display and work with the Edit toolbar
• Set selectable layers
• Create a buffer
• Print a map
Lesson introduction

Divide your class into small groups. Explain to your students that the lesson they will begin today is about drawing boundary lines. In order to identify some of the important considerations in the demarcation of boundaries, each group will take five minutes to consider the following hypothetical scenario:

Size limitations in the school building require that their classroom be divided to create two new, smaller classrooms. Other than the wall dividing the two classrooms, there will be no new construction. Each group is charged with two tasks:

• Identify the features of the present classroom which are valuable to the teachers and students who use that room (windows, for example).

• Suggest a possible boundary line to divide the present classroom and identify the features from the previous step that each of the new classrooms will have.

When five minutes have passed, make a list on the blackboard or an overhead projector of the valuable classroom features that students identified in the first step. Let each group report on the boundary they propose. Use this activity as a springboard for a discussion of the issues involved in the creation of national boundaries. Be sure to include the following points in the discussion:

• Certain features of the physical environment have greater value than others to the people who will occupy and use that space.

• The human uses of a place influence the perceived value of its physical features.

• When a boundary line is drawn, it may not be possible to divide the valuable features evenly between the parties involved.

Tell the class that this activity will explore a twenty-first-century case of the demarcation of a boundary between two countries. Although at a much different scale, this decision involved many of the same issues they faced in drawing a hypothetical boundary in their classroom.
Student activity

Before completing this lesson with students, we recommend that you work through it yourself. Doing so will allow you to modify the activity to accommodate the specific needs of your students.

After the initial discussion, have the students work on the computer component of the lesson. Ideally each student should be at an individual computer, but the lesson can be modified to accommodate a variety of instructional settings.

Distribute the GIS Investigation sheets to your students. Explain that in this activity they will use GIS to explore a region of the world where a recent boundary dispute has been settled after 65 years of conflict: the Arabian Peninsula. They will explore alternatives for boundaries between the countries involved and analyze the underlying physiographic and cultural considerations that played a part in the resolution of that conflict.

The GIS activity will provide students with detailed instructions for their investigations. In addition to the instructions, the handout includes questions to help them focus on key concepts. Some questions will have specific answers while others require creative thought.

Things to look for while the students are working on this activity:

- Are the students using a variety of tools?
- Are they answering the questions as they work through the procedure?
- Are they experiencing any difficulty managing the display of information in their map as they turn layers on and off?
- Are students experiencing any difficulty plotting latitude/longitude points or finishing their sketch when creating the Saudi–Yemeni boundary line feature?

Teacher Tip: Decide ahead of time where you want students to save their boundary line data in step 8f. Students can export a feature class to the MiddleEast geodatabase if they have their own copy of the module 5 folder. Otherwise, you may want students to export a shapefile to another location.

Conclusion

Refer your students to the activity that introduced this lesson: the creation of a hypothetical boundary line that divides their classroom into two new rooms. Review their conclusions and ask them to identify parallel issues in the settlement of the boundary dispute between Saudi Arabia and Yemen.

- Certain features of the physical environment have greater value than others to the people who will use that space. On the Arabian Peninsula, areas that get enough precipitation for agriculture, areas of grassland for grazing, sources of water, and areas with the strategic advantage of mountain peaks have greater value.
- The human uses of a place influence the perceived value of its physical features. On the Arabian Peninsula, livestock herding and farming are examples of traditional human uses.
- When a boundary line is drawn, it may not be possible to divide the valuable features evenly between the parties involved. On the Arabian Peninsula, most of the areas that get enough precipitation for agriculture, areas of grassland for grazing, and sources of water went to Yemen.
Ask students to identify issues that played a role in the Saudi–Yemeni border conflict that were not present in the classroom boundary scenario. For example:

- Historic boundaries and patterns of political control in the region played an important part in the Saudi–Yemeni border conflict. Discuss important historical events and periods such as the Ottoman Empire, the consequences of World War I in this region, international interest in the region during the twentieth century, and the British Protectorate of Aden.
- Nomadism and strong identity with regional tribal traditions are at odds with the delineation of a fixed boundary in this region. Discuss the various factors that influence a community’s or a region’s sense of itself.

Note: Students may wonder why the Saudis were willing to yield so much territory to Yemen. Ask them to speculate on possible reasons for this apparent generosity. The Treaty of Jeddah states that the two countries will negotiate if sources of “shared natural wealth” are discovered in the border region. This means that Saudi Arabia reserves the right to reopen negotiations in the event that something that they value very highly—oil or gas, for example—is discovered near the new boundary. Also, Saudi Arabia has long been interested in constructing a pipeline to the Arabian Sea across the southern part of the peninsula. The Saudis may have been hoping that a generous settlement with Yemen on the border issue could make the Yemenis more willing to agree to a Saudi pipeline across their territory.

**Assessment**

*Middle school: Highlights skills appropriate to grades 5 through 8*

In the middle school assessment, students will write a newspaper article reporting on the settlement of the Saudi–Yemeni border dispute by the Treaty of Jeddah, which was agreed to in June 2000. The article, written from either a Saudi or a Yemeni perspective, should describe the new boundary established by the treaty and analyze underlying physiographic and cultural considerations that influenced the location of that boundary. They will also prepare a map to go with the article.

*High school: Highlights skills appropriate to grades 9 through 12*

In the high school assessment, students will write a newspaper article reporting on the settlement of the Saudi–Yemeni border dispute by the Treaty of Jeddah, which was agreed to in June 2000. The article, written from either a Saudi or a Yemeni perspective, should describe the new boundary established by the treaty and analyze underlying physiographic and cultural considerations that influenced the location of that boundary. The article should also include information about historical factors that contributed to this 65-year-old boundary conflict. A map should accompany the article.

**Extensions**

- In the introductory activity, have student groups negotiate with each other to arrive at a mutually satisfactory boundary for the two new classrooms.
- Use the Internet to identify other areas of the world where international boundaries are in dispute.
- Research the events of World War I on the Arabian Peninsula. Create an ArcMap map document illustrating these events.
- Use ArcMap to compare the countries of the Arabian Peninsula by mapping and analyzing relevant economic and demographic data.
- Check out the Resources by Module section of this book’s companion Web site (www.esri.com/mappingourworld) for print, media, and Internet resources on the topics of Saudi Arabia, Yemen, and the Treaty of Jeddah.
A Line in the Sand
A GIS investigation

Answer all questions on the student answer sheet handout

The ever-changing map of the world reflects the forces of conflict and cooperation among nations and peoples of the world. In this GIS Investigation, you will explore one of the first boundary changes of the twenty-first century—the creation of a new border between Yemen and Saudi Arabia on the Arabian Peninsula. After more than 60 years of conflict, the two nations signed the historic boundary agreement in June 2000. Using data provided in the Treaty of Jeddah, you will create a map reflecting the treaty’s territory, and analyze underlying physiographic and cultural considerations that influenced the location of the boundary.

Step 1 Start ArcMap
   a Double-click the ArcMap icon on your computer’s desktop.
   b If the ArcMap start-up dialog appears, click An existing map and click OK. Then go to step 2b.
Step 2  Open the Region5.mxd file
   a  In this exercise, a map document has been created for you. To open it, go to the File menu and choose Open.

   b  Navigate to the module folder (C:\MapWorld9\Mod5) and choose Region5.mxd (or Region5) from the list.

   c  Click Open.

