Name: _____ Period: _____

MAKING A THREE DIMENSIONAL TOPOGRAPHIC MAP

A topographic map shows elevation. Each "circle" (these are never perfect circles - usually very squiggly) and sometimes only part of the circle, indicates how high above sea level the area is. These circles are called contour lines. As contour lines get smaller and closer together, this indicates the land getting higher and steeper. The smallest circle is the highest point on the map.

Determine the topographic map that you wish to use to make your model. The more lines on a map, the harder it will be to create. Keep it fairly simple. Your model must have at least five (5) contour lines, a high point (a mountain), a river (where a contour line crosses a stream or valley, the contour bends to form a "V" that points upstream or valley), a compass rose, a statement of the contour interval, a scale, and any landmarks or features that would be fun to show, such as a depression (show with hachure marks), roads, or a lake.

To make a three dimensional model of a topographic map follow the directions below.

Step 1

Cut out the lowest elevation which should be the outermost and biggest circle, or contour line. There will be smaller circles in the middle. Ignore those for now. Trace your cut-out on the material you are making the model out of and cut it out. This is the base of your 3-D model.

Step 2

Repeat this procedure for the rest of the lines on the topographic map. Cut out each contour line circle, trace onto the material, and cut out the material. Your circles should get smaller and smaller. Go ahead and discard your cut-up map pieces once you have the cut-outs to keep. Number the cutouts. Be sure to keep the cut-outs stacked up in order, so the biggest piece is on the bottom.

Step 3

Glue or attach each cut-out to one below it. Let the glue dry.

Step 4 (Optional)

Once all your cut-outs are glued together you may use dough, paper mâché (see recipes below) or modeling clay to give the model a smoother look.

Step 5

Paint and label your model (Let the dough, paper mâché or clay dry).

Step 6

Create a compass rose on a corner of the map with four arrows that designate North, East, South, and West and add a scale, which will represent the distance. For example, one inch represents one mile.

Name: _____ Period: _____

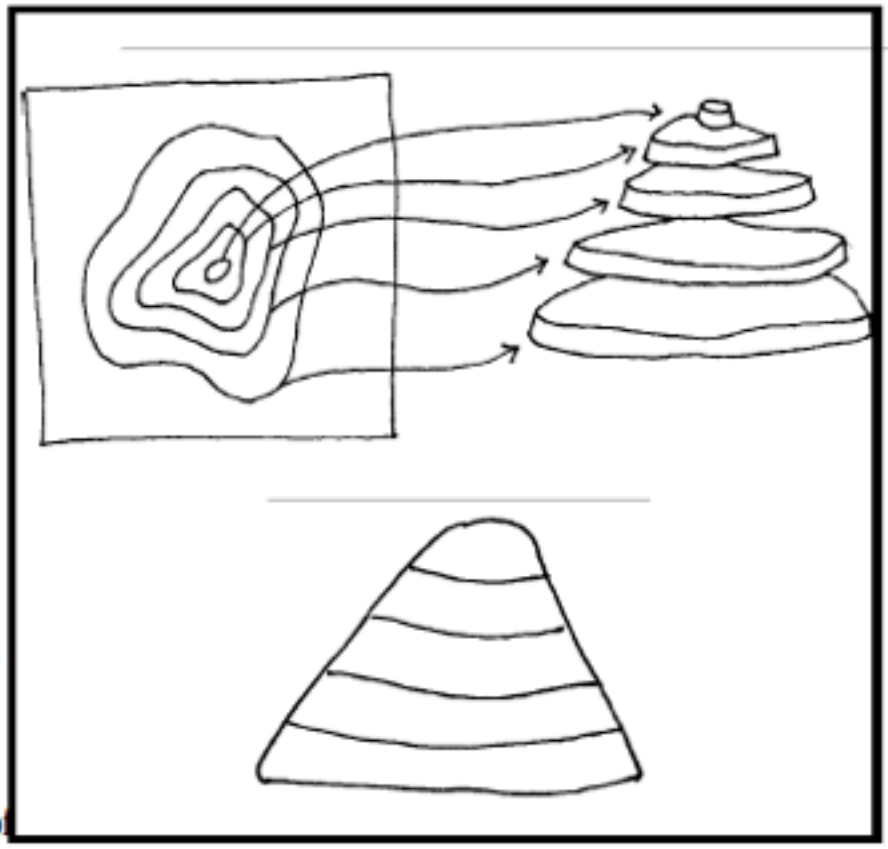
Building a Topographic Model

INTRODUCTION

Topographic maps show the shapes and features of the Earth's surface using contour lines. Contour lines show places on the map that have the same elevation. Using contour lines as a guide, you can build a three dimensional model of a landform.

