

 **Lesson Plan: Maps as Models of the Earth/Contour Models****Grade Level:** 6**Subject:** Earth Science**Duration:** 45–60**NGSS MS-ESS2-2:** Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. **Learning Objectives**

By the end of this lesson, students will be able to:

- **Identify** the different types of maps and their purposes, including physical, political, and topographic maps.
- **Describe** how contour lines represent elevation and the shape of the land on topographic

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- **Contour interval:** The difference in elevation between two consecutive contour lines on a topographic map.
- **Erosion:** A process by which weathered rock and soil is transported to a new location; the wearing away of the Earth's surface by rain, wind, snow, and ice.
- **Abrasion:** A type of mechanical erosion that occurs when one rock grinds against another.

**Materials Needed:** (all links are included in this PDF)



- Printed copies of the Study Guide (<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-maps-as-models-of-the-earth-contour-models-1.pdf>)
- Worksheet 0 (Topographic map interpretation) (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-maps-as-models-of-the-earth-contour-models-1-0.pdf>)
- Worksheet 1 (Contour line analysis) (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-maps-as-models-of-the-earth-contour-models-1-1.pdf>)
- Vocabulary matching worksheet (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-maps-as-models-of-the-earth-contour-models-1-1.pdf>)
- Modeling clay or playdough in multiple colors
- Plastic knife or wire for cutting clay layers
- Ruler
- Printed topographic map examples



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[grade-6-maps-as-models-of-the-earth-contour-models-1.pdf](https://newpathworksheets.com/api/guide/study-guide-science-grade-6-maps-as-models-of-the-earth-contour-models-1.pdf))

- Demonstrate with a physical model: stack layers of different-colored clay to represent different elevations, then cut through the stack to show how contour lines appear when viewed from above.
- Explain contour intervals and how closely spaced lines indicate steep slopes while widely spaced lines represent gentle slopes.
- Discuss how contour lines form V-shapes when crossing streams (pointing upstream) and concentric circles when representing hills or depressions.

Step 3: Guided Practice (12 minutes)



- Distribute the vocabulary matching worksheet and work through the first few terms as a class, reinforcing key concepts.
(<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-maps-as-models-of-the-earth-contour-models-1-1.pdf>)
- Project a sample topographic map and guide students through identifying features such as hills, valleys, and steep versus gentle slopes.
- Have students work in pairs to identify the contour interval on a provided map and determine the elevation of specific points.

Step 4: Independent Practice (15 minutes)

- Provide students with Worksheet 0 to practice interpreting topographic maps and identifying landforms. (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-maps-as-models-of-the-earth-contour-models-1-0.pdf>)
- Have students complete Worksheet 1, which focuses on analyzing contour lines and determining elevation changes.



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💡 Differentiation Strategies

For advanced learners:

- Challenge advanced learners to research and compare different map projections (Mercator, conic, azimuthal) and explain the advantages and distortions of each.
- Have students create a three-dimensional topographic model of a local landform using cardboard layers or digital modeling software.

For learners needing support:



- Provide students needing support with a pre-labeled topographic map showing key features and a simplified contour interval.
- Offer one-on-one assistance during the clay modeling activity, using a step-by-step visual guide to help students create their contour models.

Extension Activities

- Research Project: Have students research how topographic maps are used in real-world applications such as urban planning, hiking trail design, or flood prediction.
- Hands-on Activity: Take students on a nature walk with a topographic map of the area and have them identify features on the map as they observe them in the landscape.
- Creative Challenge: Have students design a fictional island with various terrain features and create both a topographic map and a physical contour model of their island.



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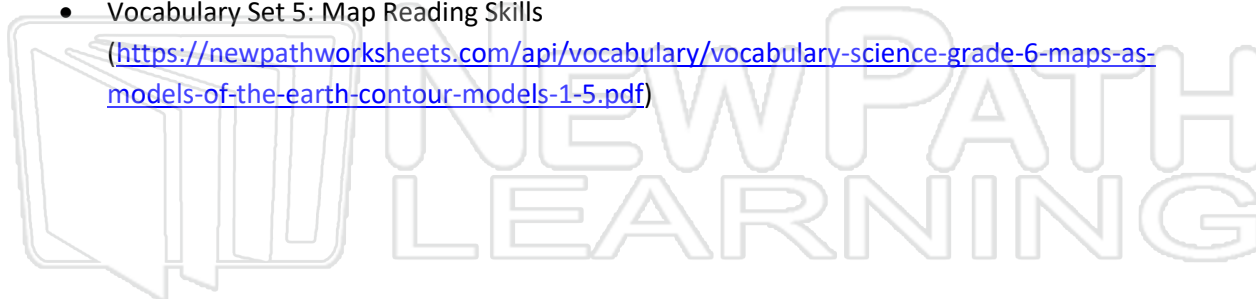
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<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-maps-as-models-of-the-earth-contour-models-1-2.pdf>