   When the map document opens, you will see a shaded relief map of the Middle East and northeast Africa. A red outline locates the Arabian Peninsula.

   d  Stretch your ArcMap window so that it fills most of your screen.

Step 3  Identify countries that border the Arabian Peninsula
   a  Click the View menu and choose Bookmarks, Arabian Peninsula. Now the Arabian Peninsula fills the view.

   b  Look in the table of contents for a layer called Neighbors - outline. Click the box to the left of the layer name to turn it on.

   c  Slide the mouse pointer over the map to display the country names.

   What countries border the Arabian Peninsula to the north?

Step 4  Investigate the physical characteristics of the Arabian Peninsula
   a  The map on your screen is a shaded relief map. It depicts landforms such as mountain ranges, valleys, plateaus, and plains.

      (1) Is any part of the Arabian Peninsula mountainous?

      (2) If so, where are the mountains located?

   b  Click the plus sign next to Water in the table of contents to expand this group of layers.

   c  Turn on the Bodies of Water and Streams layers. Then display them by checking the box next to Water.

Most of the streams you see on your map are intermittent, which means that they are dry during some parts of the year.

   (1) Are there any parts of the Arabian Peninsula that do not have any water at all? If so, where are these regions?

   (2) Do you see any relationship between landforms and the availability of water?
d Turn off the Streams layer and observe the distribution of permanent bodies of water on the Arabian Peninsula.

e Click the Zoom In tool. Click and drag a small box around an area of blue dots.

Now you can see the bodies of water more closely.

*Describe the bodies of water on your answer sheet.*

f Click the Previous Extent button to return to your view of the entire peninsula.

g Turn off the following layers: Water, Arabian Peninsula - outline, Neighbors - outline, and Shaded Relief. (You may need to scroll down in the table of contents.)

Your map display should look like this:

h Collapse the Water group. Expand the Annual Precipitation layer and turn it on.

Amounts of rainfall are given in millimeters. Here is a conversion table that compares millimeters to inches (25.4 mm. = 1 in.).

<table>
<thead>
<tr>
<th>MM.</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>400</th>
<th>500</th>
<th>600</th>
<th>700</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN.</td>
<td>3.9</td>
<td>7.9</td>
<td>11.8</td>
<td>15.7</td>
<td>19.7</td>
<td>23.6</td>
<td>27.6</td>
</tr>
</tbody>
</table>

(1) A desert is defined as a place that gets less than 10 inches of rain per year. How many millimeters equal 10 inches?

(2) Based on the amounts of rainfall displayed on the map, do you think there is much farming on the Arabian Peninsula? Explain.

(3) Approximately what percentage of the Arabian Peninsula is desert?
* Turn off Annual Precipitation. Turn on and expand the Temperature layer group. Turn on Temp: Sept. – Nov.

Use this conversion table to help you answer the next questions.

<table>
<thead>
<tr>
<th>°C</th>
<th>5°</th>
<th>10°</th>
<th>15°</th>
<th>20°</th>
<th>25°</th>
<th>30°</th>
<th>35°</th>
<th>40°</th>
</tr>
</thead>
<tbody>
<tr>
<td>°F</td>
<td>41°</td>
<td>50°</td>
<td>59°</td>
<td>68°</td>
<td>77°</td>
<td>87°</td>
<td>95°</td>
<td>104°</td>
</tr>
</tbody>
</table>

What is the approximate range of temperatures across the Arabian Peninsula during this period?

The three layers below Temp: Sept.- Nov. display temperature information for the periods December–February, March–May, and June–August.

j Turn the temperature layers on and off one at a time to see the change of temperatures on the Arabian Peninsula through the four seasons.

(1) Which season is the hottest?

(2) What is the approximate range of temperatures across the Arabian Peninsula during this period?

k Turn off the Temperature group. Scroll up and turn on the Ecozones layer. Expand its legend.

(1) What relationship do you see between the Arabian Peninsula’s ecozones as displayed on this map and its patterns of landforms, precipitation, and temperature?

(2) Use your answers from previous questions and turn different layers on and off to complete the Physical Characteristics of the Arabian Peninsula table on your answer sheet. List three observations for each physical characteristic.

(3) In your opinion, which of the region’s physical characteristics would be considered “valuable” in a boundary decision? Explain.

Step 5  Investigate the human characteristics of the Arabian Peninsula

The population of the Arabian Peninsula is approximately 45 million. The majority of this population lives in Saudi Arabia (22 million) and Yemen (17.5 million). The remaining 5.5 million can be found in Oman, the United Arab Emirates, and Qatar.

a Turn off Ecozones. Turn on the Arabian Peninsula - names layer. This layer locates the countries by name, but does not show their borders. You will explore the borders of these countries in the second part of the investigation.

b Turn on the Major Cities and Agriculture layers. Expand the Agriculture legend to see a list of the types of agricultural activity on the Arabian Peninsula.
GIS investigation

(1) What is the principal agricultural activity on the peninsula?
(2) Based on what you now know about the physical characteristics of the region, why do you think the agricultural activity is so limited?

c Turn on and expand the Population Density layer. The human population around major cities and throughout the Arabian Peninsula is displayed as number of people per square kilometer.
(1) How does Yemen compare to the rest of the Arabian Peninsula in population density?
(2) Describe the overall population density of the Arabian Peninsula.

d Turn off Population Density. Make sure Agriculture is still turned on.

e Turn on Water, then expand it and turn on Springs. Turn off Bodies of Water.

The Springs layer shows the location of springs and water holes.

f Look at the map.
(1) On your answer sheet, speculate about the ways water is most commonly and frequently used at these springs and water holes.
(2) Use your answers from previous step 5 questions and analysis of the maps to complete the table on your answer sheet. List three observations for each human characteristic.
(3) If an international boundary were to be drawn across some part of the Arabian Peninsula, how would these characteristics influence the perception of certain regions as being more valuable than others?

Step 6 Locate and describe the Empty Quarter

a Turn off Springs and turn on Roads. Expand the Roads legend.

Take note of the large area with practically no roads in the south-central part of the peninsula. This region is called the Rub´ al-Khali and is also known as the Empty Quarter. The Empty Quarter is important to this lesson because most Saudi Arabian borders with its southern neighbors cross this region.

b Turn the following layers on and off so you can observe the characteristics of the Empty Quarter: Streams, Population Density, Agriculture, Ecozones, Temperature, and Annual Precipitation.
(1) Complete the table on your answer sheet. List three observations in each column.
(2) What difficulties would an area like this present if an international boundary must cross it?

c Right-click the Middle East data frame in the table of contents and choose Collapse All Layers.
Right-click Middle East again and choose Turn All Layers Off. Then turn the following layers back on: Major Cities, Arabian Peninsula - names, and Basemap.

Ask your teacher for instructions on where to save this map document and on how to rename it. Record the map document’s new name and where you saved it on your answer sheet.

Follow the steps below to exit ArcMap if you will be doing steps 7–12 at a later time. If you will be continuing to work now, skip to step 7b.

