

Name:

Key

Measuring Earth NOTES

OBJECTIVES

Correctly define: isolines, gradient, topographic map, contour interval, hachured lines, profile, latitude, longitude, hydrosphere, lithosphere, atmosphere, elevation, model

EARTH'S SPHERES

Identify the three spheres of the Earth.

TOPOGRAPHIC MAPS

Calculate the contour interval on an unmarked map.

Determine the elevation of every point on a topographic map.

Determine the direction of flow of a river or stream on a topographic map.

Accurately calculate the distance between two locations in miles or kilometers.

Draw a profile between two points on a topographic map.

GRADIENT

Determine the gradient between two points on a topographic map.

Calculate the temperature gradient between two points on an isotherm map.

LATITUDE AND LONGITUDE

Identify the means by which latitude and longitude were created and the science upon which they are based.

Calculate the latitude and longitude of any point on the Earth's surface.

Determine the latitude and longitude of all major cities in NY State based on the map in the Earth Science Reference Tables.

Determine the latitude and longitude of all continents based on the map in the Earth Science Reference Tables.

Determine the altitude of Polaris for any location in the Northern Hemisphere.

Vocabulary

Atmosphere:

Contour Interval:

Contour Line:

Elevation:

Gradient:

Hachured Lines:

Hydrosphere:

Latitude:

Lithosphere:

Longitude:

Model:

Profile:

Key Concepts & Questions

Earth's spheres

Information regarding Earth's atmosphere can be found on page 14 of the ESRTs

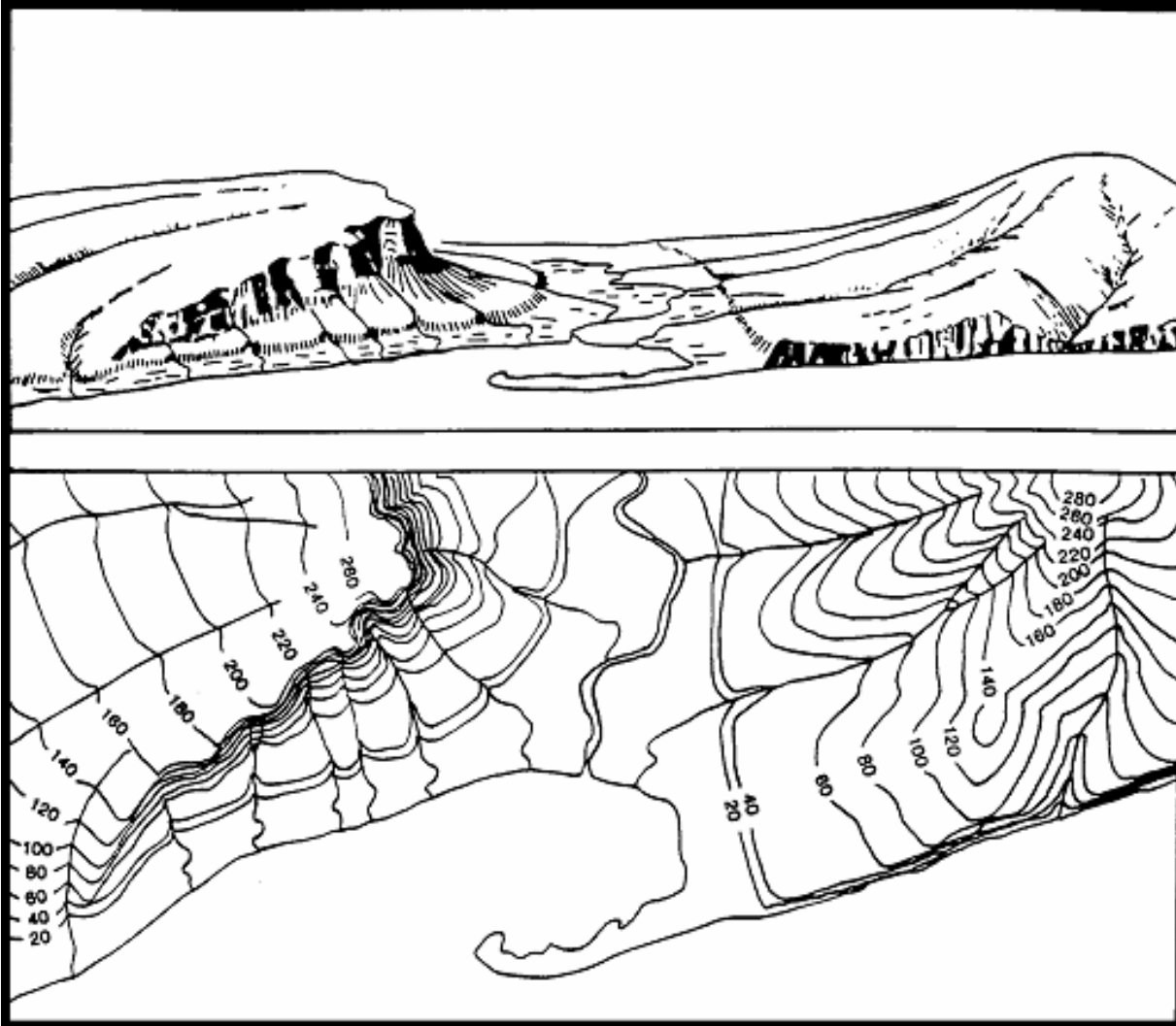
Information regarding Earth's interior can be found on page 10 of the ESRTs