- Vocabulary Set 1: Key Terms and Definitions
(<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-maps-as-models-of-the-earth-contour-models-1-1.pdf>)
- Vocabulary Set 2: Additional Map Terms
(<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-maps-as-models-of-the-earth-contour-models-1-2.pdf>)



- Vocabulary Set 3: Earth Science Terminology
(<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-maps-as-models-of-the-earth-contour-models-1-3.pdf>)
- Vocabulary Set 4: Geographic Features
(<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-maps-as-models-of-the-earth-contour-models-1-4.pdf>)
- Vocabulary Set 5: Map Reading Skills
(<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-maps-as-models-of-the-earth-contour-models-1-5.pdf>)



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MAPS AS MODELS OF THE EARTH

Overview

Geologists use a variety of different types of maps to model or depict the three-dimensional Earth on a two-dimensional surface. Each type of map serves a purpose because each type has its special strengths. All maps, however, also have their weaknesses, so geologists use the map that is best for the application at hand.

Topography and Topographic Maps

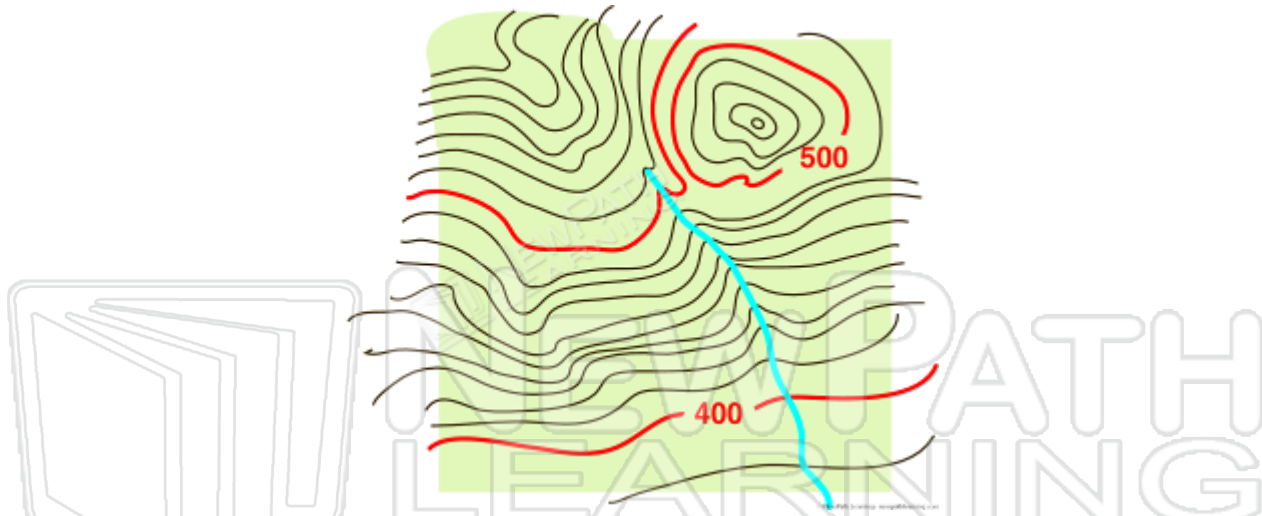


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upstream when they intersect rivers and streams. Contours form concentric circles when they indicate individual hills (or depressions).





For a topographic map to be fully useful, one must know the difference in elevation between two consecutive contour lines. This is called the contour interval. **The larger the contour interval, the more dramatic the changes in elevation between contour lines.**



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features of the Earth onto a cylinder of paper.





- **Conic Projections** are created when the surface of the Earth is projected onto a piece of paper folded into a cone shape.



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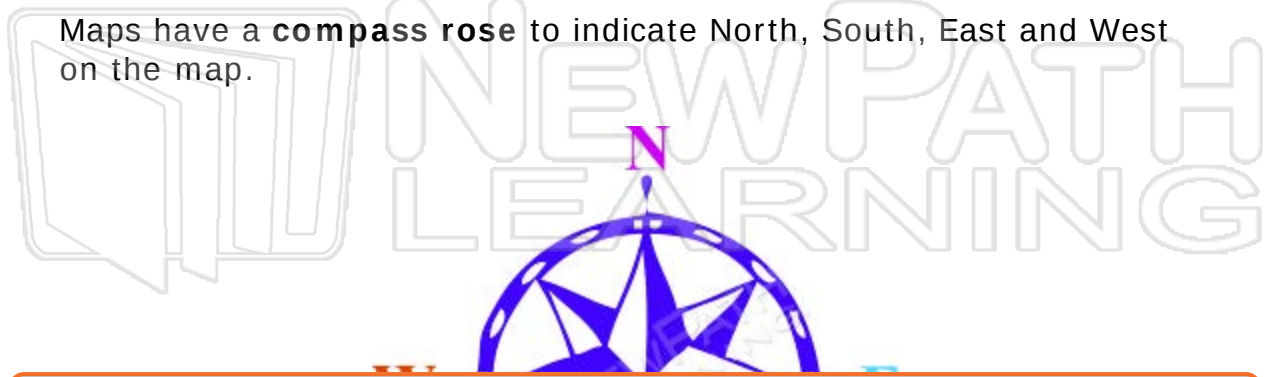


Azimuth Projection

Symbols Tell the Story

In order for any type of map to be of value, one must understand the symbols and purposes of the different maps. Every map has a scale to indicate the relationship between distance on the map and distance on the Earth's surface.

Maps have a **compass rose** to indicate North, South, East and West on the map.

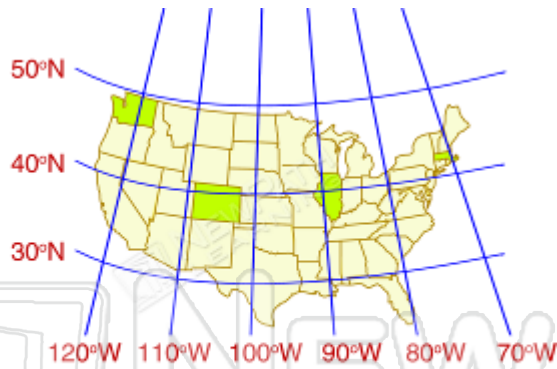


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which direction points North?





International Conventions Help Share Knowledge

There are basic conventions that all scientists and cultures agree to in order to make maps useful worldwide. Defining the location of any specific town, city, or location on the Earth is done using degrees of longitude and latitude.



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Lesson Checkpoint:

Name one universal convention of measurement on a globe which is used to make maps useful throughout the world?



Name _____ Class _____ Date _____

1

Geologists regularly use **topographic maps** in their work. Topographic maps show the **topography** of the mapped area. **Topography** refers to _____.

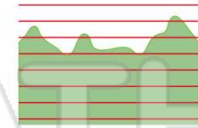
- A only structures constructed by humans
- B only natural features on the earth's surface
- C only mountains and mountain lakes
- D all natural and constructed features on the earth's surface



2

In the picture below, you can see the difference in elevation for a series of mountains and valleys. The **differences in altitude, landforms**, and the **overall form of the land** is called _____.

- A a map projection
- B a contour interval
- C topography
- D strike and dip



3

Geologists use a number of different types of maps to do their work. Below is a map with a number of **lines** that indicate **different elevations**. This type of map is called a _____.

- A road map
- B topographic map



4

By definition, topography is the difference in the altitude between the high and low parts of a land surface and overall form of the land. Below is a picture of Mt. St. Helens, a volcanic mountain in Washington State. The **difference in altitude** from the base of the volcano to its top is called _____.

- A relief



5



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9

Consider the topography in the top left corner of this picture. Notice that the contour lines are far away from each other. How would you describe the topography represented in the top left corner of this map?

- A relatively flat
- B hilly
- C sloping
- D very steep



10

Contour lines connect points of **equal elevation** on a map.

As a result, contour lines _____.

- A always form circles
- B are always close together
- C intersect occasionally
- D never intersect





Name _____ Class _____ Date _____

1

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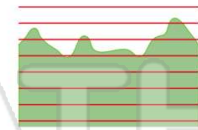


D

2

In the picture below, you can see the difference in elevation for a series of mountains and valleys. The **differences in altitude, landforms**, and the **overall form of the land** is called _____.

- A a map projection
- B a contour interval
- C topography
- D strike and dip



C

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B

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- A relief



A

5



B

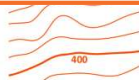
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D

- B 10 feet
- C 50 feet
- D 100 feet



- D very steep



9

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A

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D

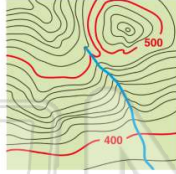


Name _____ Class _____ Date _____

1

When contour lines cross a **stream** or a **valley**, they _____.

- A** intersect each other
- B** are V-shaped, with the V pointing upstream
- C** are V-shaped, with the V pointing downstream
- D** are circular in shape

**2**

A map is a flat, two-dimensional picture of the spherical earth. When the oceans and landmasses are projected onto a cylinder of paper, a **Mercator projection** map like this is created. When mapped this way, landmasses are accurate near the equator, but distorted near the poles.

- A** true
- B** false

**3**

A **conic projection** map is created when a portion of the earth's surface is projected onto a cone of paper which is then unrolled into a flat piece of paper. The open end of the cone touches only **one line of latitude** and all lines of longitude. What can you conclude about the accuracy of these maps?

- A** Landmasses are very distorted.
- B** Distortion of the landmasses is

**4**

An **azimuthal projection** is a map that is created when the surface of the globe is projected onto a **flat plane**. The plane touches the globe at a **single point** (usually the North or South Pole). These maps are most accurate **near the point of contact** and become more distorted further away from the point of contact.

True or false?

**5**

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- C** cardinal directions
- D** index contours



- C** Seattle, Washington
- D** Denver, Colorado

**9**

The imaginary lines on the globe that run through the North Pole and South Pole are called **lines of longitude**. They are also known by the name _____.

- A** contours
- B** meridians
- C** equators
- D** projections

**10**

The **scale** of a map shows the relationship of distances on the map with those on the earth's surface. For example, one inch on the map might equal one mile on the earth's surface. Each map has its own scale depending on the purpose and size of the map. Using this map and scale, what is the distance between points A and B?

- A** 1 mile
- B** 10 miles
- C** 15 miles
- D** 20 miles



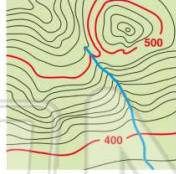


Name _____ Class _____ Date _____

1

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- A** intersect each other
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- D** are circular in shape

**B****2**

A map is a flat, two-dimensional picture of the spherical earth. When the oceans and landmasses are projected onto a cylinder of paper, a **Mercator projection** map like this is created. When mapped this way, landmasses are accurate near the equator, but distorted near the poles.

- A** true
- B** false

**A****3**

A **conic projection** map is created when a portion of the earth's surface is projected onto a cone of paper which is then unrolled into a flat piece of paper. The open end of the cone touches only **one line of latitude** and all lines of longitude. What can you conclude about the accuracy of these maps?

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**B****4**

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True or false?

**A****5****A**

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D

- C** cardinal directions
- D** index contours

**9**

The imaginary lines on the globe that run through the North Pole and South Pole are called **lines of longitude**. They are also known by the name _____.

- A** contours
- B** meridians
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- D** projections

**B****10**

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- A** 1 mile
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- C** 15 miles
- D** 20 miles

**B**



Name _____ Class _____ Date _____

1

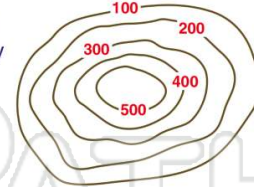
Every type of map has to have which of the following in order to be **valuable** and **useful**?

- A a legend
- B a date and a compass rose
- C a title and scale
- D all of the above

**2**

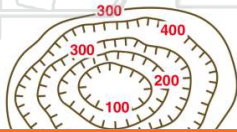
What would you call the **landform** indicated by the contour lines in this picture?

- A a mountain
- B a river valley
- C a hill
- D a crater

**3**

What would you call the **landform** indicated by the contour lines in this picture?

- A a mountain
- B a river valley
- C a hill
- D a crater

**4**

What **feature** is represented in this topographic map?

- A a mountain
- B a river valley
- C a depression
- D a steep cliff

**5**

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9

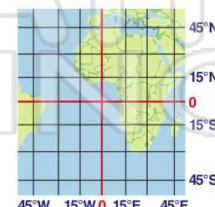
0° **latitude** is also known as _____.

- A the prime meridian
- B the equator
- C the 180 degree meridian
- D true north

**10**

The location identified by the coordinates of **40° S, 45° W** is found in _____.

- A the Northern Hemisphere
- B the Southern Hemisphere
- C Europe
- D Africa





Name _____ Class _____ Date _____

1

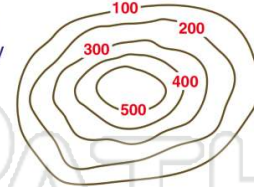
Every type of map has to have which of the following in order to be **valuable** and **useful**?

- A a legend
- B a date and a compass rose
- C a title and scale
- D all of the above

**D****2**

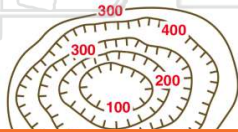
What would you call the **landform** indicated by the contour lines in this picture?

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- C a hill
- D a crater

**C****3**

What would you call the **landform** indicated by the contour lines in this picture?

- A a mountain
- B a river valley
- C a hill
- D a crater

**D****4**

What **feature** is represented in this topographic map?

- A a mountain
- B a river valley
- C a depression
- D a steep cliff

**B****5****C**

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D**9**

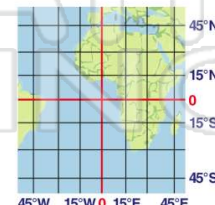
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- A the prime meridian
- B the equator
- C the 180 degree meridian
- D true north

**B****10**

The location identified by the coordinates of **40° S, 45° W** is found in _____.

- A the Northern Hemisphere
- B the Southern Hemisphere
- C Europe
- D Africa

**B**



Name _____ Class _____ Date _____

Match each of the following terms to its definition:

Azimuthal projection

Acid rain

Chemical weathering

Alluvial fan

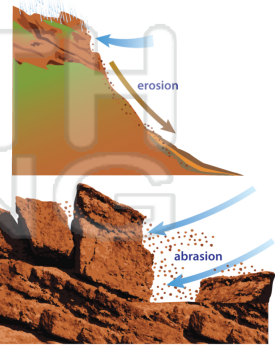
Compass rose

Abrasion

Erosion

Alpine glacier

1. _____ - a process by which weathered rock and soil is transported to a new location; the wearing away of the Earth's surface by rain, wind, snow and ice



2. _____ - a type of mechanical erosion that occurs when one rock grinds against another

3. _____ causes



4. _____ mount

5. _____ altitud

6. _____ of the single point (usually the North or South Pole)

7. _____ reactions - the breaking down of rock by chemical



8. _____ - a symbol on a map showing the four cardinal directions (North, South, East and West)





Name _____ Class _____ Date _____

Match each of the following terms to its definition:

Azimuthal projection

Acid rain

Chemical weathering

Alluvial fan

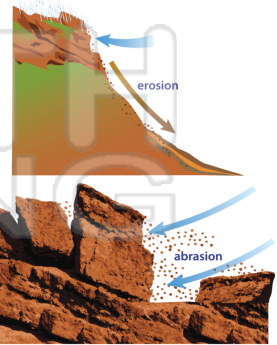
Compass rose

Abrasion

Erosion

Alpine glacier

1. erosion - a process by which weathered rock and soil is transported to a new location; the wearing away of the Earth's surface by rain, wind, snow and ice



2. abrasion - a type of mechanical erosion that occurs when one rock grinds against another

**3. acid
weathering**

**4. alluvial
fan or hill**

**5. alpine
mountain**

**6. azimuthal
projection** - a map projection that shows the whole world from a single point (usually the North or South Pole)

7. chemical weathering - the breaking down of rock by chemical reactions

8. compass rose - a symbol on a map showing the four cardinal directions (North, South, East and West)



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