From the File menu, click Exit.

Step 7 Explore Saudi Arabia’s southern boundaries

Start ArcMap. Navigate to the folder where you renamed and saved Region5. Open the map document.

Right-click the Saudi Arabia Southern Boundaries data frame and click Activate. Expand the data frame legend.

This map looks very similar to the Middle East map.

Turn on the 20th Century Boundary layer.

This layer reflects the boundary agreements Saudi Arabia made with most of its southern neighbors at the end of the twentieth century.

(1) Are the boundaries what you expected them to be?
(2) Which boundary remained unsettled?
According to international boundary expert Richard Schofield, this boundary was “the last missing fence in the desert.” The only part of the boundary that was mutually agreed upon was the western area adjacent to the Red Sea. Over the years, the boundary has shifted. Now you will add layers that reflect some of the major boundary changes.

d Click the Add Data button. Navigate to the module 5 data folder and look in the LayerFiles folder (C:\MapWorld9\Mod5\Data\LayerFiles). Hold down the Shift key and click once on each of the following file names: Yemen1.lyr, Yemen2.lyr, and Yemen3.lyr. Click Add.

e Turn off Yemen2 and Yemen3 for the moment and look at the red line of Yemen 1. This line represents the boundary between Yemen and Saudi Arabia established by the Treaty of Ta’if in 1934. It is the only part of the boundary that both countries recognized at the turn of the twenty-first century.

f Turn on Yemen2.

The green line of Yemen2 represents the Saudi–Yemeni border recognized by Yemen at the end of the century. It is based on lines established when Yemen (then the Aden Protectorate) was under British control in the early twentieth century. Most maps used these lines to delineate the extent of Yemen prior to 2000. This boundary was not recognized by Saudi Arabia.

g Turn on Yemen3.

This purple line represents the Saudi–Yemeni border claimed by Saudi Arabia at the end of the twentieth century. It is based on lines established by the Saudis in the mid-1930s. This line was still being used on Saudi Arabian maps to represent the boundary in the 1990s.

h Click the Zoom In tool. On your map, click the label Yemen. Now the map is centered on the country of Yemen.

i Click the Fixed Zoom In button two or three times until the country of Yemen fills the view.

What does the area between the green and purple lines represent?

j Turn on Agriculture and expand its legend.

What is the principal economic activity of the regions in dispute?
Turn off Agriculture and turn on and expand Population Density.

*Describe the population distribution in the disputed territory.*

If you were asked to settle the disputed boundary between Saudi Arabia and Yemen, where would you draw the line? In this next step, you will draw a proposed boundary line between Saudi Arabia and Yemen, using the Draw Line tool.

Make sure the Draw toolbar is displayed. If you don’t see it, right-click in the gray space to the right of the Help menu to display the toolbar list and click Draw. A good place to dock the Draw toolbar is at the bottom of the ArcMap window.

In the Draw toolbar, click the down arrow next to the New Rectangle tool and choose the New Line tool.

On your map, click the eastern end point of the red boundary line. (This is the boundary that both countries agree on.) Proceed eastward (to your right) and click a proposed boundary line. Double-click when you get to the end of your boundary. Now you have an additional black line that extends from the red line to Oman.

Make sure the Select Elements tool is now active. Click anywhere on the map away from the line you drew to make the blue selection box disappear.

In the next step, you will view the new boundary actually agreed upon by Saudi Arabia and Yemen in 2000.

**Step 8 Draw the Saudi–Yemeni boundary**

In June of 2000, Saudi Arabia and Yemen signed the Treaty of Jeddah, which settled their 65-year-long boundary dispute. The boundary agreement had three parts. The first part of the treaty reaffirmed agreement on the 1934 Ta’if line (Yemen1.shp). The agreement did say, however, that the line would be amended in any place where it cuts through villages.

Click the Zoom In tool. Zoom to the area of the Ta’if line (red line) by dragging a box around it.
GIS investigation

Regional case study: A Line in the Sand

MODULE 5 • HUMAN GEOGRAPHY II: POLITICAL GEOGRAPHY

b Click the Add Data button. Navigate to the module 5 Data folder and look in the LayerFiles folder (C:\MapWorld9\Mod5\Data\LayerFiles). Select Cities and Towns.lyr. Click Add.

(1) Does the red line go through any cities or towns? (Hint: You may need to zoom in again to answer the question.) If yes, approximately how many does the boundary pass through?

(2) How would you decide which side of the town to put the boundary on? Remember, this decision would determine whether the residents of that village would be citizens of Saudi Arabia or Yemen.

The second part of the Treaty of Jeddah determined the new boundary from the end of the red line to the border with Oman, 500 miles to the east. The treaty did not actually draw the line, but gave its starting and ending points and points in between as latitude/longitude grid coordinates. You will now plot these points on your map to locate the new boundary line.

c Turn off Cities and Towns and Population Density.

d Click the View menu, point to Bookmarks, and choose Yemen to zoom out to the entire country.

You will need your own layer for holding the data you will plot. You will export a copy of the BoundaryTemplate layer, which has no features, for this purpose.

e Right-click the BoundaryTemplate layer. Point to Data, then click Export Data.

f Click the Browse button in the Export Data dialog. Ask your teacher what type of file you should save and where you should save it. If you will be saving a feature class, choose Personal Geodatabase feature classes from the Save as type drop-down list and navigate to the MiddleEast geodatabase. Otherwise, choose Shapefile and navigate to the location your teacher directed you.
g. Name the file **ABC_Yemen4** where **ABC** are your initials. Click Save, and then click OK in the Export Data dialog.

```
Export Data
```

- **Export All features**
- **Use the same Coordinate System as the layer's source data**
- **Use the same Coordinate System as the data frame**

```
Output shapefile or feature class:
```

```
ABC_Yemen4
```

```
OK  ✖  Cancel
```

h. Click Yes to add the exported data to the map. Check the box to turn on ABC_Yemen4.

```
ABC_Yemen4
```

i. Right-click the BoundaryTemplate layer and click Remove to remove it from the map.

You will use tools on the Editor toolbar to plot the latitude and longitude coordinates for the new Saudi–Yemeni boundary.

j. Click the Editor Toolbar button to turn on the Editor toolbar. Dock the toolbar above the map.

```
The Middle East
```

k. Click the Editor menu on the Editor toolbar and choose Start Editing. Click the source for your ABC_Yemen4 layer in the dialog that appears and click OK.

```
Start Editing
```

l. On the Editor toolbar make sure the Task is set to Create New Feature. Make sure the Target is your layer: ABC_Yemen4.
Click the Sketch Tool on the Editor toolbar.

Right-click anywhere in the map and choose Absolute X,Y.

The first point you will enter is 52 degrees longitude, 19 degrees latitude.

Type **52** for X. Press the Tab key and type **19** for Y. Press the Enter key.

You see a red square called a vertex appear at the border with Oman. Your cursor is attached to the vertex with an elastic line. As you move your mouse around the map without clicking, the line changes. The elastic line tells you that the new line feature you are creating is not yet finished.

To enter the remaining longitude and latitude points determined in 2000, consult the table below (points 2–17). For each point, you must right-click in the map and choose Absolute X,Y and then enter the coordinates from the table. Enter all the points now.

