



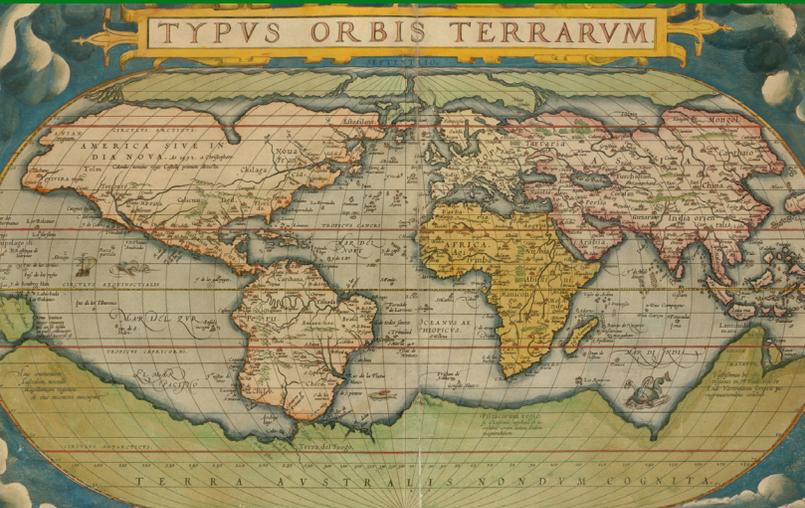
# World Maps Over Time

## SUMMARY

This lesson supports student exploration of world maps through a number of essential questions and map-reading skills: what is a map and how is it similar and different from other visual representations of places?; what kinds of approaches do critical map-readers practice?; how have representations of the world on two-dimensional maps changed over time?; how do representations of the world point to a

cartographer's purpose and audience?

Terms and topics include: legend/key, compass, scale, title and date, decorations/illustrations, distortion and projections, and purpose. Students receive an interactive lesson about maps and mapping, and work in groups to complete a map inquiry activity with some of the maps in our collection.



**LOCATIONS:** World

**TIME PERIODS:** 16th to 21st centuries

**GRADE LEVEL:** 6-9

**KEYWORDS:** distortion, projection, perspective

**SUBJECTS:** 1) world geography; 2) map projections; 3) map elements; 4) purpose

## ESSENTIAL QUESTIONS

What is a map?

How have representations of the world on two-dimensional maps changed over time?

How do representations of the world point to a cartographer's audience and purpose?

In what ways do flat maps distort the world?

What approaches do critical map-readers practice?

## OBJECTIVES

Students develop an interest in and comfort with viewing historical maps.

Students are introduced to the idea of map projections and their variety.

Students review or learn common map elements: compass, legend/key, scale, etc.

Students investigate maps to determine a cartographer's perspective, selectivity, purpose and audience, and knowledge.

Students consider what cartography can and can't express about the world.

# World Maps Over Time

## LESSON PLAN MATERIALS

Slideshow: Link to [Google Slide Presentation](#)

*Copy the presentation to save, change format, edit or revise, substitute images, etc.*

Worksheet for individual or group map inquiry

*Printable worksheet included in this document following the Lesson Plan*

*Worksheet is also available as an online activity using links on slides 22-26*

*The online map inquiry activity can be recreated and/or edited with our [Map Inquiry Tool](#), your own Google Form and any map in our [digital collections](#). When you copy in the link to a Google Form you create yourself, students can submit their answers directly to you. When using online forms, be sure to tell students not to click "SUBMIT" until they are finished with the group discussion. They will want to have access to their answers.*

## MAPS

*The lesson is designed with time for four or five map groups to report out, but you can incorporate more or fewer maps depending on the time you have available and your objectives.*

World Maps from the Leventhal Digital Collection in chronological order

*Here is a sample selection of maps to choose from for your lesson. The lesson already includes five from this list.*

Apian, Peter. "Tipus orbis uniuersalis iuxta Ptolomei cosmographi traditionem et Americi Vespuccii alior[um] que." Map. 1520. Norman B. Leventhal Map & Education Center, <https://collections.leventhalmap.org/search/commonwealth:3f462s24x>

Ortelius, Abraham. "Typus orbis terrarum." Map. 1570. Norman B. Leventhal Map & Education Center, <https://collections.leventhalmap.org/search/commonwealth:x633f946s>

Bünting, Heinrich. "Die gantze Welt in ein Kleberblat, welches in der Stadt Hannover, meines lieben Vaterlandes Wapen." Map. 1581. Norman B. Leventhal Map & Education Center, <https://collections.leventhalmap.org/search/commonwealth:3f462s41k>

