

## Module 1, Lesson 1

# *Magellan crosses the Atlantic Ocean*

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### Lesson overview

Students will follow the path of Ferdinand Magellan on the first half of his expedition's circumnavigation of the globe — from Spain to the eastern coast of South America and across the Strait of Magellan to the Pacific Ocean. As they explore the world map, students will identify continents, countries, and cities along Magellan's route and work with major latitude and longitude lines. They will also learn about the doldrums and trade winds. They will interact with the map to change the scale and appearance of the map and answer relevant questions about Magellan's voyage.

While lesson 1 and lesson 2 can be done independently, students would benefit from doing both lessons sequentially.

### Estimated time

Two 45-minute class periods

### Materials

The student activity can be found at <http://esri.com/geoinquiries>.  
Choose Module 1, Lesson 1.

Student activity: TS\_M1L1\_StudentDirections.pdf

### Objectives

After completing the lesson, a student is able to do the following:

- Locate places on a world map
- Identify major lines of latitude and longitude
- Use cardinal directions to navigate from one place to another
- Recognize the difference between small-scale and large-scale maps

### GIS Tools and Functions

- Open a map file
- Find a specific feature on the map
- Use Identify to get information about a feature
- Zoom to the geographic extent of a layer
- Zoom out to see more of the map (less detail)
- Measure distance on the map

## National Geography Standards

Standard	K-4	5-8
<b>1</b> How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information	The characteristics and purposes of geographic representations—such as maps, globes, graphs, diagrams, aerial and other photographs, and satellite-produced images	The characteristics, functions, and applications of maps, globes, aerial and other photographs, satellite-produced images, and models
<b>2</b> How to use mental maps to organize information about people, places, and environments	The location of Earth's continents and oceans in relation to each other and to principal parallels and meridians	How perception influences people's mental maps and attitudes about places
<b>3</b> How to analyze the spatial organization of people, places, and environments on Earth's surface	The spatial concepts of location, distance, direction, scale, movement, and region	How to use spatial concepts to explain spatial structure
<b>17</b> How to apply geography to interpret the past	How places and geographic contexts change over time	How people's differing perceptions of places, peoples, and resources have affected events and conditions of the past

## Teaching the lesson

### Introducing the lesson

- Begin this lesson by reviewing these concepts:
- The major lines of latitude and longitude (e.g., equator, prime meridian, tropic of cancer, Arctic Circle) and how they are used to divide the world into hemispheres and zones
- Map scale and the difference between large-scale and small-scale maps
- How winds converge at the equator, creating the doldrums and making it hard for sailing ships to cross the equator
- The importance of Magellan's circumnavigation and what it proved about the world
- How the Spanish and the Portuguese divided the world between them in the Treaty of Tordesillas

### Student activity

We recommend that you complete this lesson yourself before completing it with students. This will allow you to modify the activity to accommodate the specific needs of your students.

## Teacher Notes

- For younger grades, you can conduct the GIS activity as a teacher-led activity in which students follow along. You can lead students through the GIS steps and ask them the associated questions as a class.
- Ideally each student will have access to a computer, but students can complete the activities in groups or under the direction of a teacher.
- Throughout the GIS activity, students are presented with questions. The GIS activity sheets are designed so that students can mark their answers directly on these sheets. Alternatively, you can create a separate answer sheet.
- We recommend that students save their work as they progress through the GIS activity. Students can use either the Save command (to save their changes to the original map) or the Save As command (to save their changes to a new map). Please explain to students where and how they should save their work.

The following are things to look for while students are working on this lesson:

- As students work through the steps, are they focusing on the underlying geographic concepts (e.g., What are the spatial relationships between continents? How do major lines of latitude and longitude help us locate places on the earth?).
- Are students answering the questions in the GIS activity as they work through the steps?
- Are students able to use the legends to interpret the map layers?
- Are students aware of changes in scale as they zoom in and out on the map?

## Concluding the lesson

- Engage students in a discussion about the observations and discoveries they made during their exploration of the world map.
- Ask students about their impressions of Magellan and his circumnavigation.
- Has this activity raised any questions that students would like to explore further?
- How can GIS help students to learn about world explorers and their discoveries?
- Has this activity changed students' ideas about maps?

## Extending the lesson

- Have students research other circumnavigations and why Magellan's voyage was so important.
- Have students research the treaties between the Spanish and the Portuguese in the fifteenth and sixteenth centuries and how the line of demarcation changed over time.
- Have students research the navigation equipment that Magellan used during his voyage.

## References

- [http://www.ucalgary.ca/applied\\_history/tutor/eurvoya/](http://www.ucalgary.ca/applied_history/tutor/eurvoya/)
- <http://www.nationalgeographic.com/volvooceanrace/geofiles/01/index.html>
- <http://www.expedition360.com/home/circumnavigation.htm>

## Student activity answer key

*Answers appear in blue.*


### Module 1, Lesson 1

## ***Magellan crosses the Atlantic Ocean***

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#### Task 1: Open the map

#### Task 2: Enlarge the ArcGIS Online window


 **Q1:** Look at the continents on the map and fill in the missing letters in the following statements.

- a. Europe is touching the continent of **ASIA**.
- b. The **ATLANTIC** Ocean separates the continent of **AFRICA** from South America.
- c. The **PACIFIC** Ocean separates the continent of North America from **ASIA**.