<table>
<thead>
<tr>
<th>Point</th>
<th>Longitude</th>
<th>Latitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>52.00</td>
<td>19.00</td>
</tr>
<tr>
<td>2</td>
<td>50.78</td>
<td>18.78</td>
</tr>
<tr>
<td>3</td>
<td>49.12</td>
<td>18.61</td>
</tr>
<tr>
<td>4</td>
<td>48.18</td>
<td>18.17</td>
</tr>
<tr>
<td>5</td>
<td>47.60</td>
<td>17.45</td>
</tr>
<tr>
<td>6</td>
<td>47.47</td>
<td>17.12</td>
</tr>
<tr>
<td>7</td>
<td>47.18</td>
<td>16.95</td>
</tr>
<tr>
<td>8</td>
<td>47.00</td>
<td>16.95</td>
</tr>
<tr>
<td>9</td>
<td>46.75</td>
<td>17.28</td>
</tr>
<tr>
<td>10</td>
<td>46.37</td>
<td>17.23</td>
</tr>
<tr>
<td>11</td>
<td>46.10</td>
<td>17.25</td>
</tr>
<tr>
<td>12</td>
<td>45.40</td>
<td>17.33</td>
</tr>
<tr>
<td>13</td>
<td>45.22</td>
<td>17.43</td>
</tr>
<tr>
<td>14</td>
<td>44.65</td>
<td>17.43</td>
</tr>
<tr>
<td>15</td>
<td>44.57</td>
<td>17.40</td>
</tr>
<tr>
<td>16</td>
<td>44.47</td>
<td>17.43</td>
</tr>
<tr>
<td>17</td>
<td>44.37</td>
<td>17.43</td>
</tr>
</tbody>
</table>

**Hint:** If you make a mistake entering a point, click the Undo button to delete it. Then enter the coordinates for that point again. If you want to delete all the points you entered and start over, double-click to complete the polygon and then press the Delete key. Enter the points again beginning with point number 1.

When you are satisfied that you have entered all of the points correctly, right-click anywhere in the map and choose Finish Sketch. The completed line is highlighted in blue.

Click the Editor menu on the Editor toolbar and choose Save Edits.

**Does the new line seem to favor Yemen or Saudi Arabia? Explain.**
Step 9  Enter the maritime part of the boundary

The third and final part of the Treaty of Jeddah clarified the maritime boundary between Saudi Arabia and Yemen. A maritime boundary defines the offshore limits of a country. It too was defined by a series of latitude/longitude grid coordinates.

a  Follow the procedure outlined in steps 8n–8q to map the maritime boundary between Saudi Arabia and Yemen.

<table>
<thead>
<tr>
<th>Point</th>
<th>Longitude</th>
<th>Latitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>42.77</td>
<td>16.40</td>
</tr>
<tr>
<td>2</td>
<td>42.15</td>
<td>16.40</td>
</tr>
<tr>
<td>3</td>
<td>41.78</td>
<td>16.29</td>
</tr>
</tbody>
</table>

b  When you have finished the sketch, click the Editor menu and choose Stop Editing. Click Yes to save your edits.

c  Click the Editor Toolbar button to dismiss the toolbar.

d  Click the Fixed Zoom Out button twice. Look at your map.

What body of water does the maritime boundary traverse?

Because ArcMap randomly selects a color for a new layer, you need to change it. You will also give the layer a more descriptive name.

e  Click the name of the ABC_Yemen4 layer two times slowly and change the name to 2000 Boundary. Right-click the line symbol and choose a dark blue color from the color picker.

How does the actual boundary established by the Treaty of Jeddah compare with the boundary you drew earlier (black line)?

f  Turn on Agriculture and Population Density as needed to answer the following question.

Write three observations about the boundary line created by the Treaty of Jeddah.

g  Save your map document.

Step 10  Define the pastoral area

The Treaty of Jeddah included additional provisions about the new Saudi–Yemeni boundary. One of these was the creation of a “pastoral area” on either side of the boundary. Shepherds from either Yemen or Saudi Arabia are allowed to use the pastoral area and water sources on both sides of the border according to tribal traditions. The treaty declared that the pastoral area extends 20 kilometers on either side of the border. In this step, you will map the 20-kilometer pastoral area.

a  How many miles is 20 kilometers? (Hint: 1 kilometer = .6214 miles)

b  Click the Selection menu and click Set Selectable Layers.
GIS investigation

Regional case study: A Line in the Sand

**MODULE 5 • HUMAN GEOGRAPHY II: POLITICAL GEOGRAPHY**

- **c** Click the Clear All button in the Set Selectable layers dialog to uncheck all of the layers. Then click the box for 2000 Boundary to make it the only layer that is checked on. Click Close.

- **d** Click the Select Features tool in the Tools toolbar.

- **e** Click the blue 2000 Boundary line that crosses the land. It becomes highlighted blue on the map.

- **f** Click the Show/Hide ArcToolbox Window button to open the ArcToolbox window. 

  ArcToolbox is where you can access many ArcGIS tools that work on your data. You will use the Buffer tool to draw the 20-kilometer zone around the boundary line.

- **g** Expand the Analysis Tools toolbox and then expand the Proximity toolbox. Double-click the Buffer tool to open the Buffer dialog.

- **h** Click the down-arrow to show the Input Features drop-down list and choose 2000 Boundary.

- **i** The default Output Feature Class will be the same location and type (geodatabase feature class or shapefile) as the 2000 Boundary layer (ABC_Yemen4). Keep the default unless your teacher asks you to change it.

- **j** For Distance, choose Kilometers from the Linear unit drop-down list, and then type 20 in the box on the left as the buffer distance.

- **k** Click OK. After the buffer is completed, close the Buffer window if necessary. Close the ArcToolbox window by clicking the small ✗ in the upper right corner.

- **l** Drag the ABC_Yemen4_Buffer layer below the 2000 Boundary layer in the table of contents.

- **m** Right-click the 2000 Boundary layer, point to Selection, and click Clear Selected Features to clear the selection.

  **1** In which part of the Saudi–Yemeni border will the pastoral area be most significant? Explain.

  **2** Why do you think the Treaty of Jeddah created a pastoral area?
**Step 11  Create a map of the Arabian Peninsula**

Before you print a map of the Arabian Peninsula, you need to clean up the map.

- Click the Select Elements button. Click the boundary line you first drew (it’s black and doesn’t have the buffer around it). A dashed box appears to show the line is selected. Press the Delete key. Your line disappears from the map.

- Go to the Arabian Peninsula bookmark.

- Decide what layers you want to display on your map. Include the following layers:
  - Major Cities
  - 2000 Boundary
  - Yemen1
  - 20th Century Boundary
  - Arabian Peninsula - names
  - Arabian Peninsula - area
  - Neighbors - countries

- From the File menu, click Page and Print Setup. Follow your teacher’s instructions to select the correct printer name. Be sure to check the Use Printer Paper Settings box and the Scale Map Elements proportionally to changes in Page Size box. In the Paper section, choose Landscape paper orientation. Click OK.

- From the File menu, click Print. Click OK to print a copy of your map.