MATERIALS

- Enlarged pieces of a topographic map, 2 photocopies of each
- Thick cardboard or foam core
- Utility knife
- Glue
- Modeling clay
- Pen or pencil



Amy Hutzel

PROCEDURE

1. Examine your map. On a separate piece of paper, draw or write a description of the landscape.
2. Cut along the outermost contour line on your enlarged map.
3. Use this as a template to cut a piece of cardboard of the same shape and size.
4. Cut along next inner contour line and use it as a template to cut the next piece of cardboard.
5. Continue this process, stacking the progressively smaller pieces of cardboard.
6. Glue stacked shapes together, then compare them to an uncut version of the map.
7. To smooth the steps between contours, cover edges with modeling clay.
8. Use the map to find the location of creeks and rivers in your landform. Mark them on your model by carving them into the clay with a pencil or by using colored clay or markers.

Name: _____ Period: _____

RECIPES

A. Flour-Salt Dough
3 parts flour
1 part salt
1 part water
Mix the 3 ingredients, then knead until it reaches a workable consistency. Try for a putty-like consistency, but not too dry to be smoothed into land forms. (You should experiment with this before trying it with the map.)
Some people like to add 1 tablespoon of cooking oil per cup of flour to make the mixture more elastic.

B. Cornstarch Dough
1 part cornstarch
3 parts salt
1 part water
Mix the salt and water, then heat for a few minutes. When warm, stir in the cornstarch slowly and mix it well. Knead the dough until it reaches the desired consistency. Add more water if the dough is too stiff.

C. Making Paper Mâché
➡Prepare your desired paper mâché paste (simply mix together 1 part flour to 2 parts water. You will want it to be the consistency of thick glue, but you also want it to be runny and not thick like paste. Add more water or flour as necessary. Mix well to remove any lumps.)

➡Tear newspaper into strips.

➡Dip one piece of newspaper at a time into prepared paper mâché paste.

➡Hold the strip over the paste bowl and run it through your fingers to squeeze off excess paste.

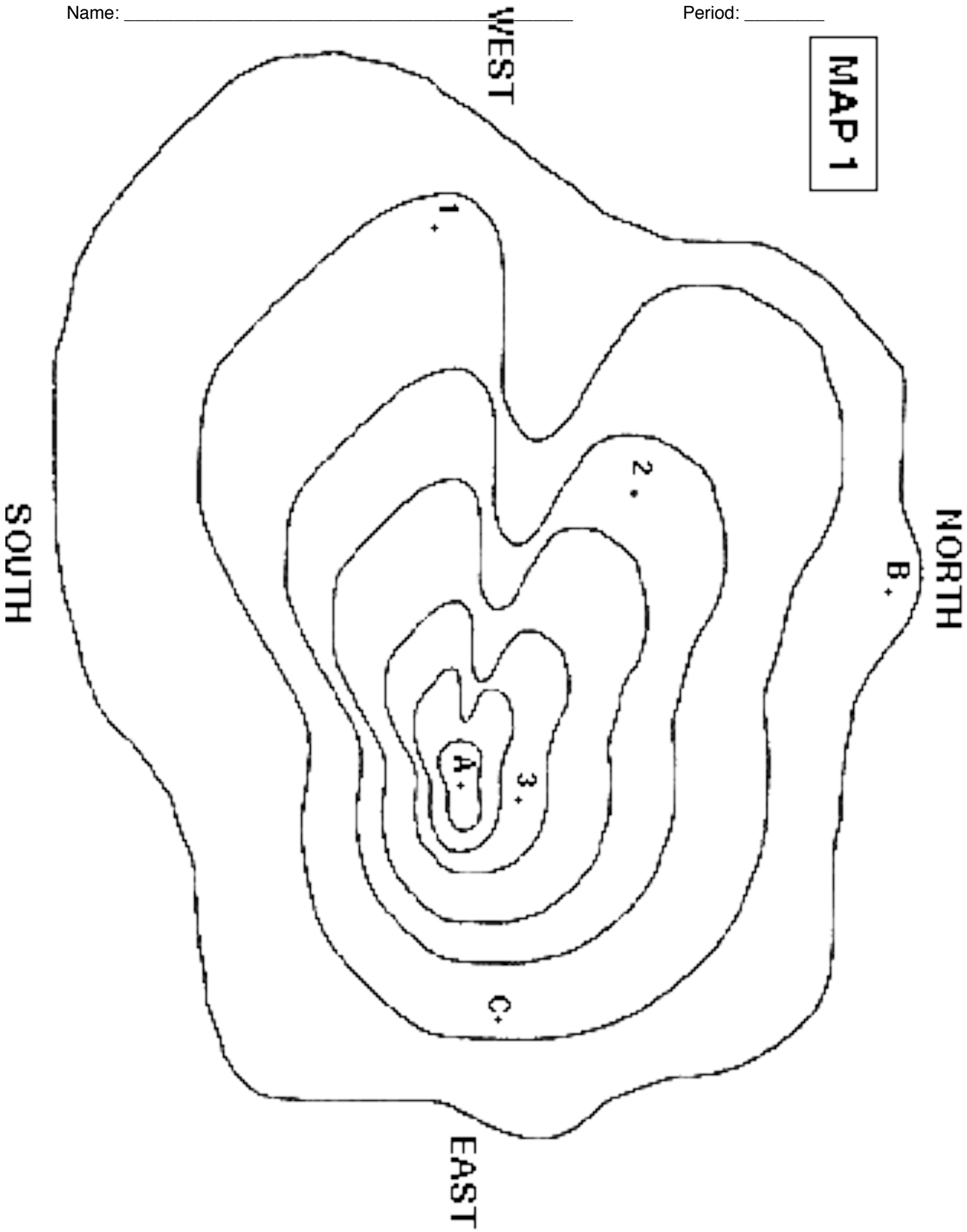
➡Stick the newspaper strip over the form you want to paper mâché, and smooth it down with your fingers.