Blaeu, Willem Janszoon. "Noua totius terrarum orbis geographica ac hydrographica tabula." Map. 1638. Norman B. Leventhal Map & Education Center, <https://collections.leventhalmap.org/search/commonwealth:3f462s701>

Hondius, Hendrik, Mercator, Gerhard, and Hondius, Jodocus. "Noua totius terrarum orbis geographica ac hydrographica tabula." Map. 1641. Norman B. Leventhal Map & Education Center, <https://collections.leventhalmap.org/search/commonwealth:3f462s72k>

Seller, John, fl. 1658-1698. "Novissima totius terrarum orbis tabula." Map. 1672. Norman B. Leventhal Map & Education Center, <https://collections.leventhalmap.org/search/commonwealth:st74cx36k>

Seutter, Matthaeus. "Diversi globi terr-aquei statione variante et visu intercedente, per coluros tropicorum, per ambos polos et particul." Map. 1730. Norman B. Leventhal Map & Education Center, <https://collections.leventhalmap.org/search/commonwealth:x633f8840>

Moll, Herman, d. 1732, Bowles, John, and Bowles, Thomas. "A new map of the whole world with the trade winds according to ye latest and most exact observations." Map. 1732. Norman B. Leventhal Map & Education Center, <https://collections.leventhalmap.org/search/commonwealth:x059cd91h>.



# World Maps Over Time

## World Maps from the Leventhal Digital Collection, continued

Maury, Matthew Fontaine, and United States Naval Observatory. "Whale chart." Map. 1851. Norman B. Leventhal Map & Education Center, <https://collections.leventhalmap.org/search/commonwealth:x633f952x>

Harrison, Richard Edes. "Eight views of the world." Map. 1944. Norman B. Leventhal Map & Education Center, <https://collections.leventhalmap.org/search/commonwealth:q524n1590>

Chase, Ernest Dudley. "The story map of flying." Map. 1944. Norman B. Leventhal Map & Education Center, <https://collections.leventhalmap.org/search/commonwealth:q524n353r>

Breding, Paul., and ODT, Inc. "The population map." Map. 2005. Norman B. Leventhal Map & Education Center, <https://collections.leventhalmap.org/search/commonwealth:x633f9404>

## LESSON PLAN FORMAT

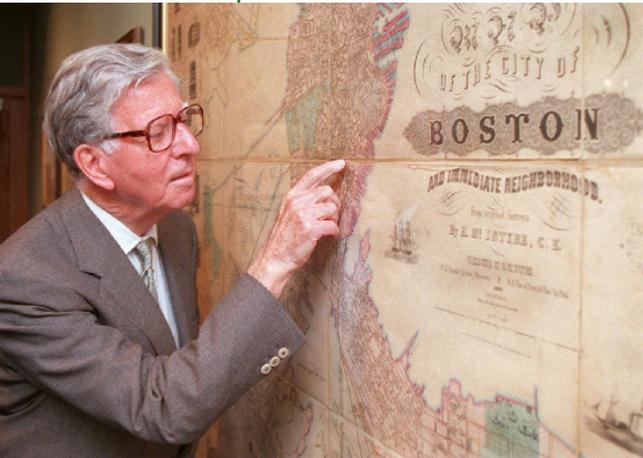
*The step-by-step lesson plan that follows is broken into timed sections. It is possible to complete the lesson in 60 minutes, but 75 is much better (in one or over two days), allowing adequate time for students to talk and explore the maps in the final inquiry exercise. Within each section, you will find a framing summary and sample scripts that show you how we teach the lesson when we are facilitating. We expect that you will make a copy of the slideshow and make it your own, choose the maps that work best for your classes, and move students through the sections in your own way. The scripts are only meant to give you a view into the concepts we emphasize and how we approach them. We hope you will adapt the lesson by getting to know some of the maps well and by adding in the connections to your curriculum that will make it a cohesive and integrated experience for your students.*



# LESSON PLAN

## Introduction to the Map Center: 2 minutes/Slides 2-4

For the same reasons we think it's important for students to think about who made a map they are exploring, we believe it's important for students to know who created their lessons!