**Step 12  Exit ArcMap**

In this exercise, you explored physical and human characteristics of the Arabian Peninsula. After analyzing this data, you explored boundary issues in this region and plotted the new Yemeni–Saudi boundary established by the 2000 Treaty of Jeddah.

- Save your map document.

- From the File menu, click Exit. When asked if you want to save your changes, click No.
Student answer sheet

Module 5
Human Geography II: Political Geography

Regional case study: A Line in the Sand

Step 3 Identify countries that border the Arabian Peninsula
   c Record the names of the countries on the map that border the Arabian Peninsula to the north.

Step 4 Investigate the physical characteristics of the Arabian Peninsula
   a-1 Is any part of the Arabian Peninsula mountainous?
   a-2 If so, where are the mountains located?
   c-1 Are there any parts of the Arabian Peninsula that do not have any water at all? If so, where are these regions?
   c-2 Do you see any relationship between landforms and the availability of water?
   e Describe the bodies of water.
   h-1 How many millimeters equal 10 inches?
   h-2 Based on the amounts of rainfall displayed on the map, do you think there is much farming on the Arabian Peninsula? Explain.
   h-3 Approximately what percentage of the Arabian Peninsula is desert?

i What is the approximate range of temperatures across the Arabian Peninsula during this period?
   ° C: ° F:
Student answers

j-1 Which season is the hottest? _______________________________________________________________

j-2 What is the approximate range of temperatures across the Arabian Peninsula during this period?

_____________ °C to ______________ °C  ______________ °F to ____________ °F

k-1 What relationship do you see between the Arabian Peninsula’s ecozones as displayed on this map and its patterns of landforms, precipitation, and temperature?

___________________________________________________________________________________

___________________________________________________________________________________

k-2 Complete the table. List three observations for each physical characteristic.

<table>
<thead>
<tr>
<th>PHYSICAL CHARACTERISTICS OF THE ARABIAN PENINSULA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landforms and bodies of water</td>
</tr>
<tr>
<td>Climate</td>
</tr>
<tr>
<td>Ecozones</td>
</tr>
</tbody>
</table>

k-3 In your opinion, which of the region’s physical characteristics would be considered “valuable” in a boundary decision? Explain.

___________________________________________________________________________________

___________________________________________________________________________________

___________________________________________________________________________________

Step 5 Investigate the human characteristics of the Arabian Peninsula

b-1 What is the principal agricultural activity on the peninsula?

___________________________________________________________________________________

b-2 Based on what you now know about the physical characteristics of the region, why do you think the agricultural activity is so limited?

___________________________________________________________________________________

___________________________________________________________________________________

___________________________________________________________________________________

c-1 How does Yemen compare to the rest of the Arabian Peninsula in population density?

___________________________________________________________________________________

___________________________________________________________________________________

___________________________________________________________________________________
c-2 Describe the overall population density of the Arabian Peninsula.

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

f-1 Speculate on the most frequent use of the water at these springs and water holes.

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

f-2 Use your answers from previous step 5 questions and analysis of the maps to complete the table. List three observations for each human characteristic.

<table>
<thead>
<tr>
<th>HUMAN CHARACTERISTICS OF THE ARABIAN PENINSULA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural activities</td>
</tr>
<tr>
<td>Population density and distribution</td>
</tr>
</tbody>
</table>

f-3 If an international boundary were to be drawn across some part of the Arabian Peninsula, how would these characteristics influence the perception of certain regions as being more valuable than others?

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

Step 6 Locate and describe the Empty Quarter

b-1 Complete the table. List three observations in each column.

<table>
<thead>
<tr>
<th>THE EMPTY QUARTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL CHARACTERISTICS</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
</tbody>
</table>

b-2 What difficulties would an area like this present if an international boundary must cross it?

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________
### Step 7  Explore Saudi Arabia’s southern boundaries

c-1 Are the boundaries what you expected them to be?

| __________________________________________________________________________ |
| __________________________________________________________________________ |

c-2 Which boundary remained unsettled?

| __________________________________________________________________________ |

i What does the area between the green and purple lines represent?

| __________________________________________________________________________ |

j What is the principal economic activity of the regions in dispute?

| __________________________________________________________________________ |

k Describe the population distribution in the disputed territory.

| __________________________________________________________________________ |
| __________________________________________________________________________ |

### Step 8  Draw the Saudi–Yemeni boundary

b-1 Does the red line go through any cities or towns? (Hint: You may need to zoom in again to answer the question.) If yes, approximately how many does the boundary pass through?

| __________________________________________________________________________ |
| __________________________________________________________________________ |

b-2 How would you decide which side of the town to put the boundary on? Remember, this decision would determine whether the residents of that village would be citizens of Saudi Arabia or Yemen.

| __________________________________________________________________________ |
| __________________________________________________________________________ |
| __________________________________________________________________________ |

r Does the new line seem to favor Yemen or Saudi Arabia? Explain.

| __________________________________________________________________________ |

### Step 9  Enter the maritime part of the boundary

d What body of water does the maritime boundary traverse?

| __________________________________________________________________________ |
e) How does the actual boundary established by the Treaty of Jeddah compare with the boundary you drew earlier?

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

f) Write three observations about the boundary line created by the Treaty of Jeddah.

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

Step 10 Define the pastoral area

a) How many miles is 20 kilometers? (Hint: 1 kilometer = .6214 miles) _____________________________

m-1 In which part of the Saudi–Yemeni border will the pastoral area be most significant? Explain.
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

m-2 Why do you think the Treaty of Jeddah created a pastoral area?
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
A Line in the Sand
Middle school assessment

You are a newspaper reporter assigned to cover the Treaty of Jeddah, signed on June 12, 2000, which settled the 65-year-old border dispute between Saudi Arabia and Yemen. You must choose to be a reporter for a newspaper in either Saudi Arabia or Yemen and write your article from that country’s perspective. In preparing your article, you may use the Line in the Sand ArcMap map document as well as additional resources such as your history and geography books, encyclopedias, and the Internet. Your article should include the following:

• A map showing the new boundary line and a relevant physical or cultural characteristic discussed in your article
• A description of the physical and cultural characteristics of the region affected by the boundary change
• A description of the new boundary established by the treaty and its implications for people living in the affected areas

Use the remainder of the page as a place to brainstorm for your article.
# A Line in the Sand