➡Completely cover your creation with a layer of newspaper strips. They should all be over-lapping.

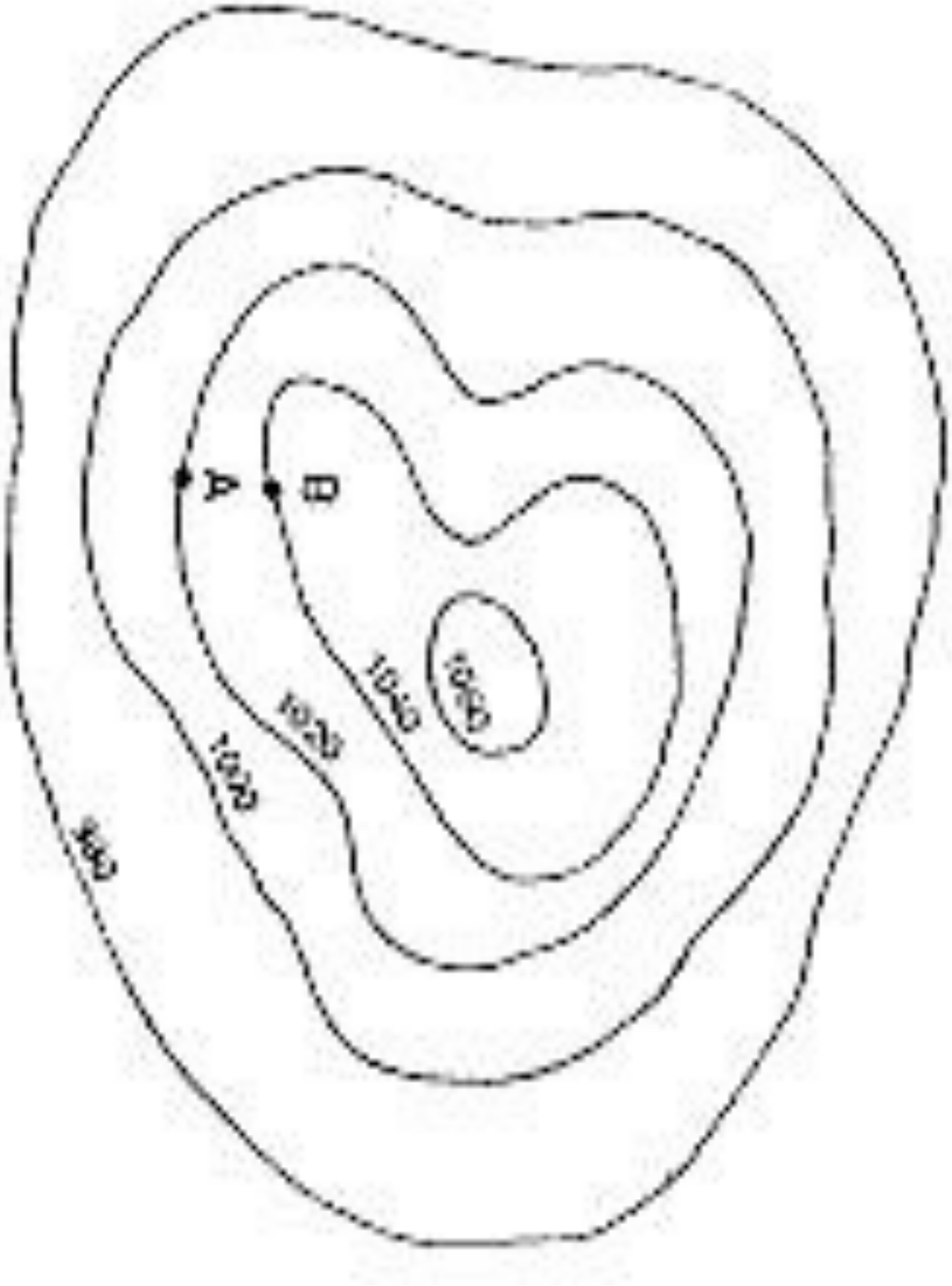
➡After one layer is applied, let it dry about 24 hours.