*Sample script: (Advance to slide 2) The Norman B. Leventhal Map Center is in the Boston Public Library in Copley Square, downtown Boston, Massachusetts. It was started in 2004 by Norman Leventhal, a wealthy real estate developer and map collector who grew up in Boston in an immigrant family and attended the Boston Public Schools. (Advance to slide 3) His idea was that all the maps in the Boston Public Library, over 200,000 maps and 5,000 atlases, should be well-cared for and available for anyone to come and see and learn from them for free. (Advance to slide 4) So today the Map Center takes care of the maps for the enjoyment and education of all through exhibitions in the Map Center and online, educational programs like this one, and even classes on how to make digital maps.*

## Is This a Map? 8 minutes/Slide 5 - 7

This section is a group discussion about whether or not the first photograph of the planet Earth taken from space can be considered to be a map. There is no right or wrong answer. The idea is to tease out what our expectations of maps are. Usually there are some yes answers and some no answers and sometimes students think both yes and no. It's best to have a range, so be sure to emphasize that there is no wrong answer. Take some time and expand on what students say for their explanations. If students say, yes, because they see continents, ask if they can identify them. If they can't, ask what would help them to do that. If a student says, it's just a photograph, you can ask about Google Earth or satellite view in Google Maps. If a student says there are no labels, you can ask if all maps have to have labels. After students have shared their answers according to the way that works best for your students and circumstance, ask them to imagine it IS a map and, if it is, what **purpose** it could have: a map for astronauts to compare what they see from space, a weather map for meteorologists, a continent quiz for students? This section ends with a broad definition that we use in our lessons.



*Sample script: (Advance to slide 5) Take a look at this image. Is this a map? Take a minute to think about it and have a reason for your answer. Then we'll hear what you think. Ok. Who says yes, this is a map? Who says no?*

Transition:

*Sample script: It doesn't matter very much whether you think this is a map or not. In some ways maybe it is, and in some ways maybe it isn't. (Advance to slide 6a) But does this image of the world feel more map-like to you? (Advance to slide 6b) Why? (Advance to slide 7a) If we are going to think broadly about maps, we might use this definition. (Advance to slide 7b, then 7c, 7d, 7e and 7f) As we move forward, try to keep these concepts in mind, especially selectivity. But now let's return to our globe.*



## Making Flat Maps/Projections: 15 minutes/Slides 8 - 17

This section of the lesson is an introduction to **projections** and the idea that all flat maps are **distortions** of the round Earth. Students are also asked to consider what different projections might tell us about a cartographer's **perspective** and **purpose**. There are moments for interaction in this section and the next, but it's mostly direct teaching. Begin with Slide 8.

*Sample script: (Advance to slide 8a) A globe is the most accurate kind of map because it's round like the planet Earth is round. (Advance to slide 8b) Things are in the right places at the right distances if the cartographer did a good job. (Advance to slide 9) But when we try to take the round earth and represent it on a flat map, we have problems to solve.*

*(Advance to slide 10a) If I draw a map of the world on an orange and try to make it flat, I might do it this way. (Advance to slide 10b) What do you think of this as a map? Is it a good map? Why or why not? I could try it again and come up with this. (Advance to slide 10c) What do you think of this as a map? Is this a good map? Why or why not? (Advance to slide 11) And yet there is a kind of map that looks like my orange peel. This cartographer even called this map an orange-peel projection. A **projection** is what it's called when cartographers make flat maps of the round Earth. Do you see any problems with this map? What do you think the purpose of this map is? What did the cartographer want us to think about?*

Here be sure to have students share their observations. If they do not notice that the quarter spherical projection has Alaska on it in two places and that Australia hangs off the edge, be sure to show them. And you may propose that the purpose of the quarter-spherical projection is to remind the viewer that the world is round and that the map could be cut out and folded back into a sphere, with Alaska overlapping itself, like a paper doll.

*Sample script: (Advance to slide 12) And this map, a homolosine projection, is kind of like the other orange peel map. What do you think the purpose of this map is? Look at the title, the key and the colors. Notice that there aren't any labels on this map because the cartographer didn't think they needed to include them to fulfill the purpose of the map, which is to show where people have had the most effect on the natural environment.*

Transition:

*Sample script: Every flat map of the world is a little wrong, **distorted**. It might be stretched in one place and squeezed in another. It might have big gaps. The shapes of things might be a little off. Every map is distorted, because no map can capture everything that is true about a place. When we talk about a map projection we are referring to the geometric approach used by a cartographer to represent a sphere as a two-dimensional image, and a cartographer's choice of projection tells us something about their perspective and the map's purpose and audience. Let's look at a few more projections through that lens.*

The next few slides present a few more projections of different kinds, starting with the Mercator, which is explored in more depth. The main ideas to emphasize are that no projection is completely accurate in all ways, and every world map is a product of a cartographer's perspective, selective choices, and purpose and audience.