**Assessment rubric**

**Middle school**

<table>
<thead>
<tr>
<th>STANDARD</th>
<th>EXEMPLARY</th>
<th>MASTERY</th>
<th>INTRODUCTORY</th>
<th>DOES NOT MEET REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student knows and understands how to use maps to analyze spatial</td>
<td>Creates a detailed map using GIS that shows the new boundary lines and</td>
<td>Creates a map showing the new boundary line and most relevant</td>
<td>Creates a map showing the new boundary line, but does not include any</td>
<td>Creates a map of the Middle East, but does not focus on the boundary issue between Saudi</td>
</tr>
<tr>
<td>distributions and patterns.</td>
<td>relevant physical or cultural characteristics.</td>
<td>boundary line and most relevant physical or cultural characteristics.</td>
<td>relevant physical or cultural characteristics.</td>
<td>Arabia and Yemen.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The student knows and understands how physical processes shape places</td>
<td>Writes a detailed description of the physical and cultural characteristics</td>
<td>Writes a description of the physical and cultural characteristics that</td>
<td>Writes a description of physical or cultural characteristics that will be</td>
<td>Describes physical or cultural characteristics of the region, but does not explain how</td>
</tr>
<tr>
<td>and how different human groups change places.</td>
<td>that will be affected by the boundary change and explains any possible</td>
<td>will be affected by the boundary change.</td>
<td>will be affected by the boundary change.</td>
<td>these things are affected by the boundary change.</td>
</tr>
<tr>
<td></td>
<td>ramifications.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The student knows and understands the multiple territorial divisions of</td>
<td>Describes the implications of the new boundary for the people living in</td>
<td>Describes the implications of the new boundary for the people living in</td>
<td>Describes characteristics of people living in the affected region, but</td>
<td>Gives little description on the characteristics of the people living in the affected</td>
</tr>
<tr>
<td>the student's own world.</td>
<td>the affected areas. Includes quotes or stories from individuals in the</td>
<td>the affected areas.</td>
<td>does not relate it specifically to the boundary change.</td>
<td>areas.</td>
</tr>
<tr>
<td></td>
<td>area (these could be real or fictional and derived from research).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The student knows and understands how various points of view on</td>
<td>Writes two clear and coherent news articles, one from the perspective of</td>
<td>Writes a clear and coherent news article from the perspective of either</td>
<td>Writes a news article on the boundary issue, but does not offer the</td>
<td>Writes an essay on the boundary issue, but does not offer any geographic perspective, and</td>
</tr>
<tr>
<td>geographic context influence plans for change.</td>
<td>Saudi Arabia and one from the perspective of Yemen on the boundary issue.</td>
<td>country involved in the boundary issue.</td>
<td>country on the boundary issue.</td>
<td>it is not in the form of a news article.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This is a four-point rubric based on the National Standards for Geographic Education. The “Mastery” level meets the target objective for grades 5–8.
A Line in the Sand

High school assessment

You are a newspaper reporter assigned to cover the Treaty of Jeddah, signed on June 12, 2000, which settled the 65-year-old border dispute between Saudi Arabia and Yemen. You must choose to be a reporter for a newspaper in either Saudi Arabia or Yemen and write your article from that country’s perspective. In preparing your article, you may use the Line in the Sand ArcMap map document as well as additional resources such as your history and geography books, encyclopedias, and the Internet. Your article should include the following:

- A map showing the new boundary line, the boundaries claimed by Yemen and Saudi Arabia prior to the settlement, and a relevant physical or cultural characteristic discussed in your article
- A description of the physical and cultural characteristics of the region affected by the boundary change
- A description of the historical factors that contributed to this long-standing conflict
- A description of the new boundary established by the treaty and its implications for people living in the affected areas

Use the remainder of the page as a place to brainstorm for your article.
### Assessment rubric

#### High school

<table>
<thead>
<tr>
<th>STANDARD</th>
<th>EXEMPLARY</th>
<th>MASTERY</th>
<th>INTRODUCTORY</th>
<th>DOES NOT MEET REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student knows and understands how to use geographic representations and tools to analyze and explain geographic problems.</td>
<td>Creates a detailed map using GIS showing the new boundary line and relevant physical and cultural characteristics.</td>
<td>Creates a map showing the new boundary line and most relevant physical or cultural characteristics.</td>
<td>Creates a map showing the new boundary line and relevant physical or cultural characteristics.</td>
<td>Creates a map showing the new boundary line, but does not include any relevant physical or cultural characteristics.</td>
</tr>
<tr>
<td>The student knows and understands the changing human and physical characteristics of places.</td>
<td>Writes a detailed description of the physical and cultural characteristics that will be affected by the boundary change and explains any possible ramifications.</td>
<td>Writes a description of physical or cultural characteristics that will be affected by the boundary change.</td>
<td>Writes a description of physical or cultural characteristics that will be affected by the boundary change.</td>
<td>Describes physical or cultural characteristics of the region, but does not explain how these things are affected by the boundary change.</td>
</tr>
<tr>
<td>The student knows and understands why and how cooperation and conflict are involved in shaping the distribution of social, political, and economic spaces on Earth at different scales.</td>
<td>Describes the implications of the new boundary for the people living in the affected areas in relationship to social issues, politics, and the economy. Includes quotes or stories from individuals in the area (these could be real or fictional and derived from research).</td>
<td>Describes the implications of the new boundary for the people living in the affected areas in relationship to social issues, politics, and the economy.</td>
<td>Describes the implications of the new boundary for the people living in the affected areas.</td>
<td>Describes characteristics of people living in the affected region, but does not relate it specifically to the boundary change.</td>
</tr>
<tr>
<td>The student knows and understands contemporary issues in the context of spatial and environmental perspectives.</td>
<td>Writes two clear and coherent news articles, one from the perspective of Saudi Arabia and one from the perspective of Yemen, on the boundary issue. It includes historical factors that contributed to the conflict.</td>
<td>Writes a clear and coherent news article from the perspective of either country involved in the boundary issue. It includes historical factors that contributed to the conflict.</td>
<td>Writes a news article on the boundary issue, but does not offer the perspective of either country on the boundary issue. The article may include one or two historical factors.</td>
<td>Writes an essay on the boundary issue, but does not offer any geographic perspective, and it is not in the form of a news article.</td>
</tr>
</tbody>
</table>

This is a four-point rubric based on the National Standards for Geographic Education. The “Mastery” level meets the target objective for grades 9–12.
Starting from Scratch

An advanced investigation

Lesson overview

Students will use physiographic (physical features) and anthropographic (cultural features) data to redraw some of the world’s international boundaries, thereby creating states characterized by internal cohesiveness and economic parity. By comparing their maps to ones reflecting contemporary political boundaries, students will identify world regions where political boundaries are in conflict with physical and cultural imperatives.

Estimated time

Three to four 45-minute class periods

Materials

✓ Student handouts from this lesson to be copied:
  • GIS Investigation sheets (pages 319 to 324)
  • Student answer sheet (page 325)

Standards and objectives

National geography standards

<table>
<thead>
<tr>
<th>GEOGRAPHY STANDARD</th>
<th>MIDDLE SCHOOL</th>
<th>HIGH SCHOOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective</td>
<td>The student knows and understands how to use maps to analyze spatial distributions and patterns.</td>
<td>The student knows and understands how to use technologies to represent and interpret Earth’s physical and human systems.</td>
</tr>
<tr>
<td>3 How to analyze the spatial organization of people, places, and environments on Earth’s surface</td>
<td>The student knows and understands how to use the elements of space to describe spatial patterns.</td>
<td>The student knows and understands how to apply concepts and models of spatial organization to make decisions.</td>
</tr>
<tr>
<td>10 The characteristics, distribution, and complexity of Earth’s cultural mosaics</td>
<td>The student knows and understands how to read elements of the landscape as a mirror of culture.</td>
<td>The student knows and understands how cultures shape the character of a region.</td>
</tr>
<tr>
<td>13 How the forces of cooperation and conflict among people influence the division and control of Earth’s surface</td>
<td>The student knows and understands the multiple territorial divisions of the student’s own world.</td>
<td>The student knows and understands the impact of multiple spatial divisions on people’s daily lives.</td>
</tr>
</tbody>
</table>

Objectives

The student is able to:

• Describe the physical features that form natural boundaries between major regions on earth.
• Describe the distribution of major language groups and religions on earth.
• Explain how political and cultural boundaries influence a country’s internal cohesiveness and opportunity for economic parity with other nations.
GIS skills and tools

- Change layer transparency
- Change map symbolization with the layer properties
- Change a layer’s label properties
- Export a layer and add new fields to an attribute table
- Digitize new polygons and enter their attribute data
- Design a presentation layout and print it
- Analyze data and make decisions based on spatial patterns

Teacher notes

Lesson introduction

Introduce the lesson by challenging students to identify regions in the world that are characterized by instability or long-term economic hardship. After generating a list, ask students if such problems in these regions are the result of boundary issues. Use this discussion to raise questions about boundary issues that influence stability, cohesiveness, and economic opportunity in a country.

