Topic III

Field Maps and Isolines

Date _____



Date _

Topic: Field Maps and Isolines Aim:

Rules:

- 1. Isolines must be drawn according to the interval.
- 2. Isolines cannot intersect.
- 3. An isoline must run to the edge of the map or connect back to itself.

1. Draw isolines on the map below using an interval of 10.

			10			10		20				20
0			10		17	19		25		30		30
	8					20	22				37	
				12				26	33			
4		10			20							42
0	10		15	20	21	23	25	30		35		41

2. Draw isolines on the map below using an interval of 2.

32	33			34		36	
35		35		36	39	40	42
	36		37				
38		39		40	43		42

3. Draw isolines on the map below using an interval of 20.



DRAWING ISOLINES – PRACTICE 1 1

94		100			100	
100		104	11	2		91
100			122	2		100
1	10	120			119	100
100			137			
	109		125	120	110	
98			110		107	100
92	100				100	99

Using a contour interval of 10 meters, construct contour lines to define this landscape. Start with the 100 meter line and work your way up.

DRAWING ISOLINES – PRACTICE 2 2

Draw an isomap using an interval of 10



Draw an isomap using an interval of 5



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HILL OR MOUNTAIN

Cutoff Point: If < 500 meters – hill; if \ge 500 – mountain



DEPRESSION (HOLE)

Hachure marks (tick marks on contour lines) indicate a decrease in elevation.

"Rule of Hachures" - the first line of hachures has the same elevation as the last contour line drawn.



Field Maps and Isolines

- 1. The contour interval is
 - (1) the distance between two contour lines
 - (2) a line joining points at the same elevation above sea level
 - (3) the difference in elevation between two consecutive contour lines
 - (4) the spacing between contour lines on a map.
- 2. The United States weather map below shows weather data plotted for a December morning.

The isolines shown on the map most likely are

- (1) contour lines
- (2) latitude lines
- (3) isobars
- (4) isotherms



- 3. The zero-foot contour line on a map always represents
 - (1) mean sea level
 - (2) the bottom of the deepest ocean
 - (3) the lowest elevation
 - (4) the average elevation
- 4. What is the elevation of the highest contour <u>line</u> shown on the map to the right?
 - (1) 10,000 feet
 - (2) 10,688 feet
 - (3) 10,700 feet
 - (4) 10,788 feet



- 5. The diagram to the right is a contour map. Between which two points is the slope of the hill steepest?
 - (1) A and B (3) C and D
 - (2) B and C (4) A and D



Base your answers to questions 6 through 8 on the topographic map shown below.



6. What is the most likely elevation of point A?

(1)	1,250	(3)) 1,75	0
(2)	1,650	(4)) 1,85	0

7. What section of the map shows the steepest gradient?

(1)	southeast	(3)	southwest
(2)	northeast	(4)	northwest

- 8. What is the approximate vertical (north-south) distance of the map?
 - (1) 2 kilometers (3) 3.5 kilometers
 - (2) 2.5 kilometers

(4) 4 kilometers

Base your answers to questions 9 through 12 on the topographic map below.

- 9. Which location most likely has an elevation of 45 meters?
 - (1) A (3) C
 - (2) B (4) D

10. Between which two locations does the steepest gradient occur?

- (1) A and B
 (3) C and D

 (2) B and C
 (4) A and C
- 11. What is the approximate distance between points B and D?
 - (1) 2 km (3) 3 km
 - (2) 2.5 km (4) 3.5 km
- 12. To go downhill you would walk from
 - (1) point B to point C
 - (2) point C to point D
 - (3) point A to point C
 - (4) point C to point A



 The map to the right shows the average number of days with thunderstorms in a part of the United States.

Approximately how many days per year do thunderstorms occur in Albany, New York?