# LESSON PLAN



*Sample script: (Advance to slide 13) This map projection is one that used to be found in most classrooms in the United States that had a two-dimensional map on the walls. It's the Mercator projection, named for a 16th century cartographer, and it gets a lot of criticism. Take a look at how the land and oceans are drawn and arranged and see if you can see why.*

Let students share their observations. Most will notice the outsized regions at the poles. Some will notice that the United States is in the center, which is not a particular feature of a Mercator projection, but is useful to notice with this map.

*Sample script: Yes, this projection has dramatic distortion in some ways, but for sailors, it was very useful. True north and south are preserved everywhere and angles off of the grid are accurate and were easy for sailors to plot their courses when travelling by sea. Mercator knew the limitations of his map, but it worked well for his purpose--to help navigators get from place to place. When educators use it to show their students the relative size of land masses, they are using the wrong projection for their purpose, and it may promote misguided narratives about our world. (Advance to slide 14)*

Move through the next two slides (14 and 15). The first shows how the Mercator projection expands the pieces of orange peel to fill the grid squares, with the sections by the equator closer to their real size and the ones at the poles subject to drastic enlargement. The second slide is a link to an animation showing the continents in a Mercator projection moving to true size, though to do that they will lose their position.

The next two slides (16a/b and 17a/b) show two additional projections: a [Peters projection](#) and [a map that presents the world with south at the top](#). Discuss with students by asking them what they notice, what seems distorted and in what ways, and then what the cartographer's purpose might be. Both the *Peters World Map* and *What's Up? South!* are meant to generate an awareness of how our understanding of the world can be shaped and might be reshaped by seeing the world through different projections.

Transition:

*Sample script: When we look at maps, we need to consider the cartographers' choices. They tell us something about where they're coming from, geographically, socially and in other ways. (Advance to slide 18)*

## Reminders for Critical Map Viewing: 5 minutes/Slides 18 - 19

The following two slides summarize some of the ideas that have surfaced in the lesson so far related to ways to ask questions of maps. Students will practice working with the four categories of perspective, selectivity, audience and purpose, and knowledge during the map inquiry activity to follow. Slide 19 addresses the category of knowledge: what does a cartographer know and not know about what they are mapping?

*Sample script: When viewing world maps it's important to keep some questions in mind. We have seen how some of these categories help us think about the cartographer behind the map and their objectives. Paying attention to the projection is one way of approaching these questions and helps us consider a cartographer's perspective. We can try to notice what was and was not included. We can think about who the map was made for and what its purpose was. It's also important to consider what the cartographer knew and may not have known in order to evaluate a map's usefulness to us or its accuracy.*



# LESSON PLAN

*Sample script continued: (Advance to slide 19) This world map was drawn by Greek cartographer Ptolemy in the 2nd century. [This version of it was printed in 1482](#) and it's the oldest map in the Leventhal Map Center collection. See if you can find the continent of Africa, Europe and Asia. Can you see the Mediterranean Sea or the Arabian Peninsula? As a map of the world, how useful is this? What's missing and why? Limited knowledge on the part of a cartographer is always something we should consider when exploring maps of any kind. With a historical world map, knowing the date it was made comes in handy.*

Transition:

*Sample script: Now that we have looked at a number of world maps together, you are ready to explore one on your own, individually or with a small group. Before assigning you your map, let's quickly review the common map tools cartographers use to help orient us.*



## Reviewing map elements: 1 minute/Slide 20

This section is a quick review of map elements students may already be familiar with. The slide adds pictures of the elements and their names one at a time as you advance the slide. You may review these in any way that works best for your students, their familiarity with the terms and your teaching circumstances.

*Sample script: You will need to know what these common map elements are when you explore a map on your own in the next activity. (Advance to slide 20 and click through all the terms)*

Transition:

*Sample script: (Advance to slide 21) Now you will be assigned a map to explore, either individually or in a small group, using the approaches we've considered together. You will have to look all over the map, sometimes looking close up at one part and sometimes looking at the whole thing at once. Work your way through the questions until you have completed the last one. When you are finished you will come back to the full group and share what you discovered. If you are looking at your map on a computer, you can zoom in and out of the map and drag it to move it around. You'll see the questions on the right side, and you can type or select your answers right there.*

## Students Work: 15 minutes/Slides 21-26

Explain to students how they will be working, either in small groups with printed maps, individually with printed maps, online in small groups or online individually. Below are five world maps from different times. Together they cover a wide-range of cartographic representations for students to discuss. You may choose to have a full class explore one at a time; or choose two to compare; or break students into five groups, each exploring a different map, or have students individually explore all five. Whatever approach you take, it is important for students to be able to make sense of maps collaboratively in some way at some point so they can notice more than they can if working alone.