Information regarding Earth's hydrosphere can be found on page 11 of the ESRTs

QUESTIONS:

1. At a depth of 2500 kilometers, what is the inferred temperature and pressure?
 - a. temperature: 4600°C
 - b. pressure: 1.1 million atmospheres
2. By volume, what element makes up the greatest percentage of the Earth's lithosphere? oxygen
3. At a height of 50 miles above the Earth's surface, what is the temperature? -90°C
4. At a height of 50 kilometers above the Earth's surface, what is the temperature? 0°C
5. How many kilometers above the Earth's surface is the interface of the troposphere and stratosphere? 12 km

Topographic Maps



What is the purpose of a topographic map? What does it show?

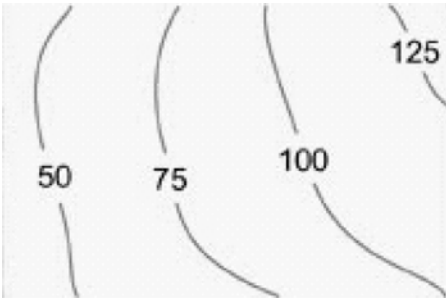
to show the elevation of every point on the map

Who uses topographic maps?

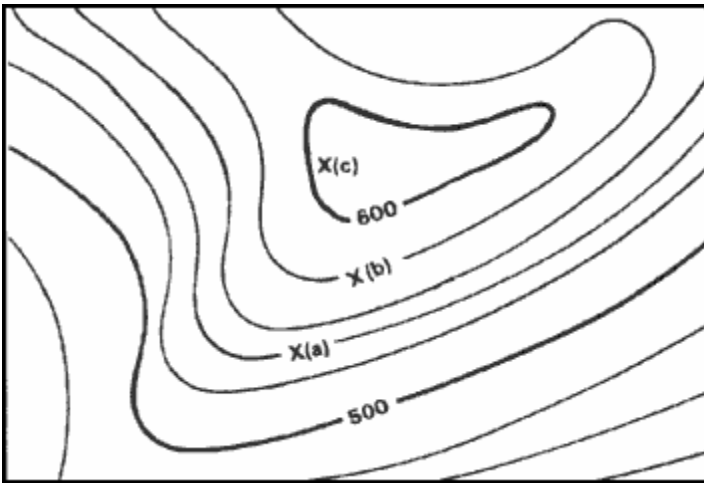
the military, miners, police, farmers

When might someone use a topographic map?