- (1) 20 (3) 28
- (2) 35 (4) 40



- 14. A contour map indicates that a stream is flowing across the landscape. If the stream has a constant volume, where on the map would the stream most likely have the highest velocity (speed)?
 - (1) as the stream moves parallel to two contour lines
 - (2) as the stream moves through a large region that has no contour lines
 - (3) as the stream moves across several closely spaced contour lines
 - (4) As the stream moves across several widely spaced contour lines
- 15. The topographic map shows part of a stream.

In which general direction is the stream flowing?

- (1) northeast
- (2) northwest
- (3) southeast
- (4) southwest



16. Point *X* is a location on the topographic map below. Elevations are measured in meters.



 What is a possible elevation, in meters, of point X?

 (1) 55
 (3) 68

 (2) 57
 (4) 70

Base your answers to questions 17-20 on your knowledge of earth science and the diagram below. The diagram represents the isolines of an elevation field (topographic map) for a region. The dashed lines represent the streams flowing in this region. [Note: On this map the contour interval is measured in feet and the scale is measured in kilometers.]



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Date _____

Topic:Field Maps and IsolinesAim:

Recall	Notes
1. What is the definition of gradient?	Gradient is the change in field value in a given distance.
	On a contour map: gradient = slope
	gentle or gradual slopes – land is relatively flat
2. What is the gradient formula?	Gradient = <u>Change in Field Value</u> — difference in elevation between 2 given point Distance — distance measured with map scale

SAMPLE PROBLEM #1

A road in New York State begins at a location 200 meters above sea level and runs down into a valley that is 40 meters above sea level. The length of the road is 20 kilometers. What is the gradient of the road? (Show all work.)

SAMPLE PROBLEM #2

What is the gradient between points A and B? (Show all work.)



Field Maps and Calculating Gradient

Base yours answers to questions 1 and 2 on the diagram to the right.

- 1 On which side of the hill does the land have the steepest slope?
 - north

1

east

2 south

- 3 4 west



2. What is the approximate gradient of the hill between points X and Y? [Refer to the Earth Science Reference Tables]



Base your answers to questions 3 and 4 on the map below.



- 3. In which direction does the Jennifer Brook flow?
 - 3 southeast 1 southwest
 - 2 northwest 4 northeast
- 4. What is the approximate gradient, in meters per kilometer, of Jennifer Brook between points A and B?



Α

• B

48-

2

3

1

Scale (km)

5. What is the approximate temperature gradient between points A and B?



6. A stream in New York State begins at an elevation of 400 meters above sea level and empties into a lake at an elevation of 200 meters above sea level. The stream is 50 kilometers long. What is the gradient of the stream?

Write Formula, Substitute Data, Calculate Gradient		

7. A stream begins at an elevation of 2,000 feet and ends in a lake at an elevation of 400 feet. The lake is 320 miles from the stream's source. What is the average gradient of the stream?



Date

Topic: Field Maps and Isolines Aim: How is a topographic profile constructed?

Sometimes you may wish to see what a contour map landscape looks like from the side view. To do so, you must construct a contour profile (topographic profile). By following the steps listed below, you will be able to draw a profile from any map, and thus have a greater understanding on the landscape you are studying.



- 1. Construct a grid with a baseline the same distance as the profile you wish to draw. Label the baseline with the correct letters (in this case "D" and "E".)
- 2. Label the y-axis (elevation axis) of the grid by the contour interval of the map.

Label the grid axes: Y-axis: elevation (feet or meters) X-axis: distance (miles or kilometers)

- 3. Find all places that a contour line intersects the profile line on the map and carefully bring that point straight down to the appropriate elevation on the grid.
- 4. Connect the dots with a smooth line.









Contour Profile Practice Worksheet



Draw a contour profile that shows the landscape between points L and M.



Contour Profile Practice Worksheet

Estimating Topographic Profiles Practice (I call this ... "drawing a profile without really drawing a profile")

1. Which picture is the best representation of the profile from point A to point B?





2. Which graph best represents the shape of the land surface from A to B?



Topic III Practice Exam: Field Maps and Isolines

<u>Directions:</u> Base your answers to **questions 1-4** on your knowledge of Earth Science and on the diagram below. This diagramshows the elevation, in meters, of several points within a geographical region as well as points R, S, T, U, X, and Y whose elevations are not recorded.



