Gradient Practice   Name __Answer key__
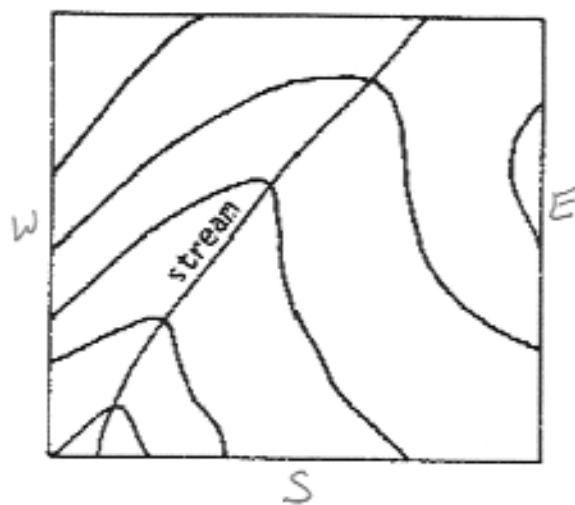
1. The diagram below is a contoured map.

North

In which geographic direction does the stream flow? How do you know?

SW the contour lines curve to the north, pointing at the source of the stream

The gradient is defined as the vertical change in elevation (in feet) per horizontal (map) distance (in miles). Calculate the stream's gradient on this map, if the stream is 2 miles long, and the contour interval is 10 feet.

$$\frac{40 \text{ ft}}{2 \text{ miles}} = 20 \text{ ft/mile}$$

2. You are climbing a mountain that starts at sea level and reaches an elevation of 5000m. The distance traveled up the side of the mountain is 2km. What is the gradient of the mountain?

$$\frac{5000m}{2 \text{ km}} = 2500 \text{ m/km}$$

3. Johnny is riding his favorite red tricycle and is getting ready to go down a hill. His mommy warned him that his tricycle will fall apart if he goes down a hill with a slope greater than 100ft/mi. Johnny ignores his mommy and takes on the hill, which goes from 300ft all the way down to 35ft. The distance he travels is 0.2 miles. Calculate the gradient of the hill and determine if Johnny's tricycle will fall apart.

$$\begin{array}{r} 300 \\ -35 \\ \hline 265 \end{array}$$ $$\frac{265 \text{ ft}}{0.2 \text{ miles}} = 1,325 \text{ ft/mile}$$

Johnny's bike __will__ fall apart.
Johnny will probably fall apart too.

5. Which hill could be 590 feet high?
    A. A
    B. B
    C. C
    D. D

6. Which side of hill C is the steepest?
    A.   northeast
    B.   southeast
    C.   northwest
    D.   southwest

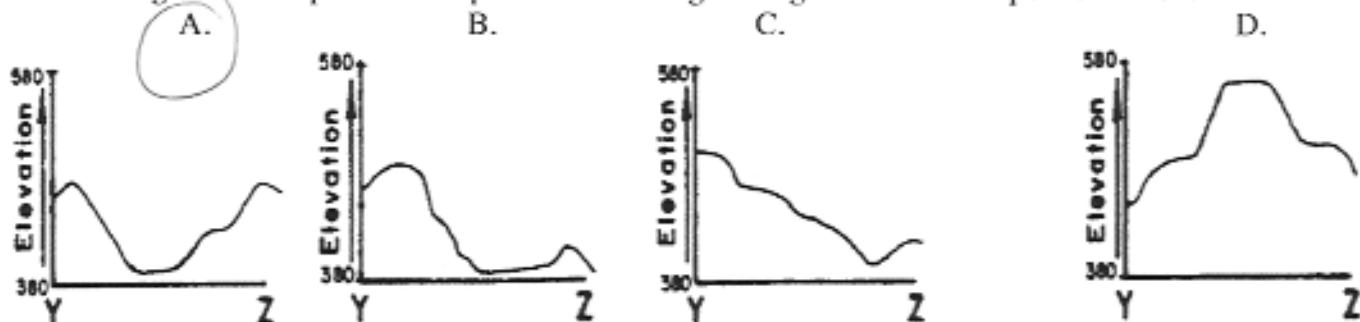7. The straight line distance between the tops of hills A and D is closest to
    A.   1.1 km
    B.   2.0 km
    C.   3.2 km
    D.   4.2 km

8. A stream which flows away from the lake is located between
    A.   hills A and B
    B.   hills B and C
    C.   hills C and D
    D.   hills D and A

9. Which diagram best represents the profile view along a straight line between points Y and Z?
    A.   B.   C.   D.

10. Which path is steeper, from the lake to the top of hill A or from the lake to hill C?   **C**

Prove it by calculating the gradient from the lake to hill A and from the lake to hill C.

$$\boxed{A} \quad \frac{180 \text{ ft}}{1.5 \text{ km}} = 120 \frac{\text{ft}}{\text{km}}$$

$$\begin{array}{r} 560 \\ -380 \\ \hline 0 \end{array}$$

$$\boxed{B}\boxed{C} \quad \frac{220 \text{ ft}}{2.25 \text{ km}} = \boxed{98 \frac{\text{ft}}{\text{km}}}$$

$$\begin{array}{r} 600 \\ -380 \\ \hline 220 \end{array}$$

4. Fausto is riding his bike and comes to the bottom of a hill. He has two roads to choose from to get to the top, so he pulls out his topographic map to determine which road will be easier to ride up. The hill has an elevation of 500m. **Road A** is 5km long, while **Road B** is 50km long. Calculate the gradient of BOTH roads and determine which road will be easier to ride up.