planning a hiking trip, building homes, landscaping, building roads



What is the contour interval of this map? _____ **25**

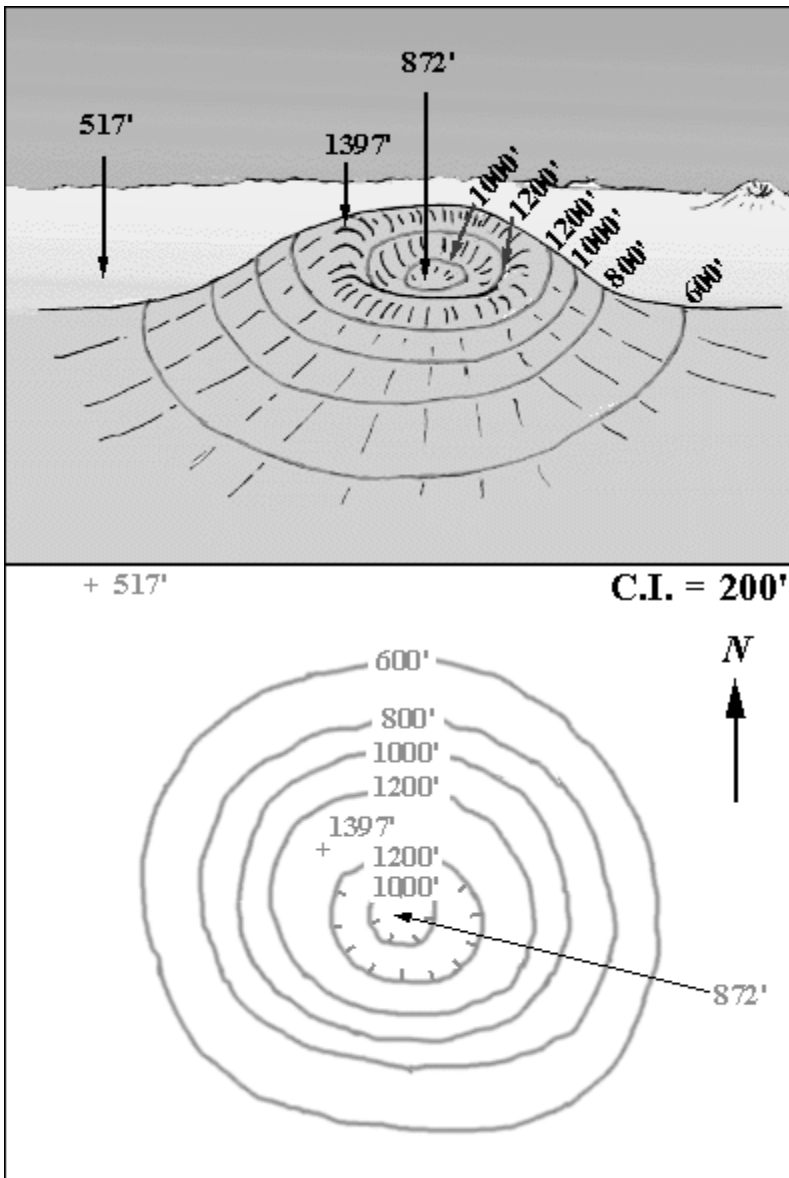


What is the contour interval on this map? _____ **20**

What is the elevation of points (a) and (b)? a: _____ **540** b. _____ **580**

What is the maximum possible elevation of (c)? _____ **619**

Topographic Maps—Hachured Lines



What do hachured lines show?

areas of depression (decreasing elevation)