1. Which diagram best represents the isolines pattern of the elevation field?



- 2. The point with the highest elevation would most probably be located nearest point

 (1) R
 (3) U
 (2) T
 (4) Y
- 3. The elevation of point S is most likely
 (1) 88 meters
 (2) 55 meters
 (3) 47 meters
 (4) 39 meters
- 4. The steepest average gradient occurs between points

(1) R and S	(3) R and U
(2) R and T	(4) T and U

<u>Directions:</u> Base your answers to **questions 5-7** on your knowledge of earth science and on the diagram to the right. The diagram represents a temperature field for a vertical cross section of a room, from ceiling to floor.



6. Which graph best represents the variations in the room temperature from the floor to the ceiling?



7. Which graph best represents the temperature change along the isotherm from point C to point U?



- 8. Which statement is true about an isoline on an air temperature field map?
 - (1) It represents an interface between high and low barometric pressures.
 - (2) It indicates the direction of maximum insolation.
 - (3) It increases in magnitude as it bends southward.
 - (4) It connects points of equal air temperature

<u>Directions:</u> Base your answers to **questions 9-12** on the information provided by the diagram. The diagram represents a sketch drawn in a notebook by an Earth Science student. Lines A, B, C, D, E, and F are isolines. The points along the isolines indicate the only locations where actual measurements were made. Points W, X, Y, and Z are reference locations in the field diagram.



- (2) 3.5 km (4) 4.5 km
- 11. Between which two points is the greatest gradient?
 - (1) X-W (3) Y-W
 - (2) X-Y (4) Z-W

12. The isolines of this field diagram are for snow depth in centimeters. In which part of the diagram is the snow deepest?

(1) southeast corner(2) northeast corner

- (3) southwest corner(4) northwest corner
- The diagram below represents a temperature field in degrees Celsius. What is the approximate temperature field gradient between points X and Y? [Refer to the Earth Science Reference Tables.]
 - (1) 0.5 °C/m
 - (2) 2 °C/m
 - (3) 3 °C/m
 - (4) 6 °C/m



14. On which map of temperatures across the United States is the 60°F isotherm drawn correctly?



- 15. A stream in New York State begins at a location 350 meters above sea level and flows into a swamp 225 meters above sea level. The length of the stream is 25 kilometers. What is the gradient of the stream?
 (1) 5 m/km
 (2) 9 m/km
 (3) 12 m/km
 (4) 15 m/km
- 16. In the diagram the thermometer held 2 meters above the floor shows a temperature of 30°C. The thermometer on the floor shows a temperature of 24°C.

What is the temperature gradient between the two thermometers?

(1) 6 °C/m	(3) 3 °C/m
(2) 2 °C/m	(4) 4 ∘C/m



- 17. What is the elevation of point A on the map?
 - (1) 7000 ft
 - (2) 7100 ft
 - (3) 7200 ft
 - (4) 7300 ft



- 18. If no elevation values were given, which general rule could be used to establish the direction a river is flowing?
 - (1) Rivers shown on maps always flow southward.
 - (2) Rivers always flow toward large bodies of water.
 - (3) Contour lines bend upstream when crossing a river.
 - (4) A large body of water is generally the source of water for a river.





Base your answers to questions 19 through 22 on the topographic map below. Elevations are in feet.

19. Toward which direction does the Green River flow?(1) northeast(2) northwest

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(3) southeast(4) southwest
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- 20. What is the gradient along the straight line between points A and B?
 (1) 10 ft/mi
 (2) 20 ft/mi
 (3) 25 ft/mi
 (4) 35 ft/mi
- 21. Which graph best represents the profile along line AB?



- 22. What evidence can be used to determine that the land surface in the northeast corner of the map is relatively flat?
 - (1) a rapidly flowing river
 - (2) the dark contour line labeled 300

(3) a large region covered by water(4) the absence of many contour lines