

# Mapping the Arroyo

## Introduction, Lesson 2

**Lesson Summary:** Students will create their own maps of the local arroyo and the surrounding environment.

**Suggested Timing:** 1 hour

### New Mexico State Standards

**Performance Expectation(s):** MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

#### Science & Engineering Practices:

[Constructing Explanations and Designing Solutions](#): Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe nature operate today as they did in the past and will continue to do so in the future.

#### Disciplinary Core Ideas:

[ESS2.A: Earth's Materials and Systems](#): The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future.

[ESS2.C: The Roles of Water in Earth's Surface Processes](#): Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations.

#### Crosscutting Concepts:

[Scale Proportion and Quantity](#): Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.

#### Evidence Statements:

- [MS-ESS2-2 Evidence Statements](#)

#### ELA CCSS Connections:

- RST.6-8.1: Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS2-2)
- WHST.6-8.2: Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS2-2)
- SL.8.5: Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ESS2-2)

#### Math CCSS Connections:

- MP.2: Reason abstractly and quantitatively. (MS-ESS2-2)
- 6.EE.B.6: Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS2-2)



- 7.EE.B.4: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (MS-ESS2-2)

Content Objectives and Daily Learning Targets	<p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>• I can draw a map</li> <li>• I can read and understand maps of different varieties</li> <li>• I can use maps to better understand the environment around me</li> </ul>
Focus Question	How do we use maps to better understand the world around us?
Language Objectives	<ul style="list-style-type: none"> <li>• Students use maps and diagrams to share information.</li> <li>• Students can identify and name different map types in conversation.</li> <li>• Students can express their observations in writing and orally.</li> </ul>
Vocabulary	<ul style="list-style-type: none"> <li>• <b>Climatic map</b> - shows the geographic distribution of the monthly or annual average values of climatic variables.</li> <li>• <b>Compass rose</b> - a figure on a map used to display the orientation of the cardinal directions and their intermediate points.</li> <li>• <b>Map key</b> - an inset on a map that explains the symbols, provides a scale, and usually identifies the type of map projection used.</li> <li>• <b>Physical map</b> - a depiction of the geographic features of an area.</li> <li>• <b>Road map</b> - designed for motorists, showing the roads of a city, state, or other area.</li> <li>• <b>Scale</b> - a ratio of size in a map, model, drawing, or plan.</li> <li>• <b>Topographic map</b> - indicates the features of the land's surface, such as mountains, hills, and valleys using contour lines.</li> <li>• <b>Utilities map</b> - shows the positioning and identification of buried pipes and cables beneath the ground.</li> </ul>
Materials	<ul style="list-style-type: none"> <li>• Assortment of maps</li> <li>• Google map of your local neighborhood (printed or available on devices)</li> <li>• Large paper or large graph paper</li> <li>• Rulers</li> <li>• Pencils</li> <li>• Colored pencils</li> <li>• Projector</li> <li>• Presentation</li> <li>• Computers or personal devices</li> </ul>
Preparation before class	<ul style="list-style-type: none"> <li>• Print maps for table groups</li> </ul>
Assessments (Formative/ Summative), Rubrics, Success criteria	<ul style="list-style-type: none"> <li>• Maps created by students</li> <li>• Success criteria: <ul style="list-style-type: none"> <li>○ Map key is clear and understandable</li> </ul> </li> </ul>



	<ul style="list-style-type: none"> <li>○ Compass rose shows the correct direction</li> <li>○ Maps include adequate detail and scale</li> </ul>
EL Supports	<ul style="list-style-type: none"> <li>● Provide key vocabulary in English and the student's native language.</li> <li>● Think-Pair-Share</li> </ul>
Culturally Relevant Strategies	<ul style="list-style-type: none"> <li>● Students are exploring the local environment.</li> <li>● Students are practicing academic and social skills by working together in groups.</li> </ul>
Special Education Modifications	<ul style="list-style-type: none"> <li>● Follow student IEP recommendations.</li> <li>● Students can express their thinking in multiple ways including: diagrams/maps, writing, and orally.</li> </ul>