#### Task 3: Locate the Spice Islands, also known as the Moluccas





 **Q2:** What is the name of the continent where the Moluccas are found?

- a. Australia
- b. Oceania
- c. **Asia**



 **Q3:** What major line of latitude passes through the Moluccas? (Circle the correct answer.)

- a. Tropic of Cancer
- b. **Equator**
- c. Tropic of Capricorn
- d. Prime Meridian


#### Task 4: View Magellan's route


-  **Q4:** *What is the name of the city where Magellan began his voyage?* **Seville**
-  **Q5:** *What country is this city in?* **Spain**
-  **Q6:** *Magellan started at the red star and traveled west. How many times did he cross the equator to return to the starting point? (Circle the correct answer.)*
- a. One time
  - b. Two times
  - c. Three times
  - d. **Four times**
-  **Q7:** *Did Magellan spend more time north of the equator or south of the equator? (Circle the correct answer.)*
- a. North of the Equator
  - b. **South of the Equator**

#### Task 5: Follow Magellan as he starts his voyage in September of 1519 and passes through two groups of islands.

- Q8:** *How did your map change?*
- a. **The map shows more detail (larger scale).**
  - b. The map shows less detail (smaller scale)
- Q9:** *What direction did Magellan have to sail to reach these islands? (Circle the correct answer.)*
- a. Northeast
  - b. North
  - c. Southeast
  - d. **Southwest**
-  **Q10:** *What is the name of the group of islands at this stop?* **Canary Islands?**
-  **Q11:** *What is the name of the group of islands at this stop?* **Cape Verde Islands?**

#### Task 6: Magellan crossed the equator in October of 1519, one month after starting his voyage

 **Q12:** Based on what you know so far, why did it take Magellan three weeks to cross the equator and reach the trade winds? *The doldrums are an area with no winds. Sailing in the doldrums would be very slow. Magellan would have to wait for a strong wind associated with a thunderstorm to move his ships.*

 **Q13:** Look at the picture on the previous page. After crossing the equator, Magellan was trying to reach Brazil on the east coast of South America. Did the trade winds blow Magellan toward Brazil or away from Brazil?


- a. *Toward Brazil*
- b. *Away from Brazil*

**Task 7:** Magellan sailed along the coast of Brazil looking for a headland that would provide passage across the South American continent.


 **Q14:** How did your map change? (Circle all the correct answers.)

- a. *The map shows less detail (smaller scale).*
- b. *The map shows more detail (larger scale).*
- c. *The map shows a bigger area.*
- d. *The map shows a smaller area.*


 **Q15:** What is the name of the place in Brazil where Magellan landed? *Rio de Janeiro*

 **Q16:** Look at the Measure window. How many nautical miles did Magellan travel?  
*4, 1 4 0.8 nm (answers will vary)*





 **Q17:** What is the name of the river where Magellan's crew explored? *Parana*

 **Q18:** Why do you think Magellan couldn't sail his ships to the other side of the continent from this place?




- *The river doesn't cross all the way to the other side of the continent.*
- *It is hard to sail up a river in a large ship.*
- *The channel might be too narrow.*
- *The current might be too strong.*
- *The wind might not be blowing the right direction.*
- *The river might be too steep.*

-  **Q19:** What happened to your map? Describe the changes in your own words. *The map moved up so that the area to the south is visible. The map is no longer centered on the Equator. The southern tip of South America and the northern portion of Antarctica (below the Antarctic Circle) are now visible. The scale of the map did not change.*

### Task 9: Follow Magellan's route south along a deserted coast


-  **Q20:** What major line of latitude is south of the southern tip of South America? (Circle the correct answer.)
- a. Equator
  - b. Tropic of Capricorn
  - c. Arctic Circle
  - d. *Antarctic Circle*
-  **Q21:** As Magellan sailed south to Stop 5, do you think the temperature got warmer or colder?
- a. *Colder*
  - b. Warmer
-  **Q22:** Look at your map. Do you see more detail or less detail?
- a. *More detail*
  - b. Less detail
-  **Q23:** What is the name of Stop 5? *San Julian*

### Task 10: Magellan discovered an ocean

-  **Q24:** Click Stop 6 to find out what this stop is called today. *Cape Virgenes*
-  **Q25:** Click Stop 7 to find out what this famous passage is called today. *Strait of Magellan*
-  **Q26:** What is the name of the ocean that Magellan reached on the west side of South America? (Circle the correct answer.)
- a. Atlantic Ocean
  - b. *Pacific Ocean*



## Task 11: Save your work

 **Q27: Write a short paragraph explaining what Magellan accomplished to this point. (Hint: What bodies of water and what major lines of latitude did he cross? What continents and countries did he visit?)** *What continents and countries did he visit? After leaving Spain, Magellan crossed the Atlantic Ocean sailing toward Brazil. When he got there, he searched for a place to cross the continent of South America. He eventually found this place and found an ocean on the other side—the Pacific Ocean. Along the way, he crossed the equator and the Tropic of Capricorn.*