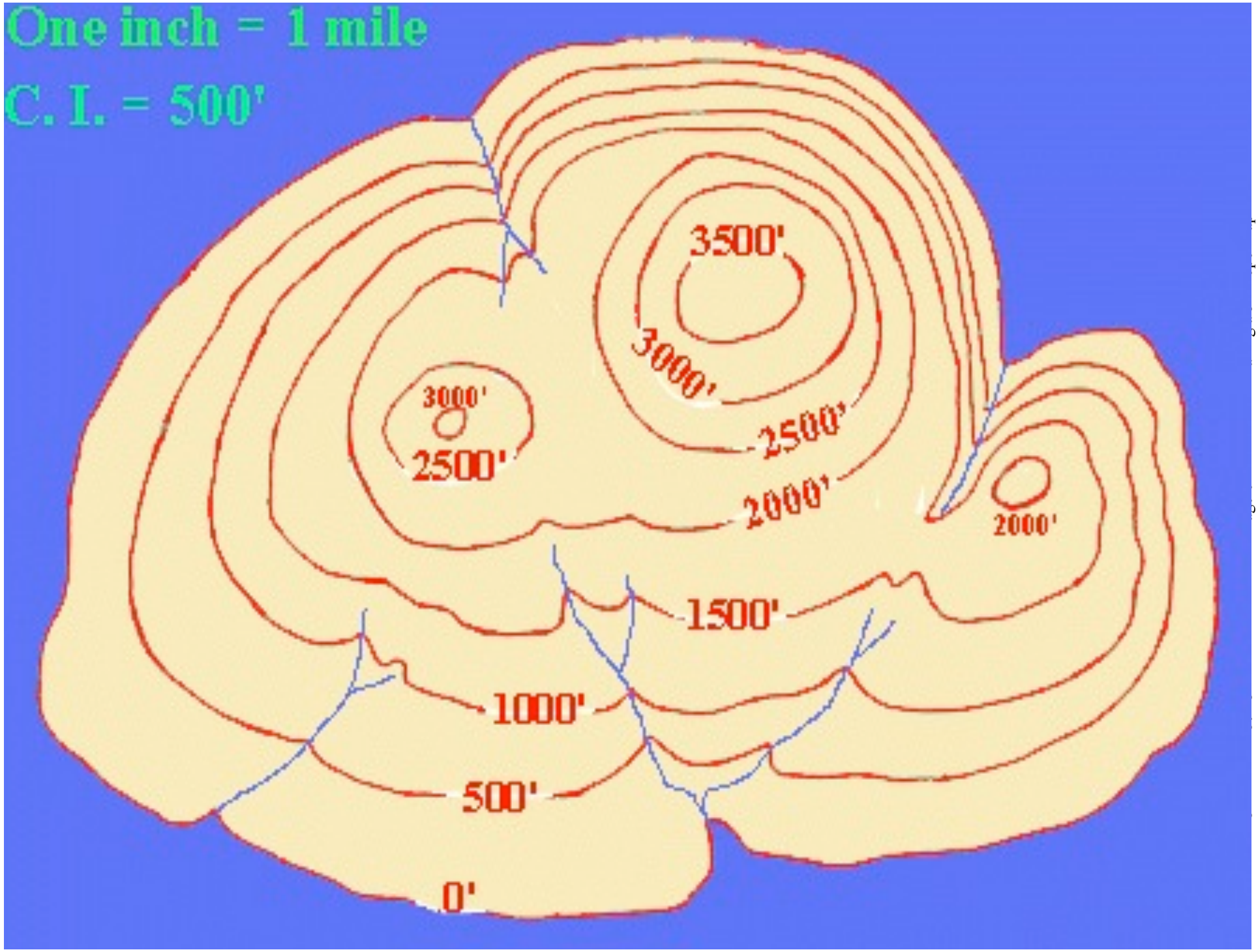
➡Add another layer of newspaper strips and let dry another 24 hours.