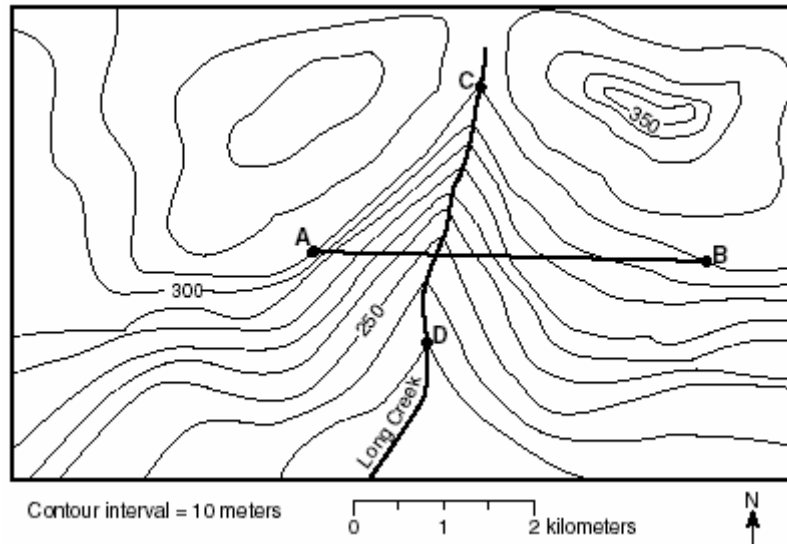
What are the rules concerning hachured lines?

the first hachured line has the same elevation as the previous contour line

Topographic Maps—Stream Flow

What you must know:

When a contour line crosses a river, stream or creek, the contour line forms a "V". The "V" always points upstream.



If North is at the top of the page, what direction is Long Creek flowing? south

Can a river flow north? YES!

Name two ways that you can determine which way a river flows on a topographic map.

the contour lines always point upstream, and rivers always flow downhill

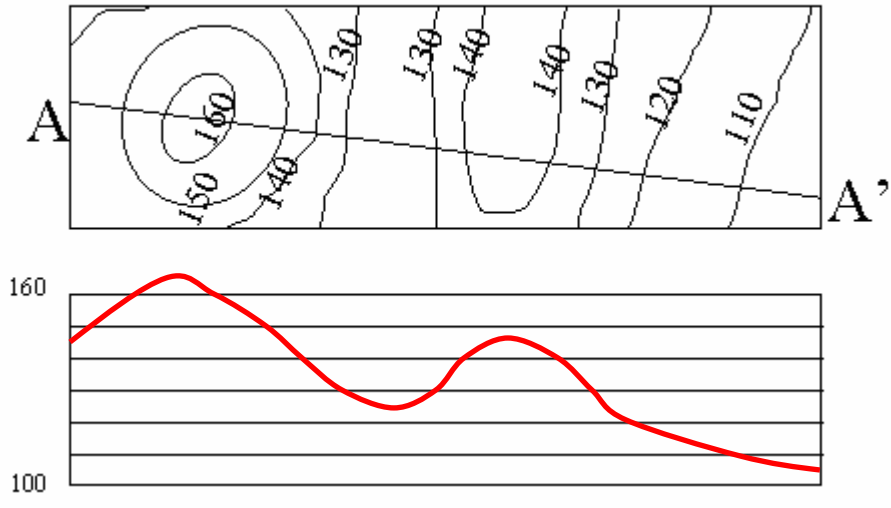
Topographic Maps—Profiles

What are the steps to draw a topographic profile?

1. place a piece of paper between the points
2. mark where every contour line touches the edge of the paper
3. determine the elevation of each mark
4. place the paper on the graph and mark the elevation of each contour line

Using the map and chart below, construct a topographic map profile.

Topographic Profile



Please match the contour map on the left with the profile on the right.

1 A

2 B

3 C

4 D

5 E

6 F

Topographic Maps—Distance Between Points

What is the distance, in kilometers, from Kingston to Oswego?

266 km (page 3 of ESRT)

What is the distance, in miles, from Plattsburgh to Jamestown?