### Lesson Plan Details

ENGAGE (~5 min):	<ul style="list-style-type: none"> <li>● Have students work with a partner.</li> <li>● Hand out the maps of Santa Fe with a START and END marked on them. Each student gets one map. Place the maps face down. Ensure one student has Map A and one has Map B.</li> <li>● Each student should also receive a blank piece of paper.</li> <li>● Start with the student who has Map A. Ask them to pick up and look at the map, but not to let their partner see the map. Ask them to turn to their partner and give directions to their partner on how they would get from the START to the END. The partner will listen to the instructions given by their partner and using their blank piece of paper, will draw a map free hand that records these instructions. They will then switch roles. At the end, have them compare what they drew to the actual map their partner described.</li> <li>● Ask students to share when they use maps in their daily lives. Ask how many have ever used a paper map or atlas.</li> </ul>
EXPLORE (~10 min):	<ul style="list-style-type: none"> <li>● Hand out the other types of maps.</li> <li>● Let students explore the maps and look up additional maps online.</li> <li>● Some links include: <ul style="list-style-type: none"> <li>○ Create your own Topo map: <a href="https://topobuilder.nationalmap.gov/">https://topobuilder.nationalmap.gov/</a></li> <li>○ Use the layers to see different types of maps: <a href="http://www.google.com/maps/">www.google.com/maps/</a></li> <li>○ Santa Fe GIS map has filters for different types of maps, including utilities, topographic, etc: <a href="https://gis.santafenm.gov/portal/apps/webappviewer/index.html?id=8cbbefaf87d44d99b4f379564e9f3c83">https://gis.santafenm.gov/portal/apps/webappviewer/index.html?id=8cbbefaf87d44d99b4f379564e9f3c83</a></li> </ul> </li> <li>● Have students make a list of questions they have about the maps to address as a whole class.</li> </ul>
EXPLAIN (~10 min):	<ul style="list-style-type: none"> <li>● Have students pull out the topographic maps and/or project for the class.</li> </ul>



	<ul style="list-style-type: none"> <li>● Explain how to read the map.</li> <li>● Look at the other maps.</li> <li>● Ensure students are able to locate places on the map.</li> <li>● Ensure students understand how to use the compass rose and map key.</li> <li>● Review common symbols used in maps.</li> <li>● Ensure students are able to use Google maps to find their local arroyo, use the terrain and satellite functions.</li> <li>● Explain assignment: <ul style="list-style-type: none"> <li>○ Students are going to work alone or in small groups to create maps of the arroyo.</li> <li>○ They should show where the arroyo starts and ends.</li> <li>○ They should use scale.</li> <li>○ They should include a compass rose and map key.</li> <li>○ They should include anything else that students think is important to show on the map.</li> </ul> </li> </ul>
ELABORATE (~25 min):	<ul style="list-style-type: none"> <li>● Hand out large paper, rulers, and colored pencils.</li> <li>● Students should create a map of the arroyo.</li> <li>● Ask them to include anything they noticed on their arroyo exploration.</li> <li>● Ask them to think about how the arroyos connect the city with the surrounding rural areas.</li> </ul>
EVALUATE (~10 min):	<ul style="list-style-type: none"> <li>● Have students do a gallery walk to look at all of the maps and think about some questions: <ul style="list-style-type: none"> <li>○ How are other student's maps different from theirs?</li> <li>○ Is there something they would go back and add to their own map?</li> </ul> </li> <li>● Allow students to add anything additional to their own map and keep them to add to as you do additional investigations in the arroyo.</li> </ul>

Additional Sources:

- [5 Es of Science Instruction](#)
- [5E Model of Instruction](#)
- [ISEC model of lesson sequence](#)