- How can the size and shape of a country promote cohesiveness or instability?
- How do cultural (anthropographic) boundaries differ from political boundaries?
- How do cultural (anthropographic) boundaries contribute to cohesiveness or instability?
- How could the political boundaries of a country foster or hinder economic advantage?

Explain that in this lesson, students will have an opportunity to redraw the boundaries of the world. The purpose in this exercise will be to create a more stable and peaceful world by drawing boundaries that foster cohesiveness and economic parity among nations.

Student activity

Before completing this lesson with students, we recommend that you complete it as well. Doing so will allow you to modify the activity to accommodate the specific needs of your students.

After the initial discussion, have the students work on the computer component of the lesson. This lesson is particularly well suited to students working in pairs, but the lesson can be modified to accommodate a variety of instructional settings.
Distribute and explain the Starting from Scratch GIS Investigation. It is important that students understand that the ultimate purpose of the activity is to create a more stable and peaceful world.

Explain that in this activity they will use GIS to observe and analyze cultural and physiographic data in order to determine the world’s new boundaries. The GIS Investigation sheets will provide them with detailed instructions for the analysis of data and drawing of borders for their assigned continent.

Things to look for while students are working on this investigation:

- Are your students taking both physiographic and anthropographic boundaries into account as they draw their boundaries?
- Do they understand that there are many more factors that influence boundary decisions and that this lesson only uses simple datasets?
- Are they applying concepts of territorial morphology (size and shape) as they draw their boundaries?

**Teacher Tip:** Students will need access to a computer and ArcMap for the equivalent of two class periods to draw their new boundaries. Decide ahead of time how and where you want your students to save their map documents. Encourage them to save their work frequently.

**Teacher Tip:** Decide where you want students to save their country boundary data in step 4e. Students can export a feature class to the World5 geodatabase if they will have their own copy of the module 5 folder. Otherwise, you may want students to export a shapefile to another location.

**Conclusion**

Each student will present a New World map to the class, describing all boundary changes, and explaining how the decisions to make those changes were arrived at. Ideally, students will use a projection device to display their maps to the class; printed copies from an ArcMap layout will also work. Be sure that presenters provide cultural or physiographic justifications for their boundary decisions. Use these presentations as a springboard to highlight present-day areas of instability, characterized by boundaries that conflict with physical and cultural imperatives in the area. Engage the students in a conversation that analyzes the data they used. Guide the students toward understanding that although language and religion are important in determining boundaries, there are many other factors that influence boundaries: access to natural resources, economics, and infrastructure are just a few. Using a GIS can help people deal with these complicated issues.

**Assessments for middle- and high-school students**

In the assessment, students will prepare a map and a report focusing on a country where political boundaries are causing cultural, political, or economic instability. The map will compare the country’s present boundaries with new boundaries proposed by the student. The report will explain how boundary issues contribute to instability in the country today and why the new boundaries will foster cohesiveness and economic stability in the future.

In preparing their report, students should consider the influence that each of the following factors has on cohesiveness and economic strength:

- Size, shape, and relative location of countries
- Cultural characteristics (language and religion)
- Distribution of natural resources
- Physiographic connections and barriers between places
Extensions

- Assign students to use the Internet to collect and map additional data about the regions they have characterized as unstable.
- Assign students to use the Internet to locate historic maps of these regions and to prepare an ArcMap layout reflecting boundary changes over time.
- Add climate, land-use, population density, and natural resource data to the project and revise boundaries based on this data.
- Have students create boundaries for all the continents and compare them to present-day boundaries.
- Ask students to use the graphs function to present religious and linguistic data that supports their boundary decisions.
- Check out the Resources by Module section of this book’s companion Web site (www.esri.com/mappingourworld) for print, media, and Internet resources on the topic of international boundaries.
Starting from Scratch
An advanced investigation

You have been selected to serve on a special commission charged with redrawing the boundaries of world nations. The goal of this commission is to defuse threats to world peace by creating political boundaries that foster stability, harmony, and economic parity among nations. You will create countries on one continent.

You may create anywhere from three to 15 countries on your continent. You will use this GIS Investigation to identify and analyze key variables that have a bearing on this important decision and to create a map reflecting your New World boundaries.

Step 1  Start ArcMap
   a  Double-click the ArcMap icon on your computer’s desktop.

   b  Open the Adv5.mxd (or Adv5) map document from the module 5 folder (C:\MapWorld9\Mod5).

   When the map document opens, you see a composite satellite image of the world. The table of contents also includes religion, language, rivers, lakes, continents, and ocean layers.

Step 2  Explore map layers

As you prepare to draw new country boundaries, you will use the Satellite Image and Rivers layers to evaluate physiographic boundaries, and you will use the Religion and Language layers to determine anthropographic boundaries.

   Note: Religion and language are not the only anthropographic factors that influence boundary decisions. For the purposes of this investigation you will use a simple dataset with only two factors.

   a  List other important factors that influence boundary decisions.

   b  Zoom to South Asia. Turn on Religion.

   Note: Click the Refresh View button at the bottom of the map area if the Religion or Satellite Image layers do not draw completely.

   c  Use the Religion legend and MapTips to determine three principal religions of South Asia. Record them on the answer sheet.
d Turn on the Effects toolbar and dock the toolbar above the map.

![Effects toolbar](image)

e Select the Religion layer in the Effects toolbar. Click the Adjust Transparency button and move the Transparency slider bar up to approximately 60%.

![Transparency slider](image)

Now you are able to see both the religion boundaries and the physical features of the earth.

*The boundary between which two religions corresponds to a physiographic boundary visible in the satellite image? (Hint: Use MapTips to help you identify religion areas.)*

f Turn off Religion and turn on Language. Identify the principal language groups in South Asia.

g Use the Effects toolbar to make the Language layer approximately 50% transparent.

*The boundary between which two language groups corresponds to a physiographic boundary visible in the satellite image?*

h Turn off the Effects toolbar.

**Step 3 Create a new layer for new world boundaries**

a Zoom to Full Extent.

b Change the name of the data frame to My New World.

![Data frame](image)

c Click the Add Data button. Navigate to the World5 geodatabase in the module 5 data folder (`C:\MapWorld9\Mod5\Data\World5.mdb`). Add `CountryTemplate`.