A $\dfrac{500m}{5\,km} = 100\,m/Km$ B $\dfrac{500m}{50\,km} = 10\,m/km$

Road B will be easier to ride up.

DIRECTIONS: *Base your answers to questions 5 through 9 on your knowledge of earth science and the diagram below. The diagram represents 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.]*

Scale (kilometers)
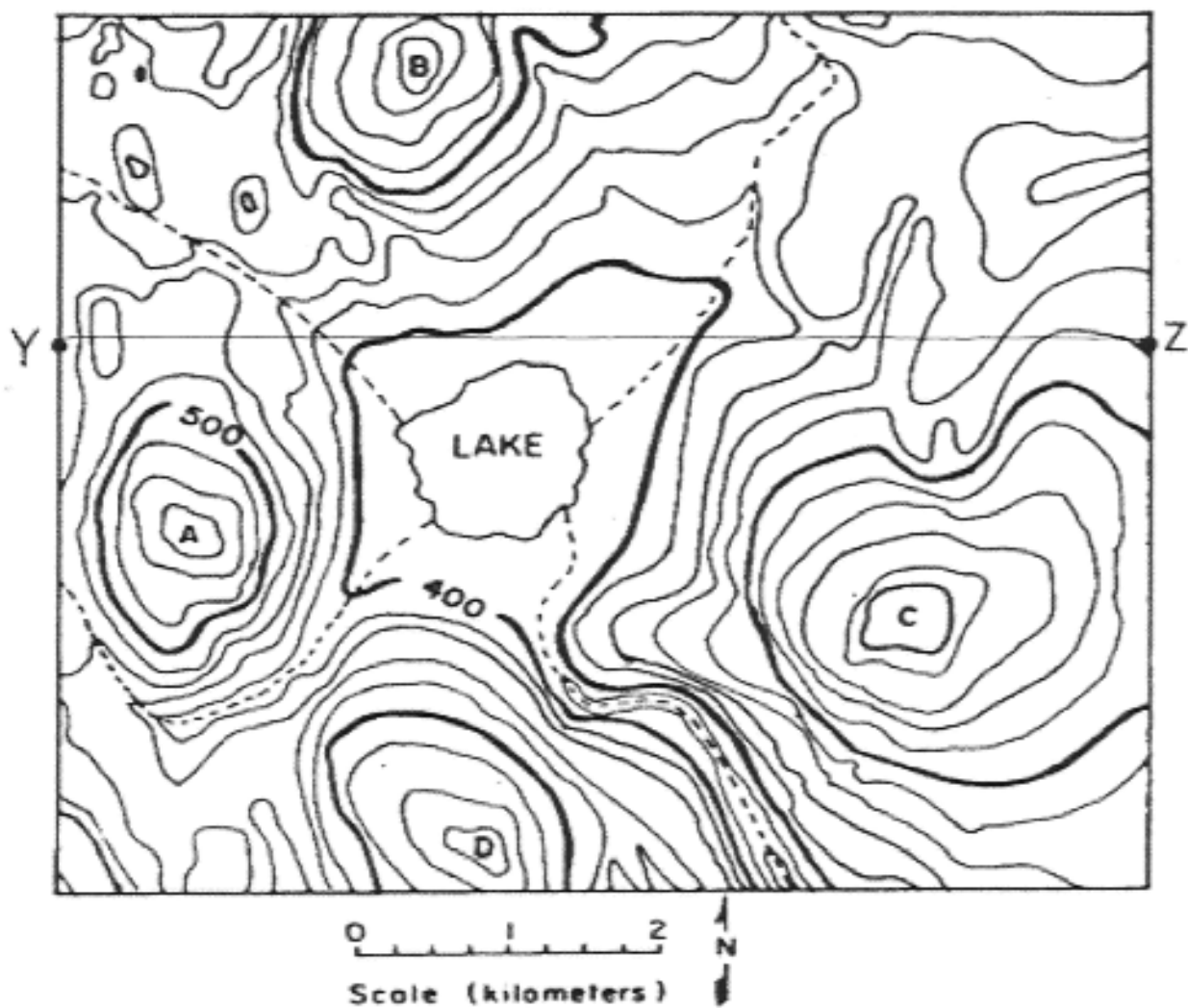
11. Base your answers to questions 6 and 7 on the topographic map of an island shown below. Elevations are expressed in feet. Points A, B, C, and D are locations on the island. A triangulation point shows the highest elevation on the island.
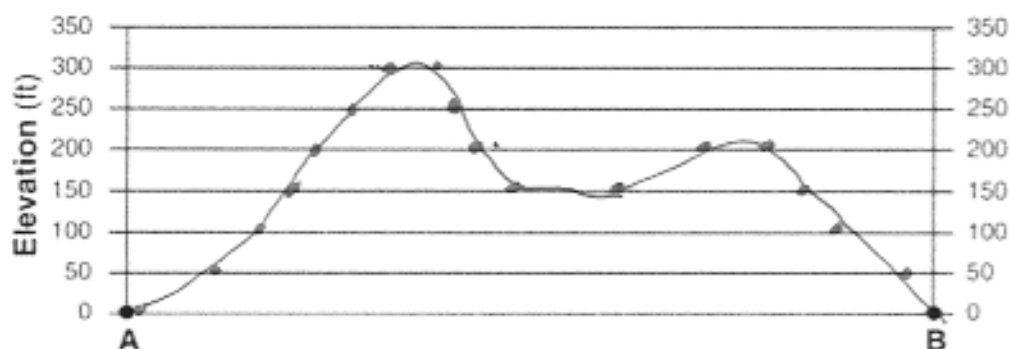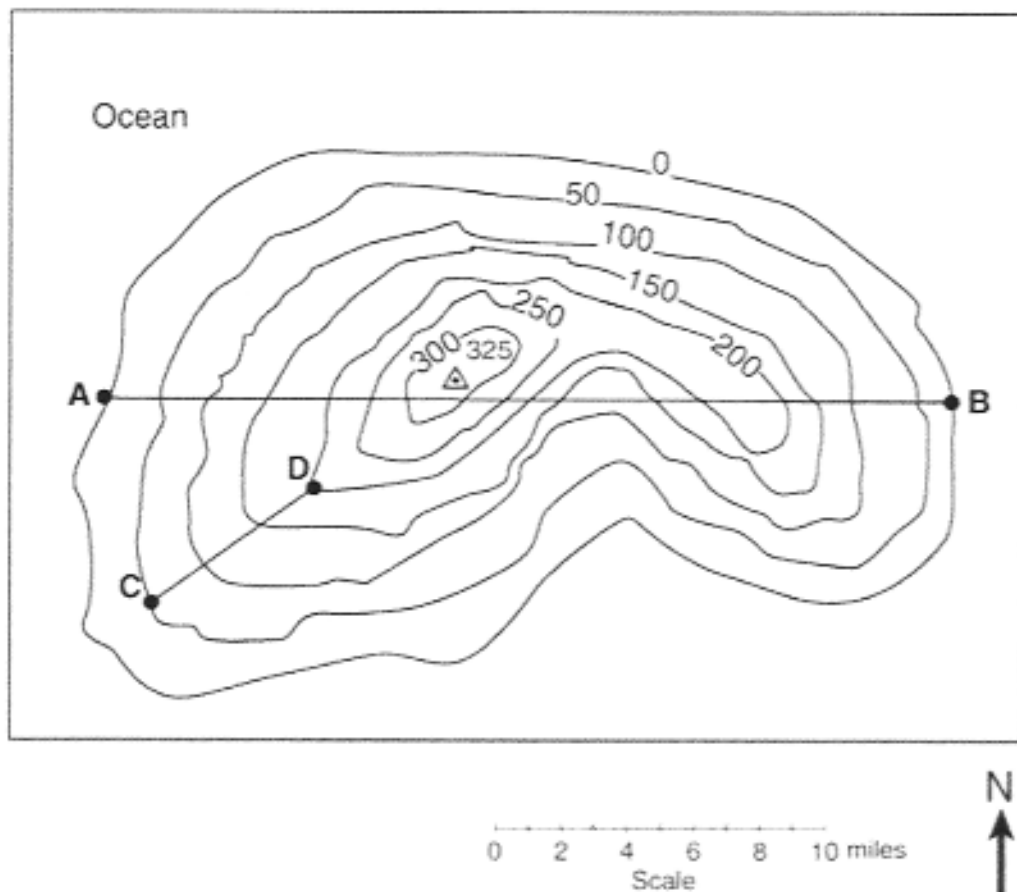
On the grid provided above, construct a topographic profile representing the cross-sectional view between point A and point B, following the directions below.

a. Plot the elevation of the land along line AB by marking, with a dot, the elevation of each point where a contour line is crossed by line AB.

b. Connect the dots with a smooth, curved line to complete the topographic profile.

12. What is the average gradient, in feet per mile, along the straight line from point C to point D?
   __25__ ft/mi

$$\frac{200}{-50} = \frac{150 \text{ ft}}{6 \text{ miles}} = 25 \frac{\text{ft}}{\text{mile}}$$
   $\frac{150}{}$