Below each map title below is a link to an interactive digital worksheet with a zoomable and moveable map on the left and questions on the right. The link to the inquiry form is also on the slides for each map. [This link](#) takes you to an inquiry worksheet tool for you to make your own versions of these worksheets if you want to use different questions or a different map from the Leventhal collection (see the map list on pages 2 and 3 of this lesson). You will need to use Google Forms to use the inquiry worksheet tool. If you create your own forms, you can have students submit their answers for your record-keeping. If you are using our forms via the links below, students do not need to submit their responses. But be sure to tell students not to click “SUBMIT” until they have discussed their map with the full group. They will want to refer to their responses, and once they “SUBMIT”, the form will close.

Typus orbis terrarum, 1570

[Map Inquiry 1](https://bit.ly/3oCyZmM): <https://bit.ly/3oCyZmM>

Noua totius terrarum orbis geographica ac hydrographica tabula, 1638

[Map Inquiry 2](https://bit.ly/2JjcaEB): <https://bit.ly/2JjcaEB>

Whale Chart, 1851

[Map Inquiry 3](https://bit.ly/3jGzLva): <https://bit.ly/3jGzLva>

Eight Views of the World, 1944

[Map Inquiry 4](https://bit.ly/2HQei5N): <https://bit.ly/2HQei5N>

The Population Map, 2005

[Map Inquiry 5](https://bit.ly/2TQGdFP): <https://bit.ly/2TQGdFP>

## Students Report Out and Wrap Up: 25 minutes/Slides 20-24

To wrap up the lesson, have students share out their work in whatever way works best for your class. In the Map Center, students stand up in front of the room with their group and show what they've discovered by pointing to areas on a large reproduction of their map. When they finish sharing, the class can add observations or ask questions. In your classroom, without large format physical reproductions of the maps, you can have students stand in front of the map projected on a white board, or talk about a map that you are showing remotely from your computer in a video conference meeting.

When all groups have presented, we often ask students to share their important take-aways from the lesson as a wrap up, adding our own ideas if they are not mentioned (the importance of looking for a map's purpose, how all maps of the world are distorted in some way, that world maps can look completely different and tell different stories depending on when they were made, etc.). A useful final question is *What are world maps good at showing and what can't they show?*



# MAP INQUIRY ACTIVITY

## 1. Map Elements - Check off the ones you can find

- compass
- legend/key
- scale
- latitude and longitude
- title: \_\_\_\_\_
- name of mapmaker: \_\_\_\_\_
- date: \_\_\_\_\_

## 2. Perspective

What does the map maker want to draw your attention to? What's in the center? What is emphasized?

## 3. Selectivity

What are three things that seemed to be important to the mapmaker to include?

## 4. Purpose and Audience

Who might have used this map at the time it was made and why do you think so?

What do you think the purpose of this map is? How do you think it was used at the time it was made?

## 5. Knowledge

Is there anything "wrong" with this map? What does this tell you about what the mapmaker knew and what they didn't?



# CURRICULUM STANDARDS

## Massachusetts History & Social Science Frameworks

### Grade 6 Content Standards:

*Topic 1. Geography: places to explore [6.T1]*

Supporting Question: What do the social sciences contribute to our understanding of the world?

1. Explain how different academic fields in the social sciences concentrate on different means of studying societies in the past and present.
2. Give examples of ways in which a current historical interpretation might build on, extend, or reject an interpretation of the past.

### Grades 6–8 Speaking and Listening Standards for Literacy in the Content Areas [SLCA] Comprehension and Collaboration

1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on discipline-specific topics, texts, and issues, building on others' ideas and expressing their own clearly.
  - a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. (See grades 6–8 Reading Standard 1 for more on the use of textual evidence.)
2. Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.

### World History 1 Content Standards

*Topic 1. Dynamic interactions among regions of the world [WHI.T1]*

Supporting question: What kinds of global connections existed among humans in the past?

4. Demonstrate the ability to analyze primary sources, including texts, maps, diagrams, works of art and architecture.

## National Geography Standards: Up to Grade 8

### Properties and Functions of Geographic Representations

1. The advantages and disadvantages of using different geographic representations—such as maps, globes, graphs, diagrams, aerial and other photographs, remotely sensed images, and geographic visualizations for analyzing spatial distributions and patterns

Therefore, the student is able to:

- A. Analyze and explain the properties (position and orientation, projections, symbols, scale, perspective, coordinate systems) and functions of geographic representations; explain why particular maps are appropriate for a specific purpose (e.g., a cartogram to illustrate total population, a remotely sensed image to observe land-use change, topographic maps to consider the best location for a wind farm, a highway map to consider best routes for new transportation corridors).