12.001 Introduction to Geology
Spring 2008

LAB 3: ROCK STRUCTURES AND GEOBLOCKS **DUE: Friday, March 7**

This lab exercise is aimed at giving you some practical experience with rock structures and how they appear on the earth's surface as well as in cross section. The drawing will help you understand how planes dip, fault, and become folded.

Throughout the worksheet each face of the block will be referred to as follows:

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PART I: LAYERS

1. Draw in the layers as they would be exposed across the **top face**.

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2. For the block below imagine cutting along the cutting plane (the gray square that intersects each block) and removing the part of the block in front of the plane. Draw what the **exposed face** along the cutting place would look like in the empty square.

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3. Imagine cutting each block along the cutting planes and removing the part of the block in front of the plane. Draw on the blank blocks below the **three exposed faces of both blocks** after the cutting plane has removed the front portion.

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4. These planar layers are at an oblique angle – they are not parallel to any face. Using the front and right sides as a guide, draw on image below how the layers would cross the **top face**.

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5. Imagine cutting the block along the gray cutting plane and removing the part of the block in front of the plane. Sketch the **exposed front face** along the cutting plan after it is cut.

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6. One of the four images below shows a straight-on view of the block from the right after it was cut and the right portion of the block removed. Circle which of the four choices shows the correct view of the exposed **right face**.

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PART II: FOLDS

1. For each syncline below, draw what the **exposed face** along the cutting plane would look like in the empty squares.

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2. For both anticlines below, draw what the face exposed along the cutting plane would look like in the squares provided.

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3. For the plunging syncline below, sketch the **right face** of the block.

4. For each plunging syncline below, draw what the **exposed face** along the cutting plane would look like in the squares provided.

5. Below, the same small block is shown with four different cutting planes. Circle the small image that, when cut and the front-most portion removed, would result in the image you see above the small squares. Hint: Pay attention to the orientation of the cutting plane and where it intersects each folded layer.

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Answer the following questions:

1. If you were looking at one fold in isolation on the land surface, name two ways you could tell whether it is a syncline or an anticline?_____

2. If you were looking at one fold in isolation on the land surface, how would you tell the direction of plunge?_____

3. How would you tell, qualitatively, the dip of the axial **plane** of a given fold from the dips of the layers on the two limbs of the fold?_____

PART III: FAULTS

1. The back half of the block has been faulted to the left or right and then eroded to form a cube again. In which direction did the **back block** shift? (Circle one) What type of fault is represented?

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LEFT

RIGHT

Fault type:_____

2. In which direction (up or down) has the fault shifted the **back block** in the image below? (Circle one)

UP

DOWN

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3. Below, vertical layers have been faulted. The **back block** has been faulted in one direction only. Which direction (up, down, left, right) was it? (Circle one) What type of fault is this?

UP **DOWN**

LEFT **RIGHT**

Image removed due to copyright restrictions.

Fault type:_____

4. With arrows, indicate a possible **combination** of faulting motions for the **back block** that would result in the image below

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5. The block below contains a synclinal fold that has been faulted. In which **one** direction was the **back block** faulted? (Circle one)

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UP **DOWN**

LEFT **RIGHT**

6. If the fault below is an oblique-slip fault, in which directions did the **back block** get displaced before it was eroded? (Circle one)

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UP and RIGHT

UP and LEFT

DOWN and RIGHT

DOWN and LEFT

PART 4: RULE OF THE V'S

The purpose of this last part of the lab is to get you to think about the intersection of geological structures (only simple planar layers) and topography. When working with geological maps, it is important to be able to tell something qualitatively about the dip of a planar feature or a planar layer from how it interacts with irregular topography.

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