You will export your own copy of this feature class to hold the new country features you will create.

d Right-click the CountryTemplate layer and choose Data, Export Data.

e Click the Browse button in the Export Data dialog. Ask your teacher what type of file you should save. If you will be saving a feature class, choose Personal geodatabase feature class from the Save as type drop-down list and navigate to the World5 geodatabase. Otherwise, choose Shapefile and navigate to the location your teacher directed you.

f Name your exported data `ABC_NewWorld` where `ABC` are your initials.
g Click OK in the Export Data dialog. Click Yes to add the exported data to the map.

h Right-click the CountryTemplate layer and remove it from the data frame.

i Open the properties for the new layer you created. Click the General tab in the Layer Properties dialog and change the layer name to New World.

j Click the Symbology tab and click the symbol. Choose Hollow with a bright red outline for the symbol. Click OK to apply your changes and close the Layer Properties dialog.

Step 4 Add language and religion fields to the New World table

a Open the attribute table for New World.

b Click the Options button in the table and click Add Field. Complete the Add Field dialog to create a Language field with the following parameters:

<table>
<thead>
<tr>
<th>FIELD NAME</th>
<th>TYPE</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>Text</td>
<td>16</td>
</tr>
<tr>
<td>Religion</td>
<td>Text</td>
<td>16</td>
</tr>
</tbody>
</table>

c Repeat step b to add a Religion field. Scroll to the right to see the two fields you have just added.

d Close the attribute table.

e Save the map document and rename it according to your teacher’s instructions. Record the new name of the map document and where you saved it.

Step 5 Draw the boundaries of new countries

It is now time to begin creating your new map of the world. You will select one continent and use the ArcMap editing tools to draw the boundaries (outlines) of the countries you create on that continent. It will be helpful to turn layers on and off so you can see the physiographic and anthropographic boundaries that exist. As you create new countries, identify the principal religion and language group of each in the attribute table.

Remember that your goal is to stabilize hot spots and foster world peace with your new boundary configuration. Consider the following points:

- Countries that are culturally uniform are generally more stable.
- Countries that have natural or physiographic boundaries as political boundaries tend to be more stable.
- Landlocked countries are at an economic disadvantage if they do not have some access to the sea.
Choose the continent you will be working on and record it on the answer sheet.

Zoom to your continent so you can see major landforms.

Display the Editor toolbar.

Note: Refer to the ArcMap Toolbar Quick Reference for a listing of the tools on the Editor toolbar.

Click the Editor menu and click Start Editing. In the top pane of the Start Editing window, choose the source that contains your feature class. (Hint: You can widen the Source column by dragging the right edge of the column header to the right.) The New World layer will be listed in the bottom pane. Click OK.

On the Editor toolbar make sure the task is Create New Feature and the target is New World.

Click the Sketch tool.

When you have chosen the first boundary to draw, click the cursor along the proposed boundary. The vertexes are displayed as small green squares. Completely encircle your proposed country, including any coastlines. You may need to click many times to create a curved line. Double-click to complete the polygon.

Note: If you make a mistake, click the Undo button to delete the last vertex you entered. Or, delete the entire sketch by double-clicking to complete the polygon and then press the Delete key. Then start again.

Next you need to add language and religion attribute data to the new country.

Click the Attributes button on the Editor toolbar.

In the Value column next to the Id field, change the number from zero to 1 and press Enter.

For Language, type the name of the major language group in the country you just created and press Enter. If there isn’t one major language group, type Mixed.

For Religion, type the principal religion for the country you just created and press Enter. If there isn’t one major religion, type Mixed.

Close the Attributes window.

From the Editor menu, choose Save Edits.

Look at your boundary and determine whether there are any parts of it you need to edit. If you don’t need to edit the boundary, proceed to step 6q. Otherwise, continue with the editing instructions below.

Zoom to the section of the boundary that you would like to edit.

Change the Task to Modify Feature in the Editor toolbar. The edit sketch is displayed showing the vertexes.

Click the Edit tool. Drag the vertices to modify your boundary line. Add new vertices by right-clicking on the green line and choosing Insert Vertex. Delete vertices by right-clicking on a green square and choosing Delete Vertex.
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q Repeat the process of making a new boundary polygon, adding its attribute data, and editing it to create countries in the remainder of your continent. Give each country a unique number in the Id field. Save your edits periodically.

r From the Editor menu, click Stop Editing and save your edits.

s Click the Editor Toolbar button to dismiss the toolbar. Save your map document.

Step 6 Label your map

a Open the New World layer properties.

b Click the Labels tab and check the box for Label features in this layer. From the Label Field drop-down list, choose Id.

c In the Text Symbol section, set the following parameters:

<table>
<thead>
<tr>
<th>Font</th>
<th>Arial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>14</td>
</tr>
<tr>
<td>Style</td>
<td>bold</td>
</tr>
<tr>
<td>Color</td>
<td>red</td>
</tr>
</tbody>
</table>

d Click OK. The labels appear on the map.

Step 7 Create and print a layout of your New World boundaries

a Turn off all layers except New World, Continents, and Ocean.

b Zoom out so you can see your continent in its entirety.

c Change the map to Layout View. Move or dock the Layout toolbar in your preferred location.

d Click the Change Layout button and choose a landscape layout template from the General tab.

The template you chose may be designed for paper that is larger than Letter size (8.5 × 11 inches). If so, you may need to change it to a paper size that is appropriate for your printer.

e From the File menu, open the Page and Print Setup dialog. Make sure the box is checked to Use Printer Paper Settings.

f In the Paper section, choose Letter or another desired paper size that your printer uses. Make sure the landscape orientation is selected. Click OK.

g Use the Select Elements tool to edit the properties for any titles, scale bars, or other elements that appear on the layout.

h Update an existing text placeholder or insert new text to include your name and the date on the layout.

i Reposition any graphics or text until you are satisfied with how the layout looks.

j Print your map.
You should be prepared to show your New World map to your classmates and explain the cultural and physical features upon which you based your decisions.

**Step 8  Exit ArcMap**

In this exercise, you used ArcMap to explore patterns in the world’s physiographic and anthropographic borders. Based on your observations, you drew new international boundaries to create countries that you feel would be more culturally and physiographically unified than those in the real world today.

1. Save your map document.
2. From the File menu, click Exit.
Student answer sheet

Module 5
Human Geography II: Political Geography

Advanced investigation: Starting from Scratch

Step 2   Explore map layers
a   List other important factors that influence boundary decisions.
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

b   Use the Religion legend and MapTips to determine three principal religions of South Asia. Record them here.
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

c   The boundary between which two religions corresponds to a physiographic boundary visible in the satellite image?
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

d   Identify the principal language groups in South Asia.
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

e   The boundary between which two language groups corresponds to a physiographic boundary visible in the satellite image?
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

Step 4   Add language and religion fields to the New World table

f   Save the map document and rename it according to your teacher’s instructions. Record the new name of the project and where you saved it.

   (Name of map document. For example: ABC_Adv5.mxd)  (Navigation path to where map document is saved. For example: C:\Student\ABC)

Step 5   Draw the boundaries of new countries

a   Choose the continent you will be working on and record it here.
____________________________________________________________________________________