Name: _____ Period: _____



Name: Period:




One inch = 1 mile
C. I. = 500'
3500'
3000'
2500'
2000'
3000'
2500'
2000'
1500'
1000'
500'
0'

Name: _____ Period: _____

The features shown on topographic maps may be divided into three groups: (1) relief, which includes hills, valleys, mountains, etc.; (2) **water features**, including lakes, ponds and streams; and (3) **cultural features**, man-made features like bridges, canals, buildings and roads.
Relief is the difference in elevation between any two points. Where relief is low, the area appears to be relatively flat as in river valleys or broad, flat uplands. When relief is high, the area is steep, as in rugged mountainous terrains. Relief determines the **contour interval**, which is the difference in elevation between adjacent **contour lines**. A contour line is an imaginary line on the Earth's surface connecting points of the same elevation. Contour intervals may be large for rugged terrains (80 or 100 feet) or they may be small in areas of low relief (10-20 feet). Contour intervals are consistent for a given map, though they may change from map to map. Usually every fifth contour line (an **index contour**) is printed heavier than the others and bears the elevation above sea level.
In addition to contour lines, heights of many points occur on the map, such as road intersections, summits of hills, lake shorelines, etc. These are **spot elevations** and are accurate to within the nearest foot or meter. More precisely located and more accurate in elevation are **bench marks**, points marked by brass plates fixed permanently on the ground. On a topographic map, bench marks are represented by crosses and the elevation, preceded by the letters "BM", is printed in black on the map.
Rules of Contour Lines — Some basic rules or facts about contour lines are listed below.
1) Where a contour line crosses a stream or valley, the contour bends to form a "V" that points upstream or valley. In the upstream direction the successive contours represent higher elevations.
2) Contours near the upper parts of hills form closures. The top of a hill is higher than the highest closed contour.
3) Hollows (depressions) without outlets are shown by closed, hatched contours. Hatched contours are contours with short lines on the inside pointing downslope. The bottom of the hollow is lower than the lowest closed contour.
4) Contours are widely spaced on gentle slopes.
5) Contours are closely spaced on steep slopes.
6) Evenly spaced contours indicate a uniform slope.
7) Contours do not cross or intersect each other, except in the rare case of an overhanging cliff.
8) All contours eventually close, either on a map or beyond its margins.
9) A single higher elevation contour never occurs between two lower ones, and vice versa. A change in slope direction is always determined by the repetition of the same elevation either as two different contours of the same value or as the same contour crossed twice.

Scale — Scale expresses the relationship between distance on the map and the true distance on the Earth's surface. This is generally expressed as a ratio or a fraction, such as 1:24,000 or 1/24,000. The numerator, usually 1, represents map distance, and the denominator, a large number, represents ground distance. Thus, 1:24,000 means that a distance of 1 unit on the map represents 24,000 such units on the ground. The unit here is not important — it could be meters, feet, or inches. What is important is the relationship between the map distance and the true ground distance. The sizes and scales of topographic maps published by the U.S. Geological Survey.

Colors and Symbols — Each color on a topographic map has significance as follows:
Blue = water features;
Green = woodlands, orchards, etc.;
Red = urban areas, important roads, public-land boundary lines, civil boundaries;
Black = man-made works;
Brown = contour lines.