342 mi (page 3 of ESRT)

$$\text{Gradient} = \frac{\text{change in elevation}}{\text{distance}}$$

The elevation of Albany is 282 feet. The elevation at Binghamton is 1634 feet. Calculate the gradient to the *nearest tenth of a ft/mi*. Show all work.

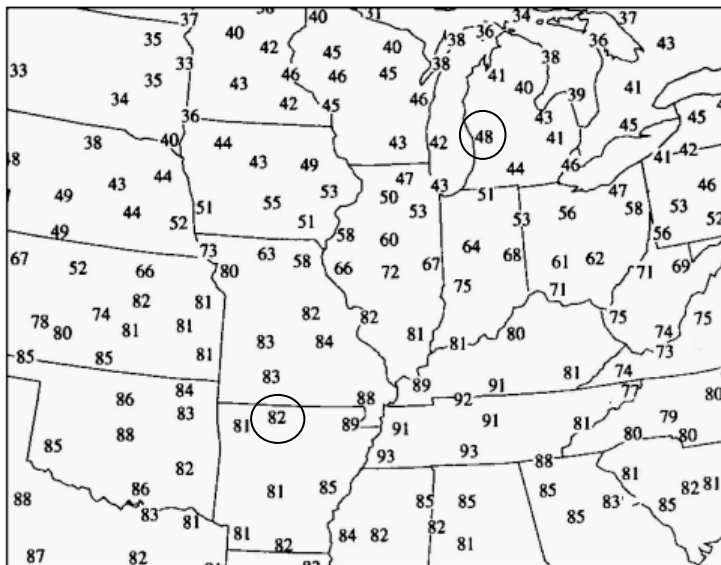
$$\text{gradient} = \frac{\text{change in elevation}}{\text{distance}} = \frac{1634 - 282}{115 \text{ miles}} = 11.8 \text{ ft/mi}$$

The elevation of Watertown is 99m. The elevation at Oswego is 144m. Calculate the gradient to the *nearest tenth of a m/km*. Show all work.

$$\text{gradient} = \frac{\text{change in elevation}}{\text{distance}} = \frac{144 - 99}{75 \text{ km}} = 0.6 \text{ m/km}$$

Temperature Gradients

Surface Temperature



If the distance between the two circled cities is 425 km, calculate the gradient to the *nearest hundredth*. Show all work including the appropriate units.

$$\text{gradient} = \frac{\text{change in temperature}}{\text{distance}} = \frac{82 - 48}{425 \text{ km}} = 0.08 \text{ }^\circ\text{F/km}$$

Latitude & Longitude

How are latitude & longitude measured?

Latitude is measured north and south from the Equator

Longitude is measured East and West from the Prime Meridian

On the coordinate system below, plot the following sets of coordinates:

A: {25°N, 100°W}

B: {30°S, 100°E}

C: {80°S, 65°W}

D: {45°N, 105°E}

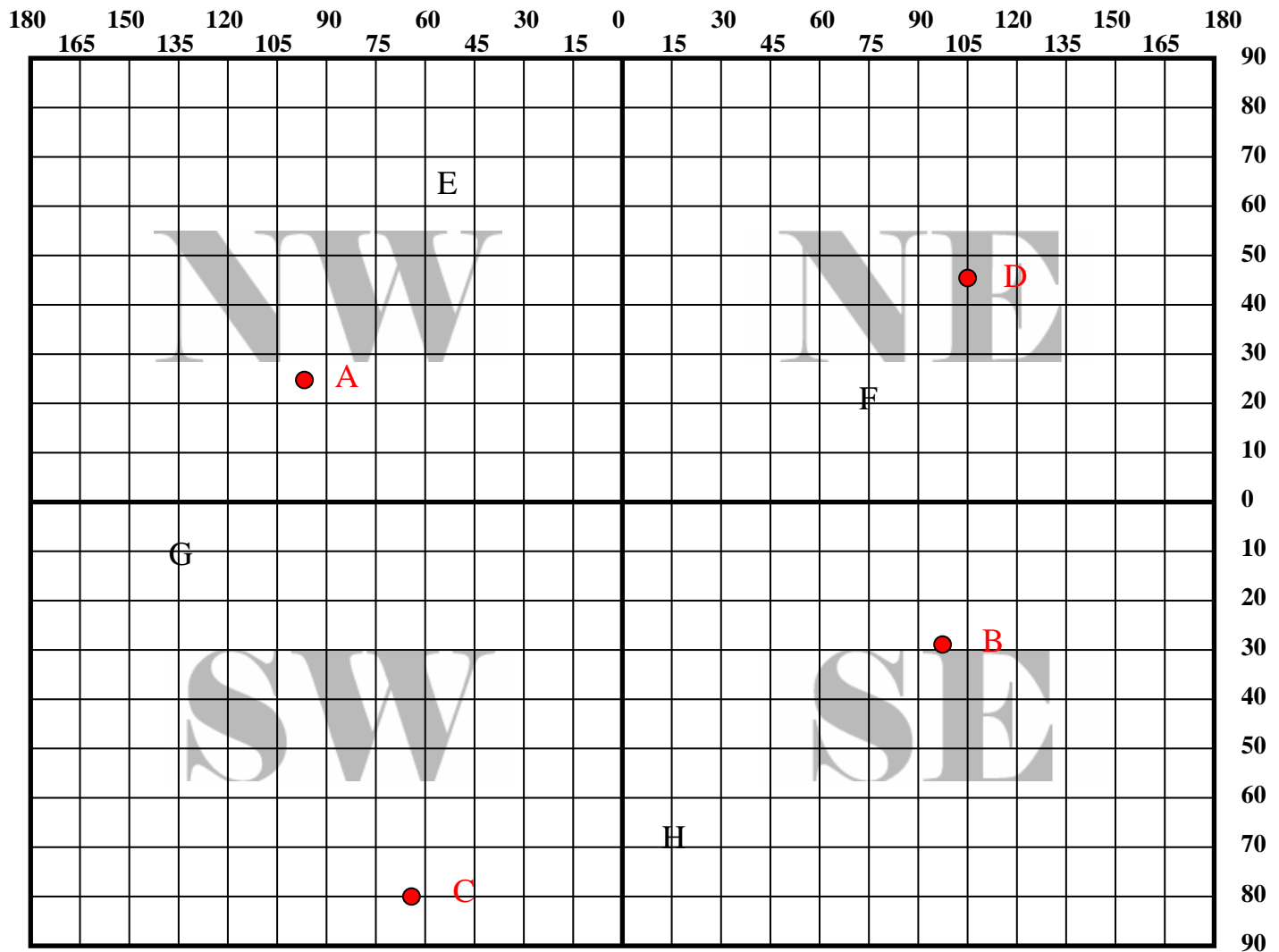
State the coordinates for each of the letters in the figure above:

E: 65°N, 50°W

F: 25°N, 75°E

G: 10°S, 135°W

H: 70°S, 15°E



All locations in the United States have a (North, South) latitude and (East, West) longitude.

Latitude:

Based on the ALTITUDE of POLARIS

LATITUDE = ALTITUDE

Polaris can only be seen in the NORTHERN Hemisphere!

For each location below, determine the altitude of Polaris:

Location	Altitude of Polaris
25°N, 100°W	25°
30°S, 100°E	can't see
80°S, 65°W	can't see
45°N, 105°E	45°

Longitude:

Based on Earth's rotation

Each hour the Earth rotates 15°

How many time zones are there? 24 Time zones are spaced 15° apart.

People on the same line of longitude have the same local time

Example: Two students record a difference in local time of two hours. How many degrees of longitude apart are they?

30°

2 hours x